41. 025 K6.01 041

Which ONE of the following identifies an ice condenser door that would require entering a 1 hour Technical Specification LCO if the door was found to be physically restrained from opening and which of the doors are equipped with flow proportioning springs to control opening?

	Require 1 hour LCO entry if physically restrained from opening	Doors equipped with flow proportioning springs
A.	Only an inlet door	Inlet doors
B.	Only an inlet door	Intermediate doors
C.	Either an inlet or intermediate deck door	Inlet doors
D.	Either an inlet or intermediate deck door	Intermediate doors

DISTRACTOR ANALYSIS:

A. *CORRECT, The 1 hour action applies to the ice condenser inlet doors as identified in Tech Spec. 3.6.5.3 Action a. The inlet doors being equipped with flow proportioning springs is correct.*

B. *Incorrect, The 1 hour action applies to the ice condenser inlet doors as identified in Tech Spec. 3.6.5.3 Action a. but the intermediate deck doors are not equipped with flow proportioning springs. Plausible because the inlet door are subject to the action and the candidate could reverse the designation of the doors with springs.*

C. *Incorrect, Tech Spec. 3.6.5.3 Action "a" 1 hour action does not apply to the intermediate deck doors, it applies only to the ice condenser inlet doors but the inlet doors being equipped with flow proportioning springs is correct. Plausible because the intermediate doors are subject to other Tech Spec action and because the inlet doors are the ones that have the springs.*

D. *Incorrect, Tech Spec. 3.6.5.3 Action "a" 1 hour action does not apply to the intermediate deck doors, it applies only to the ice condenser inlet doors and the intermediate deck doors are not equipped with flow proportioning springs. Plausible because the intermediate doors are subject to other Tech Spec action and the candidate could reverse the designation of the doors with springs.*

Proposed 2/6/2009
Sequoyah NRC RO Written Exam
as submitted

Question No. 41

Tier 2 Group 1

K/A 025 K6.01
Knowledge of the effect of a loss or malfunction of the following will have on the ice condenser system: Upper and lower doors of the ice condenser

Importance Rating: 3.4* / 3.6*

Technical Reference: Technical Specification 3.6.5.3 Amendment 277
FSAR Amendment 20

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200ICE B.6.b & B.4.e
6. Describe the administrative controls and limits for the Ice Condenser system:
b. State the ≤1 hour action limit on TS LCOs
4. Describe the following characteristics of each major component in the Ice condenser system:
e. Component operation

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.7 / 45.7)

10CFR55.43.b (n/a)

Comments: New for SQN Exam 1/2009

ICE CONDENSER DOORS

LIMITING CONDITION FOR OPERATION

3.6.5.3 The ice condenser inlet doors, intermediate deck doors, and top deck doors shall be closed and OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one or more ice condenser inlet doors inoperable due to being physically restrained from opening, restore all inlet doors to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one or more ice condenser doors open or otherwise inoperable for reasons other than action a., POWER OPERATION may continue for up to 14 days provided the ice bed temperature is monitored at least once per 4 hours and the maximum ice bed temperature is maintained less than or equal to 27°F; otherwise, restore the doors to their closed positions or OPERABLE status (as applicable) within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.5.3.1 Inlet Doors - Ice condenser inlet doors shall be:

a. Continuously monitored and determined closed, and

b. Demonstrated OPERABLE at least once per 18 months by:

1. Verifying that the torque required to initially open each door is less than or equal to 675 inch pounds.

2. Verifying that opening of each door is not impaired by ice, frost, debris, or obstruction.

3. Verifying that the torque required to open each door is less than 195 inch-pounds when the door is 40 degrees open. This torque is defined as the "door opening torque" and is equal to the nominal door torque plus a frictional torque component.

SURVEILLANCE REQUIREMENTS (Continued)

4. Verifying that the torque required to keep each door from closing is greater than 78 inch-pounds when the door is 40 degrees open. This torque is defined as the "door closing torque" and is equal to the nominal door torque minus a frictional torque component.

5. Calculation of the frictional torque of each door tested in accordance with 3 and 4, above. The calculated frictional torque shall be less than or equal to 40 inch-pounds.

4.6.5.3.2 Intermediate Deck Doors - Each ice condenser intermediate deck door shall be:

a. Verified closed and free of frost accumulation by a visual inspection at least once per 7 days, and

b. Demonstrated OPERABLE at least once per 18 months by visually verifying no structural deterioration, by verifying free movement of the vent assemblies, and by ascertaining free movement when lifted with the applicable force shown below:

Door	Lifting Force
0-1, 0-5	Less than or equal to 37.4 lbs.
0-2, 0-6	Less than or equal to 33.8 lbs.
0-3, 0-7	Less than or equal to 31.0 lbs.
0-4, 0-8	Less than or equal to 31.8 lbs.

4.6.5.3.3 Top Deck Doors - Each ice condenser top deck door shall be determined closed and OPERABLE at least once per 92 days by visually verifying:

a. That the doors are in place, and

b. That no condensation, frost, or ice has formed on the doors or blankets which would restrict their lifting and opening if required.

10,000 BTU/hr from the door with the insulation in place. Radiation and convection were taken into consideration in the calculations, both with respect to the heat input and removal. A typical deposition of frost was assumed to be on the wall panels with a nominal conductivity of 0.07 BTU/hr-ft^2-°F.

The area of deposition of frost varies with the air flow but the quantity remains constant (with constant heat input). Several techniques were utilized to bracket the air flow and corresponding sublimation calculations completed for each case.

The overall sublimation rate was calculated to be 0.2 to 0.5% per year when radiation was included as a mode of heat transfer. Previous calculations considering only convection ranged from 1 to 2% per year. It is obvious that the inclusion of radiant heat transfer effects significantly reduces the overall sublimation rate.

The model for sublimation considered only the lower ice bed volume door; the effects of heat loads from other sources intermediate deck etc., are not as significant and therefore included only in the final calculation to determine the quantity of ice deposited on the walls. Also not included was ice removal due to leakage of dry air.

A modal frequency analysis was performed for the air handling unit housings and support structure. The results indicate that the design frequency is approximately 20 Hz, so that the fundamental mode is well out of the frequency range of peak amplification on the response spectra. In the process of designing the structure on the basis of stiffness, strength of members subjected to various combinations exceeds specified limits by generous margins.

6.5.8 Embedments

See Sections 3.7 and 3.8.

6.5.9 Lower Inlet Doors

6.5.9.1 Design Basis

Function

The ice condenser inlet doors form the barrier to air flow through the inlet ports of the ice condenser for normal plant operation. They also provide the continuation of thermal insulation around the lower section of the crane wall to minimize heat input that would promote sublimation and mass transfer of ice in the ice condenser compartment. In the event of a loss of coolant accident, LOCA, causing a pressure increase in the lower compartment, the doors open, venting air and steam relatively evenly into all sections of the ice condenser.

The door panels are provided with tension spring mechanisms that produce a small closing torque on the door panels as they open. The magnitude of the closing torque is equivalent to providing approximately a one pound per square foot pressure drop through the inlet ports with the door panels open to a position equivalent to the full port flow area. The zero load position of the spring mechanisms is set such that, with zero differential pressure across the door panels, the gasket holds the door slightly open. This setting provides assurance that all doors will be open slightly, upon removal of cold air head, therefore eliminating significant inlet maldistribution for very small incidents.

For larger incidents, the doors open fully and flow distribution is controlled by the flow area and pressure drops of inlet ports. The doors are provided with shock absorber assemblies to dissipate the large door kinetic energies generated during large break incidents.

Criteria

Radiation Exposure

Maximum radiation at inlet door is 5 r/hr gamma during normal operations. No secondary radiation due to neutron exposure.

Structural Requirements

Refer to Subsection 3.8.3.

Loading Modes

1. The door hinges and crane wall embedments must support the dead weight of the door assembly during all conditions of operation. Door hinges shall be designed and fabricated to preclude galling and self welding.

2. Seismic loads will tend to open the door.

3. During normal operations the outer surface of the door will operate at a temperature approaching that of the lower compartment while the inner surface will approach that of the ice bed. During loss of coolant accidents, the outer surface will be subjected to higher temperatures on a transient basis. Resultant thermal stresses are considered in the door design.

4. During large break accidents, the doors will be accelerated by pressure gradients then stopped by the shock absorber system. During small break accidents, doors will open in proportion to the applied pressure with restoring force provided by springs. Upon removal of pressure, door closure will result as a result of spring action.

Design Criteria - Accident Conditions

1. All doors shall open to allow venting of energy to the ice condenser for any leak rate which results in a divider deck differential pressure in excess of the ice condenser cold head.

   The force required to open the doors of the ice condenser shall be sufficiently low such that the energy from any leakage of steam through the divider barrier can be readily absorbed by the containment spray system without exceeding containment design pressure.

2. Doors and door ports shall limit maldistribution to 150 percent maximum, peak to average mass input for the accident transient, for any reactor coolant system release of sufficient magnitude to cause the doors to open.

3. The basic performance requirement for lower inlet doors for design basis accident conditions is to open rapidly and fully, to insure proper venting or released energy into the

ice condenser. The opening rate of the inlet doors is important to insure minimizing the pressure buildup in the lower compartment due to the rapid release of energy to that compartment. The rate of pressure rise and the magnitude of the peak pressure in any lower compartment region is related to the confinement of that compartment. The time period to reach peak lower compartment pressure due to the design basis accident is approximately 0.05 seconds.

4. Doors shall be of simple mechanical design to minimize the possibility of malfunction.

5. The inertia of the doors shall be low, consistent with producing a minimal effect on initial pressure.

Design Criteria - Normal Operation

1. The doors shall restrict the leakage of air into and out of the ice condenser to the minimum practicable limit. (See Section 6.5.6.3.)

2. The doors shall restrict local heat input in the ice condenser to the minimum practicable limit. Heat leakage through the doors to the ice bed should be a total of 20,000 BTU/hr or less (for 24 pairs of doors).

3. The doors shall be instrumented to provide indication of their closed position. Testing of prototype doors has established that their normal position under zero differential pressure conditions is 3/8" $\pm$ 1/8" open.

4. Provision shall be made for adequate means of inspecting the doors during reactor shutdown.

5. The doors shall be designed to withstand earthquake loadings without damage so as not to affect subsequent ice condenser operation for normal and accident conditions. These loads are derived from the seismic analysis of the containment.

6. The door system shall provide a flow proportioning capability for small break conditions in accordance with Figure 6.5.9-1.

Interface Requirements

1. Crane wall attachment of the door frames is via studs with a compressible seal. Attachment to the crane wall is critical for the safety function of the doors.

2. Sufficient clearance is required for doors to open into the ice condenser. Items to be considered in this interface are floor clearance, lower support structure clearance and floor drain operation.

3. Door opening and stopping forces will be transmitted to the crane wall and lower support structure, respectively.

Design Loads

Pressure loading during LOCA was provided by the Transient Mass Distribution (TMD) code from an analysis of a double-ended hot leg break in the corner formed by the refueling canal, with 100

percent entrainment of water in the flow. For conservatism, TMD results were increased by 40 percent in performing the design analysis for the lower inlet doors.

The lower inlet door design parameters and loads are presented in Table 6.5.9-1.

6.5.9.2 System Design

Twenty-four pairs of inlet doors are located on the ice condenser side of ports in the crane wall at an elevation immediately above the ice condenser floor. General location and details of these doors are shown in Figures 6.5.9-2 through 6.5.9-6. Each door panel is 92.5 in. high, 42 in. wide and 7.5 in. thick. Each pair is hinged vertically on a common frame.

Each door consists of a 0.5 in. thick Fiber Reinforced Polyester (FRP) plate stiffened by six steel ribs, bolted to the plate. The FRP plate is designed to take vertical bending moments resulting from pressures generated from a LOCA and from subsequent stopping forces on the door. The ribs are designed to take horizontal bending moments and reactions, as well as tensile loads resulting from the door angular velocity, and transmit them to the crane wall via the hinges and door frame.

Seven inches of urethane foam are bonded to the back of the FRP plate to provide thermal insulation. The front and back surfaces of the door are protected with 26 gauge stainless steel covers which provide a complete vapor barrier around the insulation. The urethane foam and stainless steel covers do not carry overall door moments and shearing forces.

Three hinge assemblies are provided for each door panel; each assembly is connected to two of the door ribs. Loads from each of the two ribs are transmitted to a single 1.572 inch diameter hinge shaft through brass bushings.

These bushings have a spherical outer surface which prevents binding which might otherwise be caused by door rib and hinge bar flexure during accident loading conditions. The hinge shaft is supported by two self-aligning, spherical roller bearings in a cast steel housing. Vertical positioning of the door panel and shaft with respect to the bearing housing are provided by steel caps bolted to the ends of the shaft and brass spacer rings between the door ribs and bearings. Shims are provided between the shaft and caps to obtain final alignment. Each bearing housing is bolted to the door frame by four bolts, threaded into tapped holes in the housing. Again, shims are provided between the housings and door frame to maintain hinge alignment. Hinges are designed and fabricated to prevent galling and self welding.

The door frame is fabricated mainly from steel angle sections; 6 in. x 6 in. on the sides and 6 in. x 4 in. on the top and bottom. A 4 in. central I beam divides the frame into sections of each door. At each hinge bracket, extensions and gusset plates, fabricated from steel plate, are welded to the frame to carry loads to the crane wall.

The door panel is sealed to the frame by compliant bulb-type rubber seals which fit into channels welded to the door frame. During normal plant operations these seals are compressed by the cold air head of the ice bed acting on the door panels. As the seals operate at a much warmer temperature than the ice bed, frosting of the seal region is extremely unlikely. The inservice inspection program, described in Paragraph 6.5.9.4, will verify this fact on a periodic basis.

Each door is provided with four flow proportioning springs. One end of each spring is attached to the door panel and the other to a spring housing mounted on the door frame. These springs provide a door return torque proportional to the door opening angle and thus satisfy the requirement for flow proportioning. In addition, they assure that the doors will close in the event they are inadvertently opened during normal plant operations. The springs are adjusted during assembly such that, with no load on the doors, the doors are slightly open. For small door openings, the required 3/8 inch effective door opening is controlled by a 3/8 inch gap between panels and is, thus, independent of the door position as measured in degrees.

In order to dissipate the large kinetic energies resulting from pressures acting on the doors during a LOCA, each door is provided with a shock absorber assembly as shown in Figure 6.5.9-6. The shock absorbing element is a wedge shaped phenolic foam pad 89 in. high, 32 in. wide, and 28 in. thick at its maximum section. The pad is bonded to a base plate which is bolted to the ice condenser lower support structure. The pad is covered with a flexible, reinforced plastic sheet to prevent water ingress during operation and to retain foam particles following a LOCA. The plastic cover is in turn protected on the front, top, and bottom by a thin, stainless steel cover and on the remaining sides by a stainless steel mesh.

In operation, the door panel first contacts the shock absorber pad at an opening angle of 55° and crushes to approximately 30% of its original thickness. Stopping forces are distributed evenly over the outer two-thirds of the door panel, centered about the door center of percussion. The foam material is selected to provide an essentially constant crushing force over its crushing distance with minimum elastic recovery. Thus forces and bending moments on the door are minimized and, once opened, there is a negligible tendency for the door to "bounce" closed again.

Material

Door materials are consistent with the listing of acceptable materials as presented in Subsection 3.8.3. All exposed surfaces are made of stainless steel or coated with paint suitable for use inside the containment. All insulation material is compatible with containment chemistry requirements for normal and accident conditions.

6.5.9.3 Design Evaluation

The lower inlet doors were dynamically analyzed to determine the loads and structural integrity of the door for the design basis load conditions.

Using TMD results as input, the door dynamic analysis was performed using the "DOOR" Program. This computer program has been developed to predict door dynamic behavior under accident conditions. This program takes the door geometry and the pressures and calculates flow conditions in the door port. From the flow are derived the forces on the door due to static pressure, dynamic pressure and momentum. These forces, plus a door movement generated force, i.e., air friction, are used to find the moment on the door and from this are derived the hinge loads. Output from the program includes door opening angle, velocity and acceleration as functions of time as well as both radial and tangential hinge reactions.

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** ICE CONDENSER SYSTEM

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 Ice Condenser system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Ice Condenser 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 Ice Condenser system as described in the FSAR.
2. State the design basis of the Ice Condenser system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Ice Condenser system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the Ice Condenser 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 Ice Condenser system components are designed
   m. Location of controls and indications associated with the Ice Condenser 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 Ice Condenser system:
   a. Precautions and limitations
   b. Major steps performed while placing the Ice Condenser 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 Ice Condenser system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the Ice Condenser system:
   a. State Tech Specs/TRM LCOs that govern the Ice Condenser
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the Ice Condenser 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

   - SQN, Licensee Event Report, 327-92007, Numerous ice condenser lower doors found inoperable. 27 of 48 lower ice condenser doors were found inoperable on U-2.

   - SQN, Licensee Event Report, 327-92023, 12/31/1992, Low ice condenser weights result in operation outside of design basis.

VI. TRAINING AIDS:

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

42. 026 K2.01 042

Given the following:

- Unit 1 and Unit 2 6.9kV Shutdown Boards are aligned as follows:
  - 1A-A from normal feed
  - 1B-B from normal feed
  - 2A-A from alternate feed
  - 2B-B from normal feed
- Diesel Generator 2B-B is tagged for maintenance.
- 6.9kV Unit Board 2C is de-energized due to a fire.

Which ONE of the following has lost power?

A. Reactor MOV Board 1B1-B

B. Motor Driven AFW Pump 1A-A

C. Containment Spray Pump 2B-B

D. Residual Heat Removal Pump 2A-A

DISTRACTOR ANALYSIS:

A. Incorrect, 1B1-B Reactor MOV Board is supplied from Shutdown Board 1B-B via Unit Board 1C. Plausible if candidate confuses power supplies to shutdown boards from 6.9kV Unit Boards or diesel generators.

B. Incorrect, 1A-A Motor Driven AFW Pump is supplied from Shutdown Board 1A-A via 6.9kV Unit Board 2A. Plausible if candidate confuses power supplies to shutdown boards from 6.9kV Unit Boards or diesel generators.

C. CORRECT, For the given conditions, Shutdown Board 2B-B has lost power due to a fire on 69kV Unit Board 2C and the unavailability of D/G 2B-B. The containment spray pump 2B-B feeds from Shutdown Board 2B-B.

D. Incorrect, 2A-A RHR Pump is supplied from Shutdown Board 2A-A via 6.9kV Unit Board 2B. Plausible if candidate confuses power supplies to shutdown boards from 6.9kV Unit Boards or diesel generators.

Question No. 42

Tier 2 Group 1

K/A 026 K2.01
Knowledge of bus power supplies to the following: Containment spray pumps

Importance Rating: 3.4* / 3.6

Technical Reference: 2-45N724-4, Rev 27; AOP-P.06, Rev 14; AOP-P.05, Rev 16

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271AOP-P.05 & 06, B.4
Upon entry into AOP-P-05 & P.06, diagnose the applicable condition and transition to the appropriate procedure sedtion for response.
OPT200.CS B.4.b
Describe the following items for each major component in the Containment Spray system.
e. Power supply (including control power as applicable)

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

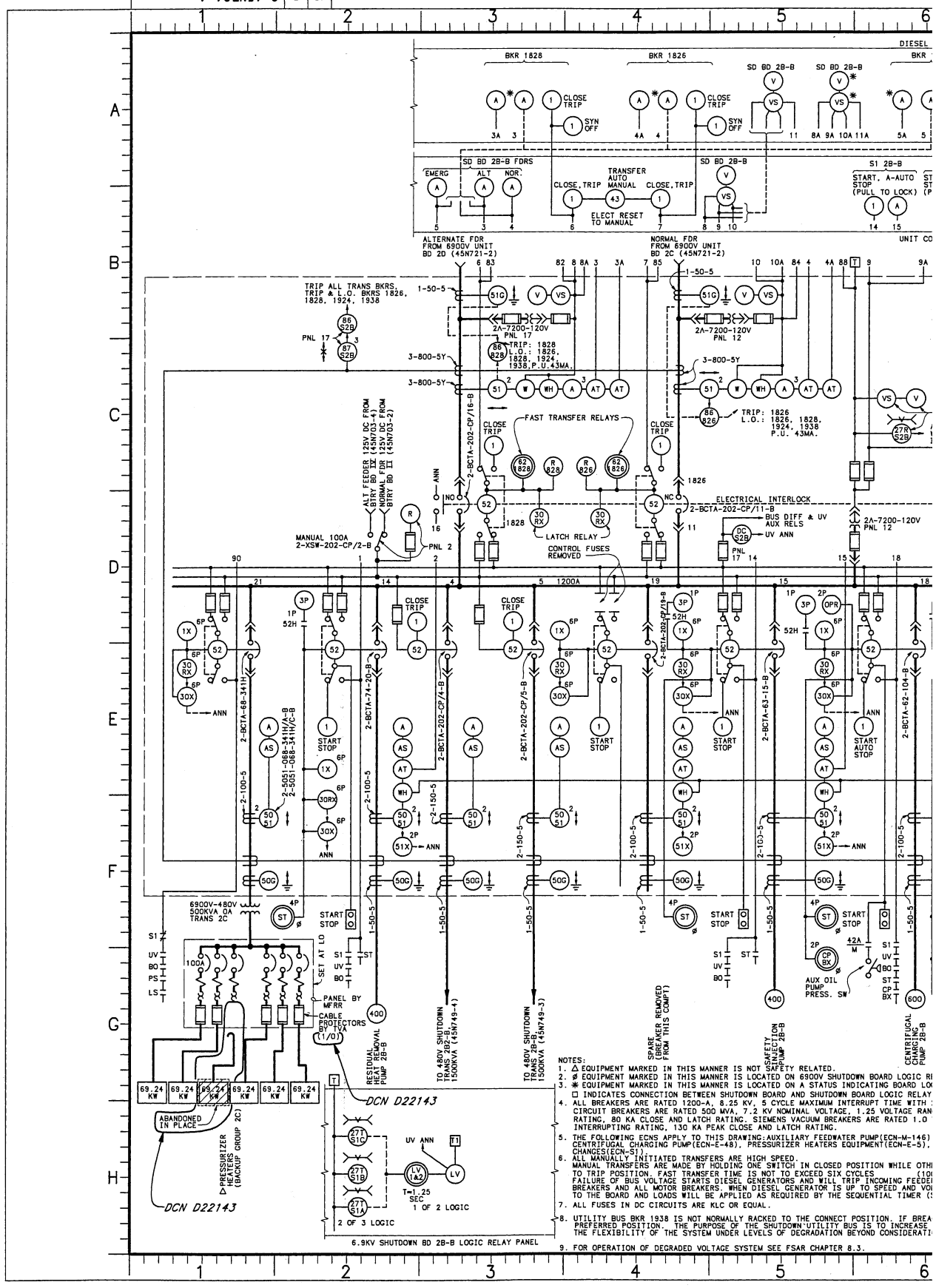
Question History: Sequoyah bank question CSS-B.10 003

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

10 CFR Part 55 Content: (41.8 / 45.5 to 45.8)

10CFR55.43.b (n/a)

Comments: Modified original bank question by changing the stem conditions to include a different 6.9kV shutdown board alignment and a fault occurring on a Unit 2 Unit Board vs. Unit 1.


BKR 1828
BKR 1826
SD BD 2B-B
SD BD 2B-B FDRS
EMERG
ALT
NOR
TRANSFER AUTO MANUAL
CLOSE, TRIP
ELECT RESET TO MANUAL
S1 2B-B
START, A-AUTO STOP (PULL TO LOCK)
ALTERNATE FDR FROM 6900V UNIT BD 2D (45N721-2)
NORMAL FDR FROM 6900V UNIT BD 2C (45N721-2)
TRIP ALL TRANS BKRS, TRIP & L.O. BKRS 1826, 1828, 1924, 1938
2A-7200-120V PNL 17
2A-7200-120V PNL 12
TRIP: 1828 L.O.: 1826, 1828, 1924, 1938, P.U. 43MA.
TRIP: 1826 L.O.: 1826, 1828, 1924, 1938 P.U. 43MA.
FAST TRANSFER RELAYS
ELECTRICAL INTERLOCK
2-BCTA-202-CP/11-B
BUS DIFF & UV AUX RELS
UV ANN
LATCH RELAY
CONTROL FUSES REMOVED
MANUAL 100A 2-XSW-202-CP/2-B
1200A
6900V-480V 500KVA OA TRANS 2C
100A
PANEL BY MFRR
CABLE PROTECTORS BY TVA
RESIDUAL HEAT REMOVAL PUMP 2B-B
TO 480V SHUTDOWN TRANS 2B2-B 1500KVA (45N749-4)
TO 480V SHUTDOWN TRANS 2B-B 1500KVA (45N749-3)
SPARE (BREAKER REMOVED FROM THIS COMPT)
SAFETY INJECTION PUMP 2B-B
CENTRIFUGAL CHARGING PUMP 2B-B
AUX OIL PUMP PRESS. SW
69.24 KW
ABANDONED IN PLACE
PRESSURIZER HEATERS (BACKUP GROUP 2C)
DCN D22143
DCN D22143
UV ANN
T=1.25 SEC
1 OF 2 LOGIC
2 OF 3 LOGIC
6.9KV SHUTDOWN BD 2B-B LOGIC RELAY PANEL
NOTES:
1. △ EQUIPMENT MARKED IN THIS MANNER IS NOT SAFETY RELATED.
2. ø EQUIPMENT MARKED IN THIS MANNER IS LOCATED ON 6900V SHUTDOWN BOARD LOGIC RE
3. ✱ EQUIPMENT MARKED IN THIS MANNER IS LOCATED ON A STATUS INDICATING BOARD LO
□ INDICATES CONNECTION BETWEEN SHUTDOWN BOARD AND SHUTDOWN BOARD LOGIC RELAY
4. ALL BREAKERS ARE RATED 1200-A, 8.25 KV, 5 CYCLE MAXIMUM INTERRUPT TIME WITH
CIRCUIT BREAKERS ARE RATED 500 MVA, 7.2 KV NOMINAL VOLTAGE, 1.25 VOLTAGE RAN
RATING, 80 KA CLOSE AND LATCH RATING. SIEMENS VACUUM BREAKERS ARE RATED 1.0
INTERRUPTING RATING, 130 KA PEAK CLOSE AND LATCH RATING.
5. THE FOLLOWING ECNS APPLY TO THIS DRAWING:AUXILIARY FEEDWATER PUMP(ECN-M-146)
CENTRIFUGAL CHARGING PUMP(ECN-E-48), PRESSURIZER HEATERS EQUIPMENT(ECN-E-5),
CHANGES(ECN-S1).
6. ALL MANUALLY INITIATED TRANSFERS ARE HIGH SPEED.
MANUAL TRANSFERS ARE MADE BY HOLDING ONE SWITCH IN CLOSED POSITION WHILE OTH
TO TRIP POSITION. FAST TRANSFER TIME IS NOT TO EXCEED SIX CYCLES (10
FAILURE OF BUS VOLTAGE STARTS DIESEL GENERATORS AND WILL TRIP INCOMING FEEDE
BREAKERS AND ALL MOTOR BREAKERS. WHEN DIESEL GENERATOR IS UP TO SPEED AND VO
TO THE BOARD AND LOADS WILL BE APPLIED AS REQUIRED BY THE SEQUENTIAL TIMER (
7. ALL FUSES IN DC CIRCUITS ARE KLC OR EQUAL.
8. UTILITY BUS BKR 1938 IS NOT NORMALLY RACKED TO THE CONNECT POSITION. IF BREA
PREFERRED POSITION. THE PURPOSE OF THE SHUTDOWN UTILITY BUS IS TO INCREASE
THE FLEXIBILITY OF THE SYSTEM UNDER LEVELS OF DEGRADATION BEYOND CONSIDERATI
9. FOR OPERATION OF DEGRADED VOLTAGE SYSTEM SEE FSAR CHAPTER 8.3.

APPENDIX L

6900V SHUTDOWN BOARD 2B-B LOAD LIST

COMPT	COMPONENT / LOAD
3	480V Shutdown Board Transformer 2B1-B (**REFER TO** Appendix M)
4	480V Shutdown Board Transformer 2B2-B (**REFER TO** Appendix N)
5	480V Shutdown Board Transformer 2B-B (Note 2)
8	ERCW Pump P-B (Note 1)
9	ERCW Pump M-B (Note 1)
10	Motor Driven AFW Pump 2B-B (Note 1)
13	Containment Spray Pump 2B-B (Note 1)
14	RHR Pump 2B-B (Note 1)
15	Safety Injection Pump 2B-B (Note 1)
18	Centrifugal Charging Pump 2B-B (Note 1)
20	Pressurizer Heaters Group 2B-B (Note 1)
21	Pressurizer Heaters Group 2C (Note 1)
22	480V Transformer 2B-B at ERCW Pumping Station (**REFER TO** Appendix O)

Note 1: If required, start redundant train equipment.
Note 2: Not normally in use. If in use, **REFER TO** Appendix M & N.

APPENDIX A

6900V SHUTDOWN BOARD 1A-A LOAD LIST

COMPT	COMPONENT / LOAD
3	480V Shutdown Board Transformer 1A1-A (**REFER TO** Appendix B)
4	480V Shutdown Board Transformer 1A2-A (**REFER TO** Appendix C)
5	480V Shutdown Board Transformer 1A-A (Note 2)
8	ERCW Pump J-A (Note 1)
9	ERCW Pump Q-A (Note 1)
10	Motor Driven AFW Pump 1A-A (Note 1)
13	Containment Spray Pump 1A-A (Note 1)
14	RHR Pump 1A-A (Note 1)
15	Safety Injection Pump 1A-A (Note 1)
18	Centrifugal Charging Pump 1A-A (Note 1)
19	Spare to Aux Bldg Lighting Board 1 for Flood Mode (Note 3)
20	Pressurizer Heaters Group 1A-A (Note 1)
21	Pressurizer Heaters Group 1D (Note 1)
22	480V Transformer 1A-A at ERCW Pumping Station (**REFER TO** Appendix D)

Note 1: If required, start redundant train equipment.
Note 2: Not normally in use. If in use, **REFER TO** Appendixes B & C.
Note 3: Not in use except during flood mode.

APPENDIX A

6900V SHUTDOWN BOARD 2A-A LOAD LIST

COMPT	COMPONENT / LOAD
3	480V Shutdown Board Transformer 2A1-A (**REFER TO** Appendix B)
4	480V Shutdown Board Transformer 2A2-A (**REFER TO** Appendix C)
5	480V Shutdown Board Transformer 2A-A (Note 2)
8	ERCW Pump R-A (Note 1)
9	ERCW Pump K-A (Note 1)
10	Motor Driven AFW Pump 2A-A (Note 1)
13	Containment Spray Pump 2A-A (Note 1)
14	RHR Pump 2A-A (Note 1)
15	Safety Injection Pump 2A-A (Note 1)
18	Centrifugal Charging Pump 2A-A (Note 1)
20	Pressurizer Heaters Group 2A-A (Note 1)
21	Pressurizer Heaters Group 2D (Note 1)
22	480V Transformer 2A-A at ERCW Pumping Station (**REFER TO** Appendix D)

NOTE 1: If required, start redundant train equipment.
NOTE 2: Not normally in use. If in use, **REFER TO** Appendix B & C.

APPENDIX M

480V SHUTDOWN BOARD 1B1-B LOAD LIST

COMPT	COMPONENT / LOAD
2C	Aux Bldg General Supply Fan 1B (Note 1)
3B	CRDM Cooling Fan 1B-B (Note 1)
3C	CCS Pump 1B-B (Note 1)
3D	Control & Service Air Compressor B (Note 1)
4B	Lower Compartment Cooling Fan 1B-B (Note 1)
8B	Normal Feeder Rx MOV Bd 1B1-B and Alternate Feeder Rx MOV Bd 1B2-B (**REFER TO** Appendix P & Q)
8D	Standby Lighting Cabinet No. 2
9B	Normal Feeder Rx Vent Bd 1B-B and Alternate Feeder C & A Vent Bd 1B2-B (**REFER TO** Appendix T & S)
10A	Alternate Feeder 125V Charger I (Note 2)
10B	Normal Feeder C & A Vent Bd 1B1-B (**REFER TO** Appendix R)
11A	Alternate Feeder Spare 125V Charger 1-S (Note 2)
11B	Normal Feeder Diesel Auxiliary Bd 1B1-B and Alternate Feeder Diesel Auxiliary Bd 1B2-B (**REFER TO** Appendix U & V)

Note 1: If required, start redundant train equipment.
Note 2: Battery charger should be aligned expeditiously.

QUESTIONS REPORT
for BANK SQN Questions

CSS-B.10 003

Given the following plant conditions:

- 6.9kV SD boards are aligned as follows:
  - 1A-A from the normal feed
  - 1B-B from the alternate feed
  - 2A-A from the normal feed
  - 2B-B from the normal feed
- Maintenance is in progress on D/G 1A-A
- A fire is reported in Unit Board 1B
- Unit Board 1B has just been de-energized

Which ONE (1) of the following is now UNAVAILABLE?

A. Safety injection pump 2A-A.

B. Containment spray pump 1A-A.

C. Residual heat removal pump 1B-B.

D. Diesel generator aux board 1B1-B.

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** CONTAINMENT SPRAY SYSTEM

IV. **LENGTH OF LESSON:** Initial License Training: 2 ½ 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 Containment Spray systems (CS) in the plant and on the simulator.

B. Enabling Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the CS 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 CS as described in the SQN FSAR.
2. State the design basis of the CS system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the CS system as illustrated on the simplified system drawing.
4. Describe the following items for each major component in the CS 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 CS system components are designed
   m. Location of controls and indications associated with the CS 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 CS system as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the CS 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 CS system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the CS system as explained in this lesson:
   a. State Tech Specs/TRM LCOs that govern the CS system
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the CS 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:

   Event Title: Containment Spray Pump Motor Breaker Inadvertently Left Opened Following Refueling Outage

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: AOP-P.05 & P.06 LOSS OF UNIT 1 & 2 SHUTDOWN BOARDS

IV. LENGTH OF LESSON/COURSE: 2 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-P.05 & P.06 Loss of Unit 1 & 2 Shutdown Boards.

B. Enabling Objectives:

	Objectives
0	Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with Loss of a Loss of Unit 1 or 2 Shutdown Boards 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-P.05 & P.06.
2.	Describe the AOP-P.05 & P.06 entry conditions.
	a. Describe the setpoints, interlocks, and automatic actions associated with AOP-P.05 & P.06 entry conditions.
	b. Describe the ARP requirements associated with AOP-P.05 & P.06 entry conditions.
	c. Interpret, prioritize, and verify associated alarms are consistent with AOP-P.05 & P.06 entry conditions.
	d. Describe the plant parameters that may indicate a Loss of Unit 1 & 2 Shutdown Boards.
3.	Describe the initial operator response to stabilize the plant upon entry into AOP-P.05 & P.06.
4.	Upon entry into AOP-P.05 & P.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-P.05 & P.06.
6.	Describe the bases for all limits, notes, cautions, and steps of AOP-P.05 & P.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-P.05 & P.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-P.05 & P.06.
10.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition.

43. 026 K3.02 043

Given the following conditions:

- Unit 1 is operating at 100% power.
- 1A-A Containment Spray (CS) Pump is out of service.
- A large break LOCA occurs
- 1B-B RHR Pump trips on instantaneous overcurrent and is damaged.
- 60 minutes later, the following conditions exist:
  - Containment pressure is 10 psig.
  - FR-Z.1, "High Containment Pressure" is in progress.
  - ES-1.3, "Transfer To RHR Containment Sump" has been completed.
  - The crew observes 1B-B CS Pump running with a discharge flow of approximately 4000 gpm.

Which ONE of the following describes the condition of the Containment Spray System and the FR-Z.1 direction concerning RHR spray?

A. Containment spray flow is normal and RHR spray should be placed in service.

B. Containment spray flow is normal and RHR spray should NOT be placed in service.

C. Containment spray flow is LOWER than normal and RHR spray should be placed in service.

D. Containment spray flow is LOWER than normal and RHR spray should NOT be placed in service.

DISTRACTOR ANALYSIS:

A. *Incorrect. Containment spray flow should be greater than 4750 gpm per train in accordance with ES-1.3, Transfer to RHR Containment Sump; however, the conditions do require the RHR spray to be placed in service. Plausible because the candidate may not realize the flow is lower than normal, but correctly determine that conditions required for RHR spray exist and that RHR spray would still be established with only one RHR pump available.*

B. *Incorrect. Containment spray flow should be greater than 4750 gpm per train in accordance with ES-1.3, Transfer to RHR Containment Sump and the existing conditions meet the requirements for placing the RHR spray in service. Plausible because the candidate may not realize that flow is lower than normal and incorrectly determine the conditions required for RHR spray, or conclude that with only one RHR pump that spray should not be established.*

C. *CORRECT. The containment spray flow is lower than normal. The flow should be greater than 4750 gpm per train in accordance with ES-1.3, Transfer to RHR Containment Sump and the existing conditions meet the requirements for placing the RHR spray in service.(Containment pressure >9.5 psig, at least 1 hour has elapsed since the beginning of the accident, RHR is aligned to containment sump, at least one CCP and one SI pump running.) With only one RHR pump running, FR-Z.1 will stop one CCP and one SI pump during the establishment of RHR spray flow.*

D. *Incorrect. Containment spray flow is lower than normal. The flow should be greater than 4750 gpm per train in accordance with ES-1.3, Transfer to RHR Containment Sump and the existing conditions meet the requirements for placing RHR spray in service. Plausible because the candidate may realize that flow is lower than normal, but incorrectly determine the conditions required for RHR spray or conclude that with only one RHR pump that spray should not be established.*

Question No. 43

Tier 2 Group 1

K/A 026 K3.02
Knowledge of the effect that a loss or malfunction of the CSS will have on the following: Recirculation spray system.

Importance Rating: 4.2 / 4.3

Technical Reference: FR-Z.1, High Containment Pressure, Rev 17
ES-1.3, Transfer to RHR Containment Sump, Rev 15

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271ES-1.3 B.6.a
Given a set of initial plant conditions use ES-1.3 to correctly:
a. Identify required actions

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

Question History: SQN bank question CSS B.11.B 001 modified

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

10 CFR Part 55 Content: (41.7 /45.6)

10CFR55.43.b (n/a)

Comments: question format changed

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21.	m. **CHECK** containment sump level greater than 18% [22% ADV].	m. **WHEN** containment sump level greater than 18% [22% ADV], **THEN** **PERFORM** Substeps 21.n through 21.p. **GO TO** Step 22.
	n. **ESTABLISH** Train B Cntmt Spray: 1) **CHECK** Train B containment spray pump suction aligned to containment sump. 2) **START** Cntmt spray pump B-B. 3) **ENSURE** FCV-72-2 Train B Cntmt Spray isol valve OPEN.	n. **ENSURE** Cntmt Spray pump B-B STOPPED. **WHEN** Train B containment spray alignment established, **THEN** **START** Cntmt Spray pump B-B.
	o. **ENSURE** recirc valves CLOSED for running Containment Spray pump(s): • FCV-72-34 Train A • FCV-72-13 Train B.	
	p. **CHECK** containment spray flow greater than 4750 gpm on each train in service.	p. **EVALUATE** cause of abnormal flow.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. **MONITOR** if RHR spray should be placed in service:

a. **CHECK** the following conditions met:

- Containment pressure greater than 9.5 psig

AND

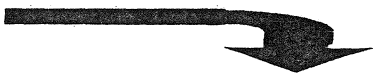
- At least 1 hour has elapsed since beginning of accident

AND

- At least one CCP **AND** one SI pump RUNNING.

a. **WHEN** conditions in Substep 22.a are met,
THEN
PERFORM Substeps 22.b and 22.c.

GO TO Step 23.



(Step continued on next page.)

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

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** ES-1.3, "Transfer to RHR Containment Sump"

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-1.3, Transfer to RHR Containment Sump.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with Transfer to RHR Containment Sump 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-1.3.
2.	Discuss the ES-1.3 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with ES-1.3 entry conditions. b. Describe the requirements associated with ES-1.3 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into ES-1.3.
4.	Describe the bases for all limits, notes, cautions, and steps of ES-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 ES-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 ES-1.3 conditions.

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	

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 2004bankBnk

1. CSS B.11.B 001

The following plant conditions exist:

- Unit 1 initially at 100% power.
- 1A-A Containment Spray pump is initially out of service for impeller replacement.
- A large break LOCA has occurred.
- 1B-B Containment Spray (CS) Pump is running, but discharge flow is approximately 3000 gpm.
- Adequate suction pressure to the 1B-B CS pump has been verified.
- Containment pressure is 10 psig.
- 60 minutes have elapsed since the start of the accident.
- ES-1.3, Transfer to RHR Containment Sump has been completed.
- Both CCPs and SI pumps are running.

Which ONE of the following describes the impact of the 1B-B Containment Spray pump malfunction?

A. 1B-B Containment Spray pump can be left running. RHR spray should be placed in service in accordance with FR-Z.1, High Containment Pressure.

B. No further action is required at this time since the 1B-B Containment Spray pump is maintaining containment pressure below design basis.

C. 1B-B Containment Spray pump should immediately be tripped and placed in pull-to-lock to permit placing RHR spray in service in accordance with FR-Z.1.

D. 1B-B Containment Spray pump should immediately be tripped and placed in pull-to-lock since it is not performing as required. No additional actions are required.

Justification:

a. Correct. Per FR-Z.1, all conditions have been satisfied to place RHR spray in service. Contaiment Spray pump 1B-B may continue to run.

b. Incorrect. Conditions have been met to place RHR spray in service to limit containment pressure.

c. Incorrect. Containment Spray pump can continue to run while RHR Spray alignment is established.

d. Incorrect. Information provided in the stem does not require 1B-B CS pump to be locked out.

44. 039 K5.05 044

Given the following:

- Plant startup in progress with MSIVs and bypass valves closed.
- RCS at 2235 psig and 547°F.
- The crew began warming the main steam lines and observed the following RCS temperature changes:

0900 - 547°F
0915 - 522°F
0930 - 495°F
0945 - 467°F
1000 - 453°F
1015 - 424°F
1030 - 410°F
1045 - 398°F
1100 - 402°F

Which ONE of the following identifies the status of the RCS cooldown rate Technical Specification limit and the component stress that represent the bases for the limit?

	Cooldown Rate	Limiting Component
A.	Tech Spec limit was exceeded	Reactor Vessel
B.	Tech Spec limit was exceeded	Steam Generator Tube Sheet
C. ✔	Maintained within the Tech Spec limit	Reactor Vessel
D.	Maintained within the Tech Spec limit	Steam Generator Tube Sheet

DISTRACTOR ANALYSIS:

A. Incorrect, RCS cooldown limit has not been exceeded and the limiting component is not the steam generator tube sheet. Plausible because the total cooldown exceeds 100°F and the steam generator tube sheet is the limiting component under other conditions.

B. Incorrect, the limiting component is the reactor vessel, but the RCS cooldown limit has not been exceeded . Plausible because the total cooldown exceeds 100°F and the reactor vessel is the limiting component.

C. CORRECT, RCS cooldown limit of 100°F/hr has not been exceeded and the limit is based mainly on the the reactor vessel stresses.

D. Incorrect, RCS cooldown limit of 100°F/hr has NOT been exceeded, and the limiting component is NOT the steam generator tube sheet. Plausible because the cooldown rate has not been and the steam generator tube sheet is the limiting component under other conditions.

Proposed 2/6/2009
Sequoyah NRC RO Written Exam
as submitted

Question No. 44

Tier 2 Group 1

K/A 039 K5.05
Knowledge of the operational implications of the following concepts as they apply to the MRSS: Bases for RCS cooldown limits

Importance Rating: 2.7 / 3.1*

Technical Reference: Tech Spec 3/4.4.9 RCS Pressure and Temperature (P/T) Limits
Pressure Temperature Limits Report, July 2003, Rev 4

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL200T.RCS B.6.a
Describe the administrative controls and limits for the RCS as explained in this lesson plan.
a. State the Tech Spec/TRM LCOs that govern the RCS.

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.5 / 45.7)

10CFR55.43.b (n/a)

Comments: New question for SQN 1/2009 exam

3/4.4.9 RCS PRESSURE AND TEMPERATURE (P/T) LIMITS

LIMITING CONDITION FOR OPERATION

3.4.9.1 RCS pressure, RCS temperature, and RCS heatup and cooldown rates shall be maintained within the limits specified in the PTLR.

APPLICABILITY: At all times.

ACTIONS:

a. With the requirements of the LCO not met in MODE 1, 2, 3, or 4, restore the parameter(s) to within limits in 30 minutes and determine RCS is acceptable* for continued operation within 72 hours. With the required action above not met, be in MODE 3 within the next 6 hours and in MODE 5, with RCS pressure < 500 psig, within the following 30 hours.

b. With the requirements of the LCO not met any time other than MODE 1, 2, 3, or 4, immediately initiate action to restore parameter(s) to within limits and, prior to entering MODE 4, determine RCS is acceptable* for continued operation.

SURVEILLANCE REQUIREMENTS

4.4.9.1.1 Verify** RCS pressure, RCS temperature, and RCS heatup and cooldown rates are within the limits specified in the PTLR every 30 minutes.

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* The determination that the RCS is acceptable for continued operation must be completed for any entry into Action (a) or (b).

** Only required to be performed during RCS heatup and cooldown operations and RCS inservice leak and hydrostatic testing.

1.0 RCS Pressure Temperature Limits Report (PTLR)

This PTLR for Sequoyah Unit 1 has been prepared in accordance with the requirements of Technical Specification (TS) 6.9.1.15. Revisions to the PTLR shall be provided to the NRC after issuance.

This report affects TS 3.4.9.1, RCS Pressure/Temperature Limits (P/T) Limits. All TS requirements associated with Low Temperature Overpressure Protection System (LTOPS) are contained in TS 3.4.12, RCS Overpressure Protection System.

2.0 RCS Pressure and Temperature Limits

The limits for TS 3.4.9.1 are presented in the subsections which follow and were developed using the NRC approved methodologies specified in TS 6.9.1.15 with exception of ASME Code Case N-640[13] (Use of K_{Ic}), WCAP-15984-P[14] (Elimination of the Flange Requirement), 1996 Version of Appendix G[4] and the revised fluences[7]. The operability requirements associated with LTOPS are specified in TS LCO 3.4.12 and were determined to adequately protect the RCS against brittle fracture in the event of an LTOP Transient in accordance with the methodology specified in TS 6.9.1.15.

2.1 RCS Pressure/Temperature (P/T) Limits (LCO - 3.4.9.1)

2.1.1 The minimum boltup temperature is 50°F

2.1.2 The RCS temperature rate-of-change limits are:

a. A maximum heatup rate of 100°F in any one hour period.
b. A maximum cooldown rate of 100°F in any one hour period.
c. A maximum temperature change of less than or equal to 10°F in any one hour period during inservice hydrostatic and leak testing operations above the heatup and cooldown limit curves.

2.1.3 The RCD P/T limits for heatup, cooldown, inservice hydrostatic and leak testing, and criticality are specified by Figures 2-1 and 2-2.

3.0 Low Temperature Overpressure Protection System (LCO 3.4.12)

The lift setpoints for the pressurizer Power Operated Relief Valves (PORVs) are presented in the subsections which follow. These lift setpoints have been developed using the NRC-approved methodologies specified in Specification 6.9.1.15.

B 3/4.4 REACTOR COOLANT SYSTEM (RCS)

B 3/4 4.9 Reactor Coolant System Pressure and Temperature (P/T) Limits

BASES

BACKGROUND

All components of the RCS are designed to withstand effects of cyclic loads due to system pressure and temperature changes. These loads are introduced by startup (heatup) and shutdown (cooldown) operations, power transients, and reactor trips. This LCO limits the pressure and temperature changes during RCS heatup and cooldown, within the design assumptions and the stress limits for cyclic operation.

The PTLR contains P/T limit curves for heatup, cooldown, inservice leak and hydrostatic (ISLH) testing, and data for the maximum rate of change of reactor coolant temperature (Ref. 1).

Each P/T limit curve defines an acceptable region for normal operation. The usual use of the curves is operational guidance during heatup or cooldown maneuvering, when pressure and temperature indications are monitored and compared to the applicable curve to determine that operation is within the allowable region.

The LCO establishes operating limits that provide a margin to brittle failure of the reactor vessel and piping of the reactor coolant pressure boundary (RCPB). The vessel is the component most subject to brittle failure, and the LCO limits apply mainly to the vessel. The limits do not apply to the pressurizer, which has different design characteristics and operating functions. The reactor vessel materials have been tested to determine their initial RT_{NDT} and the results of these tests are shown on Table B 3/4.4-1.

10 CFR 50, Appendix G (Ref. 2), requires the establishment of P/T limits for specific material fracture toughness requirements of the RCPB materials. Reference 2 requires an adequate margin to brittle failure during normal operation, anticipated operational occurrences, and system hydrostatic tests. It mandates the use of the American Society of Mechanical Engineers (ASME) Code, Section III, Appendix G (Ref. 3).

The neutron embrittlement effect on the material toughness is reflected by increasing the nil ductility reference temperature (RT_{NDT}) as exposure to neutron fluence increases.

The actual shift in the RT_{NDT} of the vessel material will be established periodically by removing and evaluating the irradiated reactor vessel material specimens, in accordance with ASTM E 185 (Ref. 4) and Appendix H of 10 CFR 50 (Ref. 5).

The operating P/T limit curves will be adjusted, as necessary, based on the evaluation findings and the recommendations of Regulatory Guide 1.99 (Ref. 6).

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** REACTOR COOLANT SYSTEM

IV. **LENGTH OF LESSON:** 3 hours (with 3 hours in the Simulator)

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 System (RCS) in the plant and on the simulator.

B. Enabling Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge and abilities associated with the RCS 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 RCS as described in the FSAR.
2. State the design basis of the RCS in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the RCS as illustrated on the simplified system drawing.
4. Describe the following items for each major component in the RCS 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 RCS components are designed
   m. Location of controls and indications associated with the RCS in the control room and auxiliary control room

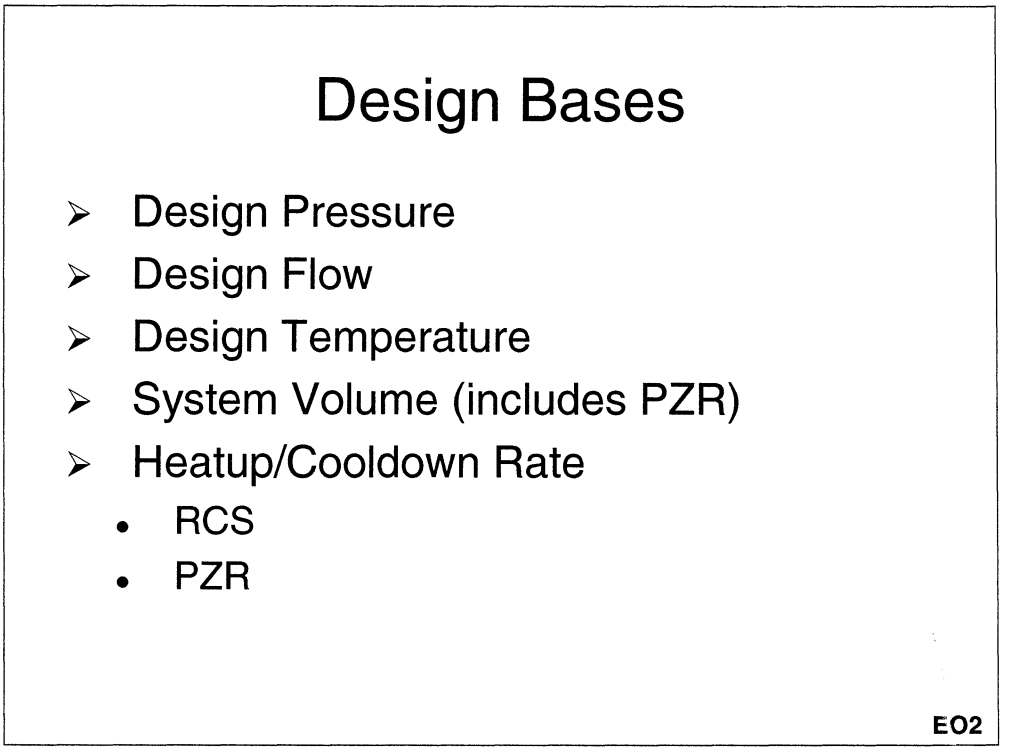
V. TRAINING OBJECTIVES (Cont'd):

B. Enabling Objectives (Cont'd):

5. Describe the operation of the RCS as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the RCS in service
   c. Alarms and alarm response
   d. How a component failure will affect system operation
   e. How a support system failure will affect RCS operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the RCS as explained in this lesson:
   a. State Tech Specs/TRM LCOs that govern the RCS
   b. State the TS/TRM LCOs that have a $\leq$ 1 hour action statement
   c. Interpret applicable Tech Specs/TRM LCOs
   d. Identify Limitations of the ODCM
   e. Interpret applicable ODCM limitations
   f. Given the conditions/status of the RCS 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. LER, 327-98004; SQN Failure to Perform a Surveillance
   b. OE15419; SQN CRDM Lower Canopy Seal Weld Failure
   c. SOER 93-1, Diagnosis and Mitigation of RCS Leakage
   d. SER 35-81; Calvert Cliffs-RCS Piping wastage
   e. SOER 82-13; Quad Cities-RCS Chemistry

VI. TRAINING AIDS:

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



X. **LESSON BODY:**

NOTE: Direct students to refer to UFSAR Table 5.1-1 which states the Design Bases of the RCS system, then to Design Parameters in the System Description.

C. Design information:

- Design pressure, 2485psig
- Design Flow 91,400 gpm/loop
- Temperature, 650°F (RCS), 680°F (Pressurizer)
- System Volume (includes PZR) 12,612 ft^3
- Heatup/Cooldown Rate 100°F/hr (vessel), 200°F/hr (PZR)

D. Discuss the importance to safety, containment, and reactivity (System Description)

45. 059 K3.04 045

Given the following:

- Unit 1 is at 100% power.
- A significant feedwater heater level transient results in HI-HI levels in Feedwater Heaters A1 and B1.
- Extraction steam to the feedwater heaters isolates.

Assuming the reactor does NOT trip, what will be the **INITIAL** effect on indicated SG narrow range levels, RCS T_{cold}, and reactor power?

A. ✔ SG NR levels will decrease, RCS T_{cold} will decrease, and reactor power will increase.

B. SG NR levels will decrease, RCS T_{cold} will decrease, and reactor power will decrease.

C. SG NR levels will increase, RCS T_{cold} will increase, and reactor power will increase.

D. SG NR levels will increase, RCS T_{cold} will increase, and reactor power will decrease.

DISTRACTOR ANALYSIS:

A. CORRECT, The colder feedwater will cause the S/G level to shrink and Tcold to decrease adding positive reactivity increasing reactor power.

B. Incorrect, The colder feedwater will cause the S/G level to shrink and Tcold to decrease but the reactor power will increase due to positive reactivity being added. Plausible because the effect on the S/G level and Tcold is correct and the change in power could be incorrectly concluded.

C. Incorrect, The S/G level and Tcold will increase but the reactor power will not decrease. Plausible because the effect on S/G level and Tcold is correct and the candidates could reverse the actual effect of the transient.

D. Incorrect, The S/G level and Tcold will decrease (not increase) and the reactor power will not decrease. Plausible if the candidates reverses the actual effect of the transient.

Question No. 45

Tier 2 Group 1

K/A 059 K3.04
Knowledge of the effect that a loss or malfunction of the MFW will have on the following: RCS

Importance Rating: 3.6 / 3.8

Technical Reference: 1-SO-5-1, Feedwater Heaters and Moisture Separator Reheaters, Rev 34

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200MFW B.5.d
Describe the normal, abnormal, and emergency operation of the Main Feedwater System as it relates to the following:
d. How a component failure will affect system operation

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

Question History: WBN bank question

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

10 CFR Part 55 Content: (41.7 / 45.6)

10CFR55.43.b (n/a)

Comments:

Date_____

8.1.1.2 Removing B1 Heater from service

NOTE 1 Due to Extraction Headers draining to the shell side of the #1 heaters, periodic draining of the heater shell will be required while out of service.

NOTE 2 Power must be reduced to 99% prior to removing a High Pressure heater from service. This will allow for a calculated 3.7 degree decrease in final feedwater temperature with additional margin for heater removal and return to service evolutions. If the heater is to be out of service for four hours or more, the unit power may be returned to 100% while work is being performed on the heater and plant conditions are stable. Prior to returning to service, the unit should again be decreased back to 99%.

[1] **ENSURE** reactor power is ≤ 99%. ☐

[2] **RECORD [1-LIC-6-35]** Level controller Level setpoint _____ ☐

[3] **ESTABLISH** communications with MCR prior to continuing. ☐

NOTE The following step may result in lowering level in B1 heater if level controller fails to respond.

[4] **CLOSE [1-6-576]** MSR High Pressure Drain to B1 heater. ☐

NOTE Setting level controller level setpoint to zero too fast could cause #2 heater level problems.

[5] **IF [1-LCV-6-35B]** bypass LCV for high pressure heater is **OPERABLE, THEN**

[a] **SET [1-LIC-6-35]** controller setpoint to **ONE.** ☐

[b] **CLOSE [1-6-609]** Manual Isolation Valve in drain line from B1 heater to B2 heater. ☐

[c] **ENSURE** B1 bypass **[1-LCV-6-35B]** opens as needed. ☐

[d] **ENSURE** B2 controller **[1-LIC-6-43]** controls heater level. ☐

[e] **ENSURE** B2 bypass **[1-LCV-6-40]** is **CLOSED.** ☐

QUESTIONS REPORT
for BANK WBN Questions MARCH 2007

059K3.04 002

With the plant initially at 100% power, a significant feed water heater level transient results in HI-HI levels in the A1 and B1 feedwater heaters. Extraction steam isolates to the heaters.

Assuming the reactor does not trip, what will be the initial effect on indicated narrow range SG levels, RCS Tcold and reactor power?

a. SG NR levels will increase, RCS Tcold will increase, and actual reactor power will increase.

b. SG NR levels will increase, RCS Tcold will increase, and actual reactor power will decrease.

c. ✔ SG NR levels will decrease, RCS Tcold will decrease, and actual reactor power will increase.

d. SG NR levels will decrease, RCS Tcold will decrease, and actual reactor power will decrease.

C is correct. Loss of feed preheating will add colder water to the SGs, reducing boiling, resulting in "shrink". The drop in Tcold adds positive reactivity, causing reactor power to increase

A is incorrect. SG levels would decrease. Tcold would decrease.

B is incorrect. SG levels would decrease. Tcold would decrease. Reactor power would increase.

D is incorrect. Reactor power would increase.

V. TRAINING OBJECTIVES (Cont'd):

B. Enabling Objectives (Cont'd):

5. Describe the normal, abnormal, and emergency operation of the Main Feedwater System as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the Main Feedwater 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 Main Feedwater System operation
   f. How an instrument failure will affect system operation
6. Describe the administrative controls and limits for the Main Feedwater System as explained in this lesson:
   a. State Tech Specs/TRM LCOs that govern the Main Feedwater System
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the Main Feedwater 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. OE17882, Auxiliary Feedwater Actuation During Unit Startup (PER 04-000196-000)

VI. TRAINING AIDS:

A. Classroom Computer and Local Area Network (LAN) Access
B. Computer projector

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** MAIN FEEDWATER SYSTEM

IV. **LENGTH OF LESSON:** 4 hour lecture; 2 hour simulator demonstration; 1 hour self-study

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 Main Feedwater 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 Main Feedwater 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 Feedwater System as described in the SQN FSAR.
2. State the design basis of the Main Feedwater System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Main Feedwater System as illustrated on the simplified system drawing.
4. Describe the following items for each major component in the Main Feedwater 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 Feedwater System components are designed
   m. Location of controls and indications associated with the Main Feedwater System in the control room and auxiliary control room

46. 061 K3.01 046

Given the following conditions:

- Unit 2 is initially at 100% power.
- Instrument failures cause a spurious Main Feedwater Isolation Signal.
- NO Auxiliary Feedwater Pumps start.
- The reactor does NOT trip.
- AMSAC fails to actuate.

Assuming **NO** operator action, which ONE of the following is the primary concern to plant systems?

A. Main steamline break due to thermal shock on Steam Generator shell.

B. SG tube rupture due to high primary-to-secondary differential pressure.

C. Challenge to PZR PORVs and safety valves due to overpressure transient in the RCS.

D. No safety injection flow through the CCPIT when RCS pressure is at the PORV setpoint.

DISTRACTOR ANALYSIS

A. Incorrect, Steam generator pressure would increase but a steam generator shell failure is not the primary concern but not the primary concern during during the transient. Plausible because the pressure transient will occur.

B. Incorrect, Differential pressure across the steam generator tubes is a concern but not the primary concern during during the event if no AFW pumps start. Plausible because the steam generator tube differential pressure can be a concern during otehr events.

C. CORRECT, With no AFW to supply invemtory to the steam generators, the condition would reach a point where the RCS pressure would increase and could not be restored to normal resulting in an overpressure transient on the RCS without operator action prior to losing minimum inventory.

D. Incorrect, The CCPs shutoff head is greater than the PORV lift pressure and will deliver flow through the CCPIT. Plausible because some plants are designed where the charging pumps woul not deliver flow.

Question No. 46

Tier 2 Group 1

K/A 061 K3.01
AFW: Knowledge of the effect that a loss or malfunction of the AFW will have on the following: RCS

Importance Rating: 4.4 / 4.6

Technical Reference: WOG Back Ground Document FR-H.1, Rev 2

Proposed references to be provided to applicants during examination: None

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

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

Question History: SQN Bank AMSAC-B.4- 001

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

10 CFR Part 55 Content: (41.7 / 45.6)

10CFR55.43.b (n/a)

Comments: SQN Bank question AMSAC-B.4- 001 with minor format changes and correct answer relocated

2. DESCRIPTION

A loss of secondary heat sink can occur as a result of several different initiating events. Possibilities are a loss of main feedwater during power operation, a loss of offsite power, or any other scenario for which main feedwater is isolated or lost when the steam generators provide the main heat removal path. For these initiating transients a failure of the auxiliary feedwater (AFW) system to inject or a loss of AFW early in the cooldown, before RHR System operation can be established, could lead to a loss of secondary heat sink.

A loss of all feedwater transient is characterized by a depletion of secondary inventory and eventual degradation of secondary heat transfer capability. As secondary heat transfer capability degrades, a loss of secondary heat sink results and core decay heat generation will increase RCS temperature and pressure until the pressurizer power operated relief valves (PORV) or pressurizer safety valves open to relieve the increasing RCS pressure. At this point the opening and closing of the PORVs or safety valves will result in a loss of RCS inventory similar in nature to a small break loss of coolant accident. If operator action is not taken, the pressurizer PORVs or safety valves will continue to cycle open and closed at the valve setpoint pressure removing RCS inventory and a limited amount of core decay heat until eventually enough inventory will be lost to result in core uncovery.

The plant status upon entering this guideline will be a function of the initiating event. If the initiating event is a loss of main feedwater during power operation with AFW flow unavailable, or from any other anticipated transient resulting in reactor trip and main feedwater isolation or failure with AFW flow unavailable, the transient may not result in an automatic SI actuation. If the initiating event has resulted in a reactor trip due to primary depressurization (i.e., small LOCA, secondary break or steam generator tube rupture) with AFW flow unavailable, then SI should have been automatically initiated. However, the status of SI upon entering the guideline is not important to the actions that will be taken. Should it become necessary to establish a bleed and feed heat removal path (actuating SI and manually opening all pressurizer PORVs), then SI will be established.

QUESTIONS REPORT
for BANK SQN Questions

AMSAC-B.4- 001

Given the following plant conditions:

- Unit 2 is initially at 100% power.
- Instrument failures occur causing a spurious feedwater isolation signal.
- NO AFW pumps start.
- The reactor fails to trip.
- AMSAC fails to actuate

Which ONE (1) of the following is the primary concern regarding Unit 2, assuming NO operator actions?

A. S/G Tube Rupture due to high primary-to-secondary Delta P.

B. Challenge to PZR PORV's and safeties due to overpressure transient in the RCS.

C. Main steamline break due to thermal shock on S/G shell.

D. No safety injection flow through the CCPIT when RCS pressure is at the PORV setpoint.

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

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** FR-H.1, LOSS OF SECONDARY HEAT SINK

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 FR-H.1, Loss Of Secondary Heat Sink.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with FR-H.1, Loss Of Secondary Heat Sink, 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-H.1.
2.	Discuss the FR-H.1 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with FR-H.1 entry conditions. b. Describe the requirements associated with FR-H.1 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into FR-H.1.
4.	Describe the bases for all limits, notes, cautions, and steps of FR-H.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-H.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-H.1 conditions.

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	

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

VI. TRAINING AIDS:

A. Computer.
B. Computer Display Projector & Controls.
C. Local Area Network (LAN) Access.
D. Simulator (if available)

VII. TRAINING MATERIALS:

A. Appendices
   1. Appendix A, Related K/As

47. 061 K5.03 047

Given the following:

- A reactor trip occured on Unit 1.
- The only operator action taken was to manually close the LCVs to the SGs supplied from 1A-A MDAFW Pump.

Which ONE of the following describes the flow that will continue to be passed through the pump?

A. 30 GPM to the CST

B. 30 GPM to the condenser hotwell

C. 165 GPM to the CST

D. 165 GPM to the condenser hotwell

DISTRACTOR ANALYSIS:

The pump recirculation is provided through an orificed line and a valved 2" line in parallel to the orificed line.

A. CORRECT, The orificed line will be providing a path for 30 gpm to the condensate storage tank. The valve line will be closed.

B. Incorrect, The orificed line will be providing a path for 30 gpm but not back to the condenser hotwell. The valve line will be closed. Plausible because the flow rate is correct and the main feed pumps do recirculate back to the condenser hotwell.

C. Incorrect, The only path will be the orificed line providing a path for 30 gpm to the condensate storage tank, the valve will be closed in the parallel path. Plausible because the flow rate would be 165 gpm to the condensate strorage tank if both paths were open.

D. Incorrect, The only path will be the orificed line providing a path for 30 gpm to the condensate storage tank, the valve will be closed in the parallel path. Plausible because the flow rate would be 165 gpm if both paths were open and the main feed pumps do recirculate back to the condenser hotwell.

Question No. 47

Tier 2 Group 1

K/A 061 K5.03
Knowledge of the operational implications of the following concepts as the apply to the AFW:
Pump head effects when control valve is shut

Importance Rating: 2.6 / 2.9*

Technical Reference: OPT200.AFW B.3 Rev 5

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.AFW B.3 & 4.e
Explain the purpose/function of each major component in the flow path of the AFW system as illustrated on a simplified system drawing.
Describe the following characteristics of each major component in the AFW system. e. Component operation

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

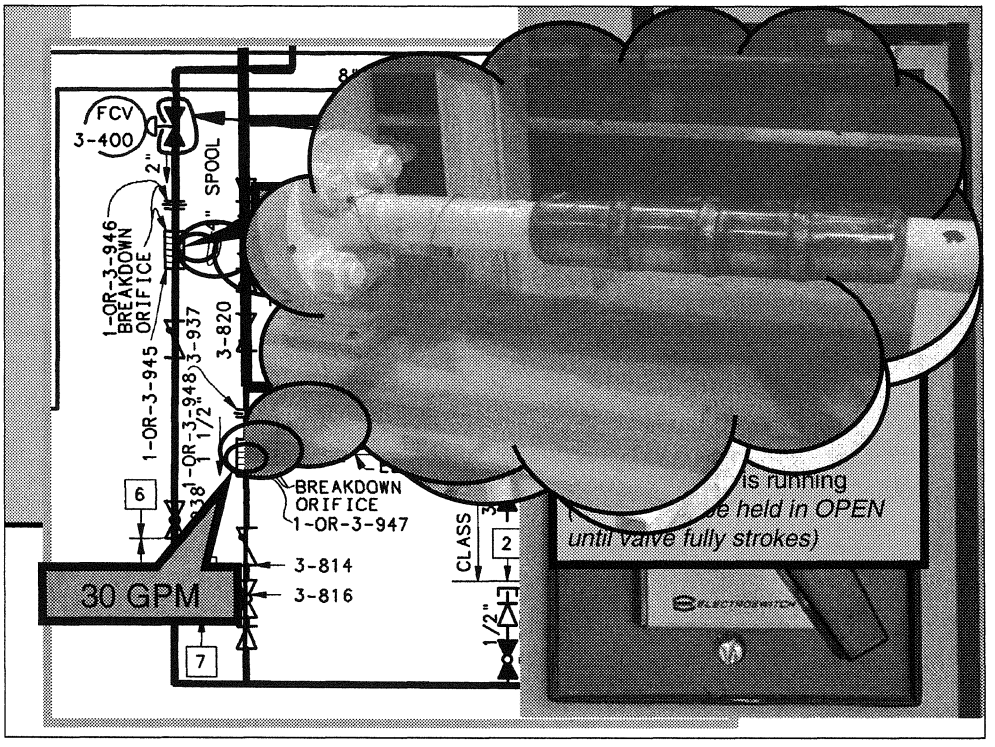
Question History: SQN bank question 061 K5.03 001

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

10 CFR Part 55 Content: (41.5 / 45.7)

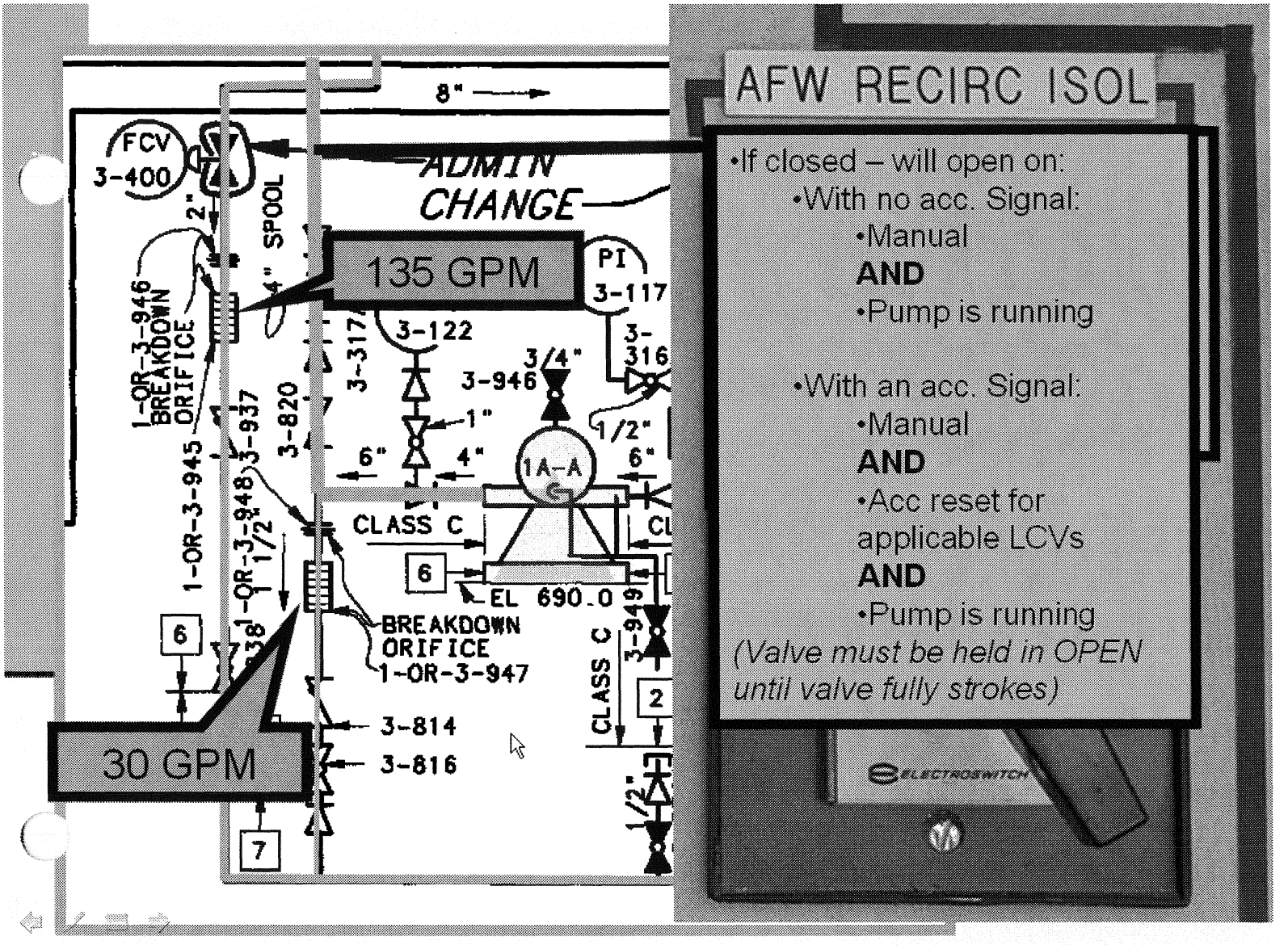
10CFR55.43.b (n/a)

Comments: SQN bank question 061 K5.03 001. Changed stem setup and changed flow rate numbers number in the correct answer and the distractors.



Objective 2

- The recirculation flow rate for each MDAFWP totals 165 gpm. This includes the original recirc orifices, 30 gpm, and the 2 inch, 135 gpm recirc line parallel to the existing recirc line on each pump.
- Manually controlled from the control room.


AFW RECIRC ISOL
•If closed – will open on:
•With no acc. Signal:
•Manual
AND
•Pump is running
•With an acc. Signal:
•Manual
AND
•Acc reset for applicable LCVs
AND
•Pump is running
(Valve must be held in OPEN until valve fully strokes)
ELECTROSWITCH
8"
FCV 3-400
ADMIN CHANGE
135 GPM
30 GPM
PI 3-117
3-122
3-946
3-316
3-317
3-820
3-937
1-OR-3-946 BREAKDOWN ORIFICE
1-OR-3-945
1-OR-3-948
1-OR-3-938
BREAKDOWN ORIFICE 1-OR-3-947
3-814
3-816
3-949
CLASS C
EL 690.0
1A-A
2" SPOOL
3/4"
1"
1/2"
6"
4"
2"
6
7
2

QUESTIONS REPORT
for SEQUOYAH bank

061 K5.03 001

After a reactor trip, both MDAFW Pumps are running.
No operator action has been taken.

If the discharge LCVs are closed on 1A-A MDAFW Pump, which ONE (1) of the following describes the minimum actual flow that will be passed through the pump?

A. 38 GPM to the condenser hotwell.

B. 38 GPM to the CST.

C. 170 GPM to the condenser hotwell.

D. 170 GPM to the CST.

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** AUXILIARY FEEDWATER

IV. **LENGTH OF LESSON:** 3 hour lecture; 1.0 hour simulator demonstration; 4 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 Auxiliary Feedwater (AFW) system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge and abilities associated with the AFW 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 AFW system as described in the FSAR.
2. State the design basis of the AFW system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the AFW system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the AFW 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 AFW system components are designed
   m. Location of controls and indications associated with the AFW 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 AFW system:
   a. Precautions and limitations
   b. Major steps performed while placing the AFW 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 AFW system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the AFW system:
   a. State Tech Specs/TRM LCOs that govern the AFW
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the AFW 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)

48. 062 K1.02 048

Given the following:

- Loss of off site power occurred on Unit 1 resulting in a Reactor Trip and Safety Injection.
- The Emergency Diesel Generators (DGs) started and DG 1A-A loaded to 4.6 MWs.

Which ONE of the following describes the operation of DG 1A-A under this load condition?

A. Must be immediately tripped.

B. May only operate for 2 hours.

C. May operate for up to 24 hours.

D. May operate indefinitely.

DISTRACTOR ANALYSIS:

A. Incorrect, maximum load rating not exceeded. 5000 kW would require the immediate shutdown of the DG to prevent the potential for extensive damage. Plausible because the DG would require an immediate shutdown if the load was 5000 kW.

B. CORRECT, the normal rating of 4400 kW is exceeded but is within the allowed 2 hour rating of 4840 kW.

C. Incorrect, the normal rating of 4400 kW is exceeded but cannot be operated at the current load for 24 hours. Plausible because a 24 hour period is used to determine if the DG can be loaded above 4400 kW. The DG can only be operated above 4400 kw for 2 hours in any 24 hour period.

D. Incorrect, the contincontinuousous duty rating normal rating of 4400 kW is exceeded , therefore the DG cannot be operated indefinitely. Plausible because the DG if the identified load was 4400 kW or less the DG could operate indefinitely.

Question No. 48

Tier 2 Group 1

K/A 062 K1.02
Knowledge of the physical connections and/or cause effect relationships between the ac distribution system and the following systems: ED/G

Importance Rating: 4.1 / 4.4

Technical Reference: AOP-P.01, Loss of Offsite Power, Rev 22
0-SO-82-1, Diesel Generator 1A-A, Rev 30

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.DG, B.4.d
Describe the following items for each major component in the Diesel generator system.
d. Normal Operating Parameters
OPL271AOP-P.1, B.6
Describe the basis for all limits, notes, cautions and step of AOP-P.01.

Question Source:

Bank # _____
Modified Bank # ____X_____
New _____

Question History:

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

10 CFR Part 55 Content: (41.2 to 41.9 / 45.77 to 45.8)

10CFR55.43.b. (n/a)

Comments: WBN question SYS082A.03 005 modified.

APPENDIX C
Page 3 of 4

NORMAL OPERATING PARAMETERS

DIESEL GENERATOR 1A-A					
PARAMETER	INSTRUMENT	LIMITS			
		MIN	MAX	NOMINAL	SHUT-DOWN(4)
Speed (RPM)		--	1030(*)	400-900	1050(4)
GENERATOR					
Voltage	ACV	6730V	7240V	6900V	8500V(4)
Generator Amps	ACA1, 2, 3	--	0	418 amps	600 amps(4)
KW	WM	1600KW for 2 hours	4840KW for 2 hours	4000KW	5000KW(4)
Stator Temperatures	0-TR-82-5036/1A (RTDs 1 thru 6)	--	135°C (*)	--	145°C(**)(4)
Generator Bearing Temperatures	0-TR-82-5036/1B (RTDs 1 thru 6)	--	80°C	--	90°C

(1) These are nominal temperatures for D/G which is full loaded (4000kW).
(2) Tech Spec Limit. Notify Unit SRO if level is approaching or is below the limit.
(4) Exceeding a shutdown parameter may cause extensive damage to the D/G. If any parameter exceeds its shutdown limit is should be immediately reported to the Unit Control Room and the D/G should be shutdown immediately. Notify Tech Support for assistance.
(*) If D/G is NOT required for emergency conditions, THEN NOTIFY the Control Room Operator to shutdown the D/G if any of these limits are exceeded.
(**) During the 2 hour run portion of 1-SI-OPS-082-024.A, the stator winding temperature maximum is ≤150°C-SQ930093PER.

APPENDIX B

LOSS OF OFFSITE POWER DIESEL GENERATOR LOAD SEQUENCE [C.2]

NOTE Diesel generator is rated at 4400kW continuous or 4800kW for 2 hours in 24-hour period.

EQUIPMENT NAME	LOADED	TIME IN SECONDS (1)
CCP	BO or SI with BO	2
SI Pumps	SI with BO only	5
RHR Pumps	SI with BO only	10
ERCW Pumps	BO or SI with BO	15
AFW Pumps	BO or SI with BO	20
Thermal Barrier Booster Pumps	BO or SI with BO	20
CCS Pumps	BO or SI with BO	30
Pressurizer Heaters (A-A & B-B only)	BO only	90
CS Pump	Phase B with BO	180
Main Control Room AHU	Phase B with BO(3)	220(3)
Electric Board Room AHU	Phase B with BO(3)	240(3)

(1) Time is measured from the time of closing the breaker connecting the D/G to the power train.

(3) Time delay only if phase B isolation is present.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	**RECORD** time of loss of off-site power. _____	
6.	**MONITOR** diesel generator loading:	
	a. **VERIFY** D/G load sequencing **USING** Appendix B, Loss of Offsite Power Diesel Generator Load Sequence **[C.2]**.	
	b. **ENSURE** four ERCW pumps RUNNING (one per shutdown board).	
	c. **MONITOR** diesel generator(s) load less than or equal to 4.4 MW (4.8 MW for 2 hours).	c. **REDUCE** excess diesel generator load **USING** Appendix A, Diesel Generator Load Evaluation List **[C.1]**.
7.	**CHECK** charging system operation:	
	a. **ENSURE** all RCS dilution activities STOPPED.	
	b. **ENSURE** CCP suction aligned to RWST: 1) **OPEN** LCV-62-135 or LCV-62-136. 2) **CLOSE** LCV-62-132 or LCV-62-133.	

APPENDIX A

DIESEL GENERATOR LOAD EVALUATION LIST [C.1] (1) (2) (3)

ELECTRICAL LOAD	480V BOARD	COMPT
D/G 1A-A		
Boric Acid Batching Tank Heater 2	Reactor MOV Bd 1A1-A	14B
48V Spare Battery Charger Normal Feeder	Reactor MOV Bd 1A1-A	7A1
48V Telephone Battery Charger Alternate Feeder	Reactor MOV Bd 1A1-A	2C1
Charging Pump 1A-A Auxiliary Oil Pump	Reactor MOV Bd 1A1-A	2C2
Primary Water Makeup Pump 1A	C&A Vent Bd 1A1-A	8A
Auxiliary Building Vent Monitor	C&A Vent Bd 1A1-A	10E2
Auxiliary Charging Booster Pump A	C&A Vent Bd 1A1-A	10C
Auxiliary Charging Pump 1A	C&A Vent Bd 1A1-A	7E
Service Building Vent Monitor	C&A Vent Bd 1A1-A	5E2
Spent Fuel Pit Cooling Sump Pump A	C&A Vent Bd 1A1-A	6E
El 722 Corridor Heater	Diesel Auxiliary Bd 1A1-A	5E
D/G 1A-A Air Compressor 2	Diesel Auxiliary Bd 1A1-A	6C
D/G 1A-A Muffler Room Exhaust Fan	Diesel Auxiliary Bd 1A1-A	6D
Lube Oil Storage Room Exhaust Fan	Diesel Auxiliary Bd 1A1-A	2B
CO_2 & Lube Oil Storage Room Exhaust Fan	Diesel Auxiliary Bd 1A2-A	2B
CO_2 Storage Room Electric Heater	Diesel Auxiliary Bd 1A2-A	3E
D/G 1A-A Air Compressor 1	Diesel Auxiliary Bd 1A2-A	6C

(1) DIESEL GENERATORS COULD POSSIBLY BE OVERLOADED FOR CONTINUOUS RATING (4400KW) IN COMBINATION OF LOSS OF OFFSITE POWER, SAFETY INJECTION, PHASE B CONTAINMENT ISOLATION, AND LOSS OF ONE POWER TRAIN.

(2) NE CONCURRENCE IS REQUIRED FOR ANY REVISIONS THAT CHANGE THE LOADS LISTED IN APPENDIX A. [C.4]

(3) DIESEL GENERATOR LOAD ANALYSIS, SQN-E3-002R15 (B85 910129 003)

APPENDIX B

LOSS OF OFFSITE POWER DIESEL GENERATOR LOAD SEQUENCE [C.2]

NOTE Diesel generator is rated at 4400kW continuous or 4800kW for 2 hours in 24-hour period.

EQUIPMENT NAME	LOADED	TIME IN SECONDS (1)
CCP	BO or SI with BO	2
SI Pumps	SI with BO only	5
RHR Pumps	SI with BO only	10
ERCW Pumps	BO or SI with BO	15
AFW Pumps	BO or SI with BO	20
Thermal Barrier Booster Pumps	BO or SI with BO	20
CCS Pumps	BO or SI with BO	30
Pressurizer Heaters (A-A & B-B only)	BO only	90
CS Pump	Phase B with BO	180
Main Control Room AHU	Phase B with BO(3)	220(3)
Electric Board Room AHU	Phase B with BO(3)	240(3)

(1) Time is measured from the time of closing the breaker connecting the D/G to the power train.

(3) Time delay only if phase B isolation is present.

WBN QUESTION

QUESTIONS REPORT

for Superwhaminine ILT EXAM BANK MARCH 2007

SYS082A.03 005

Given the following conditions;

- Loss of off site power occurred on Unit 1 resulting a Reactor Trip.
- The Emergency Diesel Generators(EDG) started and reenergized their respective 6.9 KV Shutdown Boards.
- EDG 1A-A is loaded to 4400 KW at 0200.

Which ONE of the following correctly identifies the time that EDG 1A-A must be removed from service if operated at the currently loading?

a. 0200, 24 hours later.

b. Immediately since this exceeds the maximum load limit for the EDGs.

c. 0400, 2 hours later.

d. ✔ May be operated indefinitely since this is the contiuous rating for the EDGs.

The correct answer is D

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** DIESEL GENERATOR SYSTEM

IV. **LENGTH OF LESSON:** 2 hours classroom, 3 hour simulator demonstration; 1.5 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 Diesel Generator 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 Diesel Generator 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 Diesel Generator System as described in the SQN FSAR.
2. State the design basis of the Diesel Generator System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Diesel Generator System.
4. Describe the following items for each major component in the Diesel Generator 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 Diesel Generator System components are designed
   m. Location of controls and indications associated with the Diesel Generator 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 Diesel Generator (DG) system as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the DG 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 DG system operation
   f. How an instrument failure will affect system operation
6. Describe the administrative controls and limits for the DG system:
   a. State Tech Specs/TRM LCOs that govern the DG s
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the DG 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. OE20736 - Missed Acceptance Criteria

VI. TRAINING AIDS:

A. Classroom Computer and Local Area Network (LAN) Access

B. Computer projector

I. PROGRAM: OPERATOR TRAINING - LICENSED

II. COURSE: LICENSE TRAINING

III. LESSON TITLE: AOP-P.01, LOSS OF OFFSITE POWER

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-P.01, LOSS OF OFFSITE POWER.

B. Enabling Objectives:

	Objectives
0.	Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with Loss of Offsite Power that are rated ≥ 2.5 during Initial License Training for and ≥-3.0 during License Operator Requalification Training the appropriate position as identified in Appendix A.
1.	State the purpose/goal of this AOP-P.01.
2.	Describe the AOP-P.01 entry conditions.
	a. Describe the setpoints, interlocks, and automatic actions associated with AOP-P.01 entry conditions.
	b. Describe the ARP requirements associated with AOP-P.01 entry conditions.
	c. Interpret, prioritize, and verify associated alarms are consistent with AOP-P.01 entry conditions.
	d. Describe the plant parameters that may indicate a Loss of Offsite Power.
3.	Describe the initial operator response to stabilize the plant upon entry into AOP-P.01.
4.	Upon entry into AOP-P.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-P.01.
6.	Describe the bases for all limits, notes, cautions, and steps of AOP-P.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-P.01 to correctly:
	a. Recognize entry conditions.

	Objectives
	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-P.01.
10.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition.

49. 063 G2.4.8 049
Given the following:

- Unit 2 at 100% power.
- Panel 2-M-1 Annunciator Window "125V DC VITAL CHGR III FAIL/VITAL BAT III DISCHARGE" alarms.
- The crew enters AOP-P.02, "Loss Of 125V DC Vital Battery Board".
- A reactor trip occurs on high PZR pressure.

Which ONE of the following identifies the allowed usage of AOP-P.02 after the Emergency Operating Procedure network is entered following the reactor trip?

A. Continued performance of AOP-P.02 is allowed after the crew enters ES-0.1, "Reactor Trip Response" because ES-0.1 is NOT an accident mitigation EOP.

B. Continued performance of AOP-P.02 is allowed after the crew enters ES-0.1, "Reactor Trip Response" because restoring power could have an impact on meeting the goals of the EOP.

C. Continued performance of AOP-P.02 is NOT allowed until the crew exits ES-0.1, "Reactor Trip Response" because the procedure reader must remain dedicated to the EOP in effect until the EOPs are exited.

D. Continued performance of AOP-P.02 is NOT allowed until the crew exits ES-0.1, "Reactor Trip Response" because actions taken in AOP-P.02 could degrade the performance of the EOP.

DISTRACTOR ANALYSIS:

A. Incorrect, As identified in EPM-4, selected AOP's, such as loss of vital power can be implemented concurrently with the EOPs. While ES-0.1 is not an accident mitigation procedure, that is not reason for parallel implementation, it is because the loss of power AOPs can have a significant impact on the ability of the EOP to achieve it goals. Plausible because the parallel implementation is correct but the reason for parallel implementation is not correct.

B. CORRECT, As identified in EPM-4, selected AOP's, such as loss of vital power can be implemented concurrently with the EOPs because the loss of power AOPs can have a significant impact on the ability of the EOP to acheive it goals.

C. Incorrect, EPM-4 provides that EOPs have priority over AOPs, and normally a dedicated procedure reader is utilized in the EOP network however, selected AOPs are allowed to be performed concurrently with EOPs. Plausible if candidate fails to recognize that AOP-P.02 is allowed to be used while performing ES-0.1.

D. Incorrect, EPM-4 provides that EOPs have priority over AOPs, however, selected AOPs are allowed to be performed concurrently with EOPs. Plausible if candidate fails to recognize that AOP-P.02 is allowed to be used while performing ES-0.1 and knows that the AOP actions can not be taken if the action would degrade the EOP performance.

Question No. 49

Tier 2 Group 1

K/A 063 G2.4.8
DC Electrical Distribution: Knowledge of how abnormal operating procedures are used in conjunction with EOPs.

Importance Rating: 3.8 / 4.5

Technical Reference: AOP-P.02, Rev 11; EMP-4, Rev 20

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271EPM-4, Obj. 1
Determine/idntify the correct procedural application(s) based on the operating procedures network for normal, abnormal, and emergency evolutions.

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.10 / 45.13)

10CFR55.43.b (n/a)

Comments:

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

2.3 Loss of 125V DC Vital Battery Board III

CAUTION **Restoring power to Vital Battery Bd III prior to aligning U-2 MSIV handswitches in step [2] could result in a low steamline pressure SI signal on Unit 2.**

NOTE Rx Trip Breakers RTA and BYA do not have indication due to loss of control power.

1. Unit 2 Only:
   IF Rx Trip Breakers CLOSED,
   THEN
   ENSURE Unit 2 reactor is TRIPPED
   AND
   GO TO E-0, Reactor Trip or Safety Injection, WHILE continuing in this procedure.

NOTE Unit 2 MSIVs fail closed due to loss of power to solenoid valves.

2. Unit 2 Only:
   ENSURE MSIV handswitches in CLOSE position.

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.

50. 064 A1.02 050

Given the following:

- D/G 1A-A is running at 4.4 MW for surveillance testing.
- D/G Day Tank levels are as follows:
  - 1A1 - 250 gallons
  - 1A2 - 300 gallons
- Neither Fuel Transfer Pump starts in automatic.

Which ONE of the following represents how long D/G 1A-A would continue to operate **WITHOUT** makeup to D/G 1A1 Day Tank AND the effect on D/G 1A2 Day Tank if the 1A1 Fuel Transfer Pump is able to be manually started?

A. Greater than 4 hours.
D/G 1A2 Day Tank level rises.

B. Greater than 4 hours.
D/G 1A2 Day Tank level continues to drop.

C. Less than 4 hours.
D/G 1A2 Day Tank level rises.

D. Less than 4 hours.
D/G 1A2 Day Tank level continues to drop.

DISTRACTOR ANALYSIS:

A. Incorrect, the D/G will not be able to run for greater than 4 hours (only approximately 1.6 hours) without makeup to the day tank. The level in 1A2 Day Tank will increase as the fuel transfer pumps starts on low level in 1A1 Day Tank to raise level in both day tanks. Plausible if the mimimum level or burn rate is not properly recalled and the 1A2 level rising when the 1A1 oil pump starts is correct.

B. Incorrect, the D/G will not be able to run for greater than 4 hours (only approximately 1.6 hours) without makeup to the day tank and the 1A2 tank level will not continue to drop after the fuel transfer pumps starts on low level in 1A1 Day Tank. Plausible if the mimimum level or burn rate is not properly recalled and if the pump discharge flow paths to both the 1A1 and 1A2 tanks is not realized.

C. CORRECT, At the limiting fuel oil capacity of 250 gallons and a design burn rate of ~ 155 gph (310 gph per D/G set /2 engines) at 4400 kW, the D/G will be able to run for approximately 1.6 hours without makeup to the day tank. The level in 1A2 Day Tank will increase as the fuel transfer pumps starts on low level in 1A1 Day Tank to raise level in both day tanks.

D. Incorrect, the less than 4 hour run time is correct but the 1A2 tank level will not continue to drop after the fuel transfer pumps starts on low level in 1A1 Day Tank. Plausible because the less than 4 hour run time is correct and if the pump discharge flow paths to both the 1A1 and 1A2 tanks is not realized.

Question No. 50

Tier 2 Group 1

K/A 064 A1.02
Ability to predict and/or monitor changes in parameters associated with operating the Emergency Diesel Generator controls including: Fuel consumption rate with load.

Importance Rating: 2.5 / 2.8

Technical Reference: 1,2-47W610-18-1 R6
OPT200.DG Rev 2

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.DG, Obj. 4.c
Describe the following items for each major component in the Diesel Generator:
c. Support Equipment and systems

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.8 / 45.5, 45. 8)

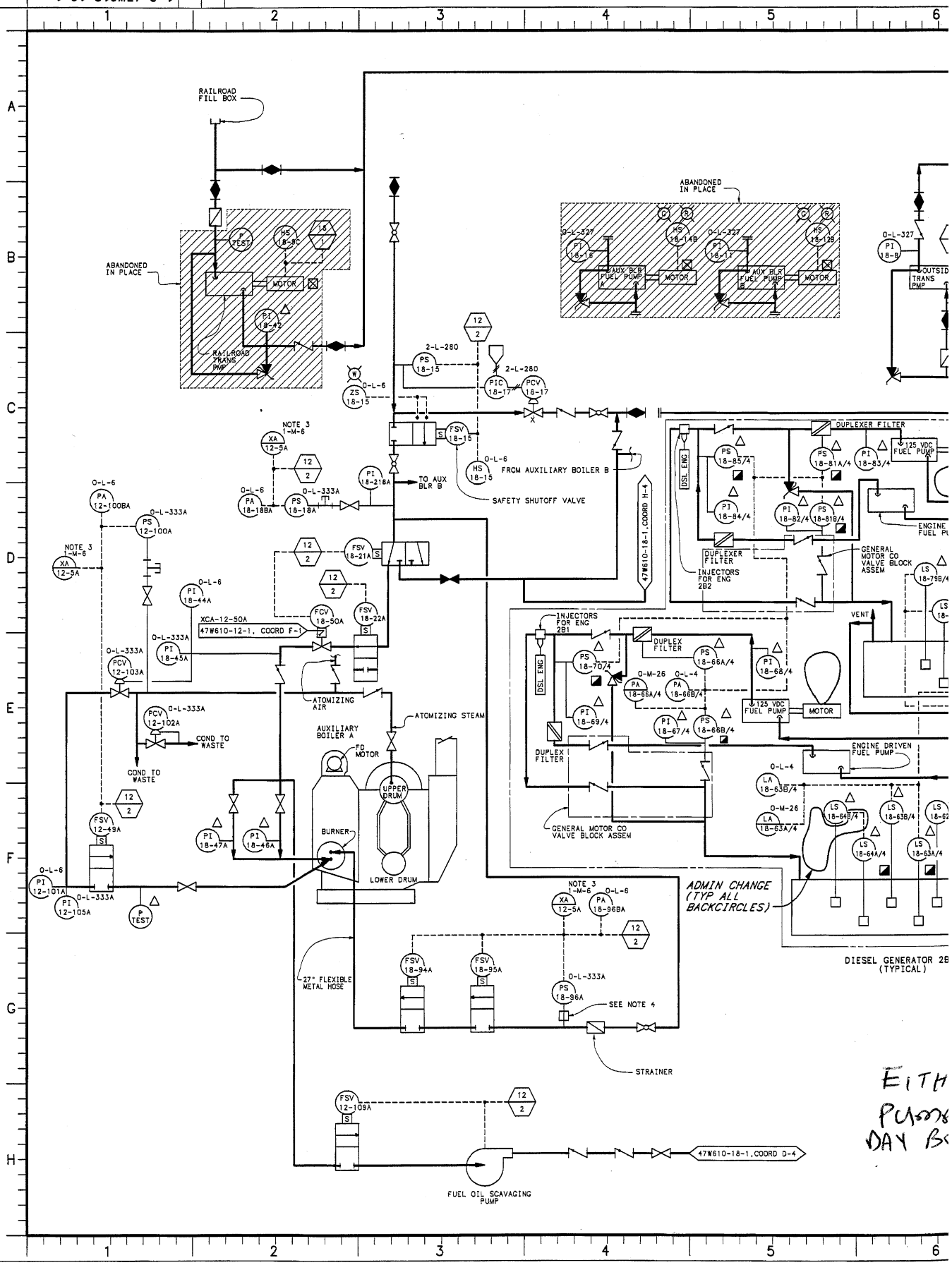
10CFR55.43.b (n/a)

Comments:

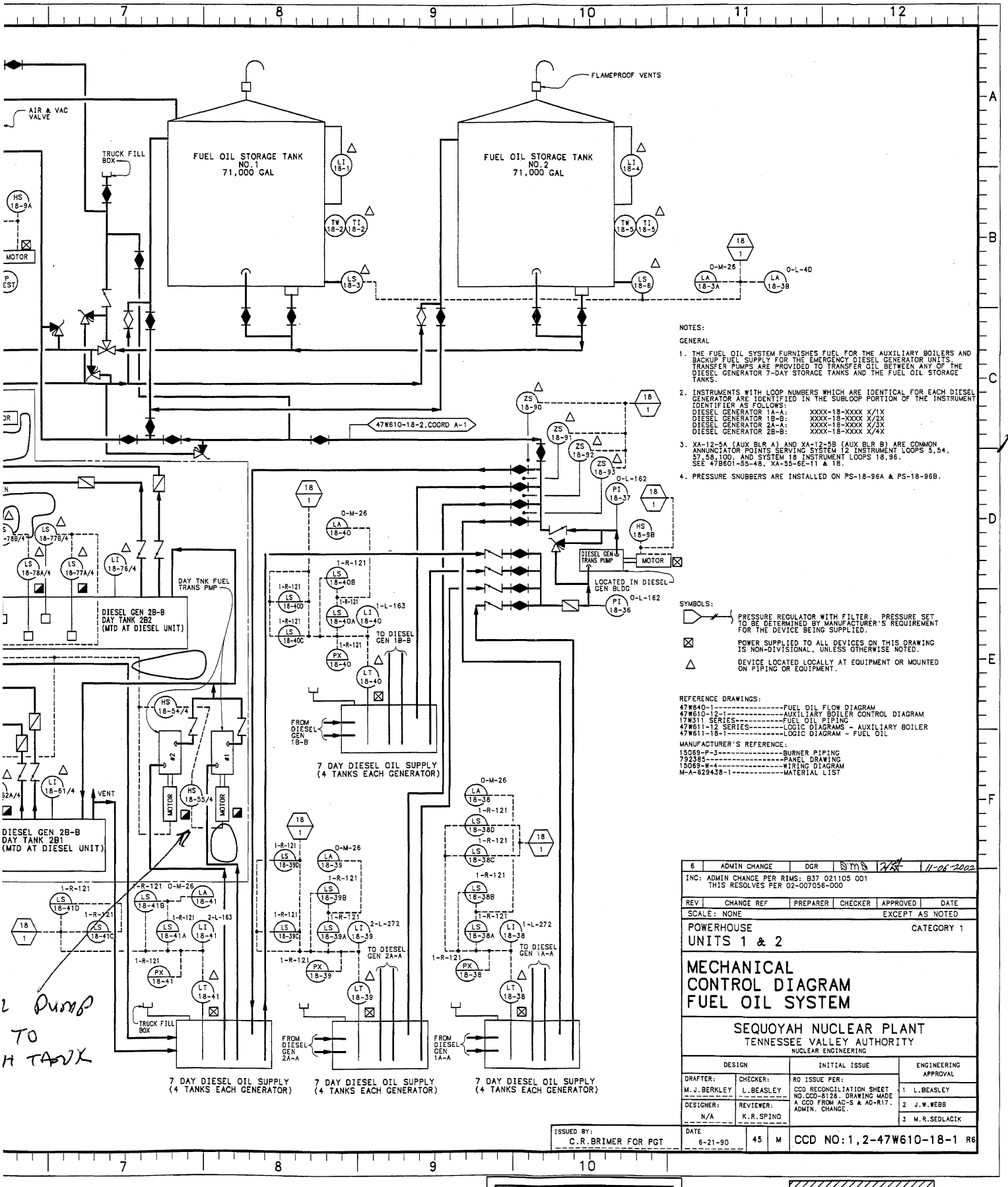
X. LESSON BODY:

D/G Fuel Oil System: (*continued*)

- The 125VDC motor-driven fuel oil pump is mounted on the accessory rack to the rear of the heat exchanger.
- It is an internal gear pump driven by the DC battery system for priming.
- It automatically starts with the engine start to ensure rapid fuel supply to the injectors.
- The DC pump is sized slightly larger than the engine driven pump.
- The engine fuel system consists of fuel injectors, engine driven pump, duplex filters and the fuel supply and return manifold.
- Components of the fuel system located on the accessory rack are the fuel suction strainer, DC motor-driven fuel pump, check valves, and associated piping.
- The excess fuel leaves the injectors in the return fuel filter, passes through a 10 psi check valve in the return fuel line in the manifold, and back to the fuel oil day tank.
- The 10 psi check valve restricts the return fuel and maintains a back pressure on the injectors.
- Each D/G set will burn ~310 gph at 4400 Kw and ~364 gph at 4840 Kw.



EITH
PUMPS
DAY BO



NOTES:

GENERAL

1. THE FUEL OIL SYSTEM FURNISHES FUEL FOR THE AUXILIARY BOILERS AND BACKUP FUEL SUPPLY FOR THE EMERGENCY DIESEL GENERATOR UNITS. TRANSFER PUMPS ARE PROVIDED TO TRANSFER OIL BETWEEN ANY OF THE DIESEL GENERATOR 7-DAY STORAGE TANKS AND THE FUEL OIL STORAGE TANKS.
2. INSTRUMENTS WITH LOOP NUMBERS WHICH ARE IDENTICAL FOR EACH DIESEL GENERATOR ARE IDENTIFIED IN THE SUBLOOP PORTION OF THE INSTRUMENT IDENTIFIER AS FOLLOWS:
   DIESEL GENERATOR 1A-A: XXXX-18-XXXX X/1X
   DIESEL GENERATOR 1B-B: XXXX-18-XXXX X/2X
   DIESEL GENERATOR 2A-A: XXXX-18-XXXX X/3X
   DIESEL GENERATOR 2B-B: XXXX-18-XXXX X/4X
3. XA-12-5A (AUX BLR A) AND XA-12-5B (AUX BLR B) ARE COMMON ANNUNCIATOR POINTS SERVING SYSTEM 12 INSTRUMENT LOOPS 5,54, 57,58,100, AND SYSTEM 18 INSTRUMENT LOOPS 18,96. SEE 47B601-55-48, XA-55-6E-11 & 18.
4. PRESSURE SNUBBERS ARE INSTALLED ON PS-18-96A & PS-18-96B.

SYMBOLS:

- PRESSURE REGULATOR WITH FILTER. PRESSURE SET TO BE DETERMINED BY MANUFACTURER'S REQUIREMENT FOR THE DEVICE BEING SUPPLIED.
- ⊠ POWER SUPPLIED TO ALL DEVICES ON THIS DRAWING IS NON-DIVISIONAL, UNLESS OTHERWISE NOTED.
- △ DEVICE LOCATED LOCALLY AT EQUIPMENT OR MOUNTED ON PIPING OR EQUIPMENT.

REFERENCE DRAWINGS:

47W840-1----------FUEL OIL FLOW DIAGRAM
47W610-12-1----------AUXILIARY BOILER CONTROL DIAGRAM
17W311 SERIES----------FUEL OIL PIPING
47W611-12 SERIES--------LOGIC DIAGRAMS - AUXILIARY BOILER
47W611-18-1----------LOGIC DIAGRAM - FUEL OIL

MANUFACTURER'S REFERENCE:

15069-P-3----------BURNER PIPING
792385----------PANEL DRAWING
15069-W-4----------WIRING DIAGRAM
M-A-629438-1----------MATERIAL LIST

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
6	ADMIN CHANGE	DGR			11-05-2002

INC: ADMIN CHANGE PER RIMS: B37 021105 001
THIS RESOLVES PER 02-007056-000

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE UNITS 1 & 2 — CATEGORY 1

MECHANICAL CONTROL DIAGRAM FUEL OIL SYSTEM

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
NUCLEAR ENGINEERING

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: M.J.BERKLEY	CHECKER: L.BEASLEY	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-8128. DRAWING MADE A CCD FROM AC-S & AD-R17. ADMIN. CHANGE.	1 L.BEASLEY
DESIGNER: N/A	REVIEWER: K.R.SPINO		2 J.W.WEBB
			3 M.R.SEDLACIK

ISSUED BY:	DATE			
C.R.BRIMER FOR PGT	6-21-90	45	M	CCD NO:1,2-47W610-18-1 R6

CAD MAINTAINED DRAWING

CONTROL ROOM DWG

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** DIESEL GENERATOR SYSTEM

IV. **LENGTH OF LESSON:** 2 hours classroom, 3 hour simulator demonstration; 1.5 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 Diesel Generator 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 Diesel Generator 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 Diesel Generator System as described in the SQN FSAR.
2. State the design basis of the Diesel Generator System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Diesel Generator System.
4. Describe the following items for each major component in the Diesel Generator 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 Diesel Generator System components are designed
   m. Location of controls and indications associated with the Diesel Generator 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 Diesel Generator (DG) system as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the DG 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 DG system operation
   f. How an instrument failure will affect system operation
6. Describe the administrative controls and limits for the DG system:
   a. State Tech Specs/TRM LCOs that govern the DG s
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the DG 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. OE20736 - Missed Acceptance Criteria

VI. TRAINING AIDS:

A. Classroom Computer and Local Area Network (LAN) Access

B. Computer projector

51. 064 K1.04 051

Given the following plant conditions:

- Unit 1 & 2 are steady-state at 100% power.
- 125V DC Vital Battery Board IV is inadvertently deenergized.
- All 4 Diesel Generators start.

Which ONE of the following describes an effect this has on the diesel generators?

A. Diesel Generator 1B-B could only be shutdown using the EMERGENCY STOP pushbutton on 0-M-26.

B. Diesel Generator 2B-B could only be shutdown using the Local Panel EMERGENCY STOP pushbutton at the DG Building.

C. All engine trips except for overspeed on Diesel Generator 1B-B would be disabled and ALL generator trips would remain enabled.

D. All generator trips except for generator differential on Diesel Generator 2B-B would be disabled and ALL engine trips would remain enabled.

DISTRACTOR ANALYSIS:

A. Incorrect, A loss of Vital Battery Board IV affects tyhe control power associated with Diesel Generator 2B-B not the 1B-B. Plausible if the control power supply for the Train B DGs and their associated controls are reversed.

B. CORRECT, A loss of Vital Battery Board III results in an auto start of all diesel generators via the CES relay and a loss of control power to the Main and Auxiliary Control Room controls for Unit 2. Vital Battery Board IV supplies control power to Diesel Generator 2B-B controls. Without control power available, Diesel Generator 2B-B can only be stopped using the Emergency Stop pushbutton locally at the diesel.

C. Incorrect, The condition of all trips being enabled except for the overspeed trip is not correct for the condition identified. Plausible because this condition would exist if the DG was paralleled to the board and received an emergency start signal from the CES relay.

D. Incorrect, The condition of all trips being enabled except for the generator differential trip is not correct for the condition identified. Plausible because this condition would exist if the DG received an emergency start signal from the emergency start pushbutton on 0-M-26.

Question No. 51

Tier 2 Group 1

K/A 064 K1.04
EDG: Knowledge of the physical connections and or cause-effect relationships between the EDG system and the following systems: DC distrubution system.

Importance Rating: 3.6 / 3.9

Technical Reference: AOP-P.02, Loss of 125V DC Vital Battery Board, Rev 11
1,2-45N767-2 R31
1,2-45N767-4 R
1,2-45N767-5 R15

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.DG B.4.b
Describe the following items for each major component in the Diesel Generator System:
b. power supplies (include control power as applicable)
g. Interlocks (including setpoints)

Question Source:

Bank # ___X_____
Modified Bank # _____
New _____

Question History: SQN Exam 1/2009,

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

10 CFR Part 55 Content: (CFR 41.2 to 41.9 / 45.7 to 45.8)

10CFR55.43.b (n/a)

Comments:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.4 Loss of 125V DC Vital Battery Board IV (cont'd)

NOTE 1 2B-B D/G CANNOT be stopped from the MCR until control power restored.

NOTE 2 D/G 2B-B ERCW supply valve is expected to open automatically, but MCR valve position indication is lost.

3. **DISPATCH** Operator to the D/G bldg to **PERFORM** the following:

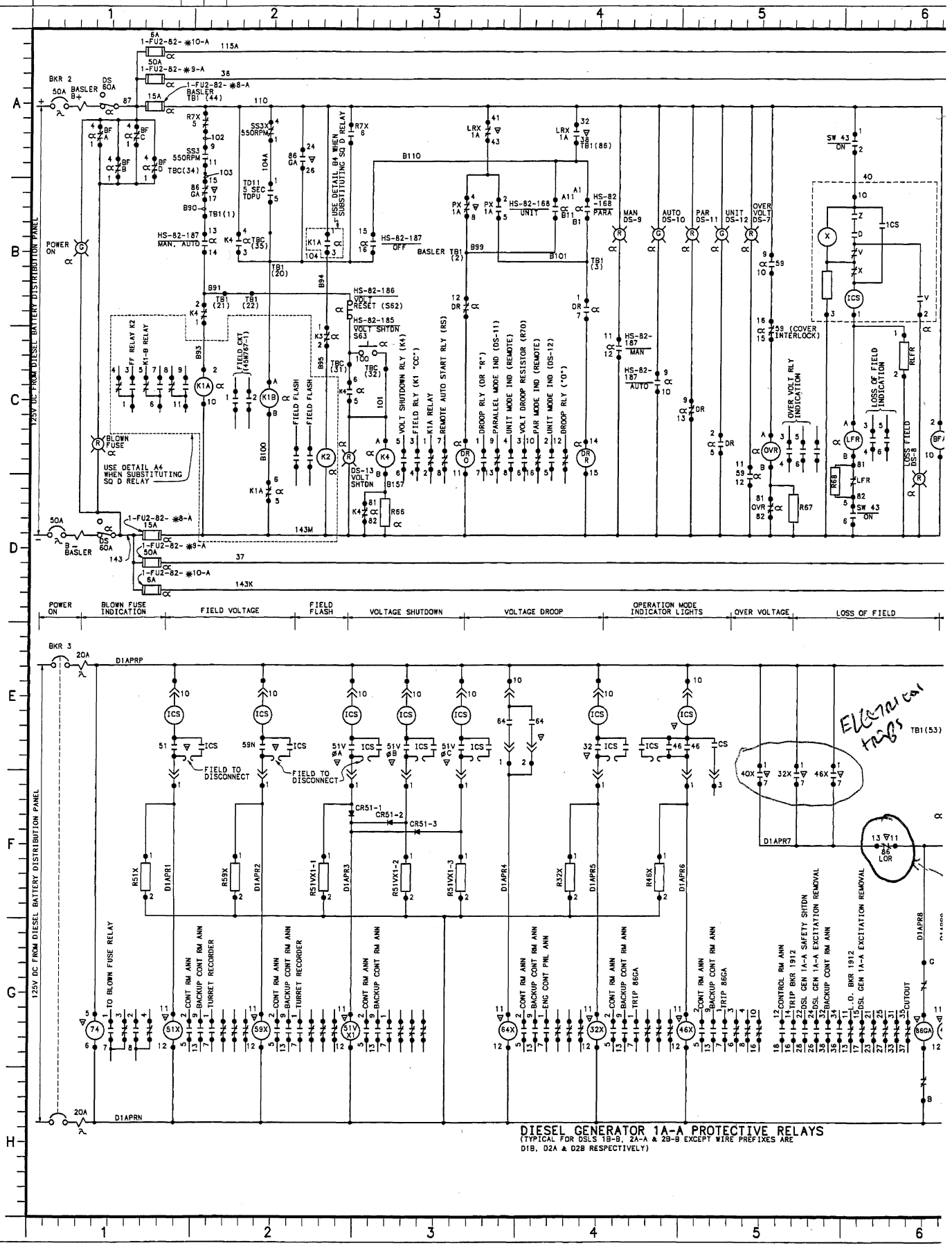
   - **ENSURE** 2B-B D/G ERCW supply valve **[2-FCV-67-67]** OPEN.

   - **OPEN** 2B-B D/G ERCW supply valve **[2-FCV-67-65]**.

4. **DISPATCH** Operators with radios to the following areas to determine the cause of the failure:

   - Aux Bldg el. 749', 125V Vital Battery Chargers

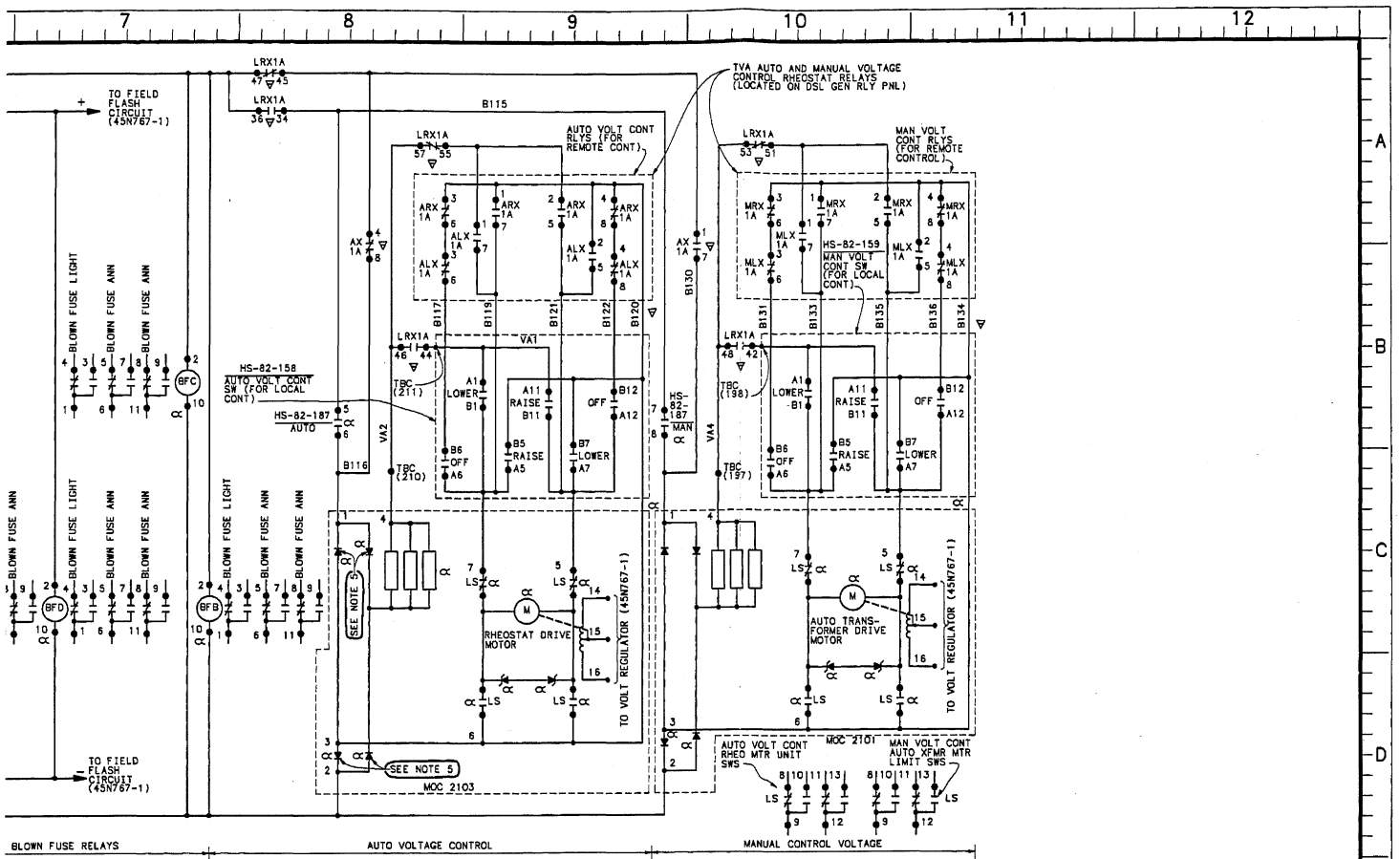
   - Aux Bldg el. 734', 125V Vital Battery Boards

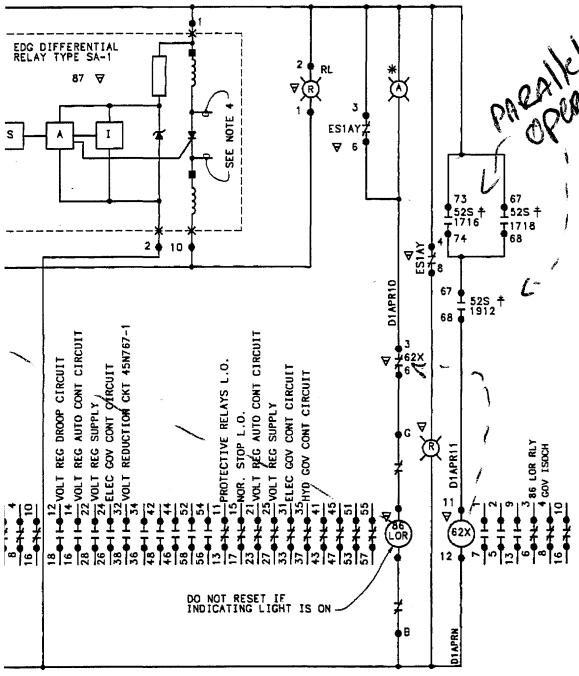


Electrical tags

DIESEL GENERATOR 1A-A PROTECTIVE RELAYS

(TYPICAL FOR DSLS 1B-B, 2A-A & 2B-B EXCEPT WIRE PREFIXES ARE D1B, D2A & D2B RESPECTIVELY)





NOTES:
1. DSL GENS 1A-A & 2A-A ASSOCIATED EQUIPMENT IS TRAIN A; DSL GENS 1B-B & 2B-B ASSOCIATED EQUIPMENT IS TRAIN B. ALL EQPT IS SAFETY RELATED.
2. FOR FUSE UNID COMBINE NO. BY FUSE AS SHOWN BELOW: EXAMPLE: 1-FU2-82-* 8-A — REFER TO NOTE 6 ON 45N767-1. THIS NO. WILL CHANGE TO 2 FOR UNIT 2 BOARDS.
3. SWITCH DESIGNATIONS SHOWN ARE FOR D-G 1A-A. FOR D-G 1B-B, 2A-A, 2B-B SEE LOCAL CONTROL SWITCH DESIGNATIONS ON DWG 45N767-5.
4. THE EDG DIFFERENTIAL RELAY IS BEING MODIFIED TO REMOVE THE Z3 ZENER DIODE, SEE NOTE 11, 45N767-1 FOR DETAILS.
5. FOR REPLACEMENT MODULES, VENDOR HAS REMOVED OR BYPASSED INPUT DIODES.

ADMIN CHANGE (TYP ALL BACKCIRCLES)

SYMBOLS:
- ---6900V SHTDN BD
- ---DSL RELAY PANEL
- ---UNIT CONTROL ROOM
- ---LOCAL CONTROL STATION
- ---MFR PNL (EXCITER PNL)
- ---DSL BTRY DISTR PNL

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
21	ADMIN CHANGE	DGR	JLG	BDS	12-10-07

INC: ADMIN CHANGE PER RIMS: B85 071207 004 THIS RESOLVES PER 100556.

SCALE: NONE — EXCEPT AS NOTED

DIESEL BUILDING
UNITS 1 & 2

CATEGORY 1

WIRING DIAGRAMS 6900V DIESEL GENERATORS SCHEMATIC DIAGRAMS SH 4

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

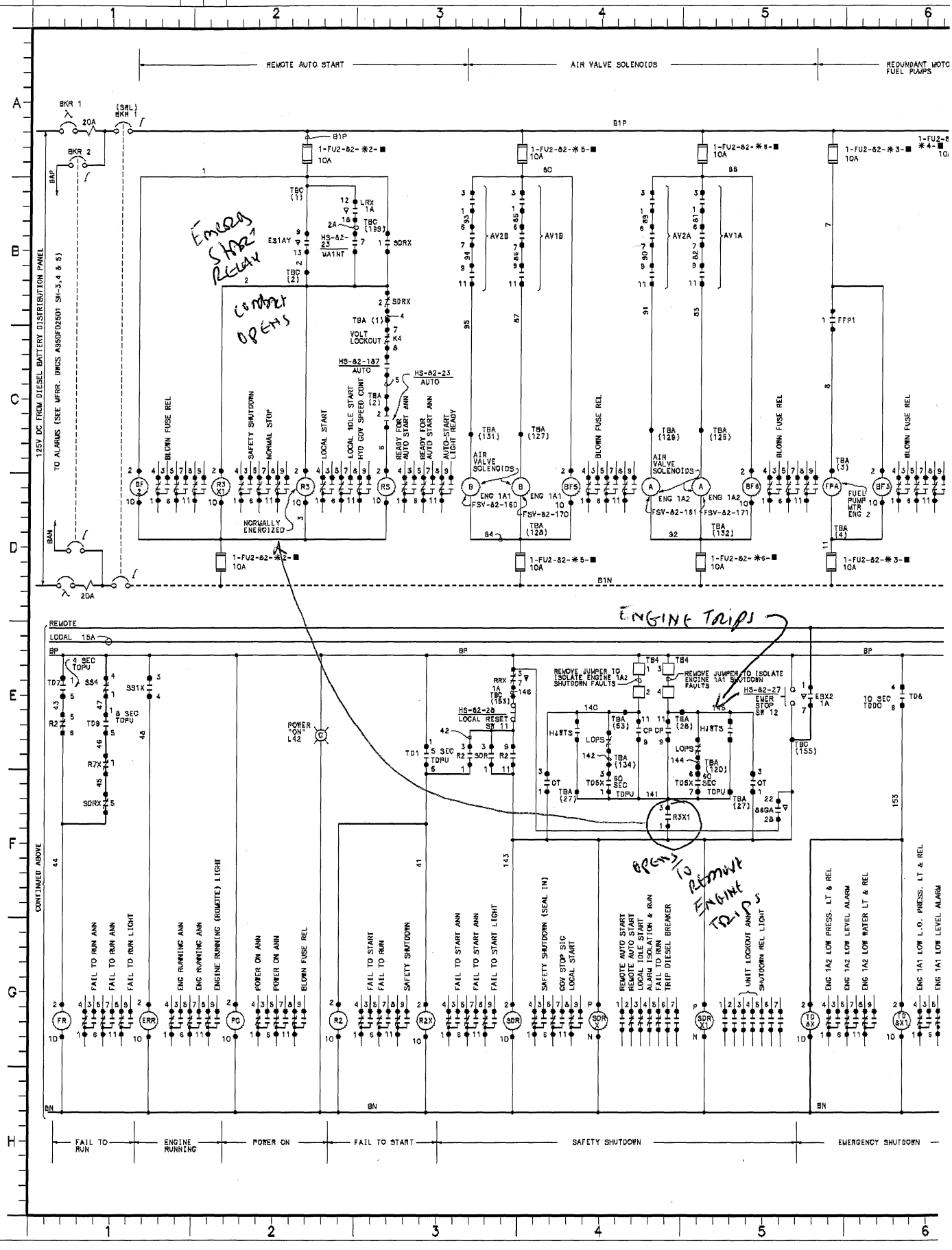
DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: J.AVITT	CHECKER: J.DUCK	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-8128. DRAWING MADE A CCD FROM AC-V & AD-R22. INC DCA-W01367-04 RO PER WP 1367-01 & DCN W01367A.	1 J.FLOYD
DESIGNER: N/A	REVIEWER: H.SUTTON		2 D.B.MURRAY
			3 M.R.SEDLACIK/LWA

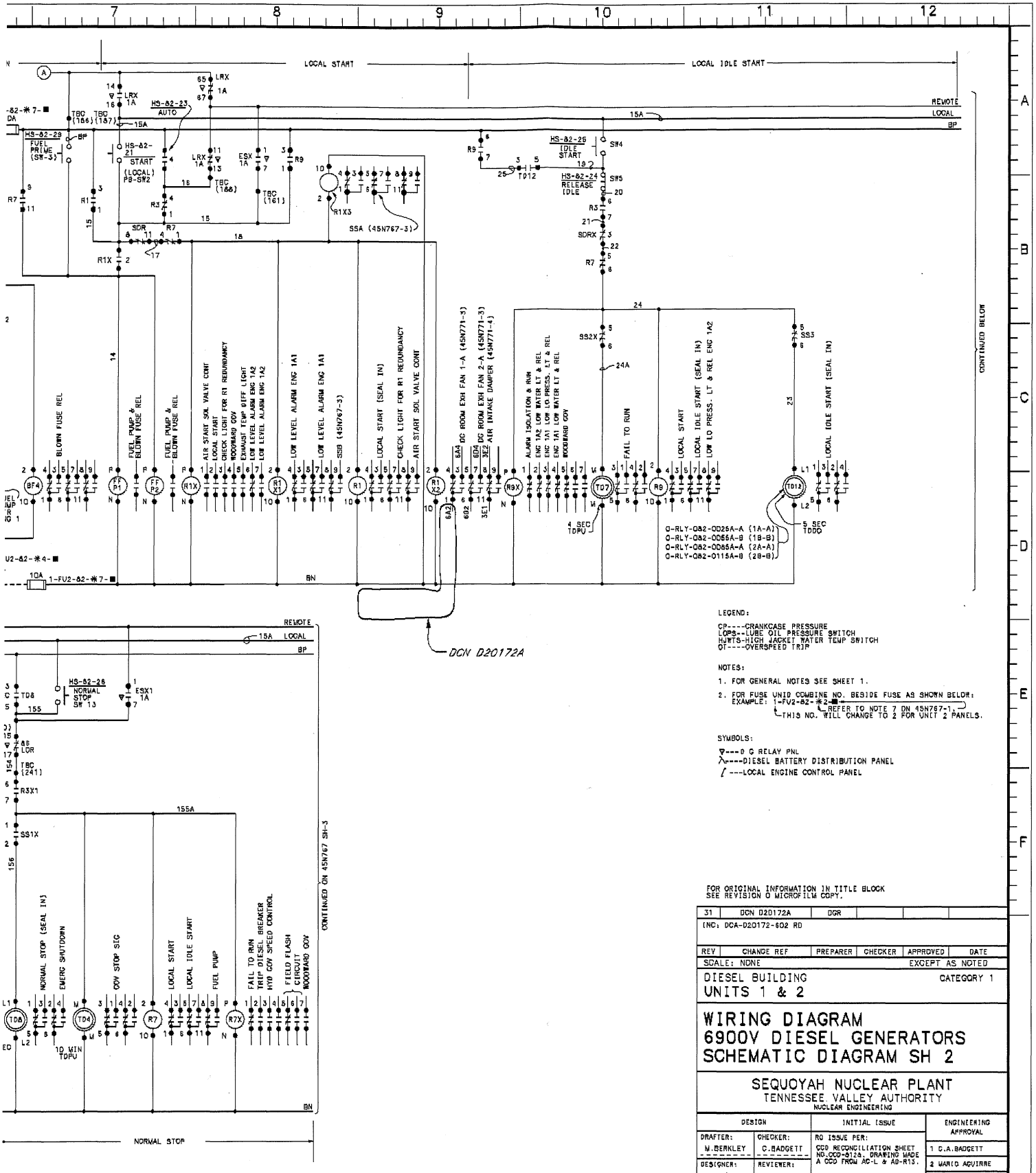
ISSUED BY: P.G.TRUDEL — DATE 2-8-90 — 45 — E

CCD NO: 1,2-45N767-4 R21

CAD MAINTAINED DRAWING

CONTROL ROOM DWG


REMOTE AUTO START
AIR VALVE SOLENOIDS
REDUNDANT WOTG FUEL PUMPS
125V DC FROM DIESEL BATTERY DISTRIBUTION PANEL
TO ALARMS (SEE MFRR. DWGS A95DF02501 SH-3,4 & 5)
BKR 1
BKR 2
20A
BAP
BAN
B1P
B1N
1-FU2-82-*2-■ 10A
1-FU2-82-*5-■ 10A
1-FU2-82-*6-■ 10A
1-FU2-82-*3-■ 10A
1-FU2-82-*4-■ 10A
TBC (1)
TBC (2)
TBC (199)
LRX 1A
ES1AY
HS-82-23 MAINT
SDRX
TBA (1)
VOLT LOCKOUT
K4
HS-82-187 AUTO
HS-82-23 AUTO
TBA (2)
BLOWN FUSE REL
SAFETY SHUTDOWN
NORMAL STOP
LOCAL START
LOCAL IDLE START
HYD GOV SPEED CONT
READY FOR AUTO START ANN
AUTO-START LIGHT READY
NORMALLY ENERGIZED
AV2B
AV1B
AV2A
AV1A
TBA (131)
TBA (127)
TBA (129)
TBA (125)
TBA (126)
TBA (132)
AIR VALVE SOLENOIDS
ENG 1A1 FSV-82-160
ENG 1A1 FSV-82-170
ENG 1A2 FSV-82-161
ENG 1A2 FSV-82-171
FFP1
FPA
TBA (3)
TBA (4)
FUEL PUMP MTR ENG 2
Emerg Shdn Relay
contact opens
ENGINE TRIPS
REMOTE
LOCAL
15A
4 SEC TDPU
8 SEC TDPU
TD7
TD9
SS4
SS1X
R2X
SDRX
R2
POWER "ON" L42
HS-82-28 LOCAL RESET SW 11
RRX 1A
TBC (153)
TD1
5 SEC TDPU
REMOVE JUMPER TO ISOLATE ENGINE 1A2 SHUTDOWN FAULTS
REMOVE JUMPER TO ISOLATE ENGINE 1A1 SHUTDOWN FAULTS
TB4
HS-82-27 EMER STOP SW 12
ESX2 1A
TBC (155)
10 SEC TDDO
TD6
HURTS
LOPS
TBA (55)
TBA (28)
TBA (134)
TBA (120)
TD5X 60 SEC TDPU
TBA (27)
R3X1
86GA
Opens to remove ENGINE TRIPS
CONTINUED ABOVE
FAIL TO RUN ANN
FAIL TO RUN LIGHT
ENG RUNNING ANN
ENGINE RUNNING (REMOTE) LIGHT
POWER ON ANN
BLOWN FUSE REL
FAIL TO START
SAFETY SHUTDOWN
FAIL TO START ANN
FAIL TO START LIGHT
SAFETY SHUTDOWN (SEAL IN)
GOV STOP SIG
REMOTE AUTO START
REMOTE AUTO STOP
LOCAL IDLE START
ALARM ISOLATION & RUN
FAIL TO RUN
TRIP DIESEL BREAKER
UNIT LOCKOUT ANN
SHUTDOWN REL LIGHT
ENG 1A2 LOW PRESS. LT & REL
ENG 1A2 LOW LEVEL ALARM
ENG 1A2 LOW WATER LT & REL
ENG 1A1 LOW L.O. PRESS. LT & REL
ENG 1A1 LOW LEVEL ALARM
FR
ERR
PG
R2
R2X
SDR
SDR X
SDR X1
TD 8X
TD 8X1
FAIL TO RUN
ENGINE RUNNING
POWER ON
FAIL TO START
SAFETY SHUTDOWN
EMERGENCY SHUTDOWN



LEGEND:

CP----CRANKCASE PRESSURE
LOPS--LUBE OIL PRESSURE SWITCH
HJWTS-HIGH JACKET WATER TEMP SWITCH
OT----OVERSPEED TRIP

NOTES:

1. FOR GENERAL NOTES SEE SHEET 1.
2. FOR FUSE UNID COMBINE NO. BESIDE FUSE AS SHOWN BELOW:
   EXAMPLE: 1-FU2-82-*2-■ (REFER TO NOTE 7 ON 45N767-1.)
   THIS NO. WILL CHANGE TO 2 FOR UNIT 2 PANELS.

SYMBOLS:

▽---0 G RELAY PNL
⅄----DIESEL BATTERY DISTRIBUTION PANEL
⌇---LOCAL ENGINE CONTROL PANEL

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

31	DCN D20172A	DGR			
INC: DCA-D20172-602 RD					
REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE

SCALE: NONE — EXCEPT AS NOTED

DIESEL BUILDING
UNITS 1 & 2 — CATEGORY 1

WIRING DIAGRAM
6900V DIESEL GENERATORS
SCHEMATIC DIAGRAM SH 2

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
NUCLEAR ENGINEERING

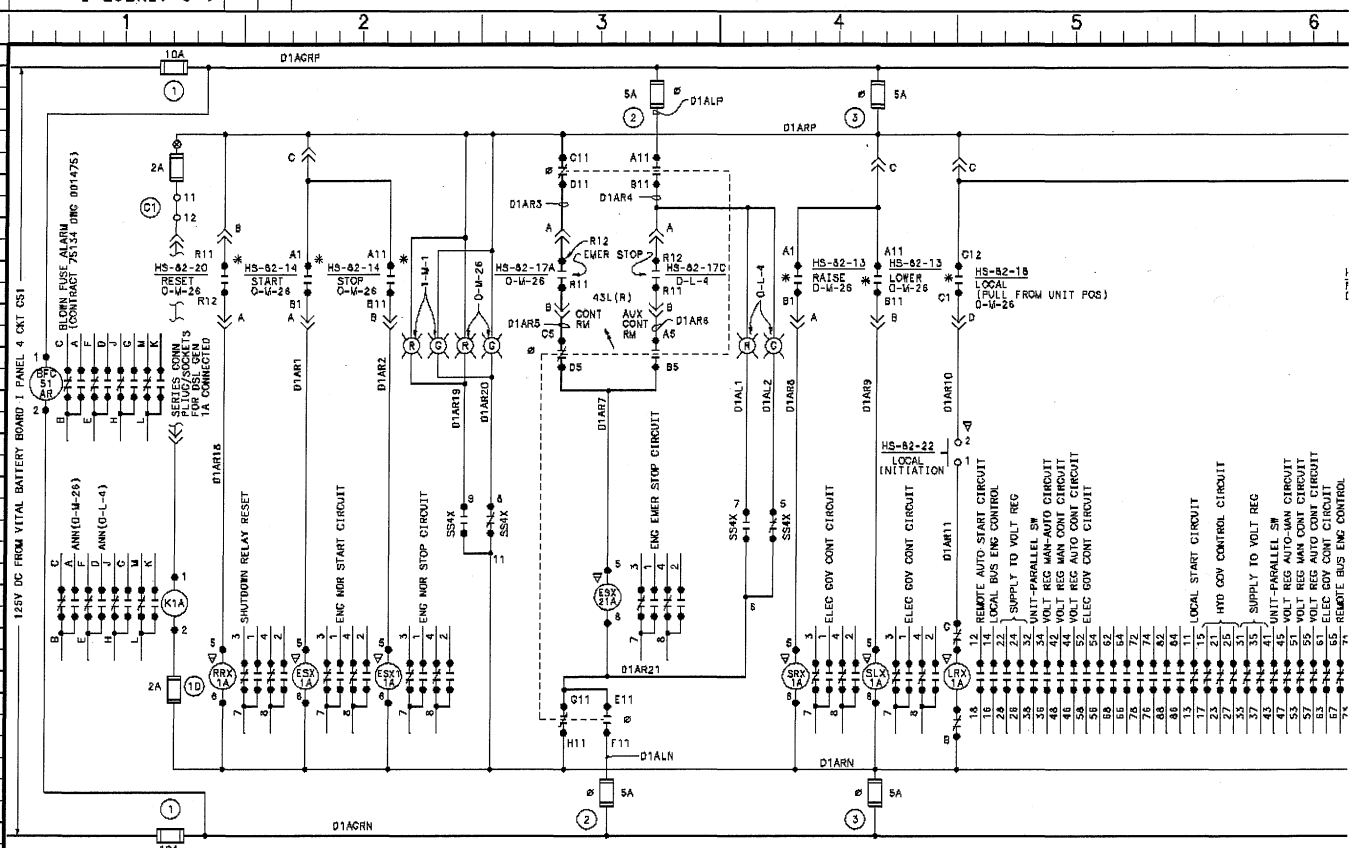
DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: M.BERKLEY	CHECKER: C.BADGETT	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-8128. DRAWING MADE A CCD FROM AC-L & AD-R13.	1 C.A.BADGETT
DESIGNER: N/A	REVIEWER: H.SUTTON		2 MARIO AGUIRRE
			3 W.R.SEDLACIK/LWA

ISSUED BY: P.G.TRUDEL — DATE 5-12-90 — 45 — E

CCD NO: 1,2-45N767-2 R31

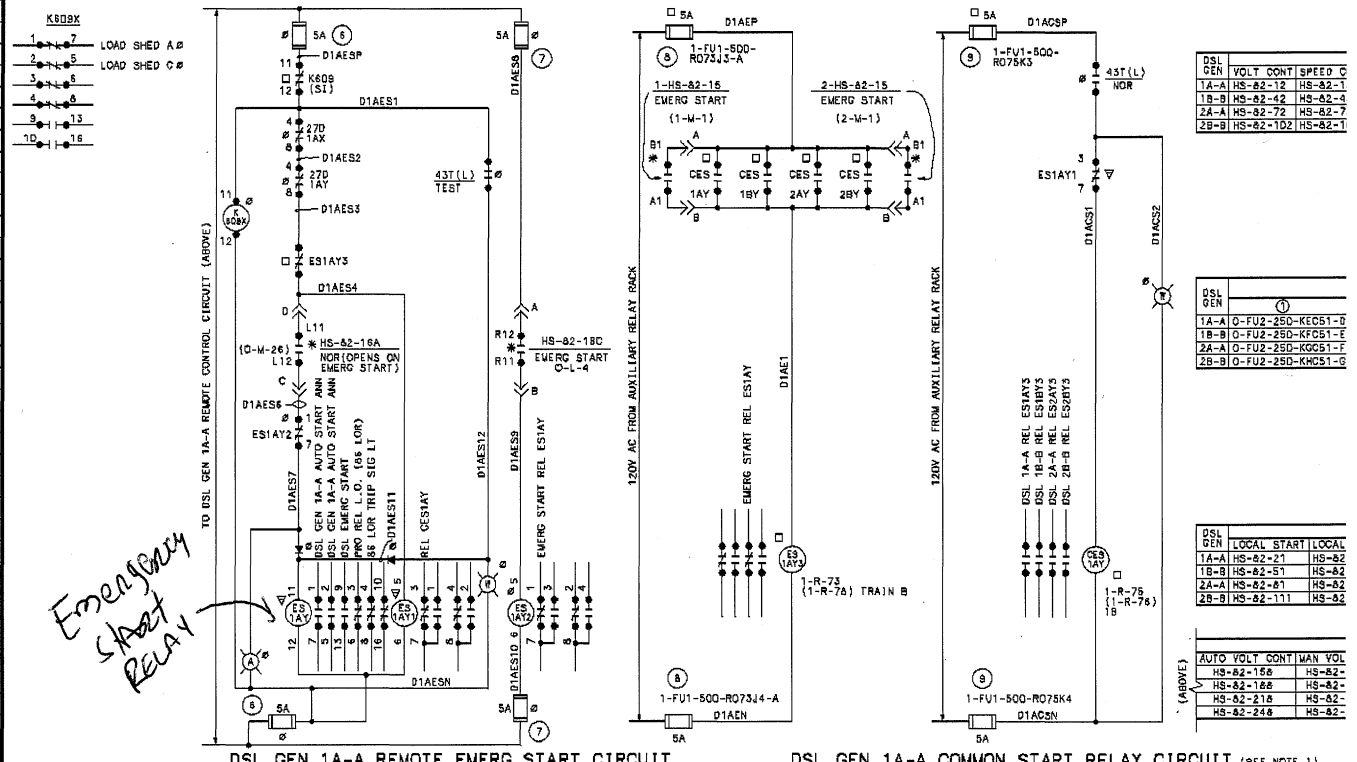
DRAWING SERVICES UNIT
PROCAD MAINTAINED DRAWING
THIS CONFIGURATION CONTROL DRAWING IS MAINTAINED BY THE SQN CAD UNIT AND IS NOW PART OF THE TVA PROCADAM DATABASE.
COMPUTER GRAPHICS

CONTROL ROOM DWG



DIESEL GENERATOR 1A-A REMOTE CONTROL CI

(TYPICAL FOR DSLS 1B-B, 2A-A & 2B-B EXCEPT WIRE PREFIXES ARE D1B, D2A & D
SEE TABLE BELOW FOR DSL GEN SWITCH DESIGNATIONS & FUSE I.D. N



DSL GEN	VOLT CONT	SPEED C
1A-A	HS-82-12	HS-82-1
1B-B	HS-82-42	HS-82-4
2A-A	HS-82-72	HS-82-7
2B-B	HS-82-1D2	HS-82-1

DSL GEN	①
1A-A	O-FU2-25D-KEC51-D
1B-B	O-FU2-25D-KFC51-E
2A-A	O-FU2-25D-KGC51-F
2B-B	O-FU2-25D-KHC51-G

DSL GEN	LOCAL START	LOCAL
1A-A	HS-82-21	HS-82
1B-B	HS-82-51	HS-82
2A-A	HS-82-81	HS-82
2B-B	HS-82-111	HS-82

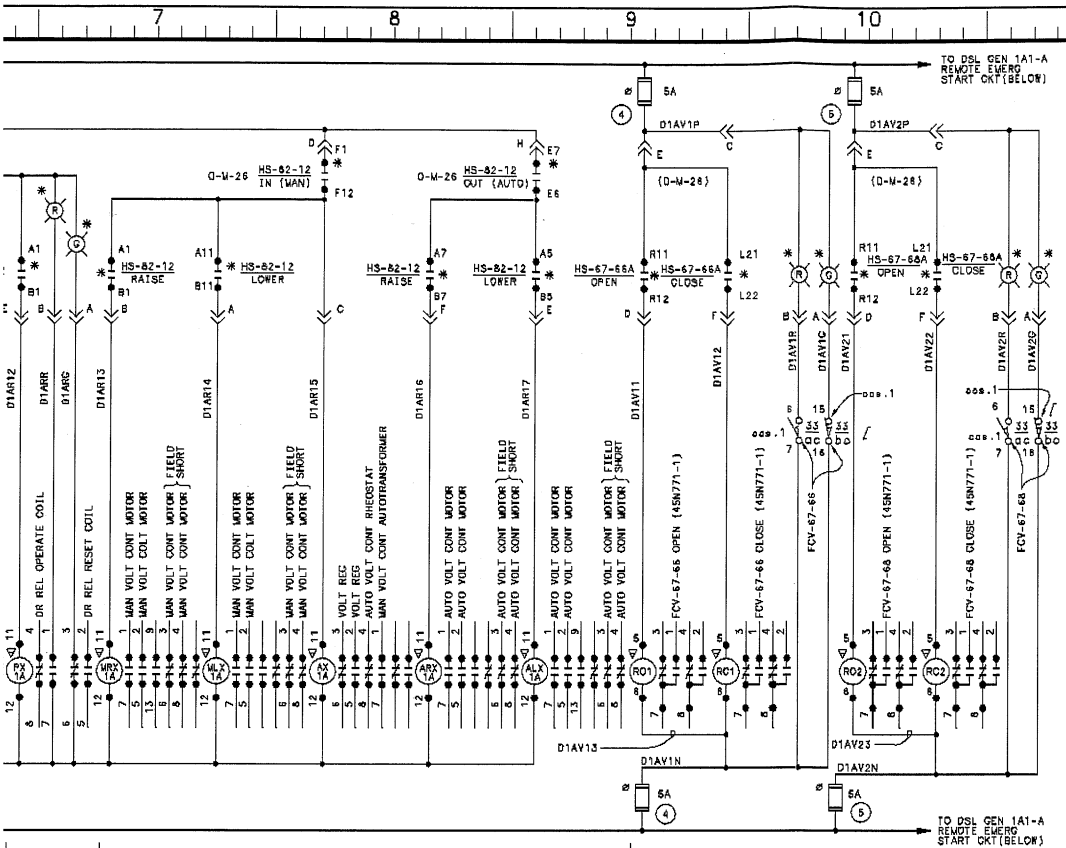
AUTO VOLT CONT	MAN VOL
HS-82-15B	HS-82-
HS-82-18B	HS-82-
HS-82-21B	HS-82-
HS-82-24B	HS-82-

(ABOVE)

DSL GEN 1A-A REMOTE EMERG START CIRCUIT

DSL GEN 1A-A COMMON START RELAY CIRCUIT (SEE NOTE 1)

(TYPICAL FOR DSLS 1B-B, 2A-A & 2B-B EXCEPT WIRE PREFIXES ARE D1B, D2A, & D2B RESPECTIVELY)
SEE TABLE AT RIGHT FOR DSL GEN SWITCH DESIGNATIONS & FUSE I.D. NOS.



SWITCH DESIGNATION						125V VITAL POWER			RELAY TAG	
NT	EMERG START	EMERG START	EMERG STOP	MODE SELECT	START RESET	BD	PNL	CKT	BLOWN FUSE RELAY	IDLE START RELAY
2-14	HS-82-15	HS-82-15A & C	HS-82-17A & C	HS-82-18	HS-82-20	I	4	C51	BFC51AR1A	D-RLY-082-0025A-A
2-44		HS-82-46A & C	HS-82-47A & C	HS-82-48	HS-82-50	II	4	C51	BFC51AR1B	D-RLY-082-0055A-B
2-74		HS-82-75A & C	HS-82-77A & C	HS-82-78	HS-82-80	III	4	C51	BFC51AR2A	D-RLY-082-0085A-A
2-104		HS-82-105A & C	HS-82-107A & C	HS-82-108	HS-82-110	IV	4	C51	BFC51AR2B	D-RLY-082-0115A-B

ADMIN CHANGE

NOTES:

1. DIESEL GENERATORS 1A-A & 2A-A ASSOCIATED EQUIPMENT IS TRAIN A; DIESEL GENERATORS 1B-B & 2B-B ASSOCIATED EQUIPMENT IS TRAIN B. ALL EQUIPMENT IS SAFETY RELATED EXCEPT DIESEL GENERATORS COMMON START RELAY CIRCUIT.
2. DIESEL GENERATOR 1A-A PROTECTIVE RELAYS MOVED TO 45N767-4.
3. RELAYS CES2AY, CES2BY, ES2AY3 AND ES2BY3 ARE LOCATED IN THE UNIT 1 RELAY RACKS NOTED ON DRAWING.
4. NUMBERS IN CIRCLES BY FUSES REFER TO FUSE I.D. NO. WHICH CAN BE FOUND FROM THE TABLE.
5. FUSE NUMBERS SHOWN IN TABLES SHOULD BE COMBINED WITH THE APPLICABLE BOARD PREFIX LISTED BELOW TO FORMULATE COMPLETE UNIQUE FUSE IDENTIFICATION NUMBER:
   1-FU1-500-( )
   EXAMPLE: 1-FU1-500-RO73J3-A & 1-FU1-500-RO73J4-A
   WHEN THE FUSE IS LOCATED IN A RELAY RACK, THE FUSE UNID TAKES THE UNIT ASSIGNMENT OF THE RELAY RACK. FOR EXAMPLE, THE UNIT 2 DIESEL EMERGENCY AND COMMON EMERGENCY START RELAYS, CES2AY, CES2BY, ES2AY3 AND ES2BY3 HAVE FUSE UNIDS ASSIGNED PER THIS NOTE EXCEPT THE UNIT ASSIGNMENT IS THE SAME AS THE RELAY RACK IN WHICH THEY ARE LOCATED.

LOCATION SYMBOLS:

- ⌀-----6.9KV SD BD LOGIC PNL
- ✱-----UNIT CONTROL ROOM
- ⊗-----M PANEL
- △-----AUX CONTROL ROOM
- □-----RELAY RACK AUX INST. RM.
- ƒ-----LOCAL CONTROL STATION
- ▽-----DSL GEN RELAY PANEL

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

FUSE UNIDS (SEE NOTE 4)			
②	③	④	⑤
D2-SA1-A	1-FU2-2D2-SA2-A	1-FU2-2D2-SA3-A	1-FU2-2D2-SA4-A
D2-SB1-B	1-FU2-2D2-SB2-B	1-FU2-2D2-SB3-B	1-FU2-2D2-SB4-B
D2-SC1-A	2-FU2-2D2-SC2-A	2-FU2-2D2-SC3-A	2-FU2-2D2-SC4-A
D2-SD1-B	2-FU2-2D2-SD2-B	2-FU2-2D2-SD3-B	2-FU2-2D2-SD4-B

(BELOW)

⑥	⑦	⑧(SEE NOTE 5)	⑨(SEE NOTE 5)	⑩
1-FU2-2D2-SA5-A	1-FU2-2D2-SA6-A	RO73J3-A, RO73J4-A	RO75K3, RO75K4	1-FU2-82-1A-A
1-FU2-2D2-SB5-B	1-FU2-2D2-SB6-B	RO78J8-B, RO78J10-B	RO76K21, RO76K22	1-FU2-82-1B-B
2-FU2-2D2-SC5-A	2-FU2-2D2-SC6-A	RO73J5-A, RO73J6-A	RO75M3, RO75M4	2-FU2-82-2A-A
2-FU2-2D2-SD5-B	2-FU2-2D2-SD6-B	RO78J11-B, RO78J12-B	RO76M2, RO76M3	2-FU2-82-2B-B

SWITCH DESIGNATION (LOCAL CONTROL)						
TO-MAINT.SW	IDLE RELEASE	IDLE START	STOP	EMERG.STOP	SD RESET	FUEL PRIME
-82-23	HS-82-24	HS-82-25	HS-82-26	HS-82-27	HS-82-28	HS-82-29
-82-53	HS-82-54	HS-82-55	HS-82-56	HS-82-57	HS-82-58	HS-82-59
-82-83	HS-82-84	HS-82-85	HS-82-86	HS-82-87	HS-82-88	HS-82-89
-82-113	HS-82-114	HS-82-115	HS-82-116	HS-82-117	HS-82-118	HS-82-119

(BELOW)

OV. CONT	TRIM ENG 1A1	TRIM ENG 1A2	UNIT/PARALLEL	ELEC.GOV	VOLT SD	VOLT RESET	VOLT REG
S-82-165	HS-82-166A,B	HS-82-167A,B	HS-82-168	HS-82-169	HS-82-185	HS-82-186	HS-82-187
S-82-195	HS-82-196A,B	HS-82-197A,B	HS-82-198	HS-82-199	HS-82-215	HS-82-216	HS-82-217
S-82-225	HS-82-226A,B	HS-82-227A,B	HS-82-228	HS-82-229	HS-82-245	HS-82-246	HS-82-247
S-82-255	HS-82-256A,B	HS-82-257A,B	HS-82-258	HS-82-259	HS-82-275	HS-82-276	HS-82-277

15	ADMIN CHANGE	DGR			
INC: ADMIN CHANGE PER RIMS: B37 981015 001					
REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE

SCALE: NONE — EXCEPT AS NOTED

DIESEL BUILDING — CATEGORY 1
UNITS 1 & 2

WIRING DIAGRAMS 6900V DIESEL GENERATORS SCHEMATIC DIAGRAMS SH 5

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
NUCLEAR ENGINEERING

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: L.WALTERS	CHECKER: JAO/RP	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-1820. DRAWING MADE A CCD FROM AC-R & AD-R1A.	1 K.OBERHOLTZER
DESIGNER: N/A	REVIEWER: M.SCRUGGS		2 W.R.SEDLACIK
			3 A.L.SMITH

ISSUED BY: J.B.HOSMER — DATE: 6-15-98 — 45 — E

CCD NO: 1,2-45N767-5 R15

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:** DIESEL GENERATOR SYSTEM

IV. **LENGTH OF LESSON:** 2 hours classroom, 3 hour simulator demonstration; 1.5 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 Diesel Generator 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 Diesel Generator 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 Diesel Generator System as described in the SQN FSAR.
2. State the design basis of the Diesel Generator System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Diesel Generator System.
4. Describe the following items for each major component in the Diesel Generator 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 Diesel Generator System components are designed
   m. Location of controls and indications associated with the Diesel Generator 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 Diesel Generator (DG) system as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the DG 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 DG system operation
   f. How an instrument failure will affect system operation
6. Describe the administrative controls and limits for the DG system:
   a. State Tech Specs/TRM LCOs that govern the DG s
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the DG 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. OE20736 - Missed Acceptance Criteria

VI. TRAINING AIDS:

A. Classroom Computer and Local Area Network (LAN) Access

B. Computer projector

52. 073 A4.02 052

Given the following:

- A Source check is to be performed on 0-RM-90-101B, Auxiliary Building Vent Rad Monitor.
- The ESF function of the monitor is to be blocked using 0-HS-90-136A3, Process Rad Monitor System Block Switch.

In accordance with the applicable System Operating Instruction, which ONE of the following describes how ...

(1) the block switch would be positioned during the source check.
and
(2) the effect the positioning of the block switch will have on the ability to block the ESF function of 1-RM-90-130, Containment Purge Rad Monitor?

A. (1) The block switch would be placed to the "101B" position and pulled out.
(2) 1-RM-90-130A could be blocked without pulling the HI RAD relay.

B. (1) The block switch would be placed to the "101B" position and pulled out.
(2) 1-RM-90-130A could NOT be blocked without pulling the HI RAD relay.

C. (1) The block switch would be placed to the "101B" position and pushed in.
(2) 1-RM-90-130A could be blocked without pulling the HI RAD relay.

D. (1) The block switch would be placed to the "101B" position and pushed in.
(2) 1-RM-90-130A could NOT be blocked without pulling the HI RAD relay.

DISTRACTOR ANALYSIS:

A. *CORRECT, The SO directs the block switch for 0-RM-90-101B to be placed to the 101B position and pulled out or the HI rad relay to be removed to block the ESF function. With the Hi Rad relay installed the switch must be placed to the block position. The Containment Purge Monitor can be blocked in the same manner and would not require the removal of the Hi Rad Relay because the purge monitor is not on the same block switch as the Aux Building Vent Monitor.*

B. *Incorrect, The SO directs the block switch for 0-RM-90-101B to be placed to the 101B position and pulled out or the HI rad relay to be removed to block the ESF function. With the Hi Rad relay installed the switch must be placed to the block position. The Containment Purge Monitor can be blocked in the same manner and would not require the removal of the Hi Rad Relay because the purge monitor is not on the same block switch as the Aux Building Vent Monitor. Plausible because the block switches can have functions for multiple rad mon and only one can be blocked at a time, thus requiring the removal of the Hi Rad relay for the additional monitor.*

C. *Incorrect, the SO directs the block switch for 0-RM-90-101B to be placed to the 101B position and pulled out, not pushed in and the Containment Purge Monitor can be blocked by the positioning a different block switch, thus, not requiring the removal of the Hi Rad Relay. Plausible because there are control switches in the MCR that can be pushed in to establish conditions in circuits and well as pulled out to establish conditions and the effect on the Containment Purge Rad Monitor is correct.*

D. *Incorrect, the SO directs the block switch for 0-RM-90-101B to be placed to the 101B position and pulled out not, pushed in and the Containment Purge Monitor can be blocked by the positioning a different block switch, thus, not requiring the removal of the Hi Rad Relay. Plausible because there are control switches in the MCR that can be pushed in to establish conditions in circuits and well as pulled out to establish conditions and because the block switches can have functions for multiple rad mon and only one can be blocked at a time, thus requiring the removal of the Hi Rad relay for the additional monitor.*

Question No. 52

Tier 2 Group 1

K/A 073 A4.02
Ability to manually operate and/or monitor in the control room:
Radiation monitoring system control panel

Importance Rating: 3.7 / 3.7

Technical Reference: 0-SO-90-2, Gaseous Process Radiation Monitoring System, Rev 21
1-SO-90-2, Gaseous Process Radiation Monitoring System, Rev 36

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.RM, Obj. 4.e, 4.f
Describe the following items for each major component in the Radiation monitoring System:
e. Component operation
f. Controls

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.7 / 45.5 to 45.8)

10CFR55.43.b (n/a)

Comments: New for SQN Exam 1/2009

QUESTIONS REPORT
for 2009 RO test first cut

Question No. 52

Tier 2 Group 1

K/A 073 A4.02
Ability to manually operate and/or monitor in the control room:
Radiation monitoring system control panel

Importance Rating: 3.7 / 3.7

Technical Reference: 0-SO-90-2, Gaseous Process Radiation Monitoring System, Rev 21
1-SO-90-2, Gaseous Process Radiation Monitoring System, Rev 36

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.RM, Obj. 4.e, 4.f
Describe the following items for each major component in the Radiation monitoring System:
e. Component operation
f. Controls

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.7 / 45.5 to 45.8)

10CFR55.43.b (n/a)

Comments: New for SQN Exam 1/2009

Date_____

8.0 INFREQUENT OPERATION

8.1 Verifying Operability of Rad Monitors

[1] **IF** radiation monitor can initiate an ESF actuation **AND** monitor not in BLOCK, **THEN**

PERFORM section 8.2 to BLOCK ESF actuation function. _____

[2] **IF** verifying operability of 0-RE-90-125 or 126, **AND** Radiation Monitor isolation relay was removed for maintenance or testing, **THEN**

REQUEST Instrument Maintenance to verify isolation relay installed and operable according to the applicable procedure or WO. **[C.2]**

Isolation Relay Reinstalled by Instrument Maintenance

MIG Signature/Date _____/_____ _____/_____
1st IV

[3] **IF** verifying operability of 0-RE-90-101, **AND** the HRA and HRB relay circuit fuses were removed due to maintenance or other activities, **THEN**

REQUEST Instrument Maintenance to reinstall the fuses using the applicable Instruction or WO. **[C.2]**

MIG Signature/Date _____/_____ _____/_____
1st IV

Date_____

8.1 Verifying Operability of Rad Monitors (Continued)

[4] **IF** source checking RM-90-125, -126, -205, or -206, **THEN**

[a] **PLACE** applicable rad monitor Mode Selector Switch to **INT** position. ☐

[b] **PLACE** operator selector switch to **SOURCE CHECK** position. ☐

[c] **OBSERVE** ratemeter trending upscale. ☐

[d] **RELEASE** operator selector switch **AND**

VERIFY it returns to **OPERATE** position. ☐

[e] **ENSURE** high Rad Alarm is **CLEAR**. ☐

[5] **IF** performing source check for 0-RM-90-118, 0-RM-90-132B or 0-RM-90-101B, **THEN**

PERFORM the following:

[a] **PRESS** the **[CLR]** button on the RM-1000 as necessary to return the Bar Graph display and reset any associated alarms. ☐

[b] **PRESS** the **[FUN]** button on the RM-1000 to access the function screen, **AND**
SELECT 2 Checksource, by pressing the **[2]** button. ☐

[c] **VERIFY** radiation indicator being checked responds upscale. ☐

[d] **PRESS** the **[CLR]** button on the RM-1000, **AND**
ENSURE bargraph display returns to normal. ☐

Date_____

8.1 Verifying Operability of Rad Monitors (Continued)

[6] **IF** 0-RE-90-101, 0-RE-90-102, or 0-RE-90-103 has been source checked, **THEN**

RESET applicable switch listed below, **AND**

VERIFY its white light is not lit. (N/A any others)

RAD MONITOR	RESET SWITCH NO.	INITIALS
0-RE-90-101	0-HS-90-101G	_____
0-RE-90-102	0-HS-90-102	_____
0-RE-90-103	0-HS-90-103	_____

[7] **IF** RM-90-125, -126, -205, or -206 has been source checked, **THEN**

ENSURE applicable rad monitor Mode Selector Switch is placed in **DIFF** position.

_____ _____
1st IV

[8] **IF** Rad Monitor was placed in **BLOCK** position, **THEN**

GO TO section 8.3 to return BLOCK switch to **NORMAL** position.

_____

END OF TEXT

Date_____

8.2 Blocking Rad Monitor Automatic Functions.

NOTE Mark steps N/A for rad monitors not blocked.

[1] **REFER** to applicable LCOs and ODCM for Rad Monitor function being removed from service. _____

[2] **DETERMINE** applicable step:

[a] **IF** automatic functions for **[0-RM-90-101B]** to be BLOCKED,
THEN GO TO step **[3]**. ☐

[b] **IF** automatic functions for **[0-RM-90-102]** to be BLOCKED,
THEN GO TO step **[4]**. ☐

[c] **IF** automatic functions for **[0-RM-90-103]** to be BLOCKED,
THEN GO TO step **[5]**. ☐

[d] **IF** automatic functions for **[0-RM-90-125]** to be BLOCKED,
THEN GO TO step **[6]**. ☐

[e] **IF** automatic functions for **[0-RM-90-126]** to be BLOCKED,
THEN GO TO step **[7]**. ☐

[3] **ENSURE [0-RM-90-101B]** removed from service to prevent an ESF actuation by performing one of the following: (N/A actions not required)

[a] **IF** 0-RM-90-101B previously removed from service , **THEN**

VERIFY 0-RM-90-101B BLOCKED or high rad relays removed. _____

NOTE Reference ODM 1.1.2.

[b] **IF** Non-Div rad monitor block switch 0-HS-90-136A3 is in OFF position, **THEN**

ROTATE [0-HS-90-136A3] to the 101B position and PULL OUT position.

_____ _____
1st CV

Date_____

5.2 Placing Containment Purge Monitors in Service

NOTE 1 Loss of power to a Rad Monitor module will initiate an ESF actuation. **[C.2]**

NOTE 2 Placing the Rad Monitor in the block position prior to placing it in service will prevent an inadvertent ESF actuation from monitors that have an ESF function. **[C.1]**

[1] **VERIFY** 1-RE-90-130 **and/or** 1-RE-90-131 available for service. _____

[2] **ENSURE** the containment purge supply and exhaust valves are **CLOSED** in accordance with LCO 3.3.2, Table 3.3-3, Action 19. _____

[3] **IF BLOCK** of 1-RE-90-130 required,
THEN
GO TO section 8.7, when BLOCK performed, return to step **[4].** _____

[4] **IF BLOCK** of 1-RE-90-131 required,
THEN
GO TO section 8.7, when BLOCK performed, return to step **[5].** _____

NOTE Valve diagram in Appendix A may be referred to when aligning 1–RE–90–130 and 1–RE–90–131.

[5] **ENSURE** the following valve checklist is completed.

RAD MONITOR	FUNCTION	ATTACH NUMBER	VALVE CHECKLIST	INITIALS
1–RE–90–130 and 1–RE–90–131	Containment Purge Air Exhaust Monitors	9	1–90–2.09	_____

Date_____

8.7 Blocking Rad Monitor Automatic Functions.

NOTE Mark steps N/A for rad monitors not blocked.

[1] **DETERMINE** applicable step:

[a] **IF** automatic functions for **[1-RM-90-130]** to be BLOCKED, **THEN** GO TO step **[2].** ☐

[b] **IF** automatic functions for **[1-RM-90-131]** to be BLOCKED, **THEN** GO TO step **[3].** ☐

[2] **ENSURE [1-RM-90-130]** removed from service to prevent an ESF actuation by performing one of the following: (N/A actions not required)

[a] **VERIFY** 1-RM-90-130 previously BLOCKED or high rad relays removed. _____

CAUTION **If 0-HS-90-136A1 in a position other than OFF or 1-130, DO NOT proceed with this section until switch position status investigated.**

[b] **IF** Train A rad monitor block switch 0-HS-90-136A1 is in OFF position, **THEN**

PLACE [0-HS-90-136A1] in 1-130 position and PULL OUT position. _____ _____
1st CV

[c] **IF** 1-RM-90-130 CANNOT be blocked using block switch,

THEN

NOTIFY MIG to remove 1-RM-90-130 high rad isolation relay. _____

[3] **ENSURE [1-RM-90-131]** removed from service to prevent initiation of an ESF actuation by performing one of the following: (N/A any actions not required)

[a] **VERIFY** 1-RM-90-131 previously BLOCKED or high rad relays removed. _____

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)

53. 076 A4.01 053

Given the following Unit 1 conditions:

- All ERCW pump controls are in a normal preferred alignment per 0-SO-67-1, "Essential Raw Cooling Water".
- ERCW Pump L-B trips.
- Train "B" ERCW header stablizes at 68 psig.
- The CRO places L-B pump handswitch in STOP PULL-TO-LOCK.

Which ONE of the following identifies the additional action(s) required to be taken in response to this event?

A. Manually start ERCW Pump N-B. Reposition 0-XS-67-286, DG Power Selector Switch.

B. Manually start ERCW Pump N-B. Leave 0-XS-67-286, DG Power Selector Switch in the position prior to the L-B pump trip.

C. Pressure remains within the normal operating band. Reposition 0-XS-67-286, DG Power Selector Switch.

D. Pressure remains within the normal operating band. Leave 0-XS-67-286, DG Power Selector Switch in the position prior to the L-B pump trip.

DISTRACTOR ANALYSIS

SOI-67.01 states **"ENSURE** diesel power selector switches are **SELECTED** for operable pumps, running pump preferred:" AOP-M.01 section 2.1 for ERCW pump failure has the selector switch transferred away from the failed pump.

A. *CORRECT. The pressure is less than the operating band of 78 to 124 psig identified in AOP-M.01 for the Train B Pressure and the procedure directs the starting of additional ERCW pumps. The DG Power selector switch is normally selected to the running pump and would require repositioning to the N-B pump.*

B. *Incorrect. The pressure is less than the operating band of 78 to 124 psig identified in AOP-M.01 for the Train B Pressure, therefore the starting of additional ERCW pumps is correct. However, the DG Power selector switch is normally selected to the running pump and would require repositioning to the N-B pump. Plausible because the starting of an additional pump is correct and the selector switch can be selected to either of the pumps fed from the same shutdown board, with the preferred position being selected to the running pump..*

C. *Incorrect. The pressure is less than the operating band of 78 to 124 psig identified in AOP-M.01 for the Train B Pressure. The DG Power selector switch is normally selected to the running pump and would require repositioning to the N-B pump. Plausible because the candidate must know the normal operating band for the question in order to determine the pressure is not within the band and may correctly identify that the selector switch is required to be repositioned.*

D. *Incorrect. The pressure is less than the operating band of 78 to 124 psig identified in AOP-M.01 for the Train B Pressure and the DG Power selector switch is normally selected to the running pump and would require repositioning to the N-B pump. Plausible because the candidate must know the normal operating band for the question in order to determine the pressure is not within the band and also know that the DG Power selector switch would have been selected to the L-B pump prior to its trip, thus requiring the switch to be repositioned.*

Proposed 2/6/2009
Sequoyah NRC RO Written Exam
as submitted

Question No. 53

Tier 2 Group 1

K/A 076 A4.01
Ability to manually operate and/or monitor in the control room: SWS pumps

Importance Rating: 2.9 / 2.9

Technical Reference: 0-SO-67-1, Essential Raw Cooling Water, Rev 0078
AOP-M.01, Loss of Essential Raw Cooling Water, Rev 19

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200ERCW, B.14.d &.f
Describe the following items for each major component in the Service Water System:
d. Normal operating parameters
F. Controls

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

Question History: SQN bank question ERCW-B.18.A 001 modified

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

10 CFR Part 55 Content: (41.7 / 45.5 to 45.8)

10CFR55.43.b (n/a)

Comments: Orginal question, ERCW-B.18.A 001, used on 2004 exam.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 ERCW Pump Failure

1. **IDENTIFY** and **LOCK OUT** failed ERCW pump.

2. **START** additional ERCW pumps as required to maintain supply header pressure between 78 psig and 124 psig.

3. **CHECK** two Train A ERCW Pumps AVAILABLE.

   IF less than two Train A ERCW Pumps available,
   THEN
   EVALUATE isolation of non-essential Train A CCS heat loads **USING** Appendix E, CCS Heat Load Reduction **[C.1]**

4. **CHECK** 1A and 2A ERCW supply header pressures and flows NORMAL:

   a. Supply header pressures [between 78 psig and 124 psig]:

      - 1-PI-67-493A
      - 2-PI-67-493A

   IF BOTH 1A **AND** 2A ERCW Headers FAILED,
   THEN
   GO TO Section 2.9, ERCW Supply Header A Failure Prior to ERCW Strainer Inlet Valves.

   b. Supply header flows [expected value]:

      - 1-FI-67-61
      - 2-FI-67-61

   IF 1A **OR** 2A ERCW Header FAILED,
   THEN
   RETURN TO Section 2.0 for diagnosis.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 ERCW Pump Failure (cont'd)

5. **CHECK** 1B and 2B ERCW supply header pressures and flows NORMAL:

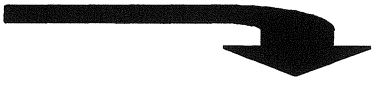
   a. Supply header pressures [between 78 psig and 124 psig]:

      - 1-PI-67-488A
      - 2-PI-67-488A

   b. Supply header flows [expected value]:

      - 1-FI-67-62
      - 2-FI-67-62

IF BOTH 1B **AND** 2B ERCW Headers FAILED,
THEN
GO TO Section 2.10, ERCW Supply Header B Failure Prior to ERCW Strainer Inlet Valves.



IF 1B **OR** 2B ERCW Header FAILED,
THEN
RETURN TO Section 2.0 for diagnosis.

6. **DISPATCH** personnel to INSPECT failed pump(s) and determine cause for failure.

7. **NOTIFY** STA to evaluate Tech Spec LCO 3.7.4, ERCW System.

8. **CHECK** ERCW pump loading amps NORMAL.

INVESTIGATE abnormal amp readings:

- **CHECK** header flows and pressures.

IF amps are high due to only one pump available,
THEN
EVALUATE isolation of non-essential ERCW loads.

Unit_____ Date_____

5.0 STARTUP/STANDBY READINESS (Continued)

NOTE The flow indicators listed below do not include flow to DGs. Typical flow rate to each diesel engine is approximately 700 gpm.

[4] **RECORD** ERCW flow below, **AND**

ENSURE flow through any strainer does not exceed 22,000 gpm (**N/A** any not applicable):

INDICATOR	FLOW RATE	INITIALS
1-FI-67-61	gpm	_____
1-FI-67-62	gpm	_____
2-FI-67-61	gpm	_____
2-FI-67-62	gpm	_____

[5] **ENSURE** pump amperes normal for any pumps started. ☐

[6] **ENSURE** diesel power selector switches are **SELECTED** for operable pumps, running pump preferred:

ERCW PUMP	DIESEL POWER SELECTOR SWITCH	INITIALS
J-A & Q-A	0-XS-67-285	_____ 1st _____ IV
R-A & K-A	0-XS-67-288	_____ 1st _____ IV
L-B & N-B	0-XS-67-286	_____ 1st _____ IV
P-B & M-B	0-XS-67-287	_____ 1st _____ IV

END OF TEXT

Unit_____ Date_____

8.1 Swapping ERCW Pumps (Continued)

[7] **ENSURE** diesel power selector switches are selected for operable pumps, running pump preferred:

ERCW Pump	Diesel Power Selector Switch	Initials
J-A & Q-A	0-XS-67-285	_____ _____ 1st IV
R-A & K-A	0-XS-67-288	_____ _____ 1st IV
L-B & N-B	0-XS-67-286	_____ _____ 1st IV
P-B & M-B	0-XS-67-287	_____ _____ 1st IV

[8] **NOTIFY** the Chem Lab Supervisor, that

IF chemical injection into the pump bays of running ERCW pumps is required, **THEN** it may be started _____

END OF TEXT

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 ERCW Pump Failure (cont'd)

9. **TRANSFER** emergency power selector switch away from failed pump.

10. **EVALUATE** need to close and place clearance on manual discharge valve for failed pump.

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

END OF SECTION

Unit_____ Date_____

8.20 Changing ERCW Pump DG Power Selector Switch position

CAUTION **Ensure diesel power selector switches are selected for operable pumps.**

[1] **PLACE** diesel power selector switch for applicable pumps to desired postion. (**N/A** any others not changed):

DIESEL POWER SELECTOR SWITCH	ERCW PUMP	INITIALS
0-XS-67-285	J-A	_____ _____ 1st IV
	Q-A	_____ _____ 1st IV
0-XS-67-288	R-A	_____ _____ 1st IV
	K-A	_____ _____ 1st IV
0-XS-67-286	L-B	_____ _____ 1st IV
	N-B	_____ _____ 1st IV
0-XS-67-287	P-B	_____ _____ 1st IV
	M-B	_____ _____ 1st IV

END OF TEXT

QUESTIONS REPORT
for 2004bankBnk

1. ERCW-B.18.A 001

The following plant conditions exist on Unit 1:

- ERCW pump L-B has tripped.
- Train B ERCW header pressure has dropped to 50 psig.

Which ONE of the following describes the action(s) required to be taken in response to this event?

A. Evaluate isolation of non-essential B Train CCS heat loads.

B. ✓ Lock out the L-B ERCW pump. Manually start another B Train ERCW pump.

C. Lock out the L-B ERCW pump. N-B ERCW pump will automatically start on low pressure.

D. Ensure the L-B ERCW pump is selected by the Emergency Power Selector Switch.

Justification:

a. Incorrect. Incomplete statement, would not be an action unless a leak was in progress.

b. Correct.

c. Incorrect. ERCW pumps do not automatically start on low pressure.

d. Incorrect. AOP-M.01 requires selecting away from failed pump.

K/A {CFR}:	076 A4.01	[2.9/2.0]	{41.7, 45.5, 45.6, 45.7, 45.8}
References:	AOP-M.01		
LP/Objectives:	OPT200.ERCW, B.18.a		
History:	New Question		
Level:	Memory		
Comments:	Reviewed by R. Creek, S. R. Johnson 3/16/04 Modified based on examiner's comments.		

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** ESSENTIAL RAW COOLING WATER SYSTEM (ERCW)

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 ERCW system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Essential Raw Cooling Water 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 ERCW system as described in the FSAR.
2. State the design basis of the ERCW system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the ERCW system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the ERCW 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 ERCW system components are designed
   m. Location of controls and indications associated with the ERCW 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 ERCW system:
   a. Precautions and limitations
   b. Major steps performed while placing the ERCW 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 ERCW system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the ERCW system:
   a. State Tech Specs/TRM LCOs that govern the ERCW
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the ERCW 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. INPO SER 84-01
   b. INPO-SER 96-008
   c. NRC Generic Letter 89-13

VI. TRAINING AIDS:

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

54. 078 K2.02 054
Given the following:

- Unit 1 is in Mode 5 with 6.9kV Shutdown Board 1A-A tagged for maintenance.
- Subsequently, 6.9kV Shutdown Board 2B-B trips and locks out due to relay operation.

Which ONE of the following statements identifies the status of the power supplies to Auxiliary Air Compressors A-A and B-B?

A. Both Auxiliary Air Compressors have power available.

B. Neither Auxiliary Air Compressor has power available.

C. Only the Auxiliary Air Compressor A-A has power available.

D. Only the Auxiliary Air Compressor B-B has power available.

DISTRACTOR ANALYSIS:

A. Incorrect, The B-B Aux Air Compressor is supplied from the C&A Vent Board 2B-1B which is supplied from Shutdown Board 2B-B (de-energized). Plausible if the candidate reverses the unit shutdown board (1B-B instead of 2B-B) that supplies the B-B Aux Air Compressor and correctly identifies the power supply to the A-A Aux Air Compressor.

B. Incorrect, The A-A Aux Air Compressor is supplied from the C&A Vent Board 2A-1A which is supplied from Shutdown Board 2A-A (energized). Plausible if the candidate correctly identifies the power supply to the B-B Aux Air Compressor and reverses the unit shutdown board (1A-A instead of 2A-A) that supplies the A-A Aux Air Compressor.

C. CORRECT The A-A Aux Air Compressor is supplied from the C&A Vent Board 2A-1A which is supplied from Shutdown Board 2A-A (energized). The B-B Aux Air Compressor is supplied from the C&A Vent Board 2B-1B which is supplied from Shutdown Board 2B-B (de-engerized).

D. Incorrect, The B-B Aux Air Compressor is supplied from the C&A Vent Board 2B-1B which is supplied from Shutdown Board 2B-B (de-energized). Plausible if the candidate reverses the unit shutdown boards where compressors get their power supply and concludes the Shutdown Board 1B-B supplies B-B Aux Air Compressor (and the Shutdown Board 1A-A supplies A-A Aux Air Compressor.)

Proposed 2/6/2009
Sequoyah NRC RO Written Exam
as submitted

Question No. 54

Tier 2 Group 1

K/A 078 K2.02
Knowledge of bus power supplies to the following: Emergency air compressor

Importance Rating: 3.3* / 3.5*

Technical Reference: 0-SO-32-2, Attachment 1, Auxiliary Compressed Air System Power Checklist, Rev 2.
1,2-15E500-1 R26.

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.CSA B.4.b
Describe the following items for each major component in the CSA.
b. Power supply (including control power as appropriate).

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

Question History: New for SQN Exam 1/2009

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

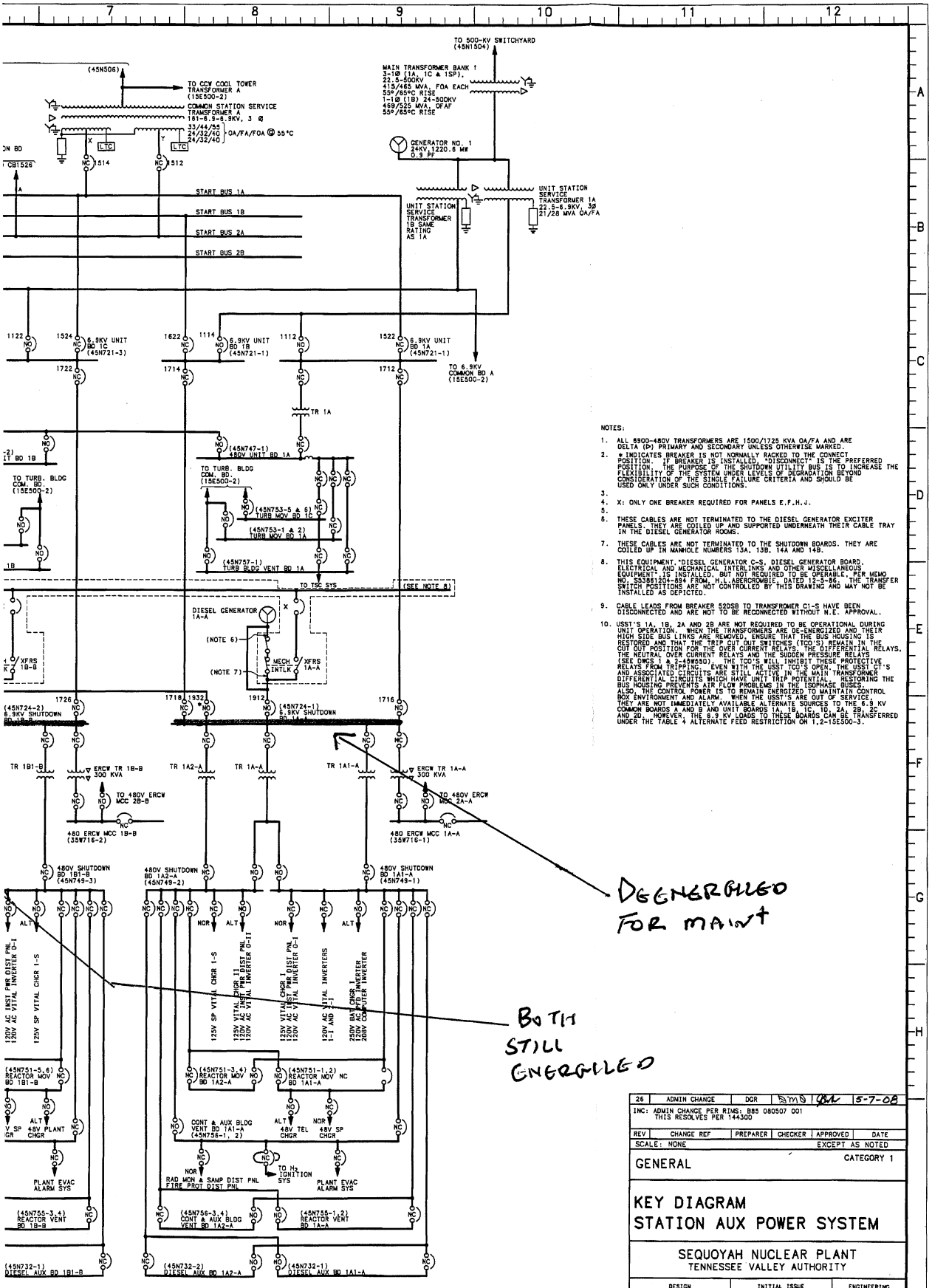
10 CFR Part 55 Content: (41.7)

10CFR55.43.b (n/a)

Comments: New for SQN exam 1/2009

EQUIPMENT I.D.	PRINT NO.	BREAKER POSITION	FUSES INSTALLED	INITIALS
Auxiliary Control Air Compressor A-A	45N756-2 45N779-22	480V C & A Vent Bd 2A1-A Compt 6C CLOSED	Two 1.6 Amp(1) Buss FRN 1.6 0-FU2-32-60-A	____ 1st ____ IV
Auxiliary Control Air Compressor B-B	45N756-6 45N7779-22	480V C & A Vent Bd 2B1-B Compt 2E CLOSED	Two 1.6 Amp(1) Buss FRN 1.6 0-FU2-32-86-A	____ 1st ____ IV

(1) Fuse location is same as breaker location.



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. S33881204-894 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 TRIP 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 & 2-45W850). THE TCO'S WILL INHIBIT THESE PROTECTIVE RELAYS FROM TRIPPING. EVEN WITH THE USST TCO'S OPEN, THE USST CT'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.

DEENERGIZED FOR MAINT

BOTH STILL ENERGIZED

• A-A
SOR - ENERGIZED

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
26	ADMIN CHANGE	DGR	SMD	GM	5-7-08

INC: ADMIN CHANGE PER RIMS: 885 080507 001
THIS RESOLVES PER 144300

SCALE: NONE — EXCEPT AS NOTED

GENERAL — CATEGORY 1

KEY DIAGRAM
STATION AUX POWER SYSTEM

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

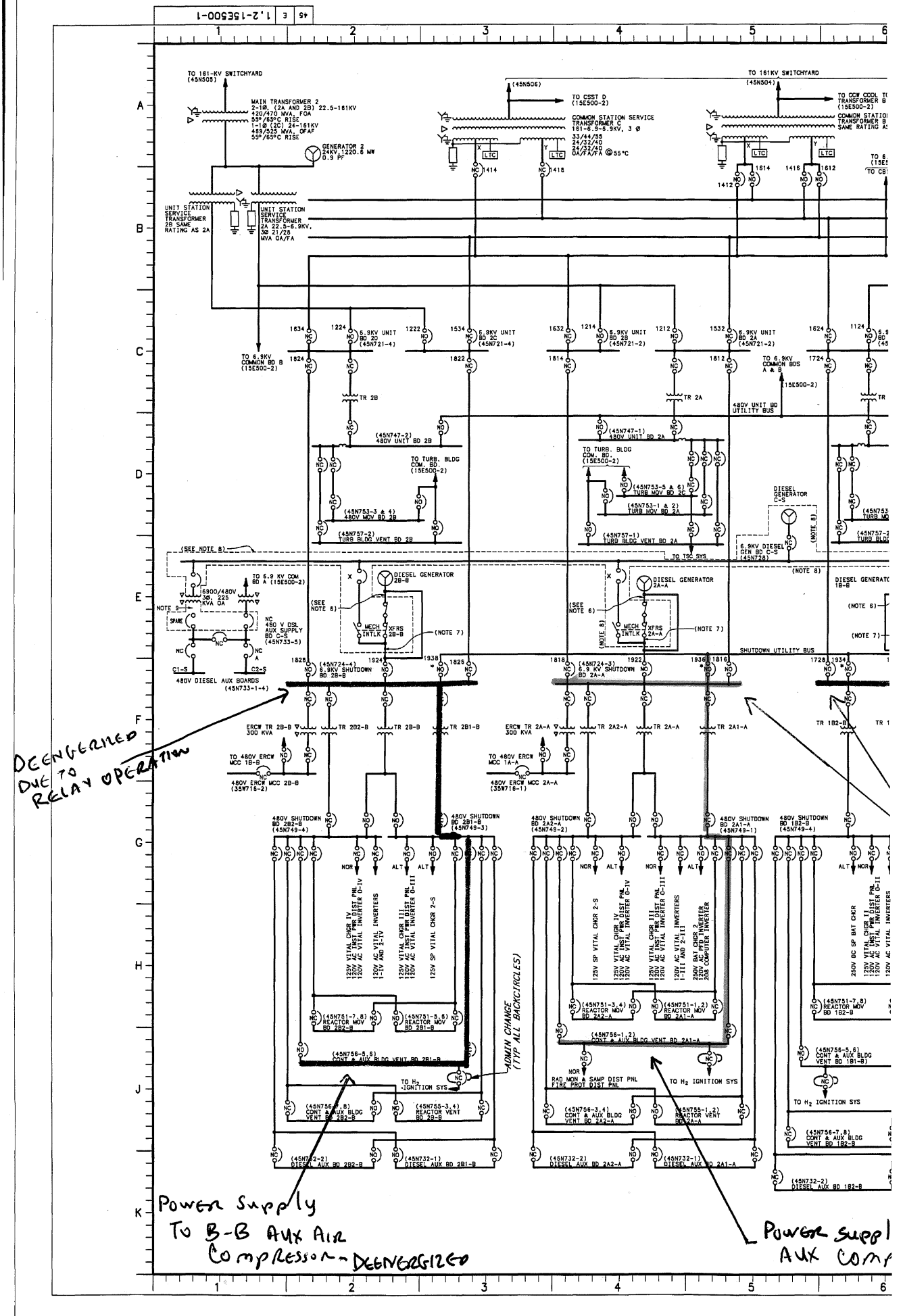
DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: PBD	CHECKER: C.A.BADGETT	NO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-6128. DRAWING MADE A CCD FROM AC-H & AD-R5 .	1 CHARLES BADGETT
DESIGNER: N/A	REVIEWER: K.R.SPINO		2 MARIO A AGUIRRE
			3 M.R.SEDLACIK/LWA
DATE 4-25-90	45	E	CCD NO: 1,2-15E500-1 R26

THIS DRAWING AND COMPANION DRAWING 15E500-2 SUPERSEDE DRAWING 15N500 PER ECN L6377.

ISSUED BY: P.G.TRUDEL

CAD MAINTAINED DRAWING

CONTROL ROOM DWG


TO 161-KV SWITCHYARD (45N505)
MAIN TRANSFORMER 2 2-1Ø, (2A AND 2B) 22.5-161KV 420/470 MVA, FOA 55°/63°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, 3Ø 21/28 MVA OA/FA
TO 161KV SWITCHYARD (45N504)
(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
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 (15E500-2)
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
(45N724-4) 6.9KV SHUTDOWN BD 2B-B
(45N724-3) 6.9 KV SHUTDOWN BD 2A-A
ERCW TR 2B-B 300 KVA
ERCW TR 2A-A 300 KVA
TR 2B2-B
TR 2B-B
TR 2B1-B
TR 2A2-A
TR 2A-A
TR 2A1-A
TR 1B2-B
TO 480V ERCW MCC 1B-B
TO 480V ERCW MCC 1A-A
480V ERCW MCC 2B-B (35W716-2)
480V ERCW MCC 2A-A (35W716-1)
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
120V VITAL CHGR IV 120V AC INST PNL 120V AC VITAL INVERTER O-IV
120V AC VITAL INVERTERS I-II AND 2-IV
125V VITAL CHGR III 120V AC INST PNL 120V AC VITAL INVERTER O-III
125V SP VITAL CHGR 2-S
120V VITAL CHGR II 120V AC INST PNL 120V AC VITAL INVERTER O-II
120V AC VITAL INVERTERS I-III AND 2-III
250V BAT CHGR 2 120V AC PID INVERTER 208 COMPUTER INVERTER
250V DC SP BAT CHGR
(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 H2 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
DEENGERIZED DUE TO RELAY OPERATION
Power Supply To B-B AUX Air Compressor - DEENERGIZED
Power Suppl AUX Comp

I. PROGRAM: OPERATOR TRAINING

II. COURSE: SYSTEMS TRAINING

III. TITLE: CONTROL AND SERVICE AIR SYSTEM

IV. LENGTH OF LESSON: Initial License Training: 3 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 Control and Service Air System (CSA) in the plant and on the simulator.

B. Enabling Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated the CSA 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 CSA as described in the SQN FSAR.
2. State the design basis of the CSA in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the CSA.
4. Describe the following items for each major component in the CSA.
   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 CSA components are designed
   m. Location of controls and indications associated with the CSA in the control room and auxiliary control room

55. 103 A1.01 055

Which ONE of the following identifies the containment pressure setpoint relative to the annulus when FCV-30-46, 47, & 48, Containment Vacuum Relief System Isolation Valves AUTOMATICALLY close AND when containment pressure lowers, how the valves are re-opened?

A. 1.5 psid;
Valves must be reopened MANUALLY by the control room operator.

B. 1.5 psid;
Valves will re-open AUTOMATICALLY when containment pressure drops to 0.5 psid.

C. 2.81 psid;
Valves must be reopened MANUALLY by the control room operator.

D. 2.81 psid;
Valves will re-open AUTOMATICALLY when containment pressure drops to 0.5 psid.

DISTRACTOR ANALYSIS:

A. *CORRECT, the isolation valves will automatically close when 2 out of 3 pressure switches on either Train A or B sense 1.5 psid containment pressure. After isolating the valves do require manual action by the MCR operator to reopen them after the containment pressure drops.*

B. *Incorrect, the isolation valves automatically close when 2 out of 3 pressure switches on either Train A or B sense 1.5 psid containment pressure, but they will not automatically re-open as containment pressure drops to 0.5 psid. Plausible because the isolation of the valves at 1.5 psid is correct and the containment negative pressure design is 0.5 psid as identified in the first note of the procedure used to restore the isolation valves to an open position. (However, the psid is negative instead of positive.) The valves re-opening automatically as pressure drops would restore the containment negative pressure design protection function.*

C. *Incorrect, the isolation valves automatically close when 2 out of 3 pressure switches on either Train A or B sense 1.5 psid containment pressure, not 2.81 psid and they will require manual action by the MCR operator to re-open as containment pressure drops. Plausible because 2.81 psid is the Phase B containment HI-HI pressure isolation setpoint and many containment valves do isolate as a result of Phase B and the manual action required to re-open the valves is correct.*

D. *Incorrect, the isolation valves automatically close when 2 out of 3 pressure switches on either Train A or B sense 1.5 psid containment pressure, not 2.81 psid and they will not automatically re-open as containment pressure drops to 0.5 psid. Plausible because 2.81 psid is the Phase B containment HI-HI pressure isolation setpoint and many containment valves do isolate as a result of Phase B and the containment negative pressure design is 0.5 psid as identified in the first note of the procedure used to restore the isolation valves to an open position. (However, the psid is negative instead of positive.) The valves re-opening automatically as pressure drops would restore the containment negative pressure design protection function.*

Question No. 55

Tier 2 Group 1

K/A 103 A1.01
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including:
Containment pressure, temperature, and humidity

Importance Rating: 3.7 / 4.1

Technical Reference: 0-SO-30-8, Containment Presure Control, Rev 27
1,2-47W611-30-3 R6
1-AR-M5-C, Ventilation, Rev 18
SSD-1-P-30-46, Rev 1

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.CntmtStructure B.4.e.,f., h. & i.
Describe the characteristics of each major component in the Containment Structure system:
e. Component Operation
f. Controls
h. Instrumentation and indications
i. Protective features (including setpoints)

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

Question History: SQN question CTMT STRUCT-B.18.H 001 modified

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

10 CFR Part 55 Content: (41.5 / 45.5)

10CFR55.43.b (n/a)

Comments: SQN question CTMT STRUCT-B.18.H 001 modified

Unit_____ Date_____

5.0 STARTUP/STANDBY READINESS

5.1 Placing Containment Automatic Vacuum Control in Service

NOTE 1 The containment design negative pressure differential with respect to the annulus atmosphere is 0.5 psi. The check valve portions of the automatic vacuum relief valves are set to open if the differential pressure of the containment atmosphere with respect to the Shield Building annulus atmosphere is -0.1 psi as read on **[PDI-30-133]** on panel M-9. This allows the annulus to relieve into the containment.

NOTE 2 The Containment Vacuum Relief Valves shall be in service when in mode 1-4 (LCO 3.6.6.1 Unit 1 or LCO 3.6.6 Unit 2).

NOTE 3 **[FCV-30-46]**, **[FCV-30-47]**, and **[FCV-30-48]** will close automatically on high containment pressure of greater than or equal to 1.5 psig as sensed by 2 out of 3 of either Train A or Train B pressure switches 30-46A, 30-46B, 30-47A, 30-47B, or 30-48A, 30-48B.

[1] **ENSURE** Power Checklist complete for the appropriate unit. (**N/A** checklist **NOT** applicable.)

UNIT	POWER CHECKLIST	INTIIALS
1	1-30-8.01	_____
2	2-30-8.01	_____

Unit_____ Date_____

5.1 Placing Containment Automatic Vacuum Control in Service (Continued)

NOTE The following chart may be used as an indication of check valve position during performance of the following steps. Full open light indications for Containment Vacuum Relief Check Valves are the same as > 60% open light indications.

		CHECK VALVE POSITION		
		CLOSED	**OPEN** < 60%	**OPEN** > 60%
Zone Switch Light Indication	A	OFF	OFF	RED
	B	GREEN	OFF	OFF
	C	GREEN	OFF	OFF
	D	GREEN	OFF	OFF

[2] **VERIFY** Containment Vacuum Relief Check Valve **[30-571] CLOSED** by the position indicator lights below (panel M-9):

INDICATOR	LIGHT
ZS-30-46A	OFF
ZS-30-46B	GREEN
ZS-30-46C	GREEN
ZS-30-46D	GREEN

_____

[3] **VERIFY** Containment Vacuum Relief Check Valve **[30-572] CLOSED** by the position indicator lights below (panel M-9):

INDICATOR	LIGHT
ZS-30-47A	OFF
ZS-30-47B	GREEN
ZS-30-47C	GREEN
ZS-30-47D	GREEN

_____

Unit_____ Date_____

5.1 Placing Containment Automatic Vacuum Control in Service (Continued)

[4] **VERIFY** Containment Vacuum Relief Check Valve **[30-573] CLOSED** by the position indicator lights below (panel M-9):

INDICATOR	LIGHT
ZS-30-48A	OFF
ZS-30-48B	GREEN
ZS-30-48C	GREEN
ZS-30-48D	GREEN

_____

[5] **OPEN [FCV-30-46]** by placing **[HS-30-46A]** and **[HS-30-46B]** (panel M-9) in the **OPEN** position. _____

[6] **PLACE [HS-30-46A]** in the **P-AUTO** position. _____

[7] **PLACE [HS-30-46B]** in the **P-AUTO** position. _____

[8] **OPEN [FCV-30-47]** by placing **[HS-30-47A]** and **[HS-30-47B]** (panel M-9) in the **OPEN** position. _____

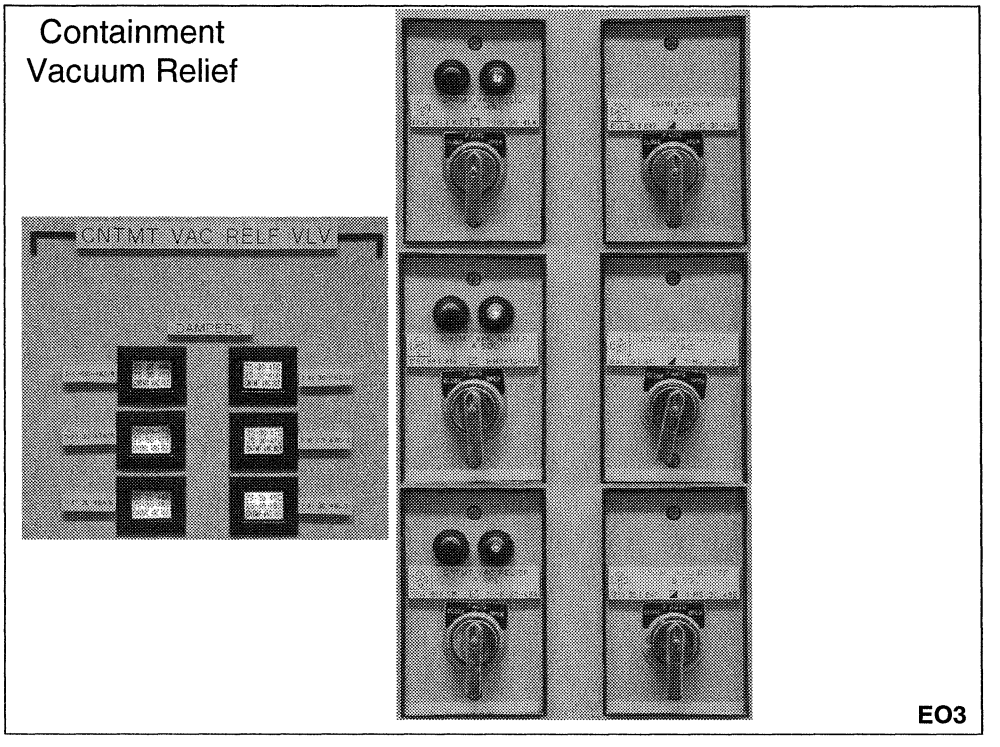
[9] **PLACE [HS-30-47A]** in the **P-AUTO** position. _____

[10] **PLACE [HS-30-47B]** in the **P-AUTO** position. _____

[11] **OPEN [FCV-30-48]** by placing **[HS-30-48A]** and **[HS-30-48B]** (panel M-9) in the **OPEN** position. _____

[12] **PLACE [HS-30-48A]** in the **P-AUTO** position. _____

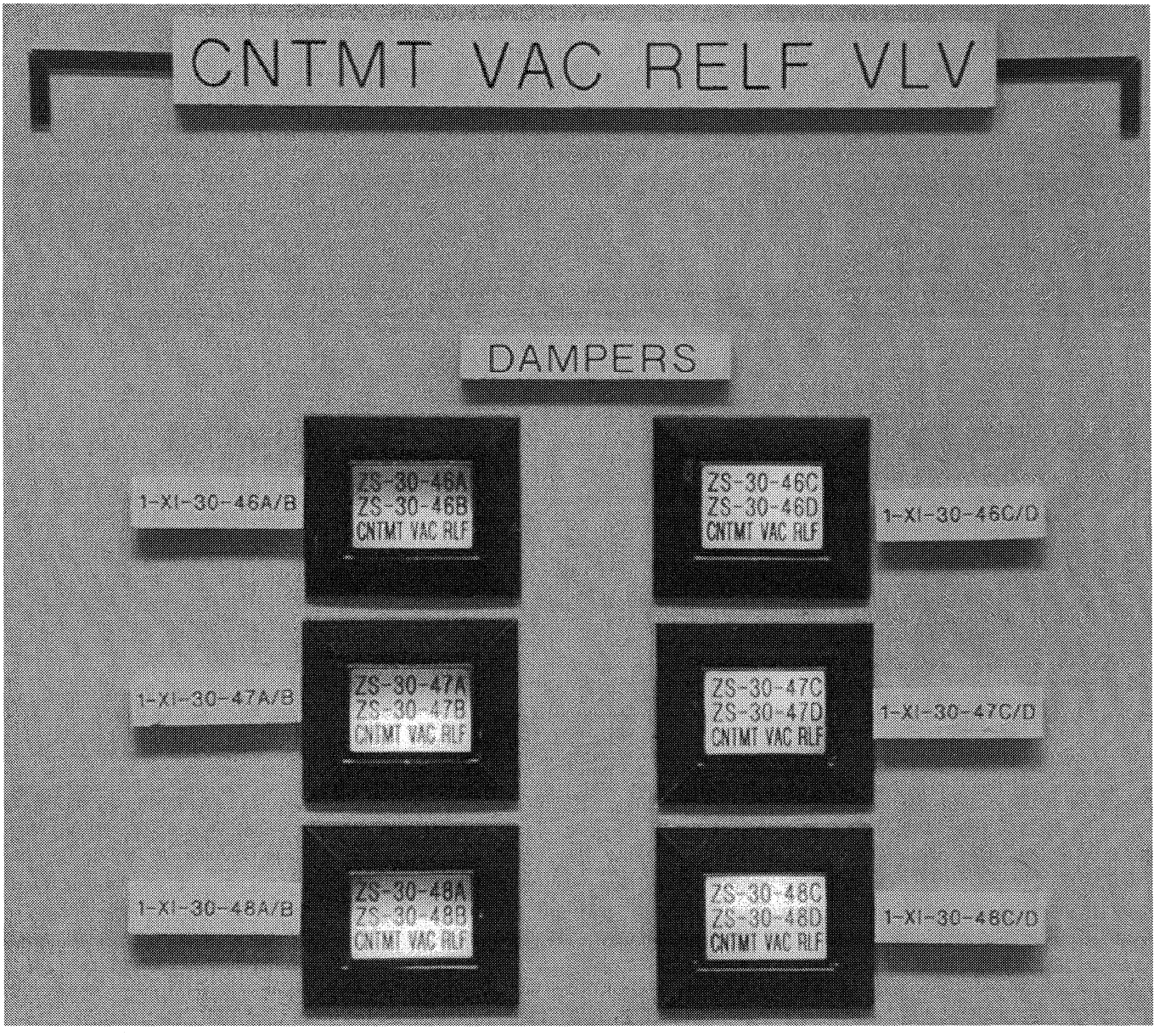
[13] **PLACE [HS-30-48B]** in the **P-AUTO** position. _____



X. **LESSON BODY:**

K. Purpose/description of components

COMPONENT	PURPOSE / DESCRIPTION
Vacuum Relief Valves (SD section 2)	• Vacuum Relief and Isolation valve switches and indication located on M-9 NOTE: Phase A isolation stops the annulus vacuum fans. With the annulus vacuum fans off, annulus pressure will increase. Normally the EGTS should start and maintain -.5 inches water pressure in the annulus to prevent opening the containment vacuum relief valves. If annulus pressure exceeds containment pressure by 0.1 psi, the vacuum relief valves will open. NOTE: Vacuum Relief valves may open on an event that causes an ABI. The most probable events are steam generator tube rupture or main steam line break outside containment. The events result in a Phase A / ABI actuation with no increase in containment pressure. The annulus vac fans discharge into the Aux. Bldg ventilation ductwork, which is isolated on an ABI.


CNTMT VAC RELF VLV
DAMPERS
1-XI-30-46A/B
ZS-30-46A
ZS-30-46B
CNTMT VAC RLF
ZS-30-46C
ZS-30-46D
CNTMT VAC RLF
1-XI-30-46C/D
1-XI-30-47A/B
ZS-30-47A
ZS-30-47B
CNTMT VAC RLF
ZS-30-47C
ZS-30-47D
CNTMT VAC RLF
1-XI-30-47C/D
1-XI-30-48A/B
ZS-30-48A
ZS-30-48B
CNTMT VAC RLF
ZS-30-48C
ZS-30-48D
CNTMT VAC RLF
1-XI-30-48C/D

Source	Setpoint	PS-30-46A, B 2/3 HI PRESS CNTMT VAC RELF ISOL VLV CLOSED
SER 422 Train A: PS-30-46A PS-30-47A PS-30-48A Train B: PS-30-46B PS-30-47B PS-30-48B	2/3 containment pressure > 1.5 psid (Train A or B)	

Probable Causes

1. LOCA inside containment
2. Feedwater or steamline break inside containment.
3. Air leak inside containment.

Corrective Actions

[1] **VERIFY** containment vacuum relief isolation valves (FCV-30-46, 47, and 48) closed on 1-M-6 (1-XX-55-6K Manual) or (1-M-9).

[2] **IF** reactor trip occurs, **THEN**

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

[3] **CHECK** containment pressure on **[1-PDI-30-42]**, **[1-PDI-30-43]**, **[1-PDI-30-44]**, **[1-PDI-30-45]** **AND**

IF pressure approaching or ≥ 1.54 psid, **THEN**

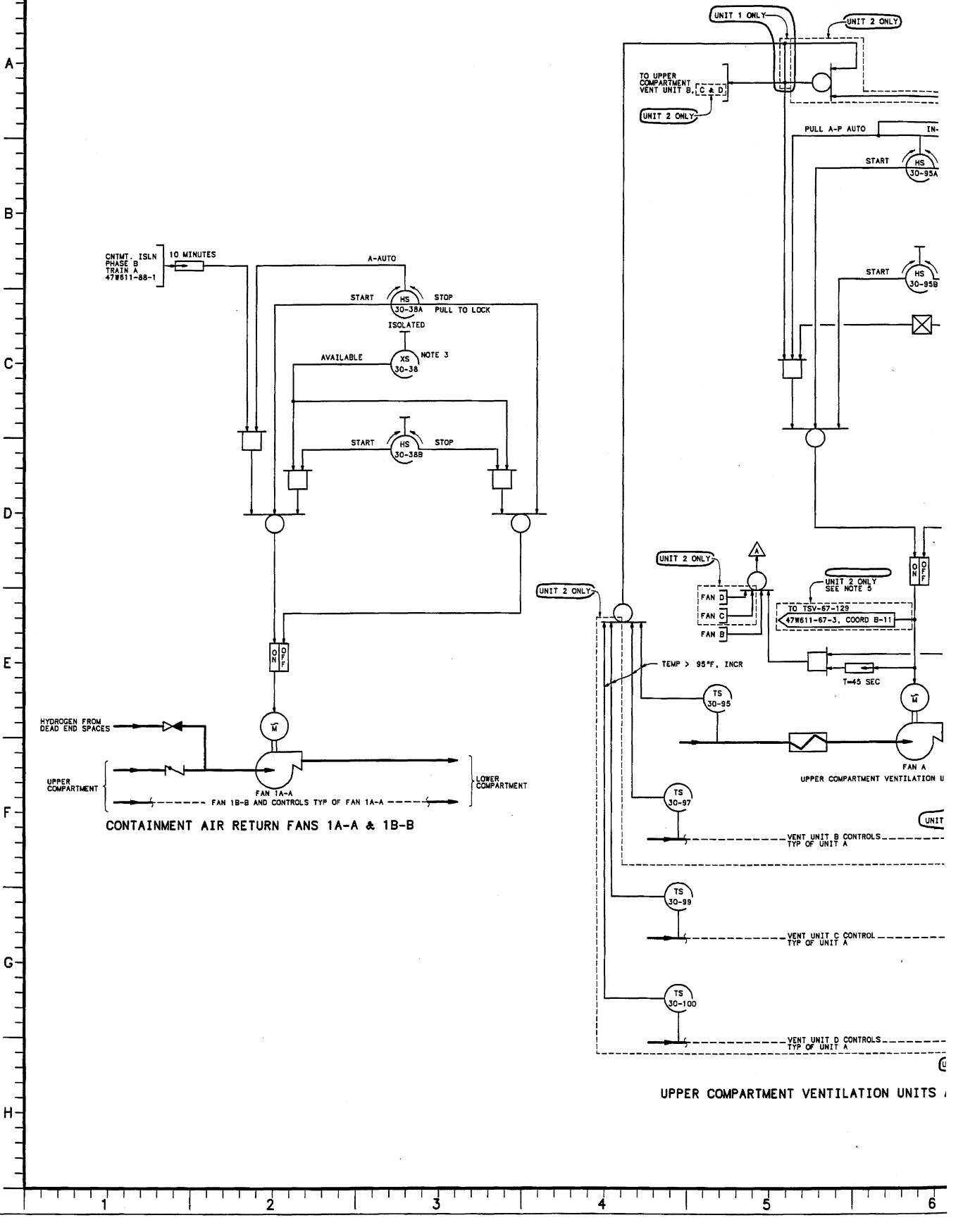
EVALUATE reactor trip & SI criteria.

[4] **WHEN** containment pressure decreases to < 1.0 psi**d, THEN**

OPEN FCV-30-46, FCV-30-47 and FCV-30-48 to prevent negative pressure inside containment.

References

45B655-05C-1
45N657-4
47B601-30-12, 13, 14



CONTAINMENT AIR RETURN FANS 1A-A & 1B-B

UPPER COMPARTMENT VENTILATION UNITS

DCN D21165
(TYP ALL BACKCIRCLES)

UNIT 2 ONLY

PHASE B
CNTMT ISLN
47W611-88-1

LOCK

2/4

FLOW < 16,000 CFM
AT 110° F

FS
30-95

FLOW < 16,000 CFM
AT 110° F

FS
30-97

FLOW < 16,000 CFM
AT 110° F

FS
30-99

FLOW < 16,000 CFM
AT 110° F

FS
30-100

C & D

NOTES:
1. FOR SYMBOLS AND GENERAL NOTES SEE SHEET 1.
2. ALL SWITCH INPUTS FROM TRAIN A TO TRAIN B SHALL BE BUFFERED.
3. SWITCH LOCATED ON 480V SHUTDOWN BOARD.
4. 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.
5. NOT APPLICABLE TO UPPER CONTAINMENT VENT UNITS 1A AND 1B WHERE ERCW FLOW IS MANUALLY CONTROLLED.

ALM COMMON FOR
TRA AND TRB
CIRCUIT

FCV-30-46
FULLY
CLOSED

P-AUTO
CLOSE HS OPEN
30-46A

P-AUTO
CLOSE HS OPEN
30-46B

TRAIN B
PS-30-47B
PRESS. > SP
PS-30-48B
2/3

NORMAL XS AUX
30-46B

NORMAL XS AUX
30-46A

TRAIN A
PRESS > SP
PS-30-47A
PS-30-48A
2/3

FSV
30-46B
S
VENT

FSV
30-46A
S

PS
30-46B

PS
30-46A

FCV
30-46

CONTAINMENT
ANNULUS

VACUUM
RELIEF
VALVE

ISOLATION
VALVE

INSIDE
CONTAINMENT

CONTAINMENT VACUUM RELIEF UNIT
(SEE NOTE 2)

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
6	DCN D21165	DGR	DTM	JRB	4-30-93

INC: DCA-D21165-1314 R0

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE — CATEGORY 1
UNITS 1 & 2

MECHANICAL LOGIC DIAGRAM VENTILATION SYSTEM

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: D.G.ROOP	CHECKER: G.G.MAILEN	RO ISSUE PER: DRAWING MADE A CCD FROM AC-N/A & AD-R14. ALSO MADE CAT 1 PER AI-25, (PART 1), APPENDIX 1 AND RIMS B37 911119 805.	1 N/A
DESIGNER: N/A	REVIEWER: N/A		2 G.G.MAILEN
			3 M.R.SEDLACIK/LWA

ISSUED BY: N/A

DATE 01-03-92 | 45 | M

CCD NO: 1,2-47W611-30-3 R6

CAD MAINTAINED DRAWING

CONTROL ROOM DWG

SITE STANDARD PRACTICE	QA Record CONTROLLING SET POINTS ORIGINAL	SSP-9.1 REV. 0 ATTACHMENT 1 PAGE 1 OF 1

SSD NUMBER: 1-P-30-46	EACH TIME THESE SET POINT AND SCALING DOCUMENTS ARE ISSUED, PREPARERS MUST ENSURE THAT THE ORIGINAL (R0) RIMS ACCESSION NUMBER IS FILLED IN.		
ECN/DCN NUMBER (OR INDICATE N/A)	REV	FOR RIMS USE	RIMS ACCESSION NUMBER
N/A	R0		B84 920123 003
DCN M09428A	R1		B84 940124 004
	R		
	R		

SSD 1-P-30-46
Page 1

SEQUOYAH NUCLEAR PLANT

SET POINT AND SCALING DOCUMENT AS-CONSTRUCTED COVER SHEET

TVA

Title: SSD 1-P-30-46

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
0	Initial issue	
1	This as-constructed revision is incorporates the as-designed R0 dated 4/9/93 and to correct the DCN number from M09254A to M09428A. This as-constructed revision supersedes the as-designed revision 0.	

TENNESSEE VALLEY AUTHORITY

DIVISION OF NUCLEAR ENGINEERING

SEQUOYAH NUCLEAR PLANT

SET POINT AND SCALING DOCUMENT

FOR INSTRUMENT LOOP NO.

1-P-30-46

SSD 1-P-30-46

PAGE 3

	REVISION R0	R1	R2	R3	R4	R5
	DATE 4/9/93	1-20-94				
PREPARED	PETE STANKE	K. DESAI kjdesai				
VERIFIED	T. Thompson					
REVIEWED						
APPROVED						
ISSUED	4/21/93	11/20/94				

LOOP NUMBER: 1-P-30-46 | QUALITY RELATED YES ✓ NO ___

LOOP FUNCTION: TO PROVIDE CONTAINMENT ISOLATION IN THE CONTAINMENT VACUUM RELIEF LINES ON INCREASING CONTAINMENT PRESSURE AND TO SIGNAL AN ALARM.

LOOP ACCURACY FUNCTION	ALLOWABLE VALUE	ACCEPTABLE AS FOUND	ACCEPTABLE AS LEFT
ISOLATION / ALARM	51.30 UPPER	+5.77/-9.65	± 1.66
	26.34 LOWER	IN. H_2O	IN. H_2O
	IN. H_2O	NOTE 2	NOTE 2
	NOTE 1		

LOOP COMPONENTS NO.	UNID NO.	PROCESS RANGE/SETPOINT	CALIBRATION VALUE INPUT	CALIBRATION VALUE OUTPUT	ACCEPTABLE AS FOUND	ACCEPTABLE AS LEFT
1	1-PS-30-46A	0.95-2.05 PSIG / 1.5 PSIG	41.60 IN. H_2O	CC 1	+5.77/-9.65 IN. H_2O	± 1.66 IN. H_2O
2	1-PS-30-46B	0.95-2.05 PSIG / 1.5 PSIG NOTE 4	41.60 IN. H_2O	CC 1	+5.77/-9.65 IN. H_2O NOTE 2	± 1.66 IN. H_2O NOTE 2

	COMPONENT DESCRIPTION MANUFACTURER / MODEL NUMBER	ORIGINAL CONTRACT NO.	LOCATION
1	STATIC-O-RING / 12TA-BBA-NX-C1A-JJTTX12	BA418-C	EL 791 AZ 257° I-L-140
2	STATIC-O-RING / 12TA-BBA-NX-C1A-JJTTX12	BA418-C	EL 791 AZ 163° I-L-142

ADDITIONAL CALIBRATION REQUIREMENTS:

CALIBRATION FREQUENCY REQUIREMENTS: CALIBRATION CYCLE NOT TO EXCEED 22.5 MONTHS (I.E. 18 MONTHS PLUS 25% EXTENSION

CALIBRATION EQUIPMENT ACCURACY REQUIREMENTS: ONE-TO-ONE ACCURACY EQUAL TO OR BETTER THAN THE DEVICE BEING CALIBRATED. (REFERENCE 7)

STATIC HEAD CORRECTION: N/A

TECHNICAL SPECIFICATIONS: 3/4.6.3

REFERENCES

NO.		NO.	
1	CALC. 1-PS-30-46A R5	6	47W611-30-3 R14
2	CCD NO: 478601-30 SERIES	7	TVA-NQA-PLN89-A
3	CCD NO: 47W610-30-1 R0	8	DCN M09264A - M09428A (Void 1/20/94) R1
4	CONTRACT BA418-C		
5	CALC. SQN-NALG-002 R1		

TRANSFER FUNCTIONS 1-P-30-46

COMPONENT NO. 1

41.60 IN. H_2O = 1.5 PSIG = CC 1 ± TOLERANCES

RESET: 41.60 - 12.10 = 29.50 IN. H_2O = CO 1 - TOLERANCES

SEE NOTE 3

COMPONENT NO. 2

41.60 IN. H_2O = 1.5 PSIG = CC 1 ± TOLERANCES

RESET: 41.60 - 12.10 = 29.50 IN. H_2O = CO 1 - TOLERANCES

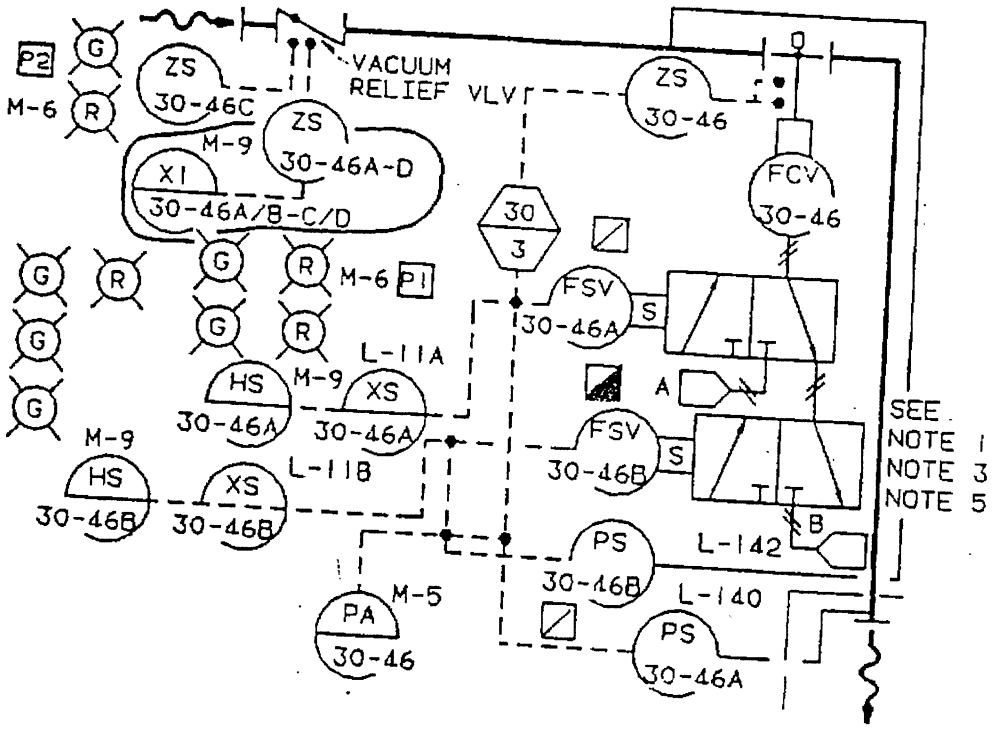
SEE NOTE 3

COMPONENT NO. _____

COMPONENT NO. _____

COMPONENT NO. _____

LOOP DIAGRAM 1-P-30-46



COMMENTS / NOTES

NOTE 1: Allowable value calculated in Reference 1

NOTE 2: Loop and component accuracy are the same because the loop has only one device to be calibrated. The As-Found and As-Left tolerances are obtained from Reference 1.

NOTE 3: The specified deadband for this instrument is 12.10" H2O (Reference #1), therefore, Reset shall occur at 41.60" H2O (1.5 psig) - 12.10" H2O for a decreasing pressure. Reset = 29.5" H2O - tolerances.

NOTE 4: Process range determined from Reference 1.

CTMT STRUCT-B.18.H 001

Which ONE (1) of the following is the setpoint at which the Containment Vacuum Relief System isolation valves will automatically close?

A. 2.81 psid

B. 1.54 psid

C. 1.50 psid

D. 1.00 psid

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** CONTAINMENT STRUCTURE

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 Containment Structure system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Containment Structure 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 Containment Structure system as described in the FSAR.
2. State the design basis of the Containment Structure system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Containment Structure system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the Containment Structure 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 Containment Structure system components are designed
   m. Location of controls and indications associated with the Containment Structure 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 Containment Structure system:
   a. Precautions and limitations
   b. Major steps performed while placing the Containment Structure 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 Containment Structure system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the Containment Structure system:
   a. State Tech Specs/TRM LCOs that govern the Containment Structure
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the Containment Structure 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. SQN ABSCE rendered inoperable, LER 96-009-00
   b. SQN Containment leak rate exceeded TS limit, LER 94-005-00
   c. SQN AFW vent line valves not secured closed, LER 93-028-00
   d. SQN personnel airlock outer housing leaking, LER 93-004-01
   e. Browns Ferry 3 MSIV leakage exceeded the TS limit, LER 94-008-01
   f. North Anna Power Station 2 breached fire barrier penetrations, LER 88-007-00

VI. TRAINING AIDS:

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

56. 011 K1.02 056

Given the following:

- Unit 1 is at 85% power steady-state.
- Rod control is in MANUAL.
- RCS Tavg Auctioneering Unit fails to 530°F.

Which ONE of the following identifies the effect the failure has on Pressurizer level and pressure with **NO** operator action?

	Pressurizer Level	**Pressurizer Pressure**
A.	Drops until letdown isolates.	Drops due to heaters deenergizing.
B.	Drops until letdown isolates.	Rises due to level rising after letdown isolates.
C.	Stabilizes before letdown isolates.	Stabilizes with variable heaters energized.
D.	Stabilizes before letdown isolates.	Stabilizes with spray valves opening.

DISTRACTOR ANALYSIS:

A. *Incorrect, The level would stabilize at 24.7% because the program is capped at the low end thus letdown would not isolate. The heaters are deenergized at the same setpoint that the letdown isolates. Plausible because the candidate may not recall the cap on the low end of the level program concluding the letdown would isolate due to the mismatch and that the heaters would be turned off causing pressurizer pressure to drop.*

B. *Incorrect, The level would stabilize at 24.7% because the program is capped at the low end thus letdown would not isolate. Plausible because the candidate may not recall the cap on the low end of the level program but be aware that there is a minimum charging flow that would causing the level to start rising after the letdown isolated and with level rising the steam bubble in the pressurizer would be getting compressed making pressure rise.*

C. *Incorrect, The level would stabilize at 24.7% because the program is capped at the low end making this part of the answer correct. However since the Group C remains energized until manually deenergized by the operator, the pressure would rise until the variable heaters were deenergized by the master pressure controller and the spray valves started opening to stabilize pressure at setpoint. Plausible because the level response is correct and the response of the master controller and the effect on the variable heaters could be misapplied.*

D. *CORRECT, The Auctioneering Tavg signal is used to program level; from 24.7 to 60% as Tavg changes from 547°F to 578.2°F. The level setpoint is capped at the 24.7% to the low end, therefore when the auctioneered Tavg signal dropped to 530°F the level setpoint would be 24.7%. The level would stabilize at 24.7% which is above the 17% where letdown isolates. At 85% power the pressuirzer level would be 54.7% and the level setpoint after the Tavg Auctioneering Unit failure would be 24.7%. With level 5% greater than setpoint the backup heaters would energize to start raising pressure. this would cause output of the master pressure controller to increase to deenergize variable heaters, start opening the spray valves to stabilize pressure. While the Group A and B heaters would turn off as the pressure increased, the Group C heaters would remain energized until manually de-energized by the operator.*

Question No. 56

Tier 2 Group 2

K/A 011 K1.02
Knowledge of the physical connections and/or cause-effect relationships between the PZR LCS and the following systems: RCS

Importance Rating: 3.7 / 3.8

Technical Reference: TI-28 Att. 9, Unit 1 & 2 Cycle Data Sheet, Effective Date: 06-28-07
1, 2-45N657-14 R4, 1-45N657-15 R3
1-AR-M5-A, Reactor Coolant - STM - FW, Rev 31

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.PZR LCS B.5.d
Describe the operation of the Pressurizer Level Control System as it relates to the following: d. How a component failure will affect system operation.

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

Question History: SQN question PZR LEVEL-B.12.D 001 modified.

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

10 CFR Part 55 Content: (41.2 to 41.9 / 45.7 to 45.8)

10CFR55.43.b (n/a)

Comments: SQN question PZR LEVEL-B.12.D 001 modified

Question No. 56

Tier 2 Group 2

K/A 011 K1.02
Knowledge of the physical connections and/or cause-effect relationships between the PZR LCS and the following systems: RCS

Importance Rating: 3.7 / 3.8

Technical Reference: TI-28 Att. 9, Unit 1 & 2 Cycle Data Sheet, Effective Date: 06-28-07
1, 2-45N657-14 R4, 1-45N657-15 R3
1-AR-M5-A, Reactor Coolant - STM - FW, Rev 31

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.PZR LCS B.5.d
Describe the operation of the Pressurizer Level Control System as it relates to the following: d. How a component failure will affect system operation.

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

Question History: SQN question PZR LEVEL-B.12.D 001 modified.

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

10 CFR Part 55 Content: (41.2 to 41.9 / 45.7 to 45.8)

10CFR55.43.b (n/a)

Comments: SQN question PZR LEVEL-B.12.D 001 modified

Source	Setpoint	LS-68-339E/F PRESSURIZER LEVEL HIGH BACKUP HTRS ON
SER 367 1-LS-68-339E/F	5% of span above level program	

Probable Causes

1. Charging and/or letdown flow mismatch.
2. Instrument malfunction of level or Tavg.
3. Load transient condition.

NOTE Changes in pressurizer heater/spray operation may cause small reactivity changes due to:

- Differences in boron concentration between Pzr & Loops or
- Changes in pressure due to pressure coefficient of reactivity.

Corrective Actions

[1] **CONFIRM** instrumentation by CHANNEL CHECK

[2] **IF** instrument has failed, **THEN**
GO TO AOP-I.04, Pressurizer Instrument Malfunction.

[3] **IF** instrument has not failed, **THEN**
ENSURE level is returning to program 1-LR-68-339 with appropriate charging and letdown.

[4] **IF** RCS pressure ≥ 2265 psig, **THEN**
DEENERGIZE backup heater 1C. **[C.1]**

[5] **EVALUATE** Technical Specifications (3.3.1 and 3.3.2).

References

45B655-05A-0,
45N657-15,
47B601-68-45

CONTROLS

TAVG	PZR LEVEL
547 °F - 578.2 °F (0 - 100% power)	24.7% - 60% (547 °F - 578.2 °F T_{avg} [Auct. Hi T_{avg}])
FEEDPUMP SPEED CONTROL	**S/G LEVEL**
80 - 195 psid, (0 - 20 %, constant 80 psig) (20 - 100% total steam flow)	33 - 44% (0 - 20% turbine load) 44% (20 - 100% turbine load)
ROD CONTROL	**FIRST-STAGE IMPULSE PRESSURE**
Auto: 8 spm; 1.5°F → 3.0°F error 8 spm - 72 spm; 3°F → 5°F error Manual: 48 spm Bank Select: 48 spm control rods 64 spm shutdown rods FP Rod Insertion Limit: 182 steps on "D" Bank	0 - 628 psia 0 - 100% power

STEAM DUMPS

Blocking:

Steam Dump Bypass Interlock Switches (M-4) in OFF

Condenser not available (absence of C-9)

Lo-Lo T_{avg} (P-12) locks out all steam dumps; interlock can be bypassed for 3 cooldown valves using the two bypass interlock switches on M-4.

Arming:

Load Rejection: 10% load decrease in a 2 minute time constant as sensed by PT-1-72 (C-7).

Reactor Trip: P-4 from 'A' Tr. Rx Trip Breakers ('B' Tr. P-4 places Rx Trip Controller I/S.)

Mode Selector Switch (M-4) in STEAM PRESSURE

Opening:

Tave Mode ⇒

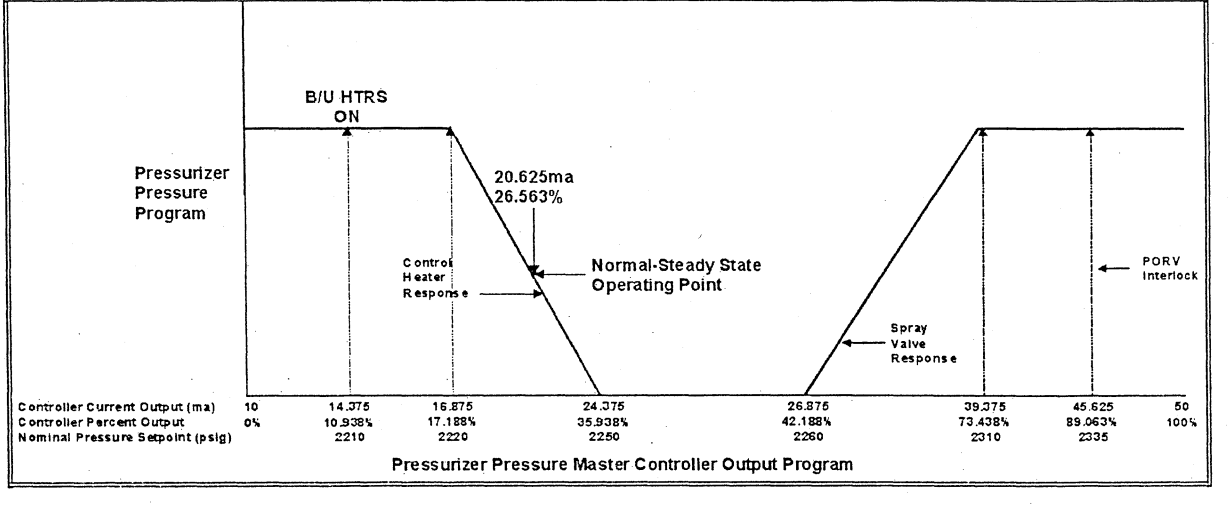
Load Reject: Tave - Tref (PT-1-73)
(2°F → 18°F = 0 → 100% open)
Trip Open - ½ @ 10°F; ½ @ 18°F

Reactor Trip: Tave - 552°F (Fixed Reference Signal)
(0°F → 50°F = 0 → 100% open)
Trip Open - ½ @ 25°F; ½ @ 50°F

Pressure Mode: Auto = steam pressure - setpoint
Manual = Operator Controlled

PRESSURIZER PRESSURE CONTROL SETPOINTS (psig)

	2485	Safety Valve Open
	2385	Reactor Trip
+100	2335	PORV Opens (requires 2/2 signals >2335)
	2315	PORV recloses after actuation
+75	2310	Spray Valve FULL OPEN
+25	2260	Spray Valve starts to open
+15	2250	Variable Heaters OFF
	2235	Variable Setpoint
-15	2220	Variable Heaters ON
	2218	Backup Heater Banks A & B OFF
-25	2210	Backup Heaters ON
	1970	REACTOR TRIP P-11 Setpoint
	1870	Low Pressure Safety Injection



Pressurizer Pressure Master Controller Output Program

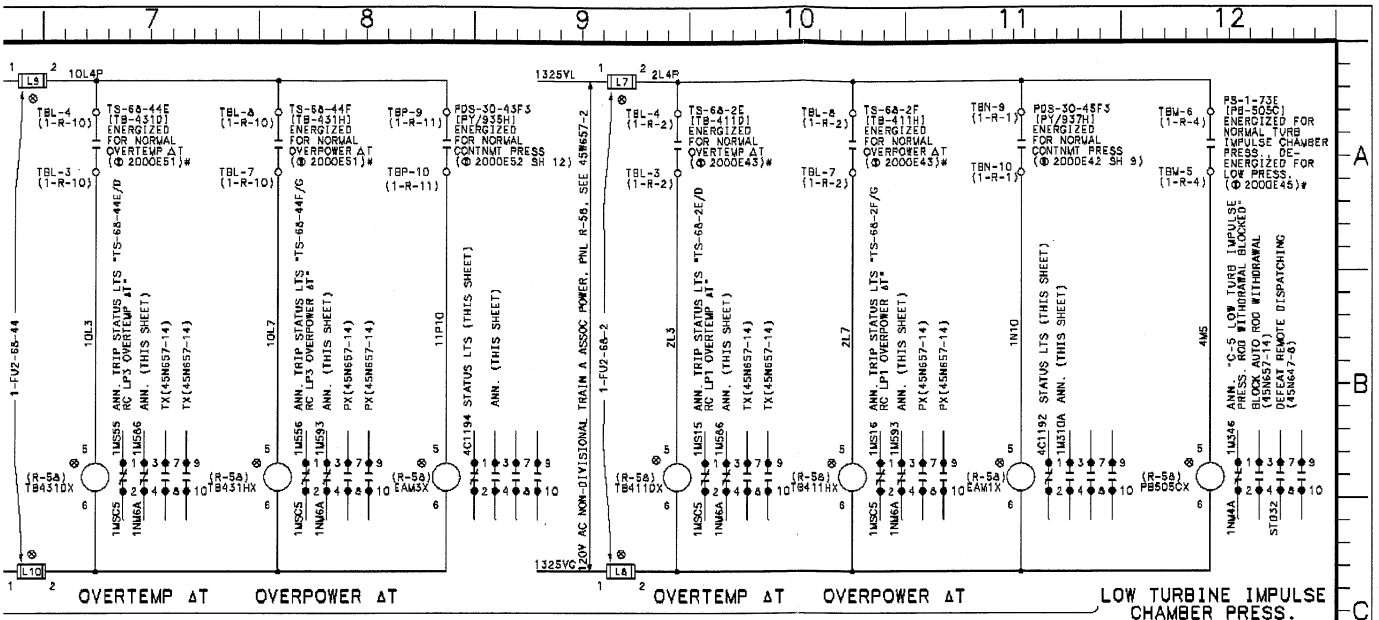
V. TRAINING OBJECTIVES (Cont'd):

B. Enabling Objectives (Cont'd):

5. Describe the operation of the Pressurizer Level Control System as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the Pressurizer Level Control 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 the Pressurizer Level Control System operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the Pressurizer Level Control System :
   a. State Tech Specs/TRM LCOs that govern the Pressurizer Level Control System
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the Pressurizer Level Control 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. Event Title: SQ970649PER - U-1 pressurizer was drained below 25% actual level while decreasing level from solid water conditions

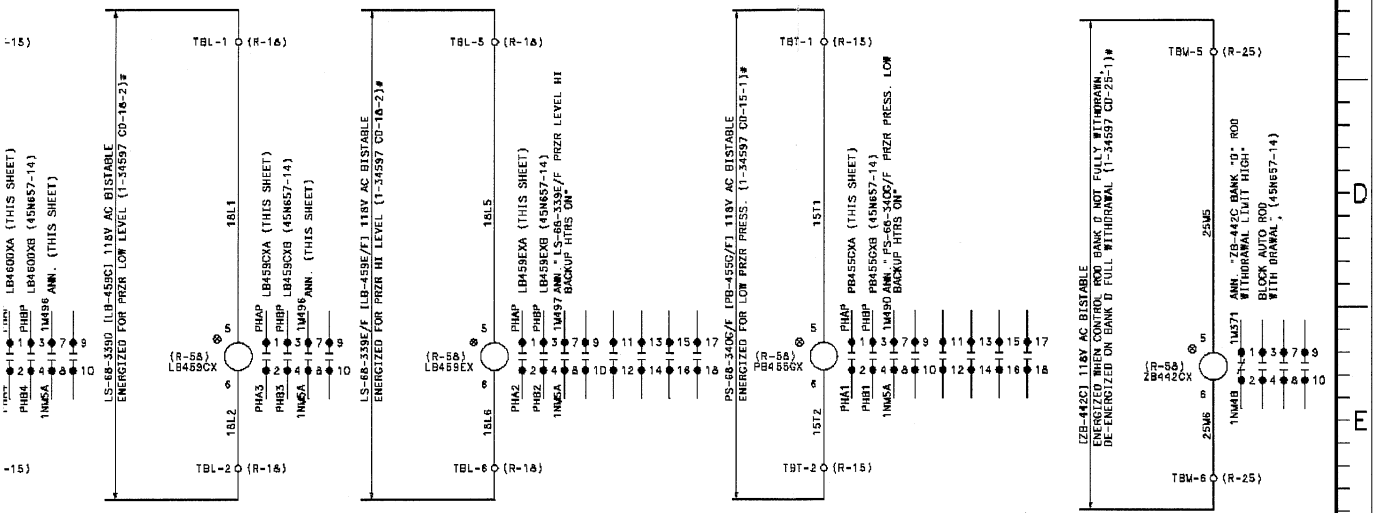
VI. TRAINING AIDS:

A. Computer.
B. Computer Display Projector & Controls.
C. Local Area Network (LAN) Access.
D. Simulator (if available)



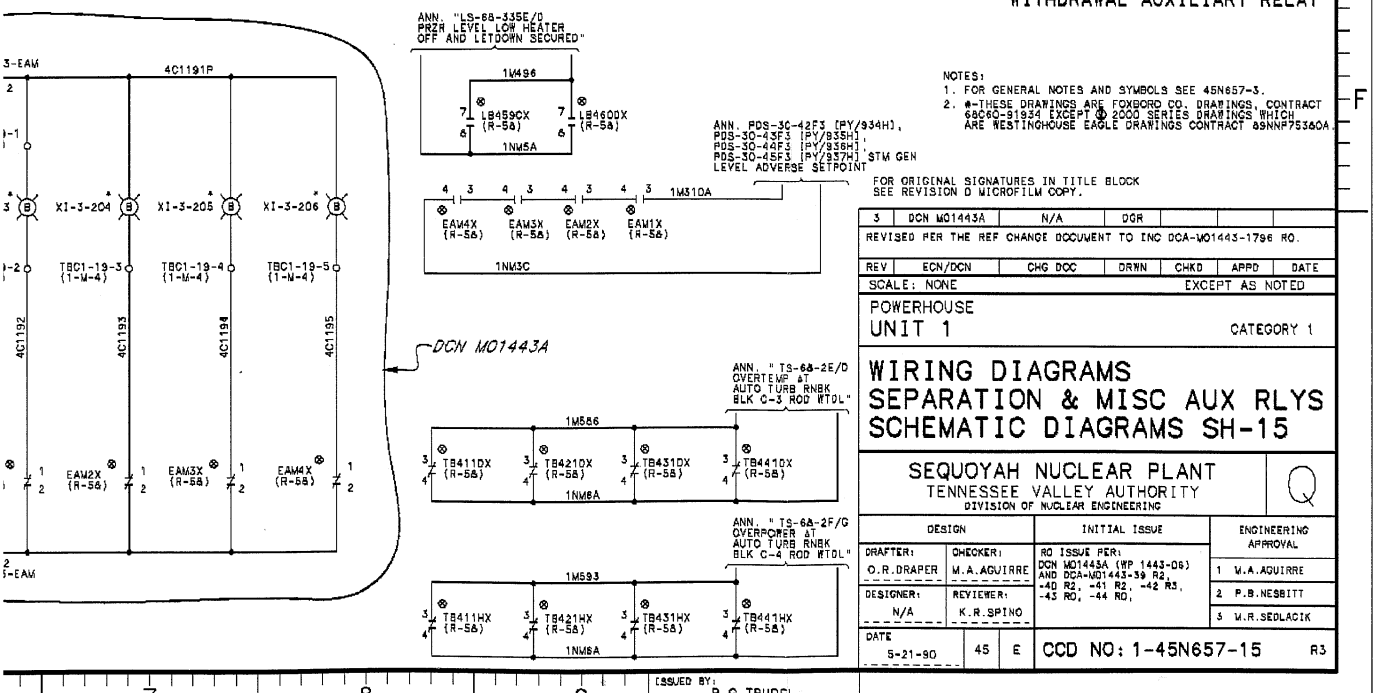
LIARY RELAYS

LOW TURBINE IMPULSE CHAMBER PRESS. SEPARATION RELAY



PRESSURIZER CONTROL SEPARATION RELAYS

CONTROL ROD BANK 'D' FULL WITHDRAWAL AUXILIARY RELAY



NOTES:
1. FOR GENERAL NOTES AND SYMBOLS SEE 45N657-3.
2. #-THESE DRAWINGS ARE FOXBORO CO. DRAWINGS, CONTRACT 68C60-91934 (EXCEPT Ⓓ 2000 SERIES DRAWINGS WHICH ARE WESTINGHOUSE EAGLE DRAWINGS CONTRACT 89NNP75360A.

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

REV	ECN/DCN	CHG DOC	DRWN	CHKD	APPD	DATE
3	DCN M01443A	N/A	DGR			

REVISED PER THE REF CHANGE DOCUMENT TO INC DCA-M01443-1796 RO.

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE
UNIT 1 — CATEGORY 1

WIRING DIAGRAMS
SEPARATION & MISC AUX RLYS
SCHEMATIC DIAGRAMS SH-15

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR ENGINEERING

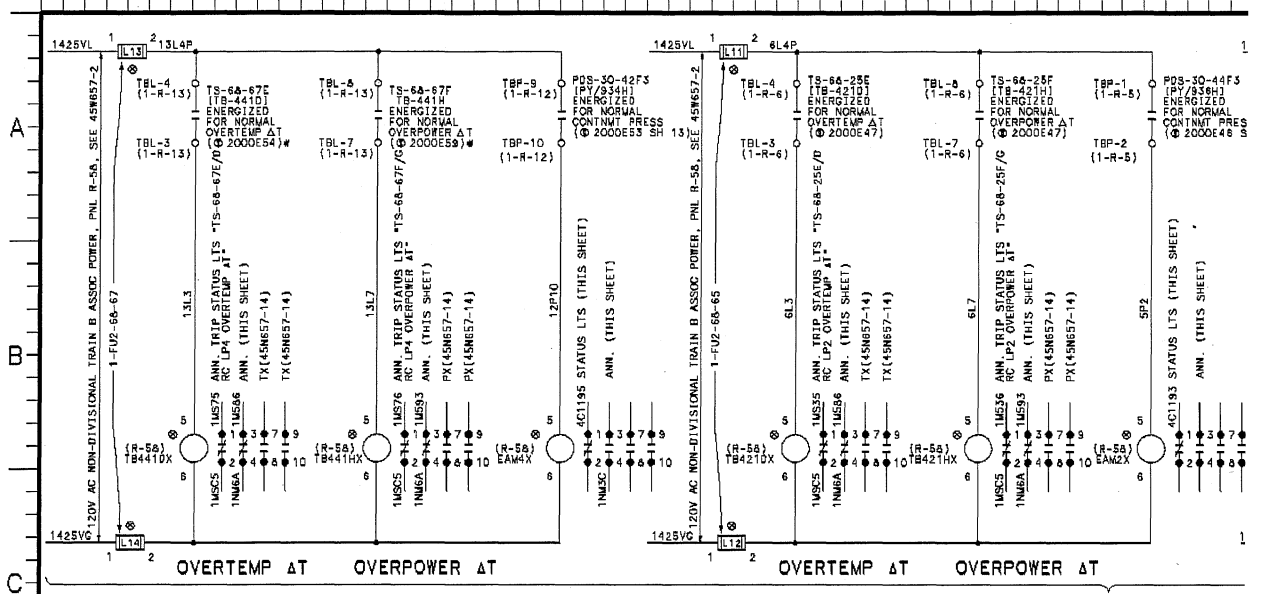
Q

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: O.R.DRAPER	CHECKER: M.A.AGUIRRE	RO ISSUE PER: DCN M01443A (WP 1443-06) AND DCA-M01443-39 R2, -40 R2, -41 R2, -42 R3, -43 R0, -44 R0,	1 W.A.AGUIRRE
DESIGNER: N/A	REVIEWER: K.R.SPINO		2 P.B.NESBITT
			5 W.R.SEDLACIK
DATE 5-21-90	45 E	CCD NO: 1-45N657-15 R3	

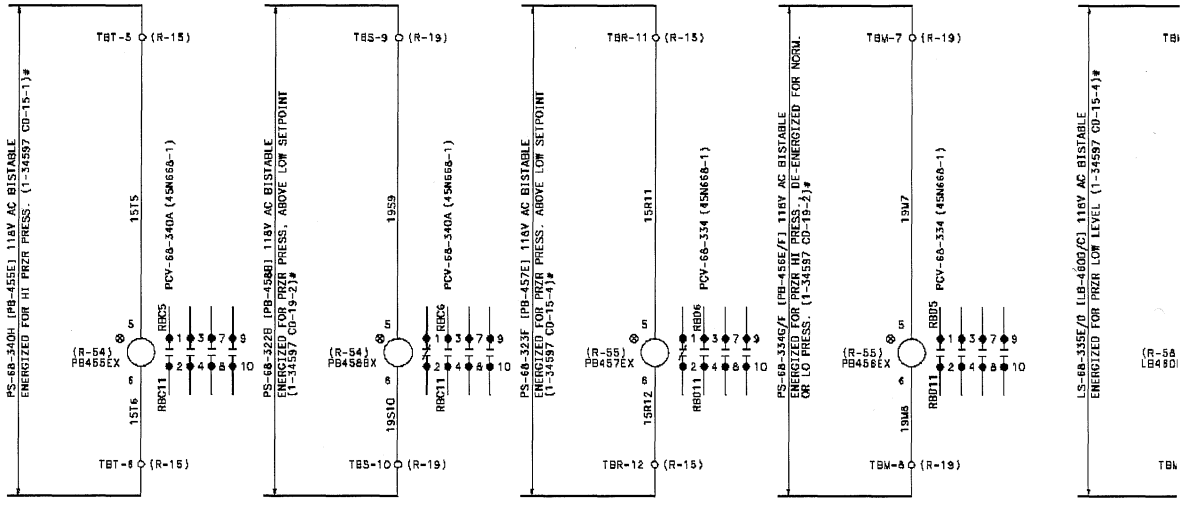
ISSUED BY: P.G.TRUDEL

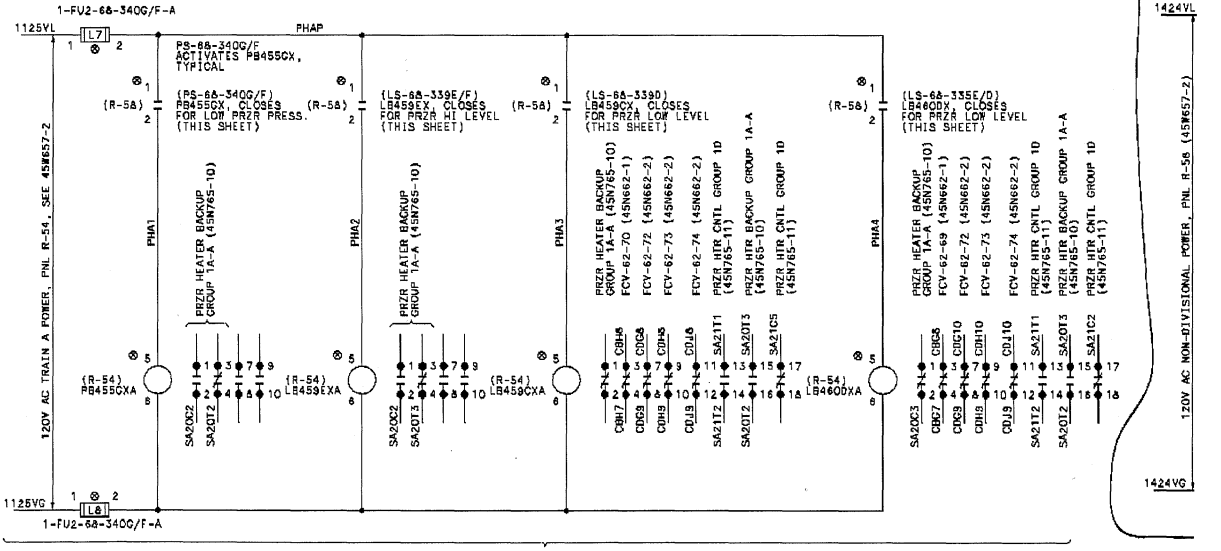
ONE-PROJECT STATIONS BRANCH
CAD MAINTAINED DRAWING
THIS CONFIGURATION CONTROL DRAWING IS MAINTAINED BY THE SQN CAD UNIT AND IS NOW PART OF THE TVA CADAM DATABASE.
COMPUTER GRAPHICS

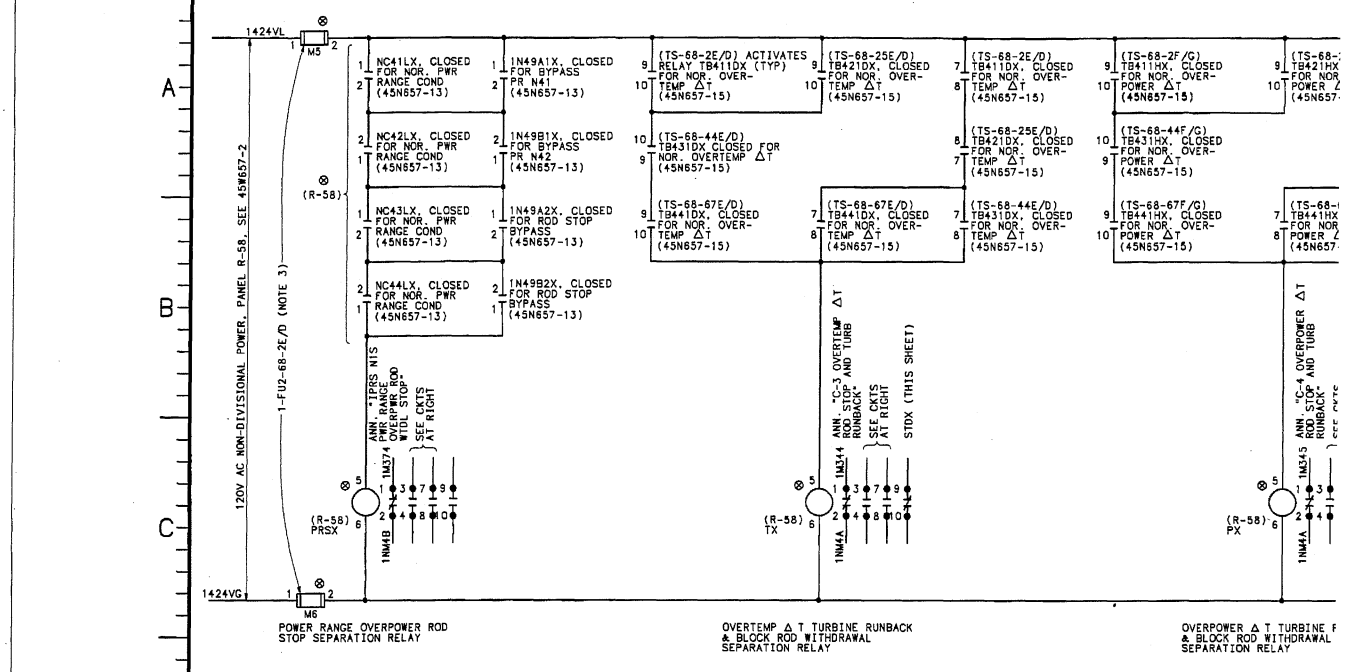
CONTROL ROOM DWG

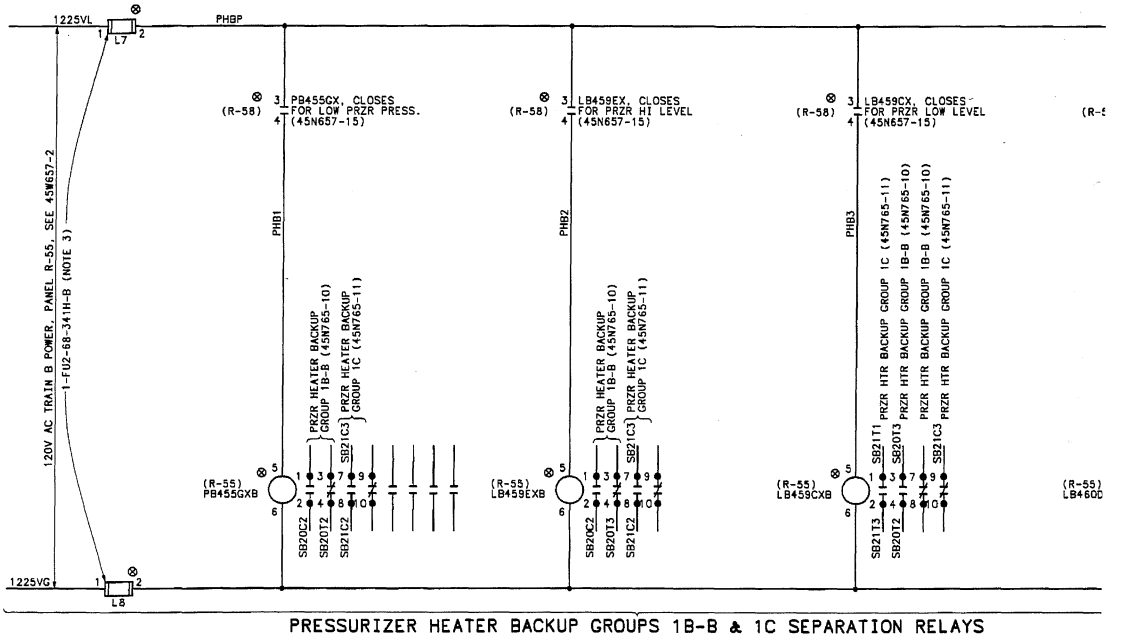


TURBINE RUNBACK & BLOCK ROD WITHDRAWAL

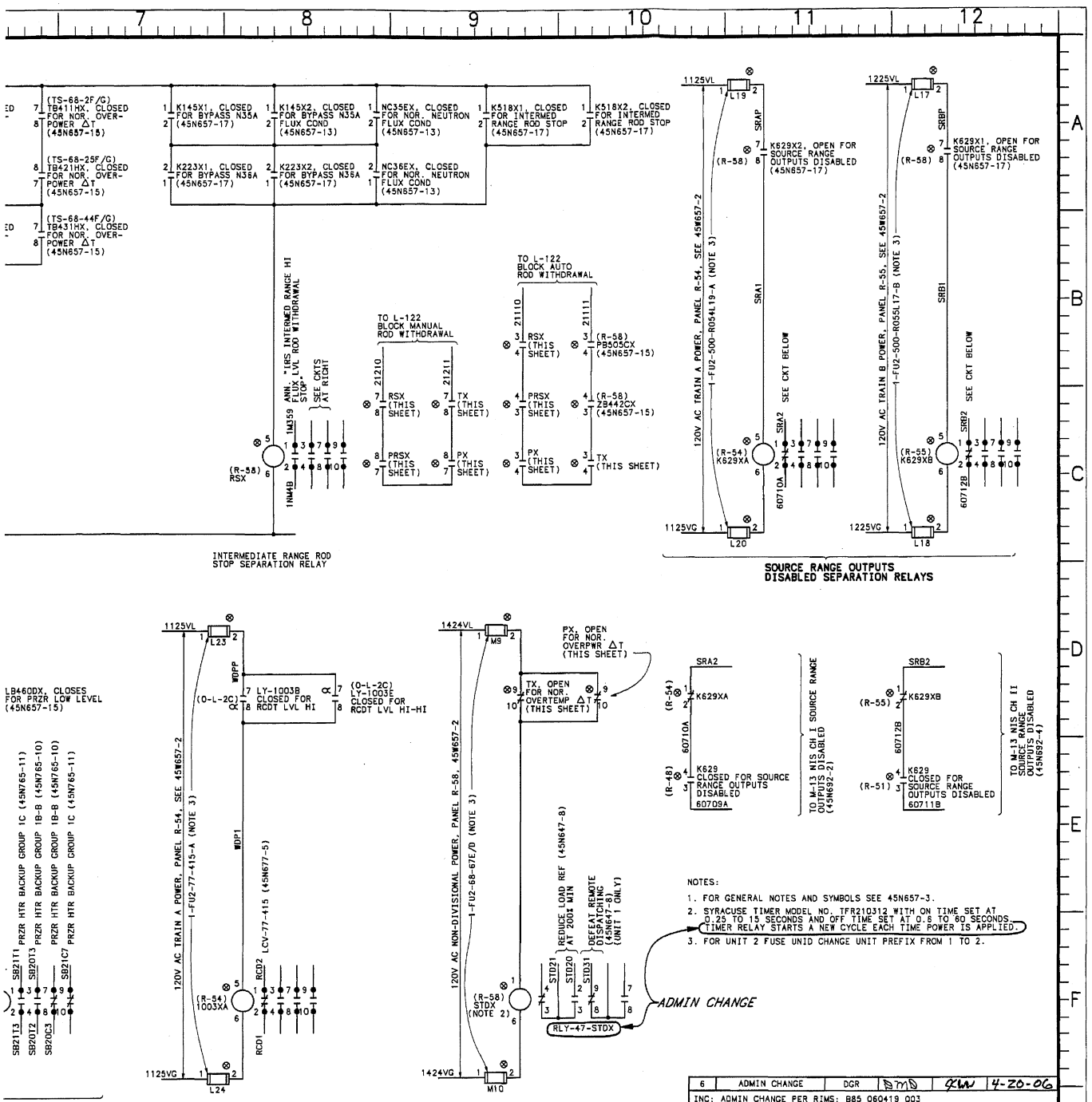








PRESSURIZER HEATER BACKUP GROUPS 1B-B & 1C SEPARATION RELAYS



REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
6	ADMIN CHANGE	DGR	BMD	KW	4-20-06

INC: ADMIN CHANGE PER RIMS: B85 060419 003
THIS RESOLVES PER 95880

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE — CATEGORY 1

UNITS 1 & 2

WIRING DIAGRAMS SEPARATION & MISC AUX RLYS SCHEMATIC DIAGRAMS SH 14

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: Dave Clark	CHECKER: LRB	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-8128. DWG MADE A CCD FROM AC-N & AD-R7. ALSO INCORPORATED WP 6186-03 PER ECN L6186.	1 J.A. DUCH
DESIGNER: N/A	REVIEWER: KKS		2 P.W. WEBB
			3 M.R. SEDLACIK

DATE 3-28-90 | 45 | E | CCD NO: 1,2-45N657-14 R6

ISSUED BY: P.G. TRUDEL/L

CAD MAINTAINED DRAWING

CONTROL ROOM DWG

QUESTIONS REPORT
for BANK SQN Questions

PZR LEVEL-B.12.D 001

Given the following plant conditions:

- Reactor power is steady-state at 100%
- Pressurizer Level Control Selector Switch (XS-68-339E) is in the 339/335 position
- Temperature input to the pressurizer level control system fails to 530^{O}F

Which ONE (1) of the following describes the effect this condition would have on the pressurizer level control system? (Assume **NO** operator action)

A. Charging initially increases to 120 gpm then returns to normal and pressurizer level stabilizes at previous value.

B. Charging initially decreases to minimum flow and indicated pressurizer level lowers to 25% where it stabilizes.

C. Charging decreases to minimum and indicated pressurizer level lowers to 17%, then level rises to the high level reactor trip setpoint.

D. Charging increases to 120 gpm and the pressurizer level rises to the high level reactor trip setpoint.

Notes:

K/A:	011K3.01	[3.2/3.4]	{41.7}
	011K4.04	[3.0/3.3]	{41.7}
	011K1.01	[3.6/3.9]	{41.3, 5, 7}
	011A3.03	[3.2/3.3]	{41.7}

Reference: FSAR
47W611-68 series prints
AOP-I.04

Objective: OPT200.PZRLCS, Obj 9.a, 11.a, 12.d, 17.c
OPL271C353, B.4

Level: Comprehension

History: New

Est Time: 4 min.

Comments:

HLC 0108:		HLC 0109:	
HLC 2006:	8/8/05	LOR Cycle Exam:	
Last Biennial Exam:		Part B (Y/N):	Y
SRO only [Y/N]:		Category 8:	

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** PRESSURIZER LEVEL CONTROL SYSTEM

IV. **LENGTH OF LESSON:** Initial License Training: 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 Pressurizer Level Control System in the plant and on the simulator.

B. Enabling Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge and abilities associated the Pressurizer Level Control 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 Pressurizer Level Control System as described in the SQN FSAR.
2. State the design basis of the Pressurizer Level Control System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Pressurizer Level Control System.
4. Describe the following items for each major component in the Pressurizer Level Control 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 Pressurizer Level Control System components are designed
   m. Location of controls and indications associated with the Pressurizer Level Control System in the control room and auxiliary control room

57. 014 K5.02 057

Given the following:

- A Unit 1 reactor startup is in progress.
- Control Bank "D" rods are being withdrawn when Rod H-8 dropped into the core.
- Control Bank "D" step counters indicated 31 steps and Rod H-8 RPI indicated 28 steps at the time of the rod drop.

Which ONE of the following identifies the status of the H-8 Rod Bottom Light and Annunciator Panel 1-XA-55-4B, Window D-7: "FULL LENGTH RODS RODS AT BOTTOM" for the above conditions?

	H-8 Rod Bottom Light	**Annunciator D-7**
A.	LIT before the rod dropped and remained LIT after the rod dropped.	In alarm
B.	LIT before the rod dropped and remained LIT after the rod dropped.	NOT in alarm
C.	DARK before the rod dropped and LIT after the rod dropped.	In alarm
D.	DARK before the rod dropped and LIT after the rod dropped.	NOT in alarm

DISTRACTOR ANALYSIS:

A. *Incorrect, The rod bottom light would NOT have been LIT before the rod was dropped because after the rod was 20 steps withdrawn the light goes out, and the "FULL LENGTH RODS RODS AT BOTTOM" alarm would NOT have been enabled until the step counters had reached 35 steps withdrawn as sensed by the P/A converter. Plausible because both conditions are associated with indications of a dropped rod. The rod bottom light lit prior to dropping the rod would be correct if the rod had dropped prior to reaching 20 steps,and the annunciator alarm would have been correct it the rod had been withdrawn 4 more steps before the rod dropped.*

B. *Incorrect, The rod bottom light would NOT have been LIT before the rod was dropped because after the rod was 20 steps withdrawn the light goes out, however, the "FULL LENGTH RODS RODS AT BOTTOM" alarm would NOT have been enabled until the step counters had reached 35 steps withdrawn as sensed by the P/A converter. Plausible because both conditions are associated with indications of a dropped rod. The rod bottom light lit prior to dropping the rod would be correct if the rod had dropped prior to reaching 20 steps,and the annunciator alarm not alarming is correct due to the rod the step counters NOT indicating 35 steps withdrawn as sensed by the P/A converter.*

C. *Incorrect, The rod bottom light would have went dark when the rod was withdrawn 20 steps however the "FULL LENGTH RODS RODS AT BOTTOM" alarm would NOT have been enabled until the step counters had reached 35 steps withdrawn as sensed by the P/A converter. Plausible because both conditions are associated with indications of a dropped rod. the rod bottom light lit is correct and the annunciator alarm would have been correct it the rod had been withdrawn 4 more steps before the rod dropped.*

D. *CORRECT, The rod bottom light would have went dark when the rod was withdrawn 20 steps however the "FULL LENGTH RODS RODS AT BOTTOM" alarm would not have been enabled until the step counters had reached 35 steps withdrawn as sensed by the P/A converter.*

Question No. 57

Tier 2 Group 2

K/A 014 K5.02
Knowledge of the operational implications of the following concepts as they apply to the RPIS: RPIS independent of demand position

Importance Rating: 2.8 / 3.3

Technical Reference: 1-AR-M4-B, NIS/Control, rev 27

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200RPI B.13.b
Explain the following operational implications of the following concepts as they apply to the RPI system:
b. RPIS independent of demand position

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

Question History: SQN bank question RDCNT-B-12.A 002

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

10 CFR Part 55 Content: (41.5 / 45.7)

10CFR55.43.b (n/a)

Comments: SQN bank question RDCNT-B-12.A 002

QUESTIONS REPORT
for 2009 RO test first cut

Question No. 57

Tier 2 Group 2

K/A 014 K5.02
Knowledge of the operational implications of the following concepts as they apply to the RPIS: RPIS independent of demand position

Importance Rating: 2.8 / 3.3

Technical Reference: 1-AR-M4-B, NIS/Control, rev 27

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200RPI B.13.b
Explain the following operational implications of the following concepts as they apply to the RPI system:
b. RPIS independent of demand position

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

Question History: SQN bank question RDCNT-B-12.A 002

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

10 CFR Part 55 Content: (41.5 / 45.7)

10CFR55.43.b (n/a)

Comments: SQN bank question RDCNT-B-12.A 002

FULL LENGTH RODS
RODS AT BOTTOM

Source	Setpoint
SER 328 1. RPI output less than 20 steps for shutdown banks and control banks. 2. Control banks B, C, and D annunciate only if pulse-to-analog converter order is greater than 35 steps then drops below 20 steps. 3. Shutdown banks and control bank A annunciates if rods are below 20 steps.	≤ 20 steps from bottom

Probable Causes

1. Dropped rod.
2. Rod position indication malfunction or failure.
3. Reactor trip.

Corrective Actions

[1] **CHECK** rod position.

[2] **IF** more than one rod drops, **THEN**
TRIP the reactor and **GO TO** E-0, *Reactor Trip or Safety Injection.*

[3] **IF** a single rod dropped, **THEN**
GO TO AOP-C.01, *Rod Control System Malfunctions.*

[4] **IF** RPI malfunction or failure, **THEN**
GO TO AOP-C.01, *Rod Control System Malfunctions.*

[5] **IF** dropped rod occurs or rod position indication is the malfunction, **THEN**
REFER TO Technical Specifications 3.2.4, 3.1.3.1, 3.1.3.5, and 3.2.1.

References

45B655-04B-0

QUESTIONS REPORT
for BANK SQN Questions

RDCNT-B.12.A 002

Given the following conditions:

- A reactor startup is in progress.
- Bank D rods are at 30 steps.
- Bank C rods are at 157 steps.

Which ONE (1) of the following explains how the Rod Control System and/or the Individual Rod Position Indication System responds to a single rod drop in Control Bank C?

A. The Rods at Bottom alarm actuates on 1-M-4 due to bank D less than 35 steps as indicated by the P/A converter.

B. The Individual Rod Position Indication rod bottom light actuates for the dropped rod due to A and B bank being fully withdrawn.

C. The Rod At Bottom alarm actuates on 1-M-4 due to the dropped rod being less than 35 steps as indicated by the P/A converter.

D. The individual rod bottom light actuates for the dropped rod due to the dropped rod being less than 20 steps as indicated by the RPIs.

Justification:

A. Incorrect. The 35 steps relates to the bank for the dropped rod. The rods at bottom alarm will annunciate due to Bank C was greater than 35 steps when the "C" rod dropped.

B. Incorrect. Rod bottom lights are independent of other banks being withdrawn.

C. Incorrect. The rods at bottom alarm will annunciate due to Bank C was greater than 35 steps (enables alarm) when the "C" rod dropped (RPI< 20 steps).

D. Correct.

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

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** ROD POSITION INDICATING (RPI) SYSTEM

IV. **LENGTH OF LESSON/COURSE:** 1 hour lecture; 1/2 hour simulator demonstration; 1 hour self-study/workshop

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:
Upon completion of this lesson and others presented, the student shall demonstrate an understanding of the rod position indicating system by successfully completing a written examination with a score of 80 percent or greater. The "*" objectives should be included in the lecture.

B. Enabling Objectives

* 1. State the purpose and functions of the RPI system. (K/A 2.1.27)
* 2. State the purpose and functions of major RPI system components. (K/A 2.1.28)
* 3. State the locations of components, switches, controls, and indications associated with the RPI system. (K/A 2.1.30, 2.1.31)
* 4. Explain and apply all design limitations. (K/A 2.1.32)
* 5. Identify and apply the RPI system Technical Specifications and Technical Requirements Manual.
   a. State the RPI system technical specifications with less than one hour action statements. (K/A 2.1.11)
   b. Explain the technical specification bases for RPI system. (K/A 2.2.25)
   c. Given a set of plant conditions, apply the appropriate technical specifications and TRM requirements for the RPI system. (K/A 2.1.12, 2.1.33, 2.2.22)
* 6. For the RPI system, describe the differences between unit's design, control board layouts, and instrumentation. (K/A 2.2.3, 2.2.4)
7. Explain and apply the RPI system precautions and limitations. (K/A 2.1.32)
8. Explain and apply the Alarm Response Procedures associated with RPI system. (K/A 2.4.46, 2.4.47, 2.4.48, 2.4.50)
* 9. Explain the physical connections and/or cause-effect relationships between RPI system and the following plant systems: (K/A K1)
   a. Control rod drive system
   b. Excore nuclear instrumentation and RPS
* 10. State the electrical supplies to RPI system's components. (K/A K2)
   a. Power supply to the LVDTs
   b. Power Supply to the pulse counters
11. Given a RPI system/component malfunction, analyze its affect on the plant systems listed. (K/A K3)
   a. CRDS
   b. Plant computer
* 12. Explain the following RPI system design features and or interlocks. (K/A K4)
   a. Upper Electrical Limit
   b. Lower Electrical Limit

c. Rod bottom lights
d. Zone reference lights
e. Rod hold interlocks
f. Individual and group misalignment

13. Explain the following operational implications as they apply to RPI system. (K/A K5)
    a. Reasons for differences between RPIS and step counter
    b. RPIS independent of demand position
    c. Differences in accuracy of reed switches and pulse counters
    d. Concepts of magnetic flux and permeability of stainless steel housing
14. Given a malfunction of listed plant systems/components, analyze its effect on the RPI system. (K/A K6)
    a. Sensors and detectors
    b. Breakers, relays, and disconnects
15. Given a plant situation, prevent exceeding operational design limits by predicting and/or monitoring, as applicable, changes in parameters that are associated with the operating controls of the RPI system. (K/A A1)
    a. Control Rod position indication on control room panels
    b. PDIL, PPDIL
    c. Axial and radial power distribution
16. Given a plant situation for the RPI system, (i) predict the impact on plant operation, and (ii) based on the impact, apply procedural guidance to correct, control, or mitigate the consequence of the situation. (K/A A2)
    a. Loss of offsite power
    b. Loss of power to the RPIS
    c. Dropped rod
    d. Misaligned rod
    e. Reactor Trip
    f. Loss of LVDT
17. Given a plant situation, demonstrate the ability to monitor the automatic operation of the RPI system. (K/A A3)
18. Given a plant situation for the RPI system, demonstrate the ability to monitor and, as appropriate, perform manual operation of the system in the control room. (K/A A4)
    a. Rod selection control
    b. Control rod mode-selection switch
    c. Primary coil voltage measurement
    d. Re-zeroing of rod position prior to startup

58. 015 K3.04 058

Given the following:

- Unit 1 is at 100% power.
- Power Range Channel NI-44 fails due to a loss of instrument power.

Which ONE of the following identifies the impact the failure of NI-44 has on Annunciator Panel 1-XA-55-4B, Window D-4: "COMPUTER ALARM ROD DEV& SEQ NIS RANGE TILTS"?

The window will alarm due to ICS sensing ...

A. An AFD alarm and the window has reflash capability for alarms from other sources.

B. An AFD alarm, but the window does NOT have reflash capability for alarms from other sources.

C. A QPTR alarm and the window has reflash capability for alarms from other sources.

D. A QPTR alarm, but the window does NOT have reflash capability for alarms from other sources.

DISTRACTOR ANALYSIS:

A. Incorrect, Loss of power to NI-44 would cause both the upper and lower detectors to fail, thus there would be no difference in the upper and lower detectors. Plausible because a different failure of the NI could result in the AFD causing the alarm and the window does have reflash capability if an alarm is generated from another source.

B. Incorrect, Loss of power to NI-44 would cause both the upper and lower detectors to fail, thus there would be no difference in the upper and lower detectors. Plausible because a different failure of the NI could result in the AFD causing the alarm and many of the annunciator windows do not have reflash capability.

C. CORRECT, The window will alarm due to the ICS calculated QPTR alarm <0.97 or > 1.02 for reactor power >50% in accordance with 1-AR-M4-B window D-4. The annunciator response NOTE 1 reads "Each of the above sources have reflash capability. AFD has multiple setpoints which will alarm on ICS computer."

D. Incorrect, The window will alarm due to the ICS calculated QPTR alarm <0.97 or > 1.02 for reactor power >50% in accordance with 1-AR-M4-B window D-4. Plausible because QPTR will cause the alarm and many of the annunciator windows do not have reflash capability.

Question No. 58

Tier 2 Group 2

K/A 015 K3.04
Knowledge of the effect that a loss or malfunction of the NIS will have on the following:
ICS

Importance Rating: 3.4* / 4.0*

Technical Reference: 1-AR-M4-B, NIS/Rod Control, Rev 27, window D-4
AOP-1.01, Nuclear Instrument Malfunction, Rev 9

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.ICS B.5.c
Describe the operation of the Integrated Computer system:
c. Alarms and alarm response

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.7 / 45.6)

10CFR55.43.b (n/a)

Comments:

COMPUTER ALARM
ROD DEV & SEQ
NIS PWR RANGE
TILTS

Source	Setpoint
SER 325	
1. Plant Computer Rod Sequencing Status	1. Incorrect Rod Overlap or sequence
2. Plant Computer Rod to Rod Status	2. Rod to Rod Deviation Status
3. Plant Computer Rod to Bank Deviation	3. Rod > 12 steps from bank demand counter
4. Plant Computer Axial Flux Difference (AFD) Alarm	4. AFD > Tech Spec Limits OR AFD outside target band initially OR AFD > 30 equivalent minutes outside target band OR AFD channels approaching TS limit OR 2/4 AFD channels out of service
5. Plant Computer Quadrant Power Tilt Ratio (QPTR) Alarm	5. Plant Computer calculated QPTR < 0.97 or > 1.02 for reactor power > 50%.

NOTE 1 Each of the above sources have reflash capability. AFD has multiple setpoints which will alarm on ICS computer.

NOTE 2 When the ICS source screen is displayed, the setpoint will change colors for a new alarm.

NOTE 3 If the ICS source screen is not displayed, then color changes of the circle M (alarm message handler) indicates that circle M must be selected to see the message/alarms.

Probable Causes

1. Plant Computer rod bank positions not updated to match step counters. (This may have occurred if the primary ICS CPU failed over to the backup CPU.)
2. Plant Computer missed logging rod bank step pulses.
3. Plant Computer perceived QPTR calculation inaccurate because:
   [a] Rx power is below high power level
   [b] rods inserted too far into the core
   [c] non-equilibrium xenon condition.
4. Plant Computer sees inappropriate NIS signals due to NIS surveillance test in progress with channel out of service **OR** NIS channel bad.
5. Plant Computer QPTR above 0.97 and below 1.02 limit but has not cleared reset deadband.
6. Rod out of position or true core tilt.
7. RPI failure.

CONTINUED NEXT PAGE

CORRECTIVE ACTIONS (CONTINUED)

COMPUTER ALARM
ROD DEV & SEQ
NIS PWR RANGE
TILTS

Corrective Actions

[1] **IF** Power Range channel failed, **THEN**
GO TO AOP-I.01, *Nuclear Instrument Malfunction.*

[2] **IF** rod sequence is improper, **THEN**
ENSURE rod control in manual, **AND**
GO TO AOP-C.01, *Rod Control System Malfunctions.*

[3] **IF** RPI failure has occurred, **THEN**
GO TO AOP-C.01, *Rod Control System Malfunctions.*

NOTE

Surveillance testing for all alarm sources is NOT required when the particular alarm source (Rod Insertion Limits, QPTR Tilt Summary or AFD) is known. All alarms have reflash capability. Only the problem source may require trending or performance of a surveillance to satisfy LCO requirements.

[4] **DETERMINE** source of alarm by performing the following:
USE ICS computer pull down menu (tool bar),
SELECT TRENDS, GROUP DISPLAY, COMPALM
(or type in SHOW COMPALM).

[a] **IF** 1U0200D, 1U0203D OR 1U0204D Quality is NOT good or Value is not normal, **THEN**
GO TO step 5.

[b] **IF** 1U0271D or 1U0272D Quality is NOT good or Value is not normal, **THEN**
GO TO step 6.

[c] **IF** any of the following conditions met:

- Quality is NOT good or value is NOT normal on any of the following points: 1U0270D or 1QC9000I or 1QC9000J

  OR

- Quality is NOT good or value is NOT normal on two out of four of 1U2111, 1U2112, 1U2113, or 1U2114

THEN
GO TO step 7.

CONTINUED NEXT PAGE

CORRECTIVE ACTIONS (CONTINUED)

COMPUTER ALARM ROD DEV & SEQ NIS PWR RANGE TILTS

NOTE COLR Rod Insertion Limits are raised by 3 steps if LEFM (U2118) NOT available.

[5] **USING** ICS plant computer access Graphics,® Primary Menu, then applications program, Rod Insertion Limits.

[a] **IF** message block for rod bank sequence or any of the three rod deviations are red, **THEN**

CHECK computer rod bank position **AND** update if computer bank positions are in error

[b] **IF** message block for any Rod Insertion Limit is red, **THEN**

CHECK rod position indications for confirmation and use appropriate plant procedure for indication deviation (PI-IXX-085-001.0).

[c] **IF** alarm is valid and remains, **THEN**

TAKE appropriate Tech Spec/Procedural action.

CORRECTIVE ACTIONS (CONTINUED)

COMPUTER ALARM
ROD DEV & SEQ
NIS PWR RANGE
TILTS

[6] **USING** ICS plant computer access Graphics,® Primary Menu, then application program, QPTR Tilt Summary.

[a] **IF** any QPTR upper or lower excore detector power tilts are shown in alarm status (red) with valid values below 0.97 or exceeding 1.02, **THEN**

1. **CHECK** control board indication to see that all RCCAs are aligned normal and that NIS channels are not in TEST or undergoing calibration.
2. **IF** NIS channels appear to be properly functioning and alarm is valid, **THEN** take appropriate Tech Spec/Procedural action (0-SI-NUC-000-133.0).

[b] **IF** any QPTR upper or lower TILTs are < 0.975, **THEN**

VERIFY RCCAs are aligned normally. It is not necessary to perform 0-SI-NUC-000-133.0 for low tilt.

NOTE

At power levels of ~ 50-85%, NIS calibration accuracy is reduced because the plant is not at full power, equilibrium xenon, and near ARO conditions. Therefore, a small difference in detector sensitivity or core quadrant powers can cause an apparent radial tilt alarm of 2% or more.

[c] **IF** alarm will not clear and all power range channels are operable with thermal ≥ 50% of RTP, **AND** no misaligned or dropped rod exist, **THEN**
Power escalation may continue provided:

[1] 0-SI-NUC-000-133.0 is performed hourly

[2] A 24 hr clock is started to **ENSURE** QPTR is ≤ 1.02 within 24 hrs **OR REDUCE** thermal power to less than 50%.

[3] Power level is limited to RTP minus 3% for every % QPTR is greater than 1.02.

CONTINUED NEXT PAGE

CORRECTIVE ACTIONS (CONTINUED)

COMPUTER ALARM
ROD DEV & SEQ
NIS PWR RANGE
TILTS

NOTE 1 Time out of band may require 24-hours to clear. Performance of 0-SI-NUC-000-044.0 is not required for time out of band as long as ICS is operational. Both, ICS and the annunciator will re-alarm if subsequent AFD target band or COLR limits are reached.

NOTE 2 AFD limit lines in COLR are made more restrictive by 1% when LEFM (U2118) NOT available.

[7] **USING** ICS plant computer access Graphics,® Primary Menu, then application program, Doghouse Display.

[a] **IF** the NIS channels appear to be properly functioning and the axial flux difference (AFD) is near the edge or outside allowable 5% target band or COLR limits, **THEN**
ATTEMPT to return the flux to target control band,
GO TO appropriate Tech Spec action, **AND**
INITIATE 0-SI-NUC-000-044.0.

[b] **WHEN** AFD is within target band and COLR limits with ICS operational, **THEN**
STOP performance of 0-SI-NUC-000-044.0.

[c] **IF** > 30 minutes time out of band exists, **THEN**

ENSURE Reactor Engineering has been notified.

[8] **IF** NIS channel is in TEST, **THEN**

ENSURE NIS channel input points to computer have been removed from processing **AND** computer values are appropriate for plant conditions.

[9] **IF** ICS fails or other failure makes AFD alarm inoperable, **THEN**

PERFORM 0-SI-NUC-000-044.0.

[10] **IF** annunciator will not clear, **THEN**

CONTACT Reactor Engineering to assist in determining the validity of the alarm.

[11] **EVALUATE** Technical Specifications 3.2.4, 3.1.3.1, 3.1.3.2, 3.2.1, and Technical Requirement 3.1.3.3 as appropriate.

References 45B655-04B-0

V. TRAINING OBJECTIVES (Cont'd):

B. Enabling Objectives (Cont'd):

5. Describe the operation of the Integrated Computer 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 Integrated Computer 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 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)

59. 016 K4.01 059

Which ONE of the following identifies the alternate locations available for Charging flow control and indication outside of the Main Control Room?

	Aux Control Room (1-L-10)	Locally in the Aux Building (1-L-112A)
A.	Controller functions and the flow indication reads only with Nor-Aux switch in AUX.	No control function on panel, flow indication only
B.	Controller functions and the flow indication reads only with Nor-Aux switch in AUX.	Panel has both controller function and flow indication
C.	Controller functions only with Nor-Aux switch in AUX. Indication reads with Nor-Aux switch in either position.	No control function on panel, flow indication only
D.	Controller functions only with Nor-Aux switch in AUX. Indication reads with Nor-Aux switch in either position.	Panel has both controller function and flow indication

DISTRACTOR ANALYSIS:

A. Incorrect, The controller functions only with the NOR-Aux switch in AUX but the indication is always live. Plausible because some controls and indicators must be transferred to place them in service and some local panels only have indications.

B. Incorrect, The controller functions only with the NOR-Aux switch in AUX but the indication is always live. Plausible because some controls and indicators must be transferred to place them in service and local panel does have both a controller and flow indication.

C. Incorrect, the Aux Control Room Controller is not functional until 1-XS-62-93 is placed to the AUX position on 1-L-11B directed in AOP-C-04, Checklist 1 but the indicator on 1-L-10 is live all the time. However, the local panel in the Aux Building has both a controller and an indication. Plausible because the Aux Control Room controller and indication are correct and some local panels only have indications.

D. CORRECT, the Aux Control Room Controller is not functional until 1-XS-62-93 is placed to the Aux position on 1-L-11B directed in AOP-C-04, Checklist 1 but the indicator on 1-L-10 is live all the time. the local panel in the Aux Building has both a controller and a flow indication.

Question No. 59

Tier 2 Group 2

K/A 016 K4.01
Knowledge of NNIS design feature(s) and/or interlock(s) which provide for the following:
Reading of NNIS channel values outside control room

Importance Rating: 2.8* / 2.9*

Technical Reference: AOP-C.04, Shutdown From Auxiliary Control Room. Rev 16
1-SO-62-1, Chemical and Volume Control System, Rev 55

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.CVCS B.4.f &.h
Describe the following characteristics of each major component in the CVCS system.
f. Controls
h. Instrumentation

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.7)

10CFR55.43.b (n/a)

Comments: New for SQN Exam 1/2009

CHECKLIST 1

UNIT 1 AUXILIARY CONTROL ROOM

CAUTION **This checklist must be completed without delay.**

[1] **PLACE** the following transfer switches on 1-L-11B and 1-L-11A in AUX position:

1-L-11B

SWITCH	EQUIPMENT NAME	AUX POSITION √
1-XS-68-334C	PRESSURIZER PORV	☐
1-XS-1-4B	S/G 1 MAIN STEAM ISOL VALVE	☐
1-XS-1-13D	S/G 2 ATM RELIEF PRESSURE CONTROL	☐
1-XS-1-13A	S/G 2 ATM RELIEF CONTROL A SOL	☐
1-XS-1-11B	S/G 2 MAIN STEAM ISOL VALVE	☐
1-XS-1-13B	S/G 2 ATM RELIEF CONTROL B SOL	☐
1-XS-1-22B	S/G 3 MAIN STEAM ISOL VALVE	☐
1-XS-1-31A	S/G 4 ATM RELIEF CONTROL A SOL	☐
1-XS-1-29B	S/G 4 MAIN STEAM ISOL VALVE	☐
1-XS-1-31D	S/G 4 ATM RELIEF PRESSURE CONTROL	☐
1-XS-1-31B	S/G 4 ATM RELIEF CONTROL B SOL	☐
1-XS-62-54	EXCESS LETDOWN ISOLATION	☐
1-XS-62-55	EXCESS LETDOWN ISOLATION	☐
1-XS-62-56	EXCESS LETDOWN ISOLATION	☐
1-XS-62-93	CHARGING FLOW CONTROL	☐

(step continued on next page)

Date_____

8.4 Local Manual Control of 1-FCV-62-93

[1] **OBTAIN** permission from Unit 1 SRO to locally control 1-FCV-62-93. _____

[2] **ESTABLISH** communication between local operator at panel 1-L-112A and MCR operator. _____

[3] **ENSURE** that a CCP is in service and that **[1-FCV-62-98]** and **[1-FCV-62-99]** are **OPEN**. _____

NOTE Charging flow abnormal Annunciator may actuate during transfer.

[4] **MATCH** setpoint (red pen) and actual reading (black pen) using **[1-HIC-62-93B]**. _____

[5] **PLACE [1-HIC-62-93B]** charging flow control in **MANUAL.** _____

[6] **VERIFY [1-XI-62-93]** on panel 1-M-5 is illuminated. _____

NOTE Charging header flow can be monitored on 1-FI-62-93B located on panel 1-L-112A.

[7] **ADJUST** charging flow as necessary to meet requirements of MCR operator. _____

[8] **WHEN [1-HIC-62-93A]** is to be returned to service, **THEN**

[a] **ESTABLISH** communications between MCR and 1-L-112A panel. _____

[b] **RECORD** charging flow _____ gpm. _____

[c] **ADJUST [1-HIC-62-93A]** to ~ 15% open from the full closed position. _____

[d] **PLACE [1-HIC-62-93B]** charging header flow control on 1-L-112A to **AUTO.** _____ _____
1st IV

[9] **ENSURE [1-XI-62-93]** on 1-M-5 is **not** illuminated. _____

[10] **ADJUST [1-HIC-62-93A]** as necessary to control charging flow. _____

END OF TEXT

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** CHEMICAL AND VOLUME CONTROL

IV. **LENGTH OF LESSON:** 4 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 Chemical and Volume Control (CVCS) system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge and abilities associated with the CVCS 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 CVCS system as described in the FSAR.
2. State the design basis of the CVCS system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the CVCS system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the CVCS 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 CVCS system components are designed
   m. Location of controls and indications associated with the CVCS 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 CVCS system:
   a. Precautions and limitations
   b. Major steps performed while placing the CVCS 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 CVCS system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the CVCS system:
   a. State Tech Specs/TRM LCOs that govern the CVCS
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the CVCS 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)

60. 017 A3.01 060

Given the following:

- Unit 2 operating at 10% reactor power.
- **CONDITION 1**: Two hours following a reactor trip and trip of all RCPs.
- **CONDITION 2**: Two hours following a reactor trip with all RCPs running.

Which ONE of the following identifies the correct combination of expected indications for incore thermocouple temperatures (TCs) and RCS cold leg temperatures (T_{cold}) for the stated conditions?

	CONDITION 1 (No RCPs)	**CONDITION 2** (ALL RCPs)
A.	TCs only slightly above T_{cold}	TCs only slightly above T_{cold}
B.	TCs only slightly above T_{cold}	TCs several degrees greater than T_{cold}
C.	TCs several degrees greater than T_{cold}	TCs only slightly above T_{cold}
D.	TCs several degrees greater than T_{cold}	TCs several degrees greater than T_{cold}

DISTRACTOR ANALYSIS:

A. Incorrect, CONDITION 2 indication is true; however, incore TC temperatures will be greater for CONDITION 1 with natural circulation flow in the core.

B. Incorrect, Indications represent the reverse order of the answer as TC temperatures will be greater during natural circulation and equal during forced flow.

C. CORRECT, Under natural circulation conditions (CONDITION 1), incore TC temperatures will be greater than Tcold temperatures in order to establish the thermal driving head necessary for natural circulation flow. Following a reactor trip with forced flow (CONDITION 2), TC temperatures and Tcold temperatures will both stabilize at ~ 552°F as steam dumps operate to control RCS temperature at the T-no load setpoint.

D. Incorrect, CONDITION 1 indication is true; however, TC temperatures are expected to be equal to Tcold temperature not greater during forced flow.

Question No. 60

Tier 2 Group 2

K/A 017 A3.01
Ability to monitor automatic operation of the ITM system including: Indications of normal, natural, and interrupted circulation of RCS

Importance Rating: 3.6* / 3.8*

Technical Reference: EA-68-6, Monitoring Natural Circulation Conditions, Rev. 0

Proposed references to be provided to applicants during examination: None

Learning Objective: GFE Thermal Hydraulics, Chapter 8, Obj. 23

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.7 / 45.5)

10CFR55.43.b (n/a)

Comments:

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

OBJECTIVES

12. Classify the following regions along a hypothetical fuel channel experiencing two-phase flow:
    a. Slug flow region
    b. Annular flow region
    c. Dryout region or mist flow region
    d. OTB point
13. Describe effects along a fuel channel experiencing two-phase flow.
14. Describe the effects of flowrate and phase change on the heat transfer coefficient.
15. Draw the radial temperature profile from the centerline of a fuel pellet to the centerline of the channel.
16. Explain the reason for the shape of the radial temperature profile.
17. Draw the axial temperature and enthalpy profile for a fuel rod and coolant channel.
18. Describe how the axial temperature profile is affected by the following:
    a. Onset of nucleate boiling
    b. Axial core flux
    c. Inlet temperature
    d. Heat generation rate
    e. Flow rate in the channel
19. Explain the necessity of determining core coolant flow.
20. Describe core bypass flow.
21. Explain the need for adequate core bypass flow.
22. Explain the causes of natural circulation.
23. Describe the means by which the operator can determine if natural circulation flow exists.
24. Describe the means by which the operator can enhance natural circulation.

Indications of Natural Circulation Flow

Several parameters measured in the plant are available to help provide indication of natural circulation. The Reactor Coolant System differential temperature should be approximately 25% to 80% of full power as indicated by wide range resistance temperature detectors (RTDs). The hot leg RTD should indicate either a steady or slowly decreasing value. This indicates that heat removal is in operation and the decay heat generated in the core is decreasing slowly, as it should.

Core exit thermocouples (CET or CETC) should also be monitored for a slowly decreasing value. Steam generator pressure should follow reactor coolant temperatures. As average reactor coolant temperature decreases, steam pressure should also decrease. Cold leg temperatures should indicate constant or slowly decreasing value.

These parameters can also indicate a loss of natural circulation flow. If natural circulation flow is lost, the RCS differential temperature will exceed the 100% full power value. This is because hot leg temperature increases as boiling occurs in the core. Since there is no flow, the hot leg temperature rises dramatically while the cold legs remain relatively constant. Core exit thermocouples (CETC) will indicate an increasing temperature as the core generates heat.

Steam generator pressure decreases as steam formation continues with no heat input from the core. Since flow is zero, temperature and pressure decrease in the steam generator as a cold water slug is formed on the reactor coolant side of the steam generator. Steam generator level increases with the same auxiliary feedwater flow, since less steam is formed as the RCS cools. If natural circulation is not restored, core temperature continues to rise because decay heat until the temperature in the upper core region reaches saturation temperature for RCS pressure.

At this point, steam voiding in the RCS occurs. The steam produced in the core rises as a two-phase mixture through the hot legs to the steam generators, where it is condensed, providing some core heat removal. If the operator fails to initiate a steam generator cooldown, this process continues to cool the core until steam collects at the top of the steam generator U-tubes, resulting in steam binding of the steam generators, causing this form of heat removal to stop.

The loss of two-phase natural circulation marks the beginning of the reflux period. Refluxing is a heat and mass transfer process. Some of the steam produced by the core is condensed in the steam generator tubes and flows back down the hot legs to the core, thus transferring energy from the core to the steam generators.

Refluxing continues until either the RCS temperature drops below the steam generator temperature, resulting in a loss of condensation, or the core uncovers, resulting in a loss of steam production.

Another mechanism that inhibits natural circulation flow is gas binding. If excessive quantities of noncondensable gases, such as oxygen or hydrogen, exist in the reactor coolant, they will collect in the highest point in the RCS. The steam generator's U-tubes are the highest point in the RCS, and an accumulation of noncondensables in the U-tubes stops natural circulation flow. In this situation, it is impossible to refill the U-tubes and re-establish natural circulation. Forced circulation is required to sweep the noncondensables from the U-tubes and refill the steam generators.

61. 027 K2.01 061

Which ONE of the following is the power supply to the Emergency Gas Treatment System (EGTS) Fan B?

A. C & A Vent Board 1B1-B

B. C & A Vent Board 2B1-B

C. Reactor Vent Board 1B-B

D. Reactor Vent Board 2B-B

DISTRACTOR ANALYSIS:

A. CORRECT, the EGTS Fan B is supplied with power from the C & A Vent Board 1B1-B.

B. Incorrect, the EGTS Fan B power supply comes from the C & A Vent Board 1B1-B. Plausible because the C & A Vent Board 2B1-B is the power supply for similar safety related equipment including ABGTS Fan B.

C. Incorrect, the EGTS Fan B power supply comes from the C & A Vent Board 1B1-B. Plausible because the Reactor Vent Board 1B1-B is a B train power supply for similar safety related equipment such as containment upper compartment cooling fans.

D. Incorrect, the EGTS Fan B power supply comes from the C & A Vent Board 1B1-B. Plausible because the Reactor Vent Board 2B1-B is a B train power supply for similar safety related equipment such as containment upper compartment cooling fans.

Question No. 61

Tier 2 Group 2

K/A 027 K2.01
Knowledge of bus power supplies to the following: Fans

Importance Rating: 3.1* / 3.4*

Technical Reference: 1,2-45N756-1 R15
1,2-45N779-20 R14

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.EGTS B. 4.b
Describe the following items for each major component in the EGTS system. b. Power supply (include control power as applicable)

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

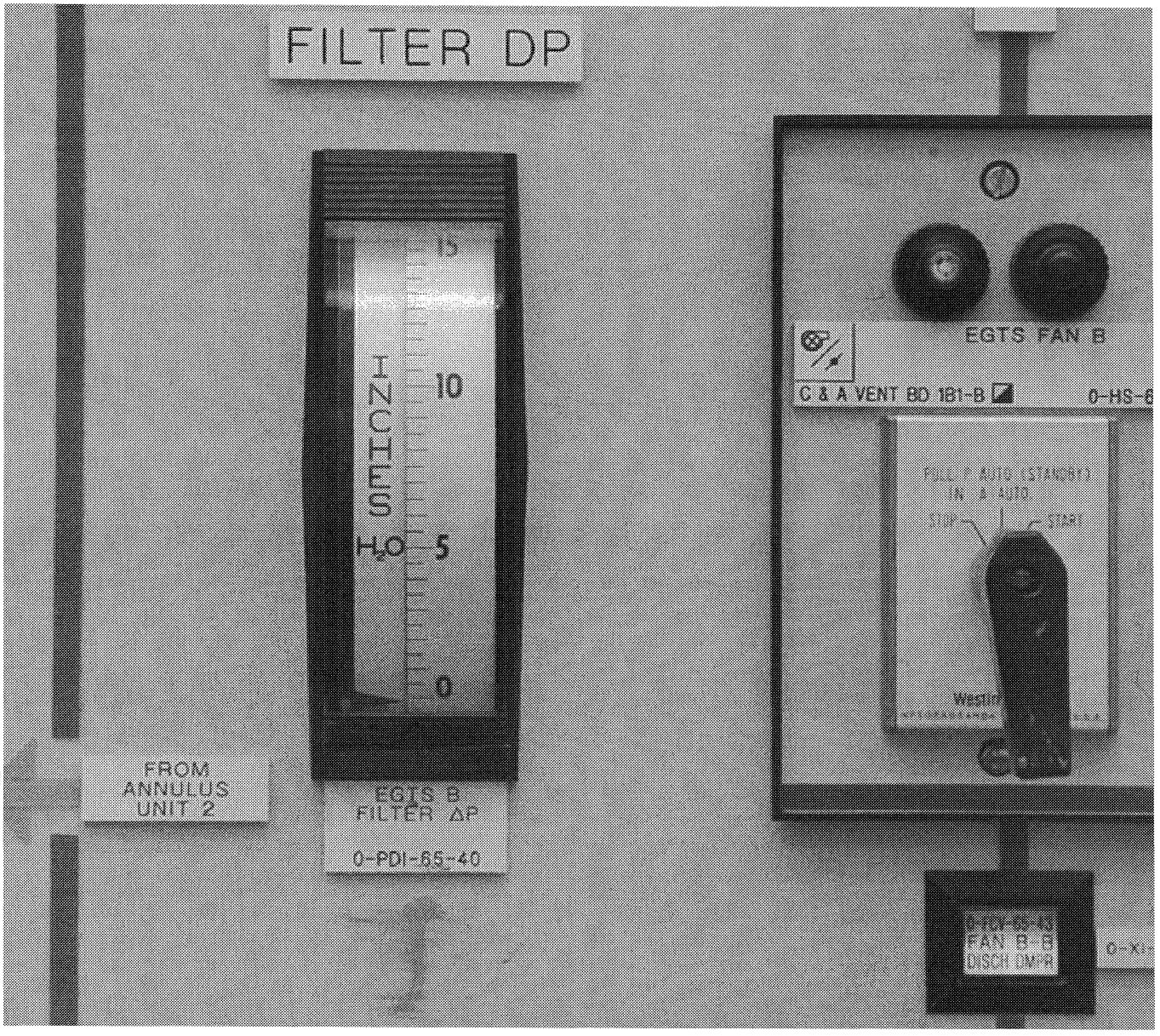
Question History: New for SQN Exam 1/2009

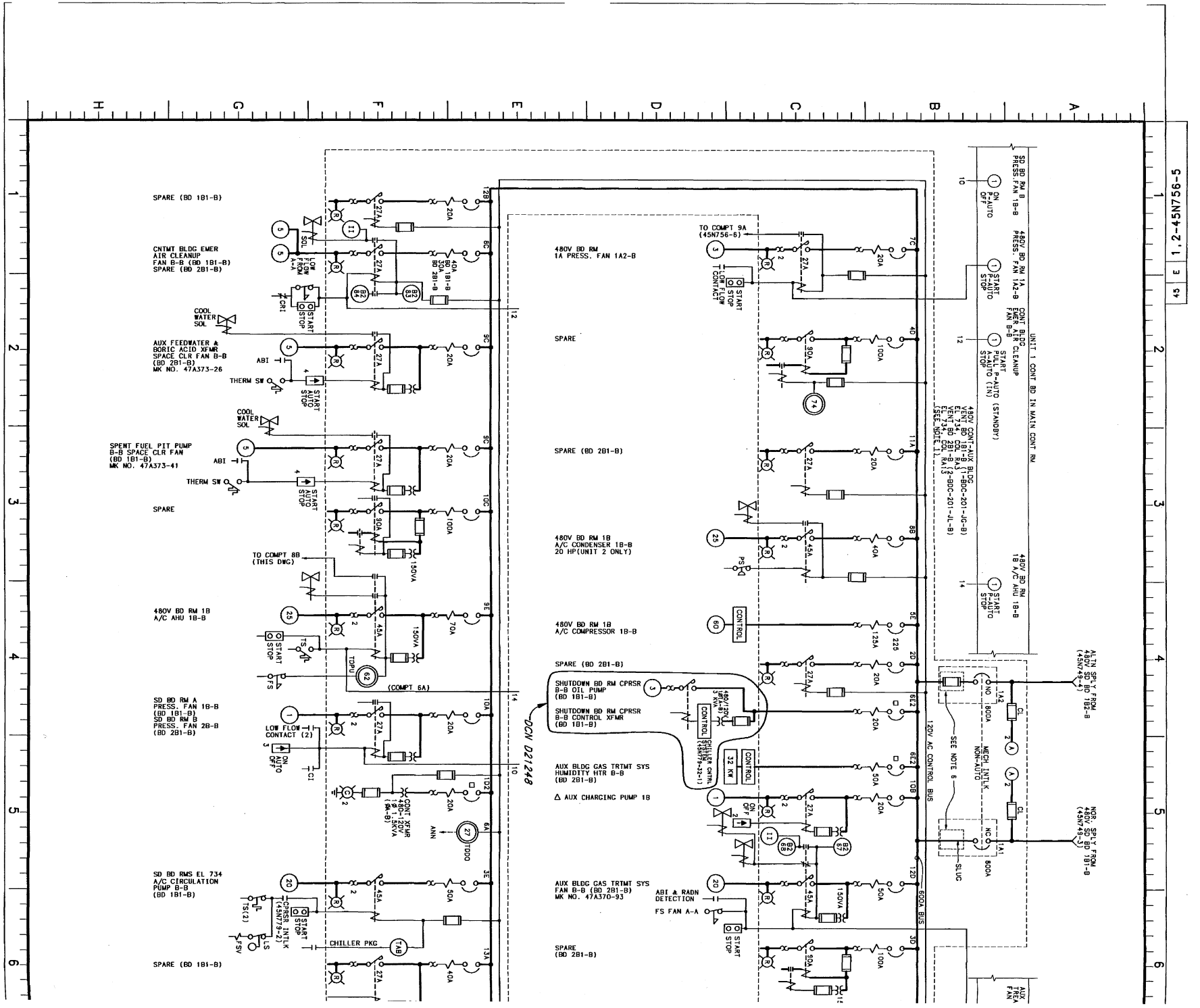
Question Cognitive Level:
Memory or fundamental knowledge _X_____
Comprehension or Analysis _____

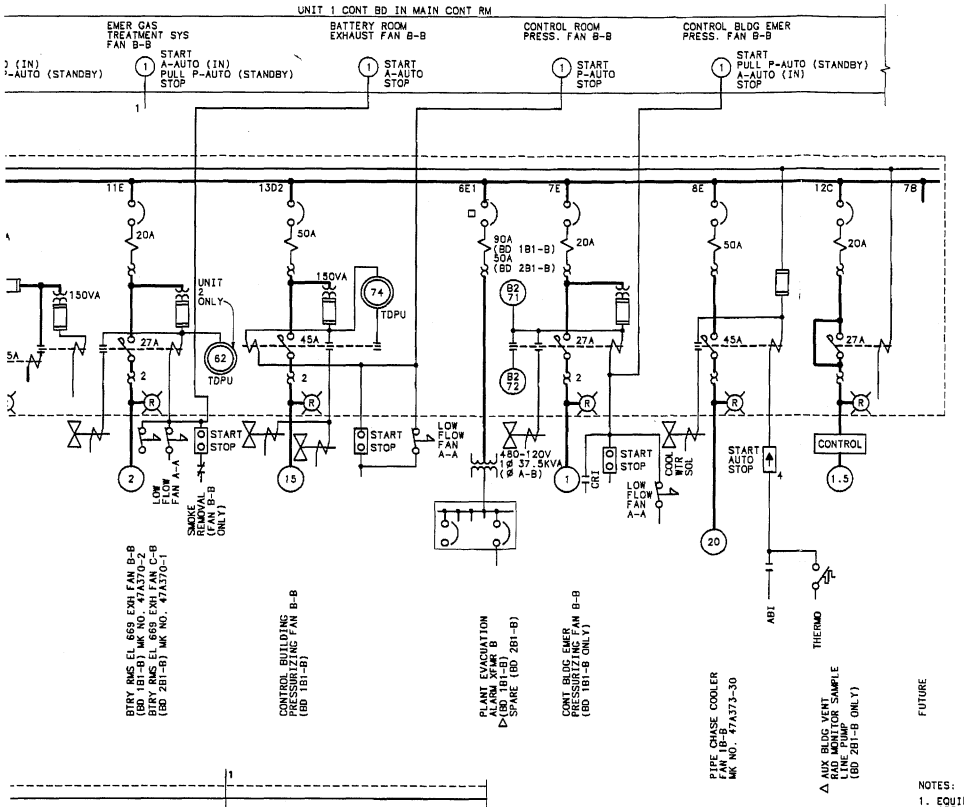
10 CFR Part 55 Content: (41.7)

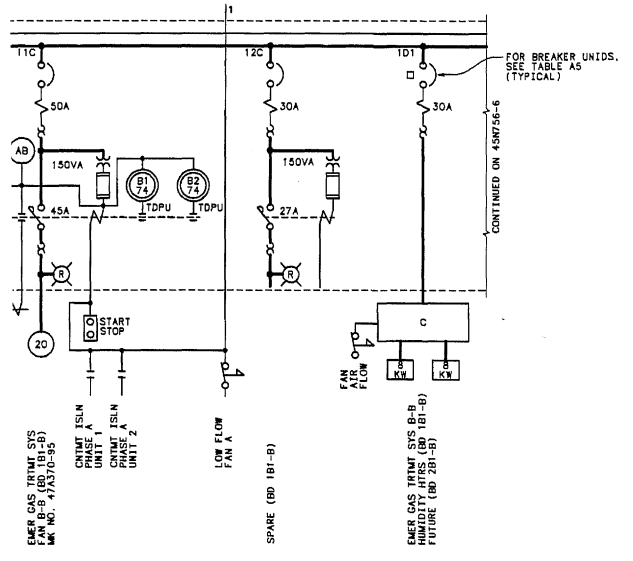
10CFR55.43.b (n/a)

Comments:


FILTER DP
INCHES H2O
15
10
5
0
FROM ANNULUS UNIT 2
EGTS B FILTER ΔP
0-PDI-65-40
EGTS FAN B
C & A VENT BD 1B1-B
0-HS-6
START
FAN B-B
DISCHARGE


1,2-45N756-5
UNIT 1 CONT BD IN MAIN CONT RM
480V BD RM 1A PRESS. FAN 1A2-B
480V BD RM 1B A/C AHU 1B-B
480V BD RM 1B A/C CONDENSER 1B-B 20 HP(UNIT 2 ONLY)
480V BD RM 1B A/C COMPRESSOR 1B-B
SPARE (BD 2B1-B)
SPARE
TO COMPT 9A (45N756-6)
TO COMPT 8B (THIS DWG)
(COMPT 6A)
SPARE (BD 1B1-B)
CNTMT BLDG EMER AIR CLEANUP FAN B-B (BD 1B1-B) SPARE (BD 2B1-B)
COOL WATER SOL
AUX FEEDWATER & BORIC ACID XFMR SPACE CLR FAN B-B (BD 2B1-B) MK NO. 47A373-26
SPENT FUEL PIT PUMP B-B SPACE CLR FAN (BD 1B1-B) MK NO. 47A373-41
SD BD RM A PRESS. FAN 1B-B (BD 1B1-B) SD BD RM B PRESS. FAN 2B-B (BD 2B1-B)
SD BD RMS EL 734 A/C CIRCULATION PUMP B-B (BD 1B1-B)
CHILLER PKG
SHUTDOWN BD RM CPRSR B-B OIL PUMP (BD 1B1-B)
SHUTDOWN BD RM CPRSR B-B CONTROL XFMR (BD 1B1-B)
AUX BLDG GAS TRTMT SYS HUMIDITY HTR B-B (BD 2B1-B)
△ AUX CHARGING PUMP 1B
AUX BLDG GAS TRTMT SYS FAN B-B (BD 2B1-B) MK NO. 47A370-93
ABI & RADN DETECTION
FS FAN A-A
120V AC CONTROL BUS
600A BUS
ALTN SPLY FROM 480V SD BD 1B2-B (45N749-4)
NOR. SPLY FROM 480V SD BD 1B1-B (45N749-3)
SEE NOTE 6
MECH INTLK NON-AUTO
DCN D21248





COMPT	BREAKER UNID	
	1B1-B	2B1-B
1A1	1-BCTD-201-JG/1A1-B	2-BCTD-201-JL/1A1-B
1A2	1-BCTD-201-JG/1A2-B	2-BCTD-201-JL/1A2-B
1D1	0-BCTD-65-37-B	-
1D2	1-BCTD-201-JG/1D2	2-BCTD-201-JL/1D2
2D	-	2-BCTD-201-JL/2D-B
3D	-	2-BCTD-201-JL/3D-B
3E	0-BCTD-313-338-B	-
4D	1-BCTD-201-JG/4D-B	2-BCTD-201-JL/4D-B
5E	1-BCTD-313-JG/5E-B	2-BCTD-313-JL/5E-B
6E1	0-BCTC-244-JG/6E1	2-BCTD-201-JL/6E1-B
6E2	1-BCTD-313-JG/6E2-B	0-BCTD-30-156-B
7C	1-BCTD-313-426-B	2-BCTD-313-476-B
7E	0-BCTD-311-109-B	-
8B	1-BCTD-313-453-B	2-BCTD-313-503-B
8C	0-BCTD-311-10-B	2-BCTD-201-JL/8C-B
8E	1-BCTD-30-202-B	2-BCTD-30-202-B
9C	0-BCTD-30-193-B	2-BCTD-30-185-B
9E	1-BCTD-313-464-B	2-BCTD-313-514-B
10A	0-BCTD-313-384-B	0-BCTD-313-392-B
10B	1-BCTC-84-21	2-BCTC-84-21
10C	1-BCTD-201-JG/10C-B	2-BCTD-201-JL/10C-B
11A	-	2-BCTD-201-JL/11A-B
11C	0-BCTD-65-42-B	-
11E	0-BCTD-311-34-B	0-BCTD-313-35-B
12A	-	2-BCTD-201-JL/12A-B
12B	1-BCTD-201-JG/12B-B	-
12C	1-BCTD-201-JG/12C-B	0-BCTD-90-101
12D	-	2-BCTD-30-157-B
13A	1-BCTD-201-JG/13A-B	-
13D2	0-BCTD-311-15-B	-

TABLE A5

NOTES:

1. EQUIPMENT DESIGNATIONS SHOWN FOR UNIT 1. DESIGNATIONS FOR UNIT 2 ARE SIMILAR EXCEPT FOR UNIT PREFIX AND AS NOTED.
2. ALL MOLDED CASE BREAKERS ARE 3 POLE, 600V AND HAVE AN INTERRUPTING RATING OF NOT LESS THAN 14,000 RMS SYMMETRICAL AMPERES OR 25,000 SYMMETRICAL RMS AMPS IF NOTED BY THE SYMBOL □.
3. ALL CONTROL TRANSFORMERS ARE 1 PHASE 480-120V, 100VA EXCEPT AS NOTED. ALL BREAKERS ARE 100A FRAME EXCEPT AS NOTED.
4. ALL NON-REVERSING STARTERS ARE PROVIDED WITH A TOTAL OF THREE NORMALLY OPEN AND TWO NORMALLY CLOSED AUXILIARY CONTACTS PER CONTACTOR. REVERSING AND MULTIPLE SPEED STARTERS TO BE PROVIDED WITH THREE NORMALLY OPEN AND TWO NORMALLY CLOSED AUXILIARY CONTACTS PER CONTACTOR.
5. ALL EQUIPMENT SHOWN ON THIS DRAWING IS SUPPLIED FROM TRAIN B. ALL EQUIPMENT IS SAFETY RELATED UNLESS NOTED BY THE SYMBOL △.
6. LIFTING THIS MECHANICALLY INTERLOCKED FUSE COVER WILL RESULT IN THE TRIP OF ITS ASSOCIATED BREAKER.
7. ALL OTHER ASPECTS SUCH AS RATING, NUMBER OF POLES, RATING (AMPS), ETC. BEING EQUAL, A THED CIRCUIT BREAKER MAY BE SUBSTITUTED FOR A TED.

13	DCN D21248	DGR		7-16-2004

INC: DCA-D21248-2003 RO

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE

SCALE: NONE — EXCEPT AS NOTED

AUXILIARY BUILDING — CATEGORY 1

UNITS 1 & 2

WIRING DIAGRAMS
480V CONT-AUX BLDG VENT BD 1B1-B
SINGLE LINE SHEET-1

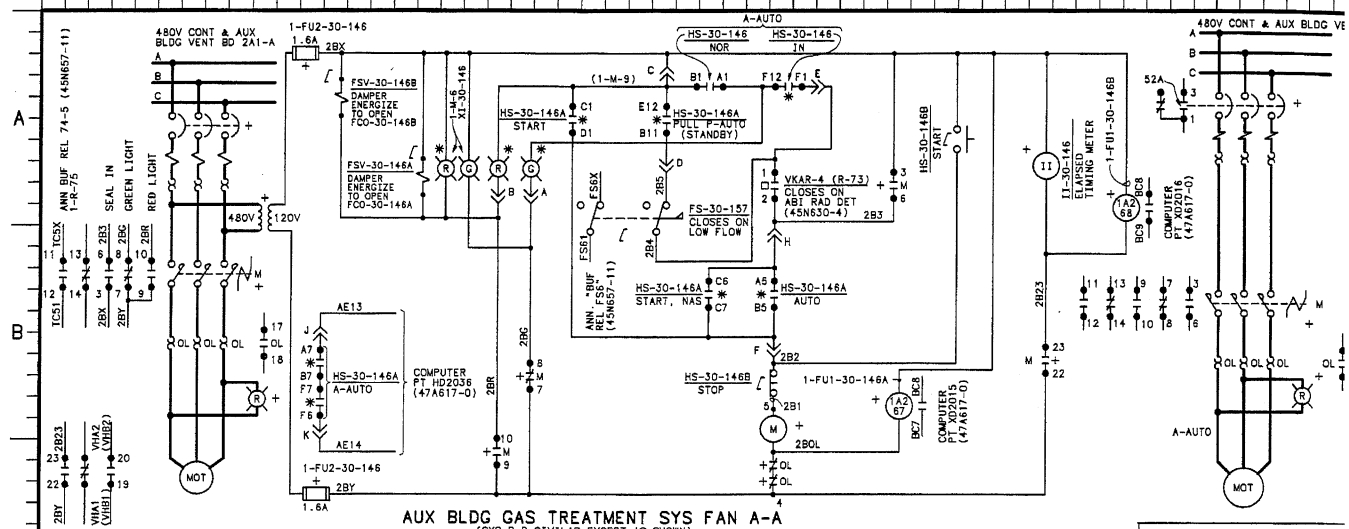
SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

INITIAL ISSUE	ENGINEERING APPROVAL
RO ISSUE PER: CCD RECONCILIATION SHEET NO. CCD-4236. DRAWING MADE A CCD FROM AC-RDD AND AD-R20.	1. SEE RO
	2 SEE RO
	3 SEE RO

CCD	ISSUE DATE 9-8-88	45	E	1,2-45N756-5	R13

CAD MAINTAINED DRAWING

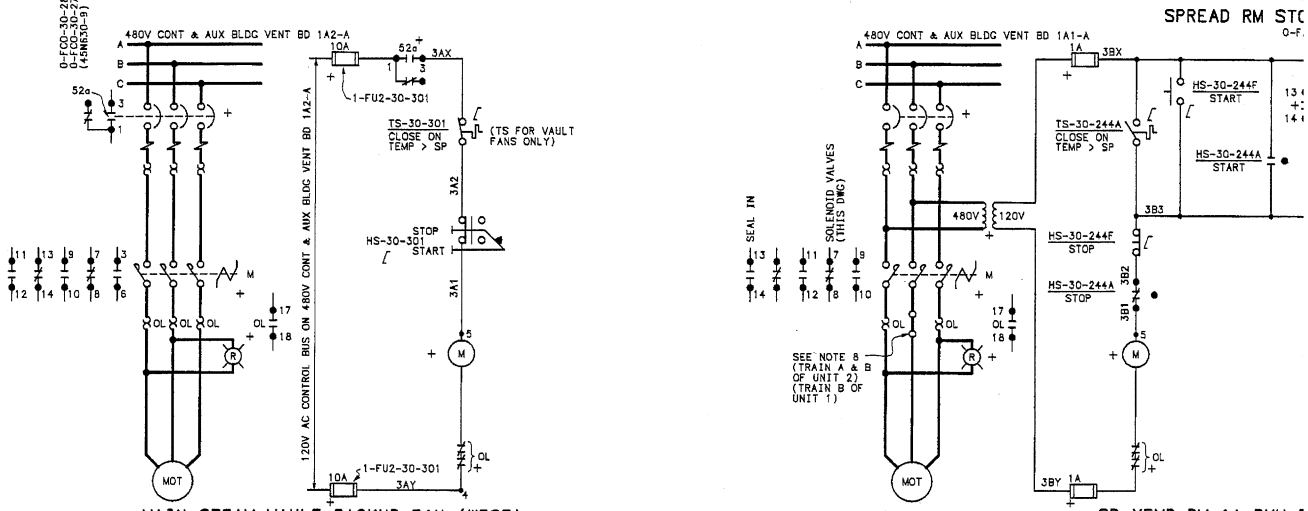
CONTROL ROOM DWG



AUX BLDG GAS TREATMENT SYS FAN A-A

(SYS B-B SIMILAR EXCEPT AS SHOWN)

ELAPSED TIMER	FUSE UNID. NOTE 6	FAN	TRAIN	480V CONT & AUX BLDG VENT BD	WIRE PREFIX	ANN BUF REL	CONT SW	AUTO INITIATION	RAD DET RELAY (CONT) LOC	DAMPER	FLTR NETWORK FUSE UNID, NOTE 6	COMPUTER POINTS HS POS	COMPUTER POINTS CONT PWR	COMPUTER POINTS FAN ON
II-30-146	1-FU2-30-146	A-A	A	2A1-A	2B	74-5	HS-30-146A & B	FS-30-157	VKAR-4 (1, 2) 1-R-73	FCO-30-146A, 146B	1-FU1-30-146A,146B	HD2036	XD2015	XD2016
II-30-157	2-FU2-30-157	B-B	B	2B1-B	12D	74-6	HS-30-157A & B	FS-30-146	VKBR-4 (1, 2) 1-R-78	FCO-30-157A, 157B	2-FU1-30-157A,157B	HD2070	XD2066	XD2067



MAIN STEAM VAULT BACKUP FAN (WEST)

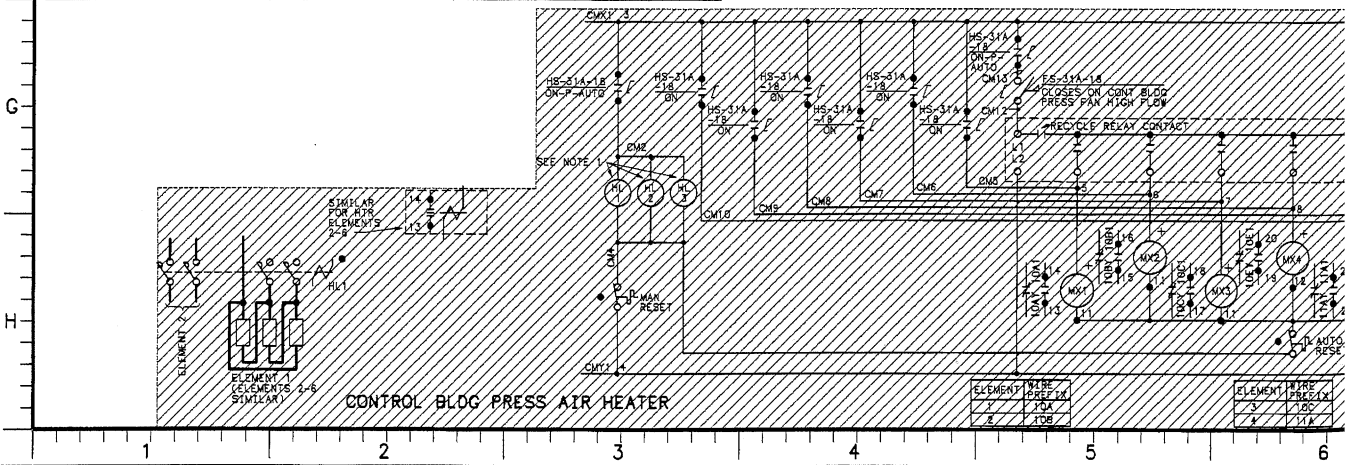
(TYPICAL FOR FANS LISTED EXCEPT AS NOTED)

FAN	MOTOR (Δ SEE NOTE 7)	480V CONT & AUX BLDG VENT BD	WIRE PREFIX	CONTROL SW	FUSE UNID (Δ SEE NOTE 7)
SAMPLING ROOM HOOD EXHAUST FAN 1A	1-MTRB-30-283	1A2-A	3D	HS-30-283	1-FU2-30-283
SAMPLING ROOM HOOD EXHAUST FAN 2A	2-MTRB-30-67	2A2-A	3D	HS-30-67	2-FU2-30-67
SAMPLING ROOM HOOD EXHAUST FAN C	1-MTRB-30-66	1B2-B	9A	HS-30-66	1-FU2-30-66
SAMPLING ROOM HOOD EXHAUST FAN 1B	1-MTRB-30-284	1B2-B	7A	HS-30-284	1-FU2-30-284
SAMPLING ROOM HOOD EXHAUST FAN 2B	2-MTRB-30-285	2B2-B	7A	HS-30-285	2-FU2-30-285
MAIN STEAM VAULT BACKUP FAN (WEST)	1-MTRB-30-301 Δ	1A2-A	3A	HS-30-301	1-FU2-30-301 Δ
ELEV MACH RM EXH FAN	0-MTRB-30-27	2B2-B	3C	HS-30-27	0-FU2-30-27
MAIN STEAM VAULT FAN WEST	1-MTRB-30-25 Δ	1A2-A (NOTE 3)	2B	HS-30-25	1-FU2-30-25 Δ
MAIN STEAM VAULT FAN EAST	1-MTRB-30-26 Δ	1B2-B (NOTE 3)	2B	HS-30-26	1-FU2-30-26 Δ
MAIN STEAM VAULT BACKUP FAN (EAST)	1-MTRB-30-302 Δ	1B2-B	5E	HS-30-302	1-FU2-30-302 Δ

SD XFMR RM 1A EXH F

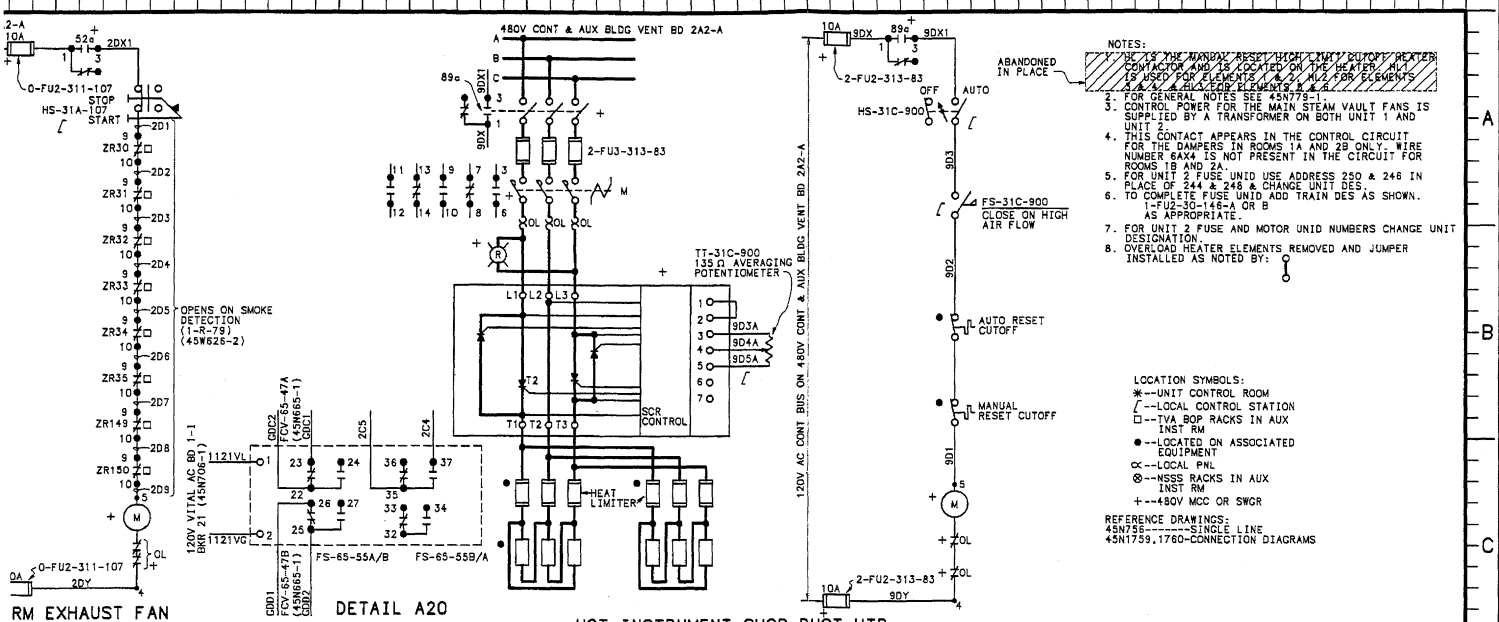
(RM 1B & UNIT 2 SIMILAR EXCEP

480V XFMR RM	EXH FAN	480V CONT & AUX VENT BD	WIRE PREFIX	HAND SWITCHES (UNIT 2 IN PAR)	TEMP SWITCH (UNIT 2 IN PAR)	FUSE UNID SEE NOTES
1A	1A1-A	1A1-A	3B	HS-30-244A & F (250A & E)	TS-30-244A (250A)	1-FU2-30-2
1A	1A2-A	1A1-A	3C	HS-30-244B & G (250B & F)	TS-30-244B (250B)	1-FU2-30-2
1A	1A3-A	1A1-A	3A	HS-30-244D & H (250D & G)	TS-30-244D (250D)	1-FU2-30-2
1B	1B1-B	1B1-B	2B	HS-30-248A & E (246A & F)	TS-30-248A (246A)	1-FU2-30-2
1B	1B2-B	1B1-B	2C	HS-30-248B & F (246B & G)	TS-30-248B (246B)	1-FU2-30-2
1B	1B3-B	1B1-B	2A	HS-30-248D & G (246D & H)	TS-30-248D (246D)	1-FU2-30-2



ELEMENT	WIRE PREFIX
1	1DA
2	1DB

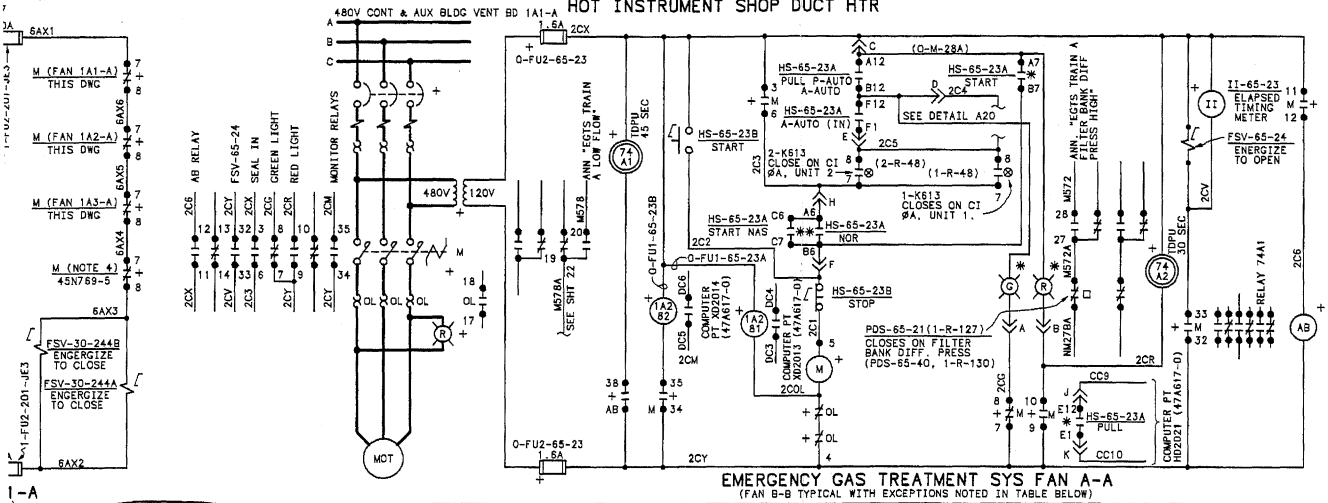
ELEMENT	WIRE PREFIX
3	1DC
4	1DA



RM EXHAUST FAN

DETAIL A20

HOT INSTRUMENT SHOP DUCT HTR

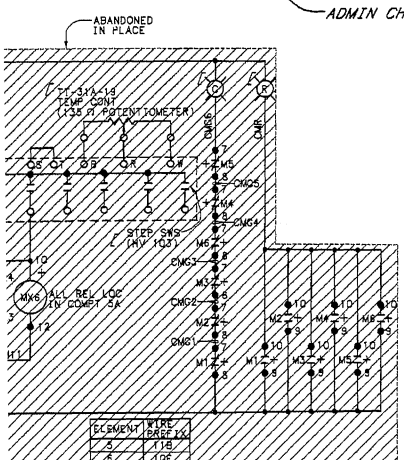


EMERGENCY GAS TREATMENT SYS FAN A-A
(FAN B-B TYPICAL WITH EXCEPTIONS NOTED IN TABLE BELOW)

FAN	TRAIN	480V CONT & AUX BLDG VENT BD	WIRE PREFIX	AUTO INITIATION	CNTMT ISLN REL LOC	CONTROL SWITCH	VALVE	ANN. SWITCHES	ELAPSED TIMER	FUSE UNID, NOTE 6	FAN	COMPUTER POINTS		
												HS POS	FAN ON	CONT PWR
A-A	A	1A1-A	2C	FS-65-55B/A	R-48	HS-65-23A, -23B	FCV-65-24	FS-65-25A/B; PDS-65-21	II-65-23	O-FU2-65-23;O-FU1-65-23A,23B	A-A	HD2021	XD2014	XD2013
B-B	B	1B1-B	11C	FS-65-31B/A	R-51	HS-65-42A, -42B	FCV-65-43	FS-65-44A/B; PDS-65-40	II-65-23	O-FU2-65-42;O-FU1-65-42A,42B	B-B	HD2055	XD2065	XD2064

SOLENOID VLVS (UNIT 2 IN PAR)	SOLENOID FUSE UNID (UNIT 2 IN PAR)
-30-244A & B	FU2-201-JE3
-30-250A & B)	(FU2-30-250AB)
-30-248A & B	FU2-201-JG3
-30-246A & B)	(FU2-30-246AB)

ADMIN CHANGE



REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
14	ADMIN CHANGE	DGR	DMD	RHA	8-11-2003

INC: ADMIN CHANGE PER RIMS: B37 030808 001

SCALE: NONE — EXCEPT AS NOTED

AUXILIARY BUILDING
UNITS 1 & 2

WIRING DIAGRAMS 480V SHUTDOWN AUXILIARY POWER SCHEMATIC DIAGRAM SH-20

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

INITIAL ISSUE	ENGINEERING APPROVAL
RO ISSUE PER: CCD RECONCILIATION SHEET NO. CCD-3018. DRAWING MADE A CCD FROM AC-2 AND AD-R28.	1 SEE RO
	2 SEE RO
	3 SEE RO

CCD	ISSUE DATE	45	E	1,2-45N779-20	R14
	9-8-88				

CAD MAINTAINED DRAWING

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** EMERGENCY GAS TREATMENT SYSTEM (EGTS)

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 EGTS system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Emergency Gas Treatment 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 EGTS system as described in the FSAR.
2. State the design basis of the EGTS system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the EGTS system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the EGTS 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 EGTS system components are designed
   m. Location of controls and indications associated with the EGTS system in the control room and auxiliary control room

62. 035 K6.02 062

Given the following:

- Unit 1 is at 50% power and stable when a transient occurs.
- The CRO reports the following parameters and trends for SG #1 with similar trends on the other SG's:

  - SG Pressure: 860 psig and lowering
  - SG Level: 46% and rising
  - SG Steam Flow: 2.0 x10^6 pph and rising

Which ONE of the following identifies the event in progress?

A. SG tube has ruptured

B. SG atmospheric relief valve open

C. RCS dilution event is in progress

D. Main turbine runback in progress

DISTRACTOR ANALYSIS:

A. Incorrect, A SG tube rupture will not cause SG pressure to drop. Plausible because SG level will increase on the affected SG.

B. CORRECT, An Atmospheric Relief Valve will increase steam flow on all SG's via the common steam header with a resulting increase in SG narrow range level due to swell and a drop in SG pressures.

C. Incorrect, A dilution event would not affect SG pressure or level. Plausible because it would cause steam flow to increase.

D. Incorrect, A turbine runback would cause steam flow to decrease to the main turbine but would result in the steam dump valves opening. When the dump valves start opening, there would be an increase in the steam flow indicated. Plausible because it would affect all of the parameters listed in the stem.

Question No. 62

Tier 2 Group 2

K/A 035 K6.02
Knowledge of the effect that a loss or malfunction of the following will have on the Steam Generator: Secondary PORV

Importance Rating: 3.1 / 3.5

Technical Reference: AOP-S.01, Steam or Feedwater Leak, Rev 7

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.MS, B.5
Describe the operation of the Main Steam System as it pertains to the following:
d. How a component failure will affect system operation.

Question Source:
Bank # ____**X**_____
Modified Bank # _____
New _____

Question History: Braidwood 12/2007 NRC Exam

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

10 CFR Part 55 Content: (41.5)

10CFR55.43.b (n/a)

Comments: Modified original question with SQN specific parameters and altered order of distractors.

3.1 Symptoms

PANEL XA-55-6B, REACTOR PROTECTION AND SAFEGUARDS	
A-1	LS-3-39D STM GEN LOOP 1 LOW FW FLOW LOW WATER LEVEL
A-7	FS-3-35B STM GEN LOOP 1 STEAM/FEEDWATER FLOW MISMATCH
B-1	LS-3-52D STM GEN LOOP 2 LOW FW FLOW LOW WATER LEVEL
B-7	FS-3-48B STM GEN LOOP 2 STEAM/FEEDWATER FLOW MISMATCH
C-1	LS-3-94D STM GEN LOOP 3 LOW FW FLOW LOW WATER LEVEL
C-7	FS-3-90B STM GEN LOOP 3 STEAM/FEEDWATER FLOW MISMATCH
D-1	LS-3-107D STM GEN LOOP 4 LOW FW FLOW LOW WATER LEVEL
D-7	FS-3-103B STM GEN LOOP 4 STEAM/FEEDWATER FLOW MISMATCH

B. Deviations or unexpected indications on any of the following may indicate a steam line or feedwater line break or leak:

- Steam flow higher on one or more channels.
- Increase in feedwater flow.
- Deviations on feedwater regulating valves.
- Main feedwater pump speed increasing.
- Increasing reactor power, decreasing T-avg with automatic rod withdrawal.
- Main steam header pressure dropping.
- Increasing containment pressure, temperature, humidity, and sump level.
- Steam generator level dropping.

#62

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	2
Question # 61	Group #	2	2
	K/A #	035.K6.02	
	Importance Rating	3.1	3.5

Proposed Question:

With the plant initially stable at 50% power, a transient occurs, the BOP reports the following parameters for the "A" SG, with similar trends on the other SGs:

- SG Pressure: 1000 psia and decreasing
- SG Level: 52% and increasing
- SG Steam Flow: 2.0 mpph and increasing

Based on plant conditions, what event is in progress?

A. A dilution event is in progress.

B. A turbine runback is in progress.

C. A Steam Generator tube has ruptured.

D. A SG Atmospheric dump valve has failed open.

Proposed Answer: D

Explanation (Optional): "D" is correct, since a failed open atmospheric dump valve will increase steam flow for all SGs via the common main steam header. Increased steam flow will cause SG pressures to drop and "swell" to raise SG Narrow Range levels. "A" is wrong, since SG pressures are decreasing, but plausible since a dilution would cause increased steam flow. "B" is wrong, since this would decrease steam flow, but plausible, since this would affect all of the parameters listed in the stem. "C" is wrong, since a tube rupture will not cause SG pressure to decrease, but is plausible since it would cause SG level to increase.

Technical Reference(s): Westinghouse Transient Analysis Text, page 8.33 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04881 Describe the major parameter changes associated with increased heat removal by the secondary system. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

V. TRAINING OBJECTIVES (continued)

5. Describe the operation of the Main Steam System as it pertains to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the Main Steam in service
   c. Alarms and alarm response
   d. How a component failure will affect system operation
   e. How a support system failure will affect Main Steam operation
   f. How an instrument failure will affect system operation
   g. For a given set of plant conditions, determine the correct response of the Main Steam System
6. Describe the administrative controls and limits for the Main Steam System as explained in this lesson.
   a. State Tech Specs/TRM LCOs that govern Main Steam
   b. State the TS/TRM LCOs that have a $\leq$1 hour action statement.
   c. Given the conditions status of the Main Steam components and the appropriate sections of the Tech Spec/TRM, determine if operability requirements are met and what actions are required.
7. Discuss related Industry Events

63. 041 A1.02 063

Given the following:

- Unit 1 is at 10% power during a plant startup.
- Steam dumps are in Steam Pressure Mode set to automatically control RCS Tavg at the no load setpoint.
- A reactor trip occurs.

Steam dumps should be controlling steam pressure at approximately ...

A. 870 psig

B. 965 psig

C. 1005 psig

D. 1040 psig

DISTRACTOR ANALYSIS:

A. Incorrect, Steam pressure value approximating normal 100% power. Plausible because the pressure is approximately the full load steam pressure

B. Incorrect, Steam pressure value approximating P-12, Lo-Lo Tavg setpoint (540°F). Plausible because the pressure is the Lo-Lo Tavg setpoint pressure

C. CORRECT, Steam pressure of 1005 psig corresponds to the no load setpoint at which steams dumps will control Tavg in the Steam Pressure Mode. For the given conditions, a reactor trip has no impact on steam dump operation when controlling in the Steam Pressure Mode.

D. Incorrect, Steam pressure value approximating setpoint of the SG atmospheric relief valves. Plausible because the pressure is the pressure the SG relief valve trips open.

Question No. 63

Tier 2 Group 2

K/A 041 A1.02
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: Steam pressure

Importance Rating: 3.1 / 3.2

Technical Reference: 0-SO-1-2, Rev 11

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.SDCS B.5.b
Describe the operation of the Steam Dump Control System as it relates to the following:
b. Major steps performed while placing the Steam Dump Control System in service

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

Question History: Modified SQN question MS-B.15.C 001 for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.4 / 45.5)

10CFR55.43.b (n/a)

Comments: Modified SQN question MS-B.15.C 001

Unit_____ **Date _____**

5.1 Pressure Mode Operation During Startup (continued)

[8] **WHEN** at no-load T Avg of 547°F, **THEN**

ENSURE [PIC-1-33] Steam Dump pressure controller setpoint adjusted to maintain T Avg of 547°F (~1005 psi) while maintaining S/G pressure below atmospheric relief valve setpoint. ☐

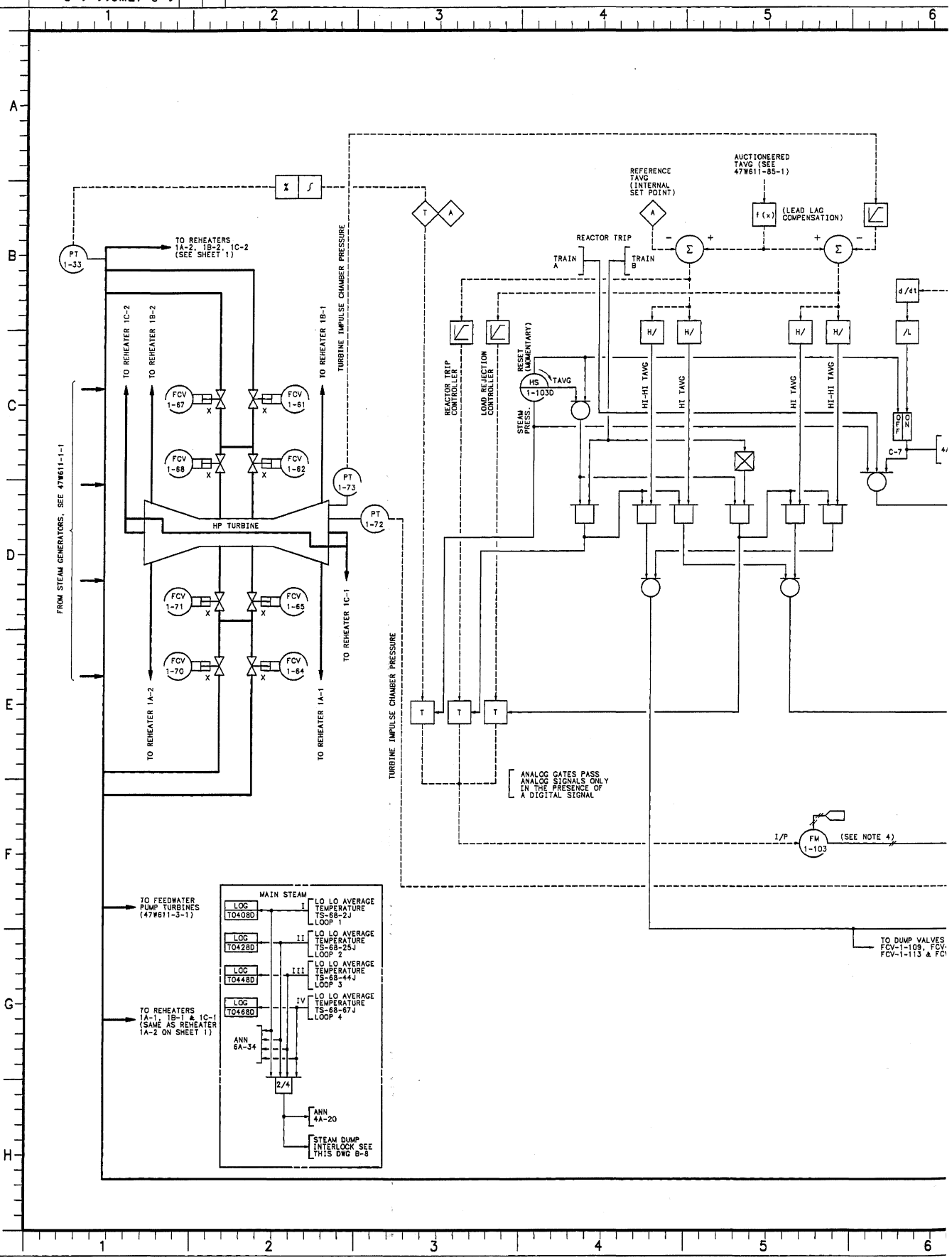
[8.1] **WHEN** steam dumps to be placed in **AUTO**, **THEN**

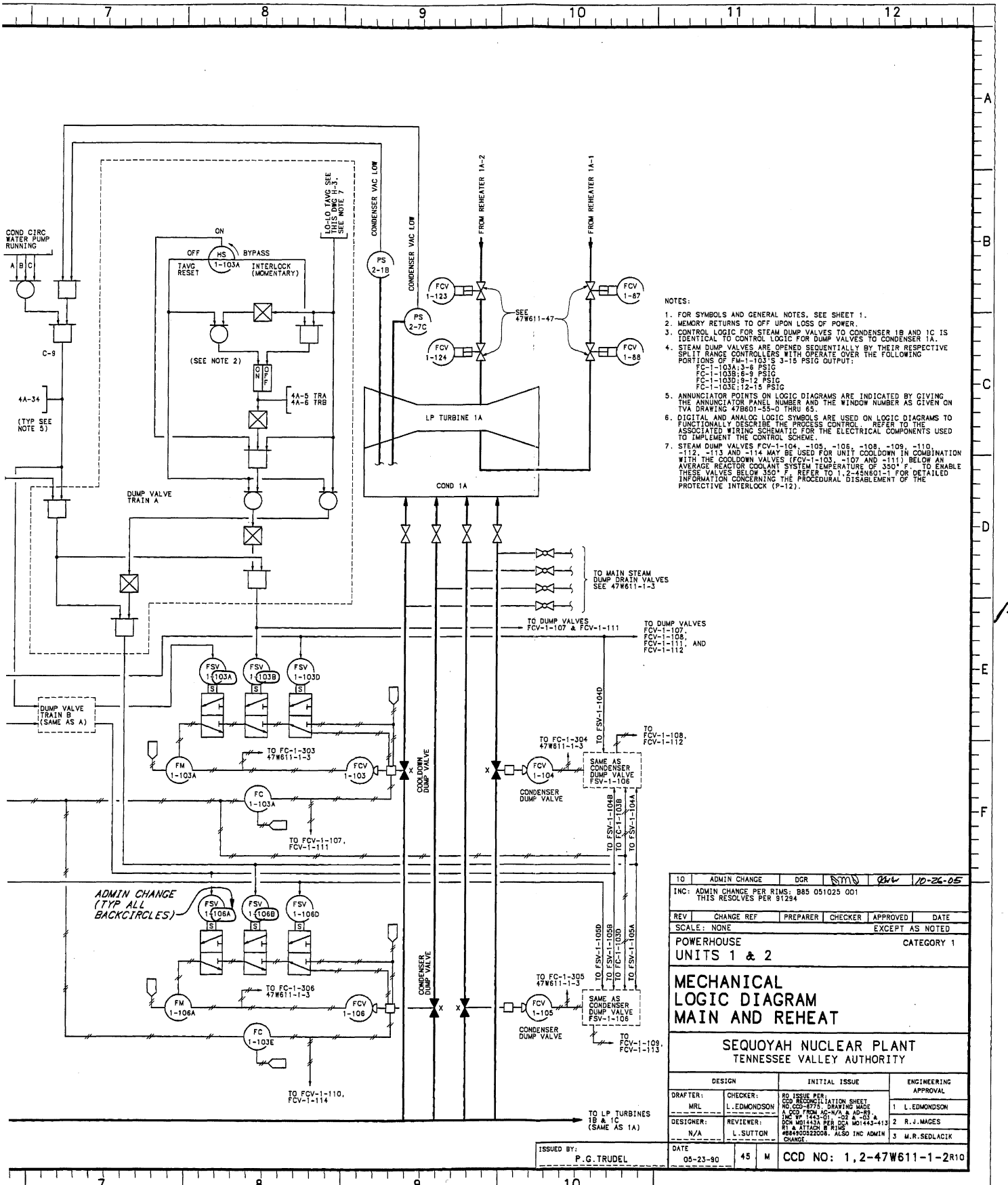
ADJUST [PIC-1-33] setpoint using ▲ or ▼ pushbuttons, and match setpoint cursor to bar graph indication. ☐

[8.2] **PLACE [PIC-1-33]** in **AUTO**. ☐

[8.3] **ADJUST** controller setpoint to maintain T Avg of 547°F (~1005 psi). ☐

END OF TEXT


TO REHEATERS 1A-2, 1B-2, 1C-2 (SEE SHEET 1)
PT 1-33
TURBINE IMPULSE CHAMBER PRESSURE
TO REHEATER 1C-2
TO REHEATER 1B-2
TO REHEATER 1B-1
FROM STEAM GENERATORS, SEE 47W611-1-1
FCV 1-67
FCV 1-61
FCV 1-68
FCV 1-62
PT 1-73
PT 1-72
HP TURBINE
FCV 1-71
FCV 1-65
FCV 1-70
FCV 1-64
TO REHEATER 1C-1
TO REHEATER 1A-2
TO REHEATER 1A-1
TURBINE IMPULSE CHAMBER PRESSURE
REFERENCE TAVG (INTERNAL SET POINT)
AUCTIONEERED TAVG (SEE 47W611-85-1)
f(x)
(LEAD LAG COMPENSATION)
REACTOR TRIP
TRAIN A
TRAIN B
REACTOR TRIP CONTROLLER
LOAD REJECTION CONTROLLER
RESET (MOMENTARY)
HS 1-103D
TAVG
STEAM PRESS.
HI-HI TAVG
HI TAVG
HI TAVG
HI-HI TAVG
d/dt
/L
C-7
ANALOG GATES PASS ANALOG SIGNALS ONLY IN THE PRESENCE OF A DIGITAL SIGNAL
I/P
FM 1-103
(SEE NOTE 4)
TO DUMP VALVES FCV-1-109, FCV-
FCV-1-113 & FCV
TO FEEDWATER PUMP TURBINES (47W611-3-1)
TO REHEATERS 1A-1, 1B-1 & 1C-1 (SAME AS REHEATER 1A-2 ON SHEET 1)
MAIN STEAM
LOG T0408D
LOG T0428D
LOG T0448D
LOG T0468D
I LO LO AVERAGE TEMPERATURE TS-68-2J LOOP 1
II LO LO AVERAGE TEMPERATURE TS-68-25J LOOP 2
III LO LO AVERAGE TEMPERATURE TS-68-44J LOOP 3
IV LO LO AVERAGE TEMPERATURE TS-68-67J LOOP 4
ANN 6A-34
2/4
ANN 4A-20
STEAM DUMP INTERLOCK SEE THIS DWG B-8



NOTES:

1. FOR SYMBOLS AND GENERAL NOTES, SEE SHEET 1.
2. MEMORY RETURNS TO OFF UPON LOSS OF POWER.
3. CONTROL LOGIC FOR STEAM DUMP VALVES TO CONDENSER 1B AND 1C IS IDENTICAL TO CONTROL LOGIC FOR DUMP VALVES TO CONDENSER 1A.
4. STEAM DUMP VALVES ARE OPENED SEQUENTIALLY BY THEIR RESPECTIVE SPLIT RANGE CONTROLLERS WITH OPERATE OVER THE FOLLOWING PORTIONS OF FM-1-103'S 3-15 PSIG OUTPUT:
   FC-1-103A;3-6 PSIG
   FC-1-103B;6-9 PSIG
   FC-1-103D;9-12 PSIG
   FC-1-103E;12-15 PSIG
5. ANNUNCIATOR POINTS ON LOGIC DIAGRAMS ARE INDICATED BY GIVING THE ANNUNCIATOR PANEL NUMBER AND THE WINDOW NUMBER AS GIVEN ON TVA DRAWING 47B601-55-0 THRU 65.
6. 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.
7. STEAM DUMP VALVES FCV-1-104, -105, -106, -108, -109, -110, -112, -113 AND -114 MAY BE USED FOR UNIT COOLDOWN IN COMBINATION WITH THE COOLDOWN VALVES (FCV-1-103, -107 AND -111) BELOW AN AVERAGE REACTOR COOLANT SYSTEM TEMPERATURE OF 350° F. TO ENABLE THESE VALVES BELOW 350° F, REFER TO 1,2-45N601-1 FOR DETAILED INFORMATION CONCERNING THE PROCEDURAL DISABLEMENT OF THE PROTECTIVE INTERLOCK (P-12).

10	ADMIN CHANGE	DGR	SMD	RWL	10-26-05

INC: ADMIN CHANGE PER RIMS: B85 051025 001
THIS RESOLVES PER 91294

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE — CATEGORY 1
UNITS 1 & 2

MECHANICAL LOGIC DIAGRAM MAIN AND REHEAT

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: MRL	CHECKER: L.EDMONDSON	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-87-76. DRAWING MADE A CCD FROM AC-N/A & AD-88; DCN WP 1443-01 -02 & -03 & DCN M01443A PER DCA M01443-413 R1 & ATTACH B RIMS #8845005220C08. ALSO INC ADMIN CHANGE.	1 L.EDMONDSON
DESIGNER: N/A	REVIEWER: L.SUTTON		2 R.J.MAGES
			3 M.R.SEDLACIK

ISSUED BY: P.G.TRUDEL — DATE: 05-23-90 — 45 — M

CCD NO: 1,2-47W611-1-2R10

CAD MAINTAINED DRAWING

CONTROL ROOM DWG

QUESTIONS REPORT
for BANK SQN Questions

MS-B.15.C 001

During the final stages of an RCS heatup, the steam dump system is set to control RCS at no load temperature.

Which ONE of the following is the correct steam dump pressure controller setpoint to maintain RCS temperature at the no load setpoint?

A. 955psig

B. 985psig

C✔ 1005psig

D. 1025psig

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** STEAM DUMP CONTROL SYSTEM (SDCS)

IV. **LENGTH OF LESSON:** 1 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 Steam Dump Control 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 Steam Dump Control 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 Steam Dump Control System as described in the SQN FSAR.
2. State the design basis of the Steam Dump Control System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Steam Dump Control System as illustrated on the simplified system drawing.
4. Describe the following items for each major component in the Steam Dump Control 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 Steam Dump Control System components are designed
   m. Location of controls and indications associated with the Steam Dump Control 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 Steam Dump Control System as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the Steam Dump Control 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 Steam Dump Control System operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the Steam Dump Control System as explained in this lesson:
   a. State Tech Specs/TRM LCOs that govern the Steam Dump Control System
   b. State the $\leq$ 1 hour action limit TS LCOs
   c. Given the conditions/status of the Steam Dump Control 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. SQN PER 02-000027-000, Level C

VI. TRAINING AIDS:

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

64. 045G2.1.25 064

Given the following:

- Unit 2 is operating at 1160 MWe.
- Generator reactive load is 325 MVARs incoming.
- All systems are operating normally.

Which ONE of the following hydrogen pressures is the LOWEST that will provide acceptable generator cooling in accordance with the generator capability curve?

REFERENCE PROVIDED

A. 55 psig

B. 60 psig

C. 65 psig

D. 70 psig

DISTRACTOR ANALYSIS:

A. Incorrect, 60 psig is the minimum H2 pressure based on the generator capability curve. Plausible if the candidate moves on the wrong line for MWe or MVARs.

B. CORRECT, 60 psig is the minimum H2 pressure based on the generator capability curve shown in TI-28, Fig. A.14 for the parameters given.

C. Incorrect, 60 psig is the minimum H2 pressure based on the generator capability curve . Plausible if the candidate moves on the wrong line for MWe or MVARs.

D. Incorrect, 60 psig is the minimum H2 pressure based on the generator capability curve. Plausible if the candidate moves on the wrong line for MWe or MVARs.

Question No. 64

Tier 2 Group 2

K/A 045 G2.1.25
Main Turbine Generator: Ability to interpret reference materials such as graphs, monographs and tables which contain performance data.

Importance Rating: 3.9 / 4.2

Technical Reference: TI-28, Fig. A.14; GO-4, Rev 56

Proposed references to be provided to applicants during examination: TI-28, Fig. A.14

Learning Objective: OPT200.MTGC, Obj. 5.b
Describe the operation of the Main Turbine-Generator Control System:
b. Major steps performed while placing the Main Turbine-Generator Control System in service

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

Question History: SQN Bank Question # MTG-B.7 004

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

10 CFR Part 55 Content: (41.10 / 45.12)

10CFR55.43.b (n/a)

Comments: Modified question by changing values used for generator MWe and MVA. Also modified distractor values to enhance symmetry of distractors values. Relocated correct answer. Reworded question.

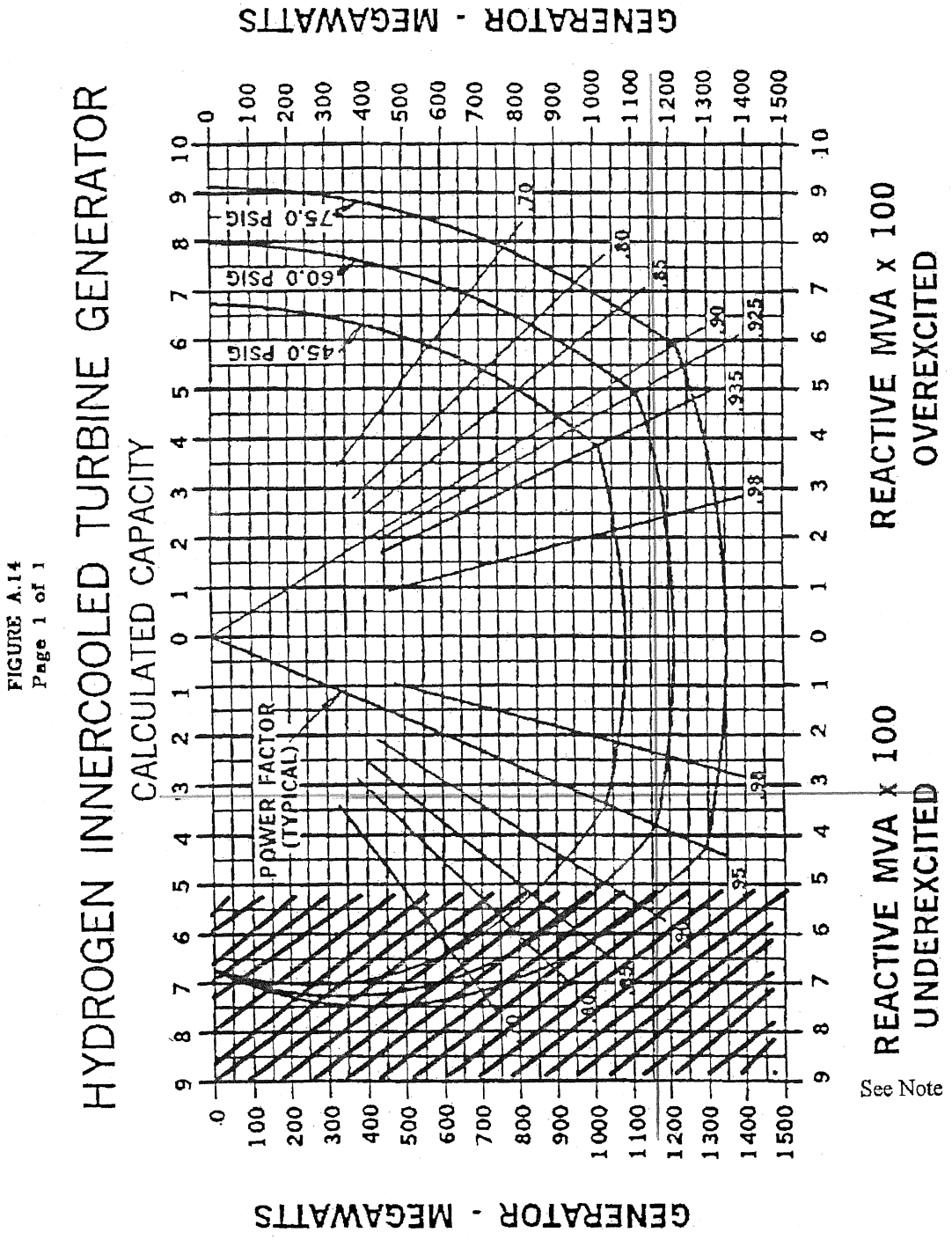


FIGURE A.14
Page 1 of 1

ote: Operation in excess of 500 MVARS incoming may cause trip from loss of field or generator backup relays.

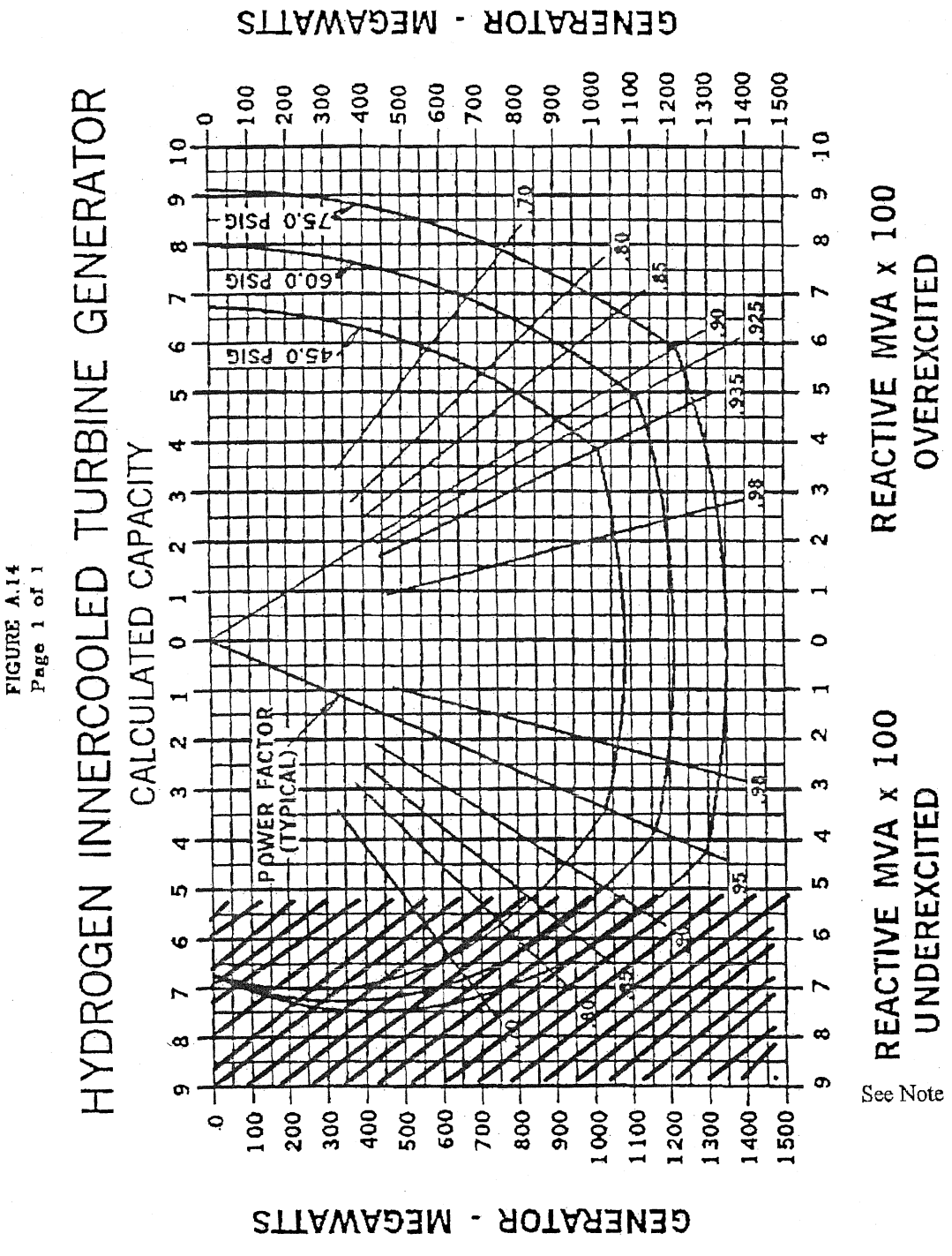


FIGURE A.14
Page 1 of 1

ote: Operation in excess of 500 MVARS incoming may cause trip from loss of field or generator backup relays.

STARTUP_____ **Unit** _____ **Date** _____

5.4 Placing Main Generator In Service

CAUTION

Generator must be operated at rated frequency (~1800 rpm).

NOTE

Steam Generator level operator is in control of unit startup until the main feedwater reg valves are in **AUTO**. **[C.5]**

NOTE

When generator is on line, on L-39 Panel hydrogen pressure should be maintained greater than or equal to 66 psig to maintain low pressure alarm clear. Operation below 66 psig permitted with increased monitoring for lowering pressure.

[1] **ENSURE** Generator hydrogen pressure is within requirements of generator capability curve. (TI-28, Figure A.14) **[C.4]** ☐

[2] **ENSURE** Appendix F, *Preparations for Generator Synch,* is complete. _____

NOTE

Maintaining hydrogen cold gas and exciter air temperatures within 10°F of seal oil temperature, normally between 105 and 110°F, will aid in controlling turbine vibration.

[3] **ENSURE** Generator hydrogen coolers are aligned and **[TIC-24-48]** is set to maintain H_2 cold gas temperature at 105 to 110°F. ☐

[4] **ENSURE** Exciter Cooling in service per 0-SO-24-1. ☐

[5] **COORDINATE** 500kv/161kv switching with system load dispatcher. ☐

[6] **ENSURE** 1,2-PI-OPS-057-002.0 has been completed. ☐

MTG-B.7 004

Unit-2 is operating at 100%

Generator power is 1100 Megawatts at 24.8 Kv
Reactive is outgoing at 200 MVA

Which ONE of the following is the minimum hydrogen pressure needed to ensure the Generator has enough cooling (assume hydrogen cooling aligned normal)?

A. 45 psig

B. 48 psig

C. 60 psig

D. 75 psig

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** MAIN TURBINE-GENERATOR CONTROL

IV. **LENGTH OF LESSON:** 3 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 Main Turbine-Generator Control system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Main Turbine-Generator Control 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 Main Turbine-Generator Control system as described in the FSAR.

2. State the design basis of the Main Turbine-Generator Control system in accordance with the SQN FSAR.

3. Explain the purpose/function of each major component in the flow path of the Main Turbine-Generator Control system as illustrated on a simplified system drawing.

4. Describe the following characteristics of each major component in the Main Turbine-Generator Control 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 Main Turbine-Generator Control system components are designed
   m. Location of controls and indications associated with the Main Turbine-Generator Control 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 MAIN Turbine-Generator Control system:
   a. Precautions and limitations
   b. Major steps performed while placing the Main Turbine-Generator Control 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 Main Turbine-Generator Control system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the Main Turbine-Generator Control system:
   a. State Tech Specs/TRM LCOs that govern the Main Turbine-Generator Control.
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the Main Turbine-Generator Control 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. INPO SOER 84-6, Reactor Trips Caused by Turbine Control and Protection System Failures

VI. TRAINING AIDS:

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

65. 071 A4.16 065

Given the following:

- Waste Gas Decay Tank A is "IN SERVICE".
- Waste Gas Decay Tank D is in "STANDBY MODE".
- An automatic transfer occurs from WGDT A to WGDT D.
- An AUO dispatched to respond to the transfer reports the following:
  - WGDT A pressure is 120 psig.
  - WGDT D pressure is 11 psig.

Which ONE of the following describes BOTH the transfer from WGDT A to WGDT D and the status of the WGDT D pressure?

A. The transfer occurred prior to the automatic swapover setpoint of 135 psig. WGDT D pressure is above the minimum pressure to be "IN SERVICE".

B. The transfer occurred prior to the automatic swapover setpoint of 135 psig. WGDT D pressure needs to be raised by adding nitrogen to the tank.

C. The transfer occurred past the automatic swapover setpoint of 100 psig. WGDT D pressure is above the minimum pressure to be "IN SERVICE".

D. The transfer occurred past the automatic swapover setpoint of 100 psig. WGDT D pressure needs to be raised by adding nitrogen to the tank.

DISTRACTOR ANALYSIS:

A. *Incorrect, While the high pressure alarm setpoint is 135 psig, the transfer did not occur early. It should have occurred when the tank pressure reached 100 psig in accordance with 0-SO-77-12, Waste Gas Decay Tank Operation and the pressure in Tank D is below the 13 psig minimum to prevent false readings on the Waste Gas Analyzer. Plausible because high pressure alarm setpoint could be misapplied as the transfer setpoint in which case the transfer would have occurred early and the minimum pressure of 5 psig for the tank in "COVER GAS MODE" could be misapplied to the tank that had been is "STANDBY MODE."*

B. *Incorrect, While the high pressure alarm setpoint is 135 psig, the transfer did not occur early. It should have occurred when the tank pressure reached 100 psig in accordance with 0-SO-77-12, Waste Gas Decay Tank Operation however the pressure in Tank D is below the 13 psig minimum to prevent false readings on the Waste Gas Analyzer and nitrogen does need to be added to the tank. Plausible because high pressure alarm setpoint could be misapplied as the transfer setpoint in which case the transfer would have occurred early and nitrogen does need to be added to the Tank D to raise the pressure to greater than the 13 psig required.*

C. *Incorrect, The transfer should have occurred when the tank pressure reached 100 psig in accordance with 0-SO-77-12, Waste Gas Decay Tank Operation, however the pressure in Tank D is below the 13 psig minimum to prevent false readings on the Waste Gas Analyzer. Plausible because the transfer occurring late is correct and the minimum pressure of 5 psig for the tank in "COVER GAS MODE " could be misapplied to the tank that had been is "STANDBY MODE."*

D. *CORRECT, The transfer should have occurred when the tank pressure reached 100 psig in accordance with 0-SO-77-12, Waste Gas Decay Tank Operation, and the procedure has nitrogen added if the new in service tank (Tank D) pressure is less than 13 psig to prevent false readings on the Waste Gas Analyzer.*

Question No. 65

Tier 2 Group 2

K/A 071 A4.16
Ability to manually operate and/or monitor in the control room:
Waste gas decay tank shifts

Importance Rating: 2.5* / 2.2*

Technical Reference: 0-SO-77-12, Waste Gas Decay Tank Operation

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.GRW B.4.d & .g
Describe the following characteristics of each major component in the GRW system:
d. Normal operating parameters
g. Interlocks (including setpoints)

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.7 /45.5 to 45.8)

10CFR55.43.b (n/a)

Comments: new question for 1/2009 exam

3.0 PRECAUTIONS AND LIMITATIONS

A. Gas Decay Tank relief valve setpoint is 150 psig.

B. Gas Decay Tank minimum operating pressure is 13 psig, except for "Cover Gas". The 13 psig ensures adequate pressure to provide flow to the Waste Gas Analyzer. Gas Analyzer false readings may occur with less than minimum operating pressure. "Cover Gas" has a minimum pressure of 5 psig and must be increased to at least 13 psig prior to sampling (TSIR 98 NSSS-077-975). (Minimum pressures were determined with a clean PCV inlet filter. If filter is clogged, pressure may have to be increased or filter replaced to maintain alarms clear.)

C. Gas Decay Tank automatic swap over to Standby Tank Setpoint is 100 psig.

D. Do not place more than one Gas Decay Tank in the "COVER GAS MODE" at any time. This prevents transfer of gas from one tank to another.

E. Failure to observe all posted radiation control requirements may lead to unnecessary radiation exposure.

F. Waste Gas Analyzer should be aligned to the inservice Gas Decay Tank or LCO 3.3.3.10 entered prior to Waste Gas Compressor operation.

G. Due to several problems with valve reach-rod position indicators, reach-rod position indicators shall not be used for valve position indication without approval of Shift Manager.

H. Normally reach rods will not be used to operate valves: however, if valves cannot be operated without the use of reach rods, then contact the Shift Manager for approval. This is due to the problem of torque storage in the flex hose coupling between the reach rod and the local handwheel, which may cause unwanted rapid opening of the valve.

I. 0-SI-CEM-077-416.0 satisfies T S Surveillance requirement 4.11.2.6 and must be performed within 24 hours when any radioactive material is being added to a WGDT.

Date _____

5.0 STARTUP/STANDBY READINESS

5.1 Placing a Gas Decay Tank "IN SERVICE"

NOTE At least one Gas Decay Tank should be available at all times to receive gaseous waste, and have an atmosphere of less than 2% oxygen by volume prior to leaving it in service.

[1] **IF** automatic swap-over of a WGDT has occurred, **THEN**

[a] **RECORD** I.D. for the "IN SERVICE" tank:

Tank _____ "IN SERVICE". _____

[b] **IF** the "IN SERVICE" tank has a pressure less than 13 psig, **THEN**

PERFORM Section 8.2 "Adding Nitrogen Gas to a Gas Decay Tank". ☐

[c] **ISOLATE** the previous "IN SERVICE" Gas Decay Tank in accordance with Attachment 2. ☐

NOTE SI must be performed within 24 hours when any WGDT is placed in service or has been in service.

[d] **NOTIFY** Radiochemical Laboratory Shift Supervisor to perform 0-SI-CEM-077-416.0 on the previous "IN SERVICE" and the current "IN SERVICE" WGDT. ☐

[e] **PERFORM** Section 5.2 for placing another WGDT in "STANDBY". ☐

[f] **PERFORM** Section 8.4 (N/A if not required). ☐

[2] **IF** manual swap-over of a WGDT is required, **THEN**

[a] **ENSURE** tank desired to be placed in service is aligned for "STANDBY MODE" in accordance with Attachment 2. _____

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** GASEOUS RADWASTE

IV. **LENGTH OF LESSON:** 3 hour lecture; 0.5 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 Gaseous Radwaste (GRW) system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge and abilities associated with the GRW 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 GRW system as described in the FSAR.
2. State the design basis of the GRW system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the GRW system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the GRW 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 GRW system components are designed
   m. Location of controls and indications associated with the GRW 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 GRW system:
   a. Precautions and limitations
   b. Major steps performed while placing the GRW 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 GRW system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the GRW system:
   a. State Tech Specs/TRM LCOs that govern the GRW
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the GRW 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)

66. G 2.1.14 066

Following Safety Injection, which ONE of the following identifies the **'Procedural Requirement'** to ensure a plant announcement has been made regarding the reactor trip/safety injection?

A. Immediately after completing the Immediate Action Steps in E-0, "Reactor Trip or Safety Injection".

B. Immediately after transitioning from E-0, "Reactor Trip or Safety Injection" to another ERG procedure.

C. When directed to by a step in ES-0.1, "Reactor Trip Response".

D. When directed to by a step in ES-0.5, "Equipment Verifications".

DISTRACTOR ANALYSIS:

A. Incorrect, ES-0.5 contains the direction for making a plant announcement. Plausible because the step following the Immediate Actions in E-0 is to perform ES-0.5 which contains the direction for making a plant announcement.

B. Incorrect, ES-0.5 contains the direction for making a plant announcement. Plausible since other actions are often peformed at procedure transitions, such as monitoring status trees and conducting crew briefs.

C. Incorrect, ES-0.5 contains the direction for making a plant announcement. Plausible based on similarity of procedure designation as an ES type procedure.

D. CORRECT, The Operator performing ES-0.5 is directed at Step 15 to ensure a plant announcement is made regarding Reactor Trip and SI.

Question No. 66

Tier 3 Group

K/A G2.1.14
Conduct of Operations: Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trip, mode changes, etc.

Importance Rating: 3.1 / 3.1

Technical Reference: ES-0.5, Rev 1

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271E-0 B.6.b
Given a set of initial plant conditions use E-) to correctly:
b. Identify required actions

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.10 / 45.13)

10CFR55.43.b (n/a)

Comments:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12.	**CHECK** secondary and containment rad monitors **USING** the following: • Appendix A, Secondary Rad Monitors • Appendix B, Containment Rad Monitors.	
13.	**CHECK** pocket sump pumps STOPPED: [M-15, upper left corner] • HS-77-410, Rx Bldg Aux Floor and Equipment Drain Sump pump A • HS-77-411, Rx Bldg Aux Floor and Equipment Drain Sump pump B.	**STOP** pumps.
14.	**DISPATCH** personnel to perform EA-0-1, Equipment Checks Following ESF Actuation.	
15.	**ENSURE** plant announcement has been made regarding Reactor Trip and SI.	

END

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

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** E-0, "Reactor Trip or Safety Injection"

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

V. **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 E-0, "Reactor Trip or Safety Injection".

B. Enabling Objectives

	Objectives
0.	Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with Reactor Trip or Safety Injection 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 E-0.
2.	Describe the E-0 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into E-0.
4.	Describe the bases for all limits, notes, cautions, and steps of E-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 E-0 to correctly:
	a. Recognize entry conditions.
	b. Identify required actions.
	c. Respond to Contingencies.
	d. Observe and Interpret Cautions and Notes.
7.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition.

67. G 2.1.3 067

Which ONE of the following identifies the items in the list below that are required to be reviewed by an oncoming OATC during Shift Turnover in accordance with OPDP-1, Conduct of Operations?

1. Abnormal equipment lineup/conditions
2. SI/Test in progress/planned
3. Standing Order changes since last shift worked
4. Work Orders generated since last shift worked
5. Tech Spec LCOs in effect
6. Priority 1 and 2 Operator Workarounds

A. All EXCEPT 1 and 2

B. All EXCEPT 1 and 4

C. All EXCEPT 2 and 6

D✔ All EXCEPT 4 and 6

DISTRACTOR ANALYSIS:

A. Incorrect, Abnormal equipment lineup/conditions and SI/Test in progress/planned are required to be reviewed as listed on the Shift Turnover Checklist.

B. Incorrect, Work Orders generated since last shift worked are not required to be reviewed as listed on the Shift Turnover Checklist.

C. Incorrect, Priority 1 and 2 Operator Workarounds are not required to be reviewed as listed on the Shift Turnover Checklist.

D. CORRECT, Neither item is required to be reviewed as listed on the Shift Turnover Checklist.

Proposed 2/6/2009
Sequoyah NRC RO Written Exam
as submitted

Question No. 67

Tier 3

K/A 2.1.3
Conduct of Operations: Knowledge of shift or short term relief turnover practices.

Importance Rating: 3.7 / 3.9

Technical Reference: OPDP-1, Rev 10

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271C209, B.11
Describe the contents of a shift turnover checklist

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

Question History: SQN NRC Exam 1/2008 question modified

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

10 CFR Part 55 Content: 41.10 / 45.13

Comments: Modified question stem and changed the answer from choice 'C' to 'D'.

Attachment 2
(Page 1 of 1)

OPDP-1-1 Shift Turnover Checklist

SHIFT TURNOVER CHECKLIST

Page _____ of _____

☐ SM
☐ US/MCR Unit _____ _____
☐ UO Unit _____ Off-going - Name
☐ AUO Station _____ _____
☐ STA (STA Function) On-coming - Name

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:

- SI/Test in progress/planned: (including need for new brief)

- Major Activities/Procedures in progress/planned:

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

☐ A review of the Operating Log since last held shift or 3 days, whichever is less.
☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following programs for changes since last shift turnover:

☐ Standing Orders ☐ LCO(s) in actions (N/A for AUOs) ☐ PER review (N/A for AUOs)
☐ Immediate required reading ☐ TACF (N/A for AUOs)

Part 3 - Performed by both off-going and on-coming shift

☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

QUESTIONS REPORT
for RO SRO COMBINED WRITTEN EXAM QUESTIONS

G 2.1.3 066

Which ONE (1) of the following identifies actions, in the list below, that are included in the listing of activities required to be reviewed during during Shift Turnover in accordance with OPDP-1, Conduct of Operations, by an on-coming OAC at Sequoyah?

1. Radiological changes in plant
2. PERs generated since last shift worked
3. Standing Orders
4. Temporary Alteration Control forms (TACFs)
5. LCOs
6. Priority 1 and 2 Operator Workarounds

A. All EXCEPT 1 and 2

B. All EXCEPT 1 and 4

C. All EXCEPT 2 and 6

D. All EXCEPT 4 and 6

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** LICENSED TRAINING & NON LICENSED

III. **LESSON TITLE:** CONDUCT OF OPERATIONS (OPDP-1, SPP-10.0, ODM)

IV. **LENGTH OF LESSON/COURSE:** 4 hours

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of this lesson, the student will have reviewed the "Conduct of Operations" procedures and will demonstrate an understanding of these procedures and other material presented by passing a written examination as outlined by program procedure.

B. Enabling Objectives:

Each student will understand the following

1. State the purpose of OPDP-1

2. Explain the scope of OPDP-1

3. State the expectations for conservative bias to plant conditions to include:
   a. Safety Focus
   b. Conservative Decision Making
   c. Expectations for Inserting a Manual Scram or Manual Reactor Trip
   d. Manual Control of Automatic Systems
   e. Reactivity Management
   f. Radiological Safety
   g. Industrial Safety
   h. Use of the Corrective Action Process

4. Describe the expectations for closely monitoring plant conditions to include:
   a. Control Board Monitoring
   b. Equipment Manipulations and Status Control
   c. Operator Watchstanding and Equipment Monitoring
   d. Annunciator Response
   e. Maintaining Control Room Professionalism
   f. Log keeping
   g. Intolerance for Equipment Failure

5. State the expectations for precisely controlling plant evolutions to include:
   a. Procedural Adherence
   b. Operations Role in Effective Work Management
   c. Briefings

6. Describe the requiremnts for understanding plant design and interaction to include:

a. Training and Qualification
b. Operator Training and Training Week
c. Clearances

7. Describe the expectations for effective teamwork to include
   a. Operations Roles and Responsibilities
   b. Error Prevention Tools
   c. Shift Turnover
   d. Coaching
   e. Self-Assessment

8. State the types of records to include:
   a. QA Records
   b. Non-QA Records

9. Definitions

10. State the requirements for shift staffing

11. Describe the contents of a shift turnover checklist

12. Explain the management expectations for briefings

13. State the expectations for operations mentors of initial license training

68. G 2.1.37 068

The administrative requirements for reactivity management contained in OPDP-1, Conduct of Operations states that Unit Operators are responsible for ...

A. personally overseeing all reactivity changes in the MCR.

B. making positive reactivity changes by only one method at a time.

C. reviewing and approving all planned reactivity changes as developed by Reactor Engineering.

D. notifying the shift Reactor Engineer of unplanned reactivity changes that exceed 1% thermal power.

DISTRACTOR ANALYSIS:

A. Incorrect, This responsibility is designated to the Unit Supervisor in accordance with OPDP-1, Section 3.5.B. Plausible because the function is designated for a member of the operating control room staff.

B. CORRECT, OPDP-1, Section 3.5.C stipulates that a responsibility of the Unit Operator is to make positive reactivity changes by only one method at a time.

C. Incorrect, This responsibility is designated to the Unit Supervisor in accordance with OPDP-1, Section 3.5.B. Plausible because the function is designated for a member of the operating control room staff.

D. Incorrect, This responsibility is designated to the Unit Supervisor in accordance with OPDP-1, Section 3.5.B. Plausible because the function is designated for a member of the operating control room staff.

Question No. 68

Tier 3 Group

K/A G2.1.37
Conduct of Operations: Knowledge of procedures, guidelines or limitations associated with reactivity management.

Importance Rating: 4.3 / 4.6

Technical Reference: OPDP-1, Rev 10

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271C209, Obj. B.3.e
State the expectations for conservative bias to plant conditions to include:
e. Reactivity Management

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: 41.10 / 45.13

10CFR55.43.b (n/a)

Comments: New for SQN Exam 1/2009

3.4 Manual Control of Automatic Systems (continued)

B. When operating in manual mode, the Unit Supervisor will specify the frequency of monitoring, control bands and trigger values as appropriate.

C. When manual operation is no longer required or the automatic function is restored, return systems to automatic or standby mode.

D. When practical, before placing controls in manual for activities which require manual control, review system response and actions to be taken during potential off normal events.

3.5 Reactivity Management

NOTE

It is acceptable to utilize another SRO to perform the Unit Supervisor Reactivity Management function described below for significant reactivity changes such as start-up, shutdown, etc.

A. The Unit Supervisor is responsible for all manipulations that affect reactivity and is charged to:

1. Giving permission to Unit Operators to make reactivity changes. Personally oversee all reactivity changes or assign another SRO to oversee the reactivity change if unable to give his/her undivided attention.

2. Utilize approved reactivity plans or notify the shift Reactor Engineer of unplanned reactivity changes greater than 1% thermal power.

3. Review and approve all planned reactivity changes in accordance with approved procedures or instructions developed by Reactor Engineering.

4. Ensures that pre-job briefs for work activities address potential reactivity effects, approves all core alterations, ensures that reactivity changes during shift turnover or shift crew briefings are avoided and ensures reactor engineering are available in the control room during significant reactivity evolutions.

B. Unit Operators are charged to:

1. Monitor reactor parameters to ensure the unit is operating within prescribed bands and monitor prescribed parameters and instrumentation to verify plant response is as expected during reactivity manipulations. If, after investigation, the unit is determined to be operating above its licensed core thermal power limit take prompt (typically no more than10 minutes from point of discovery) action to reduce power below the core thermal power limit.

2. Take conservative action, including manual scram/reactor trip, when abnormal reactor conditions are encountered, and does not rely solely on the Reactor Protection System to protect the reactor during reactivity events.

3. Monitors nuclear instrumentation during refueling activities that could affect the reactivity of the core so that abnormal reactivity events can be mitigated.

3.5 Reactivity Management (continued)

4. Directly supervise trainees manipulating reactivity related controls, as if the Unit Operator were performing the manipulation personally. The trainees must be enrolled in an approved licensed training program.

5. Knows and monitors the effects of the reactivity change. Make positive reactivity changes by only one method at a time.

6. Understands and compares reactivity management plan and actual plant performance during core maneuvers (BWR).

7. Stops and questions unexpected situations involving reactivity, criticality, power level, or core anomalies. Meets anomalous indication with conservative action.

3.6 Radiological Safety

A. The radiological protection requirements established within the TVA NPG for conduct in plant radiation areas are developed and implemented to protect all radiation workers from the harmful effects of radiation. As one of three safety focus areas, operators lead their station in following and enforcing the procedures and standards that have been established.

1. All operations personnel are expected to demonstrate the following fundamental behaviors when working in and around radiologically protected areas:

- Adhering to all radiological posting requirements
- Using proper practices and precautions when working in a radiologically posted area
- Being aware of and taking actions to reduce personal exposure through the use of fundamental concepts of time and distance
- Knowing the requirements of the general or specific RWP controlling the work activity
- Promptly reporting identified radiological hazards to RP and the control room
- Informing RP prior to evolutions which have the potential to change radiological conditions in the plant
- Coaching and correcting observed deviations in personnel radiological work practices
- Maintaining overall awareness of normal plant radiological conditions
- Minimizing waste generation by limiting packaging in the RCA. Controlling radioactive material and ensuring all material is surveyed before it leaves the RCA
- Maintaining up-to-date awareness of personnel exposures
- Ensuring that pre-job briefs discuss radiological conditions, planned exposure and specific actions to minimize dose and avoid contamination

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** LICENSED TRAINING & NON LICENSED

III. **LESSON TITLE:** CONDUCT OF OPERATIONS (OPDP-1, SPP-10.0, ODM)

IV. **LENGTH OF LESSON/COURSE:** 4 hours

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of this lesson, the student will have reviewed the "Conduct of Operations" procedures and will demonstrate an understanding of these procedures and other material presented by passing a written examination as outlined by program procedure.

B. Enabling Objectives:

Each student will understand the following

1. State the purpose of OPDP-1

2. Explain the scope of OPDP-1

3. State the expectations for conservative bias to plant conditions to include:
   a. Safety Focus
   b. Conservative Decision Making
   c. Expectations for Inserting a Manual Scram or Manual Reactor Trip
   d. Manual Control of Automatic Systems
   e. Reactivity Management
   f. Radiological Safety
   g. Industrial Safety
   h. Use of the Corrective Action Process

4. Describe the expectations for closely monitoring plant conditions to include:
   a. Control Board Monitoring
   b. Equipment Manipulations and Status Control
   c. Operator Watchstanding and Equipment Monitoring
   d. Annunciator Response
   e. Maintaining Control Room Professionalism
   f. Log keeping
   g. Intolerance for Equipment Failure

5. State the expectations for precisely controlling plant evolutions to include:
   a. Procedural Adherence
   b. Operations Role in Effective Work Management
   c. Briefings

6. Describe the requiremnts for understanding plant design and interaction to include:

a. Training and Qualification
b. Operator Training and Training Week
c. Clearances

7. Describe the expectations for effective teamwork to include
   a. Operations Roles and Responsibilities
   b. Error Prevention Tools
   c. Shift Turnover
   d. Coaching
   e. Self-Assessment

8. State the types of records to include:
   a. QA Records
   b. Non-QA Records

9. Definitions

10. State the requirements for shift staffing

11. Describe the contents of a shift turnover checklist

12. Explain the management expectations for briefings

13. State the expectations for operations mentors of initial license training

69. G 2.2.13 069

Given the following plant conditions:

- Unit 1 at 100% power.
- 1-FCV-62-93, Charging Flow Control Valve, is selected as a boundary isolation valve for a clearance on the CVCS charging header.

Which ONE of the following is an acceptable method for tagging the valve?

A. Tag the air isolation valve in the open position and tag the handswitch in the closed position.

B. ✔ Close the valve, install a jacking device, isolate the air supply and tag the jacking device.

C. Dog the valve closed with its handwheel, tag the valve handwheel and tag the air isolation valve.

D. Isolate and de-pressurize the air supply to the valve and tag the air isolation valve.

DISTRACTOR ANALYSIS:

A. Incorrect, SPP-10.02 does not allow tagging an air supply valve open and tagging the control switch in the close position to keep a fail open valve closed. Examinee may select since the procedure does allow tagging drain valves in the open position.

B. CORRECT, Since FCV-62-93 is a fail open valve a jacking device must be installed to keep the valve in the closed position and the jacking device must be tagged with a hold order card.

C. Incorrect, FCV-62-93 does not have a handwheel to dog the valve closed. Examinee may select since some valves do have dogs associated with them and that would be an acceptable method for tagging the valve.

D. Incorrect, FCV-62-93 fails open and this method would not close the valve, but examinee may confuse the failure mode of the valve and select this option.

Question No. 69

Tier 3

K/A G2.2.13
Knowledge of tagging and clearance procedures.

Importance Rating: 4.1 / 4.3

Technical Reference: SPP-10.2, Clearance Procedure to Safely Control Energy, Rev. 1, Appendix E.

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271SPP-10.2 B.3
Identify the responsibilities for Plant Personnel involved in implementing the clearance program.

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

Question History: WBN bank

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

10 CFR Part 55 Content: (41.10 / 45.13)

10CFR55.43.b (n/a)

Comments: WBN exam bank

Appendix E
(Page 1 of 2)

Special Requirements for Mechanical Clearances

1.0 REQUIREMENTS

A. An air-operated valve that fails open on a loss of air is not be considered closed for blocking purposes unless it is held closed with an installed jacking device or device used to secure the valve in the required position. A clearance tag will be issued and attached to the jacking or other device.

B. An air-operated valve that fails closed must have its air supply electrically or mechanically isolated, depressurized, and the valve visually checked-to-be-closed by local or remote indication. The air supply energy-isolating devices must be tagged.

C. An air-operated valve that fails "as is" shall be closed and mechanically restrained. Its air supply should be electrically or mechanically isolated, depressurized, and the valve visually checked to be closed by local or remote indication. The air supply energy-isolating devices and mechanical restraint must be tagged.

D. In cases where it is not possible to physically secure an air operated valve that fails "as-is" in the closed position, the valve will be tagged closed by applying closing air to the valve diaphragm by the use of the solenoid valve air overrides and tagging both the hand-switch in the closed position and the solenoid valve air overrides. Prior to allowing work to begin, the equipment will be drained and de-pressurized to ensure the boundary valves are holding. This condition will be noted in the remarks section of the clearance sheet to inform PAE/Authorized Employee(s) that pressurized air is required to ensure the valve remains closed. This work is considered "working on energized equipment" and must be approved by the management official in charge.

E. Pressure controlled valves, relief valves, and check valves will not be used as isolation boundary valves under normal conditions. Where such a valve does not have an external means of physical restraint, the work is considered "working on energized equipment" and must be approved by the management official in charge.

F. The following instructions govern the use of freeze plugs

1. The clearance should be in place, but not issued, before establishing the freeze plug.

2. The need for the freeze plug should be identified on the Remarks Section of the clearance sheet. The freeze plug should not be listed as a device held on the clearance sheet. The establishment and maintenance of the freeze plug shall be in accordance with approved procedures or work documents.

3. The freeze plug must be attended by qualified personnel to ensure that it is maintained intact until all work is complete and the proper Post Maintenance Tests (PMTs) are performed.

4. If the clearance must be released to allow performance of a PMT, the equipment must be retagged before allowing the freeze plug to thaw. This will prevent migration of a portion of the plug.

Appendix E
(Page 2 of 2)

Special Requirements for Mechanical Clearances

1.0 REQUIREMENTS (continued)

5. The clearance must be released before allowing the freeze plug to thaw. However, to prevent migration of the freeze plug, tags on boundary valves shall not be removed until the freeze plug has completely thawed.

6. All vents and drains must be verified CLOSED before allowing the freeze plug to thaw.

G. The inability to depressurize must be clearly documented in the remarks section and communicated to the proposed clearance holder. In cases where the component design does not include a vent or drain path within the clearance boundary, the clearance must be "locked" to preclude clearance holder sign-on and initiation of work prior to direct communication with the RE. Suitable methods to depressurize and prevent repressurization must be agreed upon by the RE and the PAE before the clearance is held by the PAE.

H. When performing Temporary Lifts that could result in fluid flow (e.g., Motor Operated Valve Actuator Test (MOVAT) testing, valve stroke, etc.) the PAE responsible for the activity must ensure that a flow blocking clearance is in place to maintain safe isolation and adequate flow blocking.

I. Clearances for work on high energy systems (operate with temperature greater than 200°F or pressure greater than 500 psig), lethal chemical systems, or systems connected to high energy systems shall, when possible isolate the work area by two closed valves in series. If equipped, a tell-tale vent or drain between the isolation valves should be opened. Lack of two valve isolation shall be clearly documented and communicated to the proposed clearance holder before issue.

J. The use of Abandoned Equipment Boundary valves as energy isolating devices requires the application of the same constraints that apply for the use on any other valve used as an energy isolating device. For example: position verification capability, maintenance of isolation from hazardous energy, etc.

K. The establishment of a safe boundary to allow work to be done on an Abandoned Equipment Boundary valve shall utilize equipment NOT abandoned. The boundary shall meet the same criteria as any other boundary.

QUESTIONS REPORT

for Superwhaminine ILT EXAM BANK MARCH 2007

G2.2.13 001

Given the following plant conditions:

- Unit is operating at 100% power
- 1-FCV-62-93, Charging Flow Control Valve, is being tagged as a boundary isolation valve for a clearance on the CVCS charging header.

Which ONE of the following is an acceptable for tagging the valve?

a. Tag the air isolation valve in the open position and tag the handswitch in the closed position for 1-FCV-62-93.

b. ✔ Close the valve, install a jacking device, isolate the air supply for 1-FCV-62-93, and tag the jacking device.

c. Dog 1-FCV-62-93 closed with its handwheel, tag the valve handwheel, and tag the air isolation valve.

d. Isolate and de-pressurize the air supply for 1-FCV-62-93 and tag the air isolation valve.

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

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** SPP-10.2, Clearance Program Procedure

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 SPP-10.2 Clearance Program.

B. Enabling Objectives:

In order to accomplish this objective, **using appropriate plant references and situations (where applicable)**, each student shall be able to successfully:

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with SPP-10.2, Clearance Program, 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.	State the purpose of SPP-10.2, "Clearance Program".
2.	Identify the responsibilities for the Shift Manager as stated in SPP-10.2 "Clearance Program".
3.	Identify the responsibilities for Plant Personnel involved in implementing the clearance program as stated in SPP-10.2, "Clearance Program".
4.	Identify the types of documentation/materials that are required to be used when preparing clearance boundaries.
5.	State when actual work can begin on equipment isolated by a clearance, and state any exceptions to the requirement.
6.	List the conditions that require two closed valves in series (double valve isolation) for mechanical clearances.
7.	Identify when a Safety Assessment/Safety Evaluation (SA/SE) must be performed on a piece of equipment that has a clearance placed on it.

8.	List the sequence requirements for manipulating components when tagging and untagging plant equipment as stated in SPP-10.2, "Clearance Program".
9.	Explain the purpose of all clearance tags of SPP-10.2, "Clearance Program".
10.	Explain the process for modifying the boundary of an existing clearance as stated in SPP-10.2 "Clearance Program".
11.	Explain the procedural requirements for authorizing a temporary clearance lift as stated in SPP-10.2 "Clearance Program".
12.	Explain the procedural requirements for clearance reviews and audits as stated in SPP-10.2 "Clearance Program".
13.	***Objective for Re-qualification ONLY*** Identify changes made to SPP-10.2 "Clearance Program" in latest revision.

70. G 2.2.37 070
Given the following:

- Both Units are at 100% power with all systems are aligned normal.
- ERCW pumps J-A and M-B are tagged out of service for maintenance.

Which ONE of the following identifies the MAXIMUM average ERCW temperature allowed without entering a Technical Specification LCO, and the LCO that would be entered if the temperature was exceeded?

	Maximum Allowed Temperature	**LCO Entered**
A.	73°F	3.7.4, Essential Raw Cooling Water System
B.	73°F	3.7.5, Ultimate Heat Sink
C.	87°F	3.7.4, Essential Raw Cooling Water System
D.	87°F	3.7.5, Ultimate Heat Sink

DISTRACTOR ANALYSIS:

A. Incorrect, 73°F is not the maximum temperature allowed without a T/S entry being required with the J-A and M-B ERCW pumps being out of service and if the maximum temperature was exceeded with the stated conditions, T/S LCO 3.7.4, Essential Raw Cooling Water System would not be the Tech Spec LCO entered. Plausible because the maximum temperature would be 73°F and T/S 3.7.4 would be the correct LCO to be entered if the conditions in the stem had a strainer isolated instead of pumps out of service.

B. Incorrect, 73°F is not the maximum temperature allowed without a T/S entry being required with the J-A and M-B ERCW pumps being out of service but the T/S to be entered is for the stated conditions. Plausible because the maximum temperature would be 73°F if the conditions in the stem had a strainer isolated instead of pumps out of service and T/S LCO 3.7.5, Ultimate Heat Sink is the correct entry for the stated conditions

C. Incorrect, 87°F is the maximum temperature allowed without a T/S entry being required with the J-A and M-B ERCW pumps being out of service but if the temperature was exceeded T/S LCO 3.7.4, Essential Raw Cooling Water System would not be the Tech Spec LCO entered. Plausible because the maximum temperature is correct and T/S 3.7.4 would be entered due to temperature if the conditions in the stem had a strainer isolated instead of pumps out of service.

D. CORRECT, 87°F is the maximum temperature allowed without a T/S entry being required with the J-A and M-B ERCW pumps out of service and if the temperature was exceeded T/S LCO 3.7.5, Ultimate Heat Sink would be entered.

Question No. 70

Tier 3

K/A G2.2.37
Ability to determine operability and/or availability of safety related equipment.

Importance Rating: 3.6 / 4.6

Technical Reference: 1-SI-OPS-00-002.0, Shift Log, Rev 90
0-SO-67-1, Essential Raw Cooling Water, Rev 78
Technical Specifications 3/4.7.4 and 3./4.7.5

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.ERCW B.5.a and B.6.a
Describe the operation of the ERCW system:
a. Precautions and limitations
Describe the administrative controls and limits for the ERCW system :
a. State Tech specs/ TRM LCOs that govern the ERCW

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.7 / 43.5 / 45.12)

10CFR55.43.b (n/a)

Comments: New for SQN exam 1/2009

APPENDIX A

	SR.	Mode	Notes	TS Limits	Instrument No./Location	Units	0630-1830	1830-0630	REMARKS
Ultimate Heat Sink	4.7.5.1	1,2,3,4	54, 55, 57, 58, 70	≤87°F with Forebay water level ≥ 674'	1PA009 ☐ OR 2PA009 ☐ OR Appendix G ☐ OR Appendix N ☐	°F		N/A	
				level ≥ 674'	0-LI-27-133/2-M-15	ft		N/A	
		1,2,3,4	54, 59		ERCW Strainer Inoperable Yes ☐ No ☐	°F		N/A	
							UO/RO Review Initials		

NOTES:

54. **IF** Unit 2 is in mode 1, 2, 3, or 4, **THEN OBTAIN** ultimate heat sink data from the Unit 2 "Shift Log" and ensure all necessary actions are initiated via the Unit 2 "Shift Log". Otherwise, **OBTAIN** data from Unit 1 and take all necessary actions via the Unit 1 "Shift Log."
55 **CHECK** box(es) for method used to determine ERCW supply temp. If ICS points are unavailable, manually calculate instantaneous average using App. O
56.
57. **IF** ERCW temperature is ≥ 85°F with water level ≥ 674 ft., **THEN NOTIFY** both unit SROs **AND PERFORM** Appendix G to obtain the instantaneous average until Acceptance Criteria is met.
58. **IF** level indicator 0-LI-27-133 is inoperable, ICS Computer Points 0Y2200A or 0Y2201A can be used to determine water level.
59. **IF** ERCW Strainer (at ERCW Pumping Station) is inoperable, instantaneous average ERCW temperature must be verified ≤ 73°F. **IF** temperature is > 73°F with strainer inoperable, **THEN NOTIFY** the SM to evaluate the applicability of LCO 3.7.4. N/A if all Strainers operable. **[C.5]**
70 **IF** temperature is > 81°F and 0-FCV-67-205, 1A ERCW supply Header to Station Air Compressors, is OPEN, **THEN** evaluate LCO 3.7.15 for operability of A-A MCR Chiller and TR 3.7.14 for EBR Chiller A. (PER 117954 & FE 41792 R1)

3.0 PRECAUTIONS AND LIMITATIONS

A. Failure to observe all posted radiation control requirements may lead to unnecessary radiation absorbed doses.

B. ERCW building ventilation system should be in service to allow safe occupancy of building (especially during chlorination). Supply fan breakers may be open between November 1 and April 15 in accordance with 0-PI-OPS-000-006.0 if temperature of the middle or bottom elevations drops to $\leq 65°F$.

C. If a traveling screen and/or screen wash pump are not available, and screen delta P is greater than 8" H_2O, then operation of associated ERCW pumps should be avoided.

D. When running ERCW pumps:

1. Motor winding temperature should not exceed 300°F.
2. Bearing temperature should not exceed 220°F.

E. Operation of ERCW supply headers with the crosstie in the CCW Pumping Station open and an ERCW strainer isolated is limited to intake temperatures $\leq 73°F$ [1(2)-SI-OPS-000-002.0 Shift Log Ultimate Heat Sink temperature]. If temperature exceeds 73°F, the actions of LCO 3.7.4 will be applicable to the train with the isolated strainer.

F. An ERCW strainer is not considered inoperable solely due to power being removed, provided that:

1. The manual backwash and flushout schedule is within it's required frequency.
2. The normal requirements contained in 0-SO-67-3 can be met.

If these requirements cannot be met, then the strainer must be declared inoperable and precaution E is applicable.

G. Large Bore manual throttle valves must remain as positioned by 0-SI-OPS-067-682.M whether or not associated component is in service. This applies to throttle valves larger than 8 inches in diameter. Large throttle valves, larger than 8 inches in diameter, only exist on the flowpaths associated with the Component Cooling Heat Exchangers and the Containment Spray Heat Exchangers. If any of these valves are not correctly positioned, then the provisions of LCO 3.7.4 may be applicable. This precaution does NOT apply for ERCW if valve is positioned more closed than normal. If valve is positioned more closed than normal, the associated component that ERCW is supplying may be inoperable.

3/4.7.4 ESSENTIAL RAW COOLING WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.4 At least two independent essential raw cooling water (ERCW) loops shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With only one ERCW loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.4 At least two ERCW loops shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) servicing safety related equipment that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. At least once per 18 months, during shutdown, by:

1. Verifying that each automatic valve servicing safety related equipment actuates to its correct position on a Safety Injection test signal.

2. Verifying that each ERCW pump starts automatically on a Safety Injection test signal.

3/4.7.5 ULTIMATE HEAT SINK

LIMITING CONDITION FOR OPERATION

3.7.5 The ultimate heat sink shall be OPERABLE with:

a. A minimum water level at or above elevation 674 feet mean sea level USGS datum, and

b. An average ERCW supply header water temperature of less than or equal to 87°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the requirements of the above specification not satisfied, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.5.1 The ultimate heat sink shall be determined OPERABLE at least once per 24 hours by verifying the average ERCW supply header temperature and water level to be within their limits.

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** ESSENTIAL RAW COOLING WATER SYSTEM (ERCW)

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 ERCW system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Essential Raw Cooling Water 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 ERCW system as described in the FSAR.
2. State the design basis of the ERCW system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the ERCW system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the ERCW 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 ERCW system components are designed
   m. Location of controls and indications associated with the ERCW 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 ERCW system:
   a. Precautions and limitations
   b. Major steps performed while placing the ERCW 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 ERCW system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the ERCW system:
   a. State Tech Specs/TRM LCOs that govern the ERCW
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the ERCW 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. INPO SER 84-01
   b. INPO-SER 96-008
   c. NRC Generic Letter 89-13

VI. TRAINING AIDS:

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

71. G 2.3.11 071

Which ONE of the following identifies the FIRST radiation monitor that should respond to a SGTR and the effect on the monitor when the SGTR results in Safety Injection being actuated?

A. RM-90-119, Condenser Vacuum Exhaust Monitor. The monitor will automatically isolate.

B. ✔ RM-90-119, Condenser Vacuum Exhaust Monitor. The monitor will NOT automatically isolate.

C. RM-90-120/121, Steam Generator Blowdown Sample Monitor. The monitor will automatically isolate.

D. RM-90-120/121, Steam Generator Blowdown Sample Monitor. The monitor will NOT automatically isolate.

DISTRACTOR ANALYSIS:

A. Incorrect - RM-90-119 will detect radiation first since it is more sensitive than RM-90-121/121 and the transit time for the radiation to reach the detector is shorter. Incorrect because there is no signal that will automatically isolate RM-90-119 on a SGTR. Plausible because the other monitor that responds to a SGTR will automatically be isolated due to the SI.

B. CORRECT- RM-90-119 will detect radiation first and there is no signal that will automatically isolate RM-90-119 on a SGTR.

C. Incorrect - RM-90-120/121 does respond on a SGTR but not an quickly as RM-90-119. RM-90-120/121 will be automatically isolated due to a Phase A signal that results from an SI actuation. Plausible because the monitor does respond, but is not the first to respond and the monitor will be isolated due to the SI.

D. Incorrect - RM-90-120/121 does respond on a SGTR but not an quickly as RM-90-119 and an SI signal will cause the isolation of RM-90-120/121 due to the resulting Phase A signal . Plausible because the monitor does respond, but is not the first to respond and the other monitor that responds will not be isolated due to the SI.

Question No. 71

Tier 3

K/A G2.3.11
Ability to control radiation releases.

Importance Rating: 3.8 / 4.3

Technical Reference: OPT200.RM, Radiation Monitoring System, Rev 2
1,2-47W611-1-3 R15
1,2-47W801-2 R49

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.RM B.4.l
Describe the following characteristics of each component in the Radiation Monitoring System:
l. Types of accidents for which the monitor is designed

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

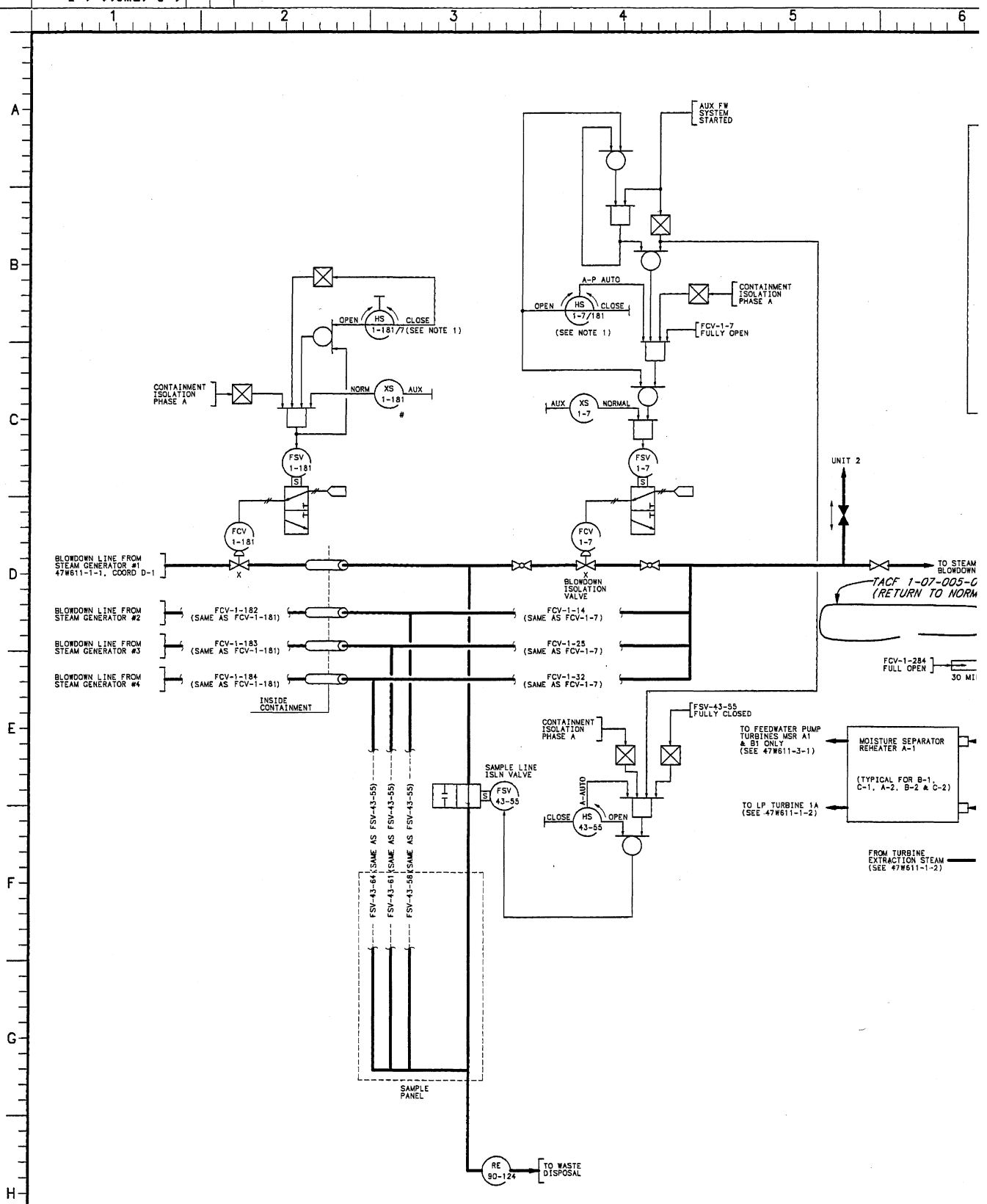
Question History: WBN bank

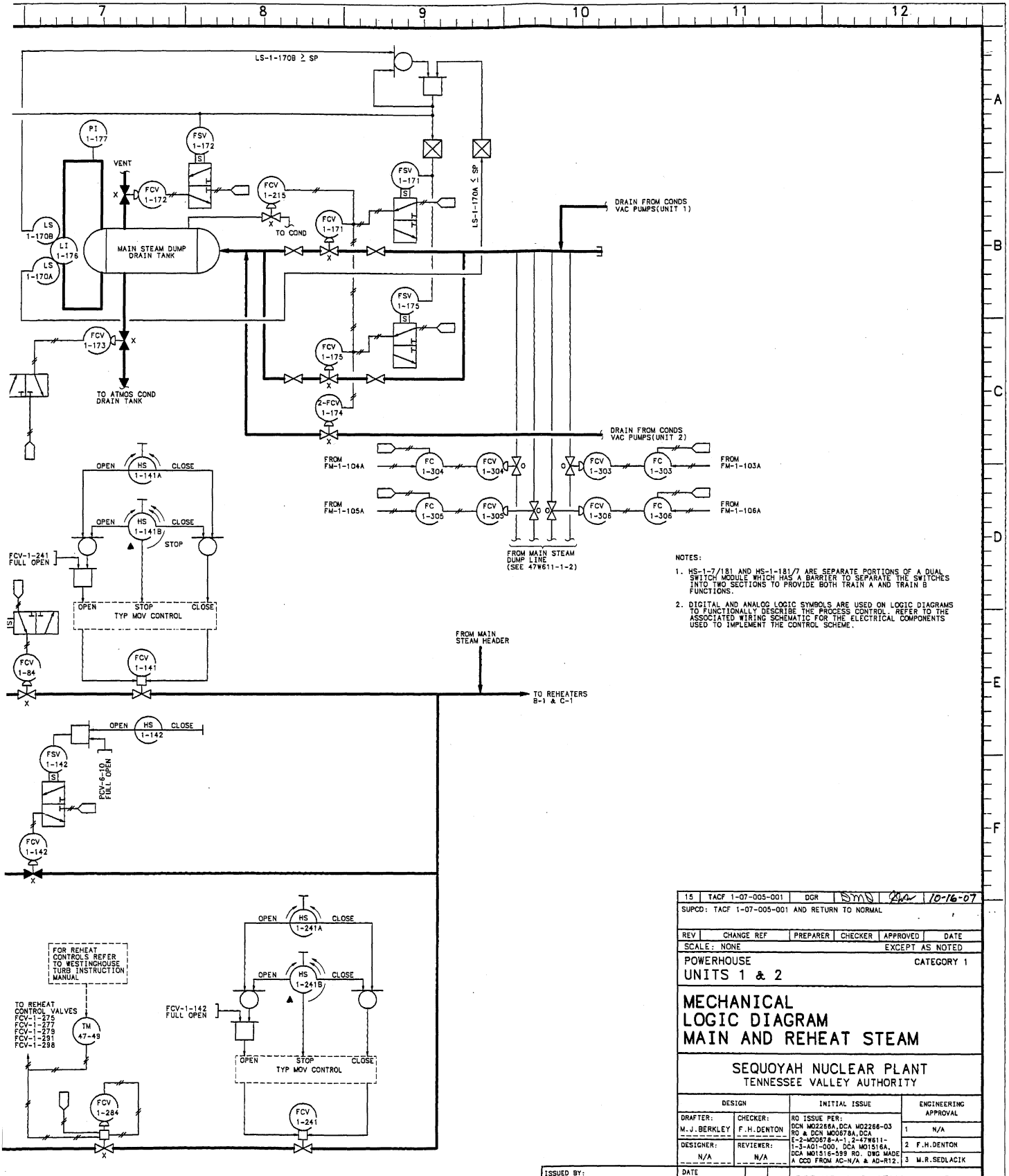
Question Cognitive Level:
Memory or fundamental knowledge __X_____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.11 / 43.4 / 45.10)

10CFR55.43.b (n/a)

Comments:


AUX FW SYSTEM STARTED
A-P AUTO
OPEN
HS 1-7/181
CLOSE
(SEE NOTE 1)
CONTAINMENT ISOLATION PHASE A
FCV-1-7 FULLY OPEN
OPEN
HS 1-181/7 (SEE NOTE 1)
CLOSE
CONTAINMENT ISOLATION PHASE A
NORM
XS 1-181
AUX
#
AUX
XS 1-7
NORMAL
FSV 1-181
FSV 1-7
FCV 1-181
FCV 1-7
UNIT 2
BLOWDOWN LINE FROM STEAM GENERATOR #1 47W611-1-1, COORD D-1
BLOWDOWN LINE FROM STEAM GENERATOR #2
BLOWDOWN LINE FROM STEAM GENERATOR #3
BLOWDOWN LINE FROM STEAM GENERATOR #4
FCV-1-182 (SAME AS FCV-1-181)
FCV-1-183 (SAME AS FCV-1-181)
FCV-1-184 (SAME AS FCV-1-181)
INSIDE CONTAINMENT
BLOWDOWN ISOLATION VALVE
FCV-1-14 (SAME AS FCV-1-7)
FCV-1-25 (SAME AS FCV-1-7)
FCV-1-32 (SAME AS FCV-1-7)
TO STEAM BLOWDOWN
TACF 1-07-005-0
(RETURN TO NORM
FCV-1-284 FULL OPEN
30 MI
FSV-43-55 FULLY CLOSED
CONTAINMENT ISOLATION PHASE A
TO FEEDWATER PUMP TURBINES MSR A1 & B1 ONLY (SEE 47W611-3-1)
MOISTURE SEPARATOR REHEATER A-1
(TYPICAL FOR B-1, C-1, A-2, B-2 & C-2)
SAMPLE LINE ISLN VALVE
FSV 43-55
A-AUTO
CLOSE
HS 43-55
OPEN
TO LP TURBINE 1A (SEE 47W611-1-2)
FROM TURBINE EXTRACTION STEAM (SEE 47W611-1-2)
FSV-43-64 (SAME AS FSV-43-55)
FSV-43-61 (SAME AS FSV-43-55)
FSV-43-58 (SAME AS FSV-43-55)
SAMPLE PANEL
RE 90-124
TO WASTE DISPOSAL



NOTES:

1. HS-1-7/181 AND HS-1-181/7 ARE SEPARATE PORTIONS OF A DUAL SWITCH MODULE WHICH HAS A BARRIER TO SEPARATE THE SWITCHES INTO TWO SECTIONS TO PROVIDE BOTH TRAIN A AND TRAIN B FUNCTIONS.
2. 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.

15	TACF 1-07-005-001	DGR	SMD	10-16-07

SUPCD: TACF 1-07-005-001 AND RETURN TO NORMAL

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE — CATEGORY 1

UNITS 1 & 2

MECHANICAL LOGIC DIAGRAM MAIN AND REHEAT STEAM

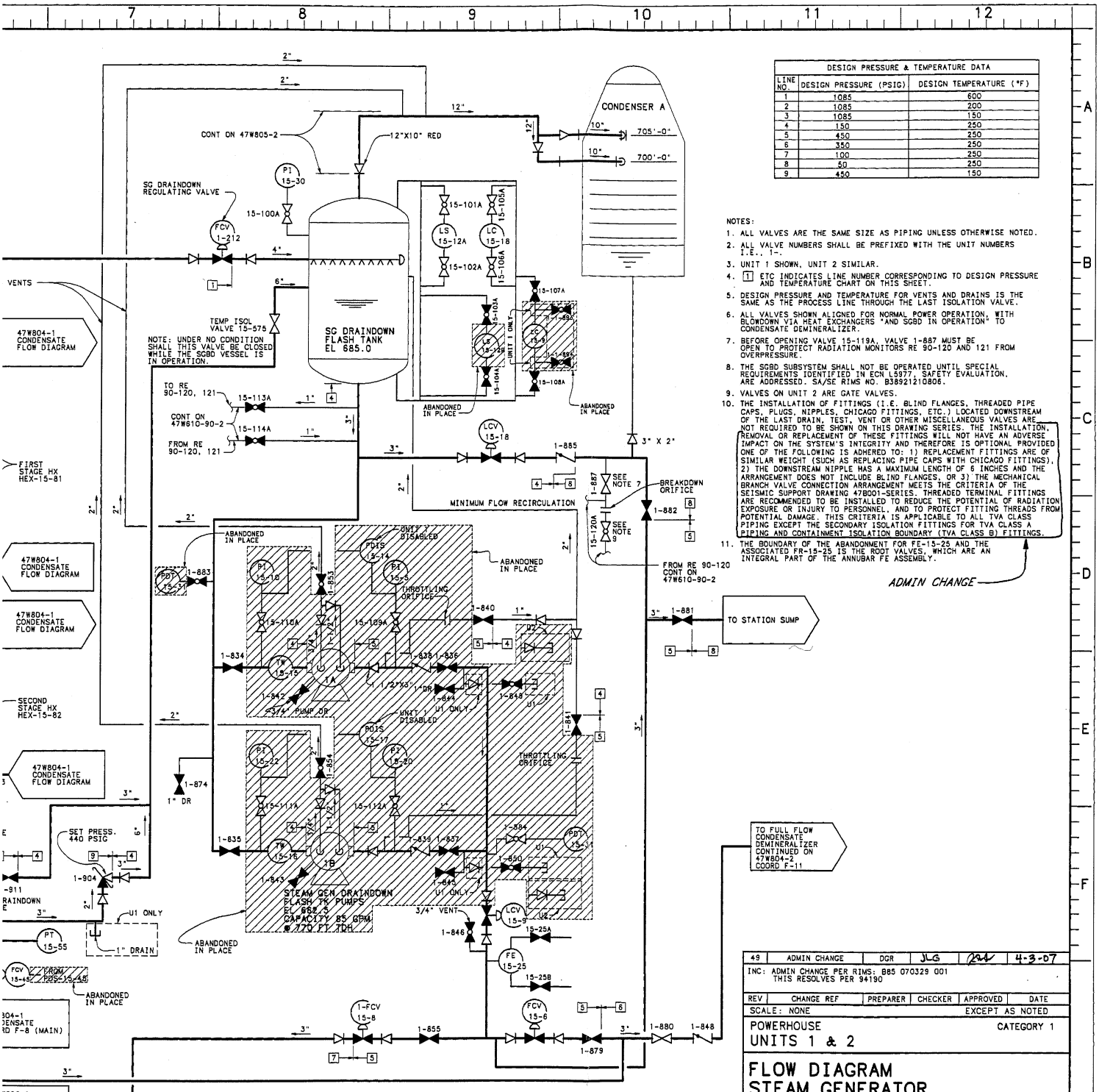
SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: M.J.BERKLEY	CHECKER: F.H.DENTON	RO ISSUE PER: DCN MO2266A,DCA MO2266-03 RO & DCN MO0678A,DCA E-2-MO0678-A-1,2-47W611-1-3-AQ1-000, DCA MO1516A, DCA MO1516-599 RO. DWG MADE A CCD FROM AC-N/A & AD-R12.	1 N/A
DESIGNER: N/A	REVIEWER: N/A		2 F.H.DENTON
			3 M.R.SEDLACIK

ISSUED BY:	DATE			
N/A	11-29-90	45	M	CCD NO: 1,2-47W611-1-3 R15

CAD MAINTAINED DRAWING

CONTROL ROOM DWG



DESIGN PRESSURE & TEMPERATURE DATA		
LINE NO.	DESIGN PRESSURE (PSIG)	DESIGN TEMPERATURE (°F)
1	1085	600
2	1085	200
3	1085	150
4	150	250
5	450	250
6	350	250
7	100	250
8	50	250
9	450	150

NOTES:

1. ALL VALVES ARE THE SAME SIZE AS PIPING UNLESS OTHERWISE NOTED.
2. ALL VALVE NUMBERS SHALL BE PREFIXED WITH THE UNIT NUMBERS I.E., 1-.
3. UNIT 1 SHOWN, UNIT 2 SIMILAR.
4. [1] ETC INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE AND TEMPERATURE CHART ON THIS SHEET.
5. DESIGN PRESSURE AND TEMPERATURE FOR VENTS AND DRAINS IS THE SAME AS THE PROCESS LINE THROUGH THE LAST ISOLATION VALVE.
6. ALL VALVES SHOWN ALIGNED FOR NORMAL POWER OPERATION, WITH BLOWDOWN VIA HEAT EXCHANGERS "A"AND SGBD IN OPERATION" TO CONDENSATE DEMINERALIZER.
7. BEFORE OPENING VALVE 15-119A, VALVE 1-887 MUST BE OPEN TO PROTECT RADIATION MONITORS RE 90-120 AND 121 FROM OVERPRESSURE.
8. THE SGBD SUBSYSTEM SHALL NOT BE OPERATED UNTIL SPECIAL REQUIREMENTS IDENTIFIED IN ECN L5977, SAFETY EVALUATION, ARE ADDRESSED. SA/SE RIMS NO. B38921210806.
9. VALVES ON UNIT 2 ARE GATE VALVES.
10. THE INSTALLATION OF FITTINGS (I.E. BLIND FLANGES, THREADED PIPE CAPS, PLUGS, NIPPLES, CHICAGO FITTINGS, ETC.) LOCATED DOWNSTREAM OF THE LAST DRAIN, TEST, VENT OR OTHER MISCELLANEOUS VALVES ARE NOT REQUIRED TO BE SHOWN ON THIS DRAWING SERIES. THE INSTALLATION, REMOVAL OR REPLACEMENT OF THESE FITTINGS WILL NOT HAVE AN ADVERSE IMPACT ON THE SYSTEM'S INTEGRITY AND THEREFORE IS OPTIONAL PROVIDED ONE OF THE FOLLOWING IS ADHERED TO: 1) REPLACEMENT FITTINGS ARE OF SIMILAR WEIGHT (SUCH AS REPLACING PIPE CAPS WITH CHICAGO FITTINGS), 2) THE DOWNSTREAM NIPPLE HAS A MAXIMUM LENGTH OF 6 INCHES AND THE ARRANGEMENT DOES NOT INCLUDE BLIND FLANGES, OR 3) THE MECHANICAL BRANCH VALVE CONNECTION ARRANGEMENT MEETS THE CRITERIA OF THE SEISMIC SUPPORT DRAWING 47B001-SERIES. THREADED TERMINAL FITTINGS ARE RECOMMENDED TO BE INSTALLED TO REDUCE THE POTENTIAL OF RADIATION EXPOSURE OR INJURY TO PERSONNEL, AND TO PROTECT FITTING THREADS FROM POTENTIAL DAMAGE. THIS CRITERIA IS APPLICABLE TO ALL TVA CLASS PIPING EXCEPT THE SECONDARY ISOLATION FITTINGS FOR TVA CLASS A PIPING AND CONTAINMENT ISOLATION BOUNDARY (TVA CLASS B) FITTINGS.
11. THE BOUNDARY OF THE ABANDONMENT FOR FE-15-25 AND THE ASSOCIATED FR-15-25 IS THE ROOT VALVES, WHICH ARE AN INTEGRAL PART OF THE ANNUBAR FE ASSEMBLY.

REFERENCES:

47W400-6,7,8,11,12,13,14,15,18,19 -- PIPING DRAWINGS
47W611-1 SERIES ---------- LOGIC DIAGRAM
47W610-1-1,2,3 ---------- CONTROL DIAGRAM
47W800-1 ---------- FLOW DIAGRAM-PRINCIPAL PIPING SYSTEM
30B617 ---------- INSTRUMENTATION SYMBOLS & IDENTIFICATION
47W610-15-1 ---------- CONTROL DIAGRAM
47BM400-7,10,12,13,17,18,19,20 ----- BILL OF MATERIAL
47BM436-4 ---------- BILL OF MATERIAL
SQN-DC-V-3.0 ---------- CLASSIFICATION OF PIPING, PUMPS, VALVES & VESSELS
SQN-DC-V-3.1.1 ---------- STEAM GENERATOR BLOWDOWN SYSTEM
30137-A1 ---------- FLOW DIAGRAM - SGB DEMINERALIZER HUNGERFORD & TERRY, CONTRACT NUMBER 86PNR-838135

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
49	ADMIN CHANGE	DGR	JLG		4-3-07

INC: ADMIN CHANGE PER RIMS: B85 070329 001 THIS RESOLVES PER 94190

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE UNITS 1 & 2 — CATEGORY 1

FLOW DIAGRAM STEAM GENERATOR BLOWDOWN SYSTEM

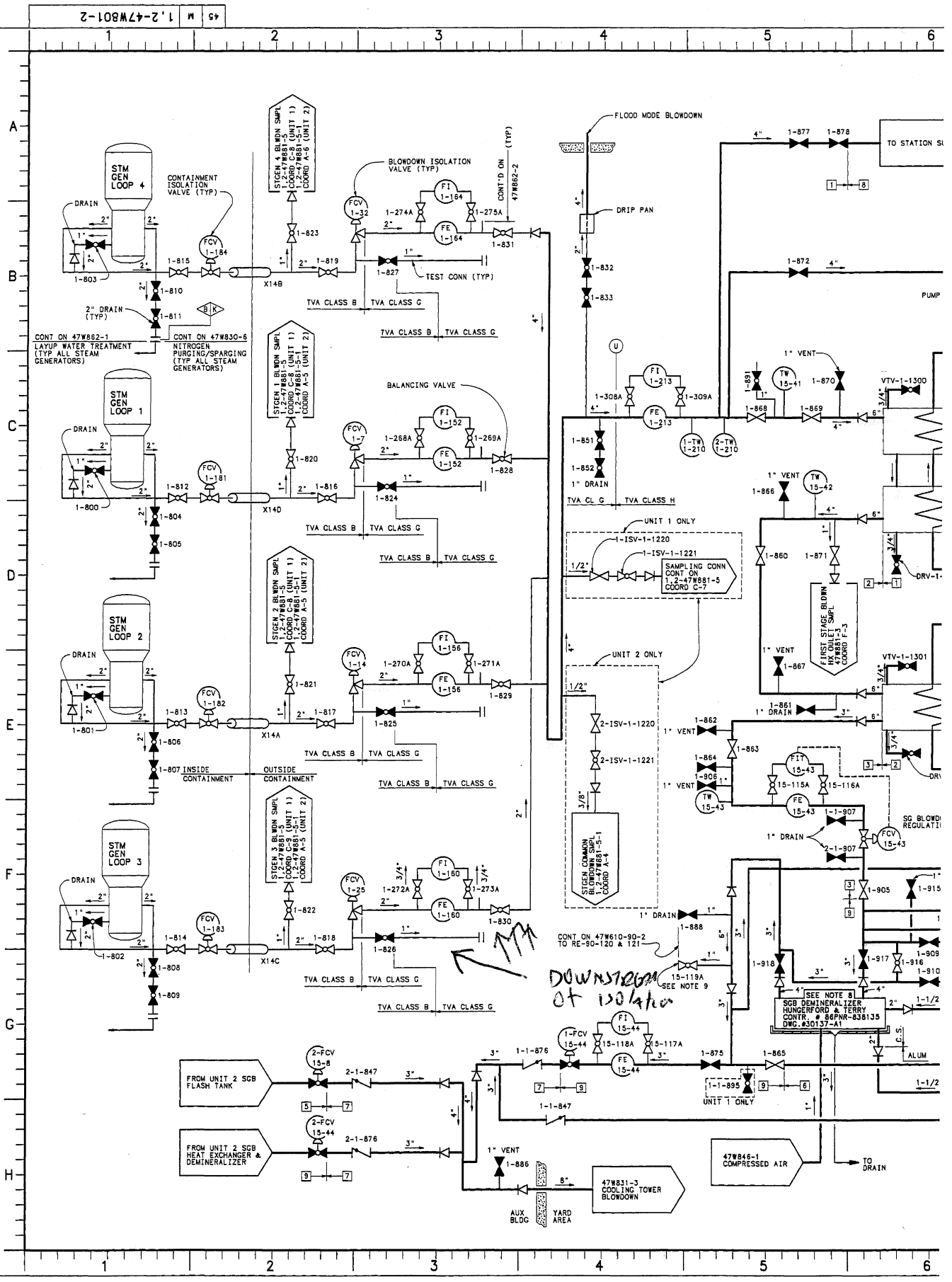
SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

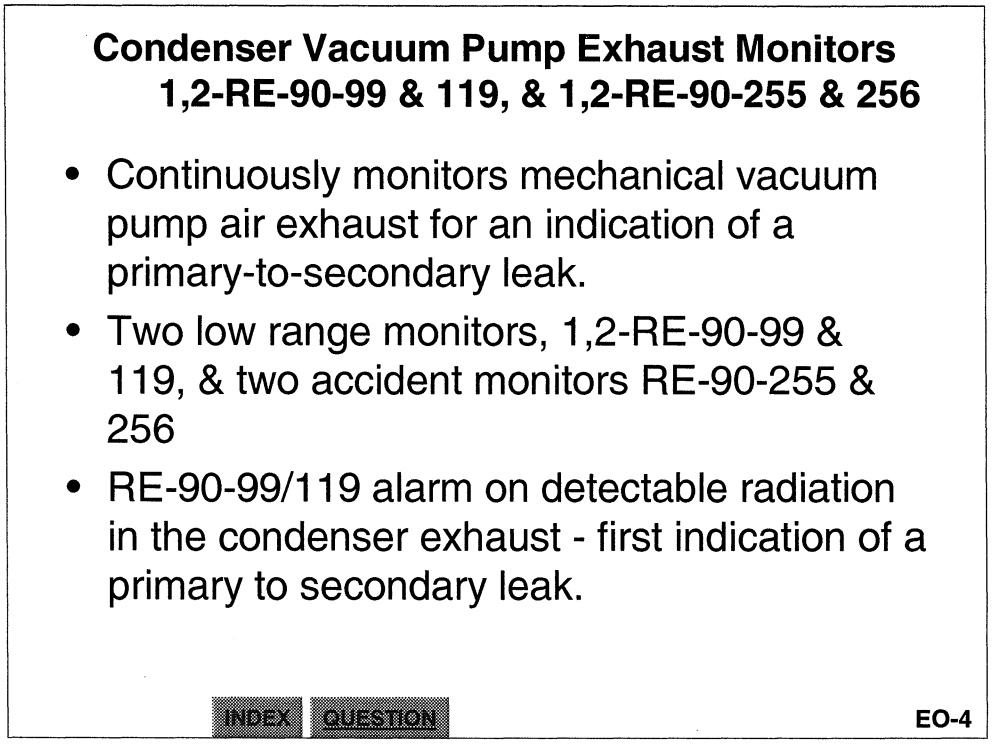
DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER:	CHECKER: GEORGE GARNER	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-0752 R1. DWG MADE A CCD FROM AC-CC & AD-R28. AND INC AC 1968 PER NEP 6.1 EXCEPTION 3.5.A, RIMS #B25871208700, TO RESOLVE 87002671.	1 T.A.WILLIAMS
DESIGNER: N/A	REVIEWER: PERRY MADDOX		2 W.L.ELLIOTT
			3 GEORGE GARNER

ISSUED BY: PAUL G TRUDEL — DATE 9-25-89 — 45 M — CCD NO: 1,2-47W801-2 R49

CAD MAINTAINED DRAWING

CONTROL ROOM DWG


1,2-47W801-2
STM GEN LOOP 4
STM GEN LOOP 1
STM GEN LOOP 2
STM GEN LOOP 3
CONTAINMENT ISOLATION VALVE (TYP)
BLOWDOWN ISOLATION VALVE (TYP)
BALANCING VALVE
FLOOD MODE BLOWDOWN
DRIP PAN
TEST CONN (TYP)
TVA CLASS B
TVA CLASS G
TVA CL G
TVA CLASS H
2" DRAIN (TYP)
CONT ON 47W862-1
LAYUP WATER TREATMENT (TYP ALL STEAM GENERATORS)
CONT ON 47W830-6
NITROGEN PURGING/SPARGING (TYP ALL STEAM GENERATORS)
INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
UNIT 1 ONLY
UNIT 2 ONLY
SAMPLING CONN CONT ON 1,2-47W881-5 COORD C-7
1-ISV-1-1220
1-ISV-1-1221
2-ISV-1-1220
2-ISV-1-1221
SG BLOWDOWN COMMON BLOWDOWN 1,2-47W881-5-1 COORD A-4
FIRST STAGE BLDWN HX OUTLET SMPL 1,2-47W881-5 COORD F-3
SEE NOTE 8
SGB DEMINERALIZER HUNGERFORD & TERRY CONTR. # 86PNR-838135 DWG. #30137-A1
SEE NOTE 9
CONT ON 47W610-90-2 TO RE-90-120 & 121
DOWNSTREAM of isolation
FROM UNIT 2 SGB FLASH TANK
FROM UNIT 2 SGB HEAT EXCHANGER & DEMINERALIZER
47W831-3 COOLING TOWER BLOWDOWN
47W846-1 COMPRESSED AIR
TO DRAIN
TO STATION SU
PUMP
AUX BLDG
YARD AREA
ALUM
C.S.



X. LESSON BODY

D. Major Components

4. Process and Effluent *Gas* Monitors

Condenser Vacuum Pump Exhaust Monitors 1, 2-RE-90-119, 1,2-RE-90-99, 1,2-RE-90-255, 1,2-RE-90-256

- Continuously monitor the mechanical vacuum pump air exhaust for an indication of a primary-to-secondary leak.
- Two low range monitors, 1,2-RE-90-99 and 1,2-RE-90-119, and two accident monitors RE-90-255 & 256 (mid & high range) – overlapping ranges
- RE-90-99 or 119 continuously samples the condenser vacuum pump exhaust to monitor noble gas concentrations for indications of primary to secondary leakage and for evaluations of radioactivity released to the environment.
    - Cover the same range of concentrations - both monitors should not be in service at the same time due to flow limitations on the condenser vacuum pump exhaust.
    - alarm on any detectable reading of radiation in the condenser exhaust - first indication of a primary to secondary leak.
- RE-90-255 & 256, provides detection of noble gases over the entire range of concentrations from normal operations to accident conditions.
- 99 & 119 located on el. 732 of the turbine bldg.
    - Power Supply:- 480 V C&A Vent Board
    - Instrumentation: Radiation process & area monitor power dist panel

Steam Generator Blowdown Liquid Discharge Monitors (RE-90-120, 121)

- With no preexisting (baseline) leakage present, the steam generator blowdown liquid discharge monitor can detect a primary-to-secondary leak of <0.1 GPM at minimum blowdown conditions one hour after the leak begins.
- At setpoint of either monitor the blowdown path to the cooling tower blowdown isolates
- Radiation setpoints are determined in accordance with ODCM methodology.
- Monitors are indicated, recorded, annunciated & alarmed in the MCR - high radiation & instrument malfunction.

INDEX EO-4

X. LESSON BODY

D. Major Components

3. Process and Effluent *Liquid* Monitors

Steam Generator Blowdown Liquid Discharge Monitors RE-90-120, 121 (Cont'd)

- The monitor response time is dependent upon mixing time in the steam generator secondary side water volume, transit time to the monitor, steam generator blowdown rate, abnormal leakage rate, and the amount of fission product and corrosion product activity in the primary coolant.
- With no preexisting (baseline) leakage present, the steam generator blowdown liquid discharge monitor can detect a primary-to-secondary leak of less than 0.1 GPM at minimum blowdown conditions one hour after the leak begins.
- Leakage detection capability is within Regulatory Guide 1.45 RO guidelines.
- Located next to flash tank on el. 685 of the turbine bldg.
- Power Supply: 120 vac rad monitor & sampling power dist panel 1 & 2.
  - Pumps powered from C & A Vent Bds
- ODCM 1.1.1
- Drawing 47W610-90-2

QUESTIONS REPORT

for Superwhaminine ILT EXAM BANK MARCH 2007

G2.3.11 001

Which ONE of the following identifies the first radiation monitor that should respond to a SGTR and the effect on the monitor?

a. Condenser Vacuum Exhaust Monitor RM-90-119 and the monitor will be automatically isolated.

b. ✔ Condenser Vacuum Exhaust Monitor RM-90-119 and the monitor will NOT be automatically isolated.

c. Steam Generator Blowdown Sample Monitor RM-90-120/121 and the monitor will be automatically isolated.

d. Steam Generator Blowdown Sample Monitor RM-90-120/121 and the monitor will NOT be automatically isolated.

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)

72. G 2.3.4 072

Given the following plant conditions:

- A LOCA has occurred and a SAE has been declared.
- The TSC and OSC have been activated.
- To prevent damage to equipment needed for protection of the public, it is recommended that an individual make an entry into the 1A-A Safety Injection Pump Room 1A.
- Projected dose rate in the pump room is 1.1 $x10^5$ mR/hr.
- Duration of the exposure is expected to be 6 minutes.

Which ONE of the following individuals must authorize this exposure?

A. Radcon Manager

B. ✔ Site Emergency Director

C. Plant Manager

D. Site Vice President

DISTRACTOR ANALYSIS:

A. Incorrect, per EPIP-15 of the Radiological Emergency plan the Site Emergency Director must authorize emergency dose limits in excess of TVA admin limits and 10 CFR 20. Examinee may select since the Radcon Manager is responsible for completing the paperwork and he must authorize exceeding the limit during non-emergency conditions.

B. CORRECT, With a projected dose of 1.1E+5 mr/hr, the total dose to respond to this emergency condition is 11 Rem.((1.1E+5 mR/hr / 60 minutes) x 6 minutes). Per EPIP-15 of the Radiological Emergency plan the Site Emergency Director must authorize emergency dose limits in excess of TVA administrative limits and 10 CFR 20.

C. Incorrect, per EPIP-15 of the Radiological Emergency plan the Site Emergency Director must authorize emergency dose limits in excess of TVA admin limits and 10 CFR 20. Examinee may select since Plant Manager must approve exceeding 5R during non -emergency conditions.

D. Incorrect, per EPIP-15 of the Radiological Emergency plan the Site Emergency Director must authorize emergency dose limits in excess of TVA admin limits and 10 CFR 20. Examinee may select since Site Vice President is the highest management level position staffed in the TSC during an event and additional approval must authorized prior exceeding 5 R during non-emergency conditions.

Question No. 72

Tier 3

K/A G2.3.4
Knowledge of radiation exposure limits under normal or emergency conditions.

Importance Rating: 3.2 / 3.7

Technical Reference: EPIP-15, Emergency Exposure Guidelines, Rev 9, page 3
SPP-5.1, Radiological Controls, Rev 6

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271REP
Discuss the Radiological Emergency Plan
f. Describe the process of authorizing Emergency Radiological Exposures in accordance with EPIP-15

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

Question History: WBN Exam Bank

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 (n/a)

Comments: SRO question from WBN, changed reason for entring room, stay time, and dose for use on an RO exam.

1.0 PURPOSE

This procedure provides guidance for authorizations of personnel dose limits under emergency conditions, consistent with **EPA-400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents** (Reference 2.A). These limits apply only to emergency exposure authorizations and not to spontaneous reactions by individuals attempting to mitigate an emergency situation.

2.0 REFERENCES

A. EPA-400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

B. TVAN Radiological Emergency Plan (TVAN-REP)

C. SPP-5.1, Radiological Controls

D. EPIP-10, Medical Emergency Response

E. EPIP-14, Radiological Control Response

3.0 RESPONSIBILITIES

3.1 Radiation Protection

Radiation Protection is responsible for completing **Appendix A, Authorization to Exceed Occupational Dose Limits**, in accordance with **Section 4.1.I**, and will perform radiological surveys or other assessments to estimate the radiation doses.

3.2 Site Emergency Director (SED)

The SED shall provide written authorization (Appendix A) for all emergency radiation doses that may exceed the limits of **10CFR20, Standards for Protection Against Radiation**.

4.0 REQUIREMENTS

4.1 Guidance for Emergency Dose Limits

NOTE For the purposes of this procedure the assumption of 1 rad = 1 rem is assumed for all levels of exposure.

A. The total effective dose equivalent (TEDE) of personnel during emergency operations shall be maintained As Low As Reasonably Achievable (ALARA).

B. The utilization of respiratory equipment may be required to ensure TEDE is maintained ALARA. Respiratory equipment assigned protection factors (APF) are provided in **Appendix C, Assigned Protection Factor Guideline for Respiratory Protection**.

APPENDIX A

ACKNOWLEDGMENT AND AUTHORIZATION TO EXCEEL OCCUPATIONAL DOSE LIMITS

READ THE FOLLOWING STATEMENT BEFORE SIGNING THIS FORM:

I acknowledge by signature on this form that I am volunteering for exposures in excess of 10 CFR 20.1201 limits and that I have been made aware through training or a briefing of the risks involved. Briefing material was presented from Appendix B of this procedure.

The persons listed below have acknowledged and volunteered to receive dose limits in excess of 10 CFR20.1201 limits. Authorization is required by the Site Emergency Director signature on the bottom of this form.

Name (please print Last, First, MI)	Employee Identification Number	Signature	Dose Limit (REM)

Hand carry or Fax to the TSC (843-6461) for SED signature

Radiation Protection Survey # _____ (If Applicable)

Remarks: Emergency Location(s) _____

Estimated Dose(s) _____

Authorized by: _____

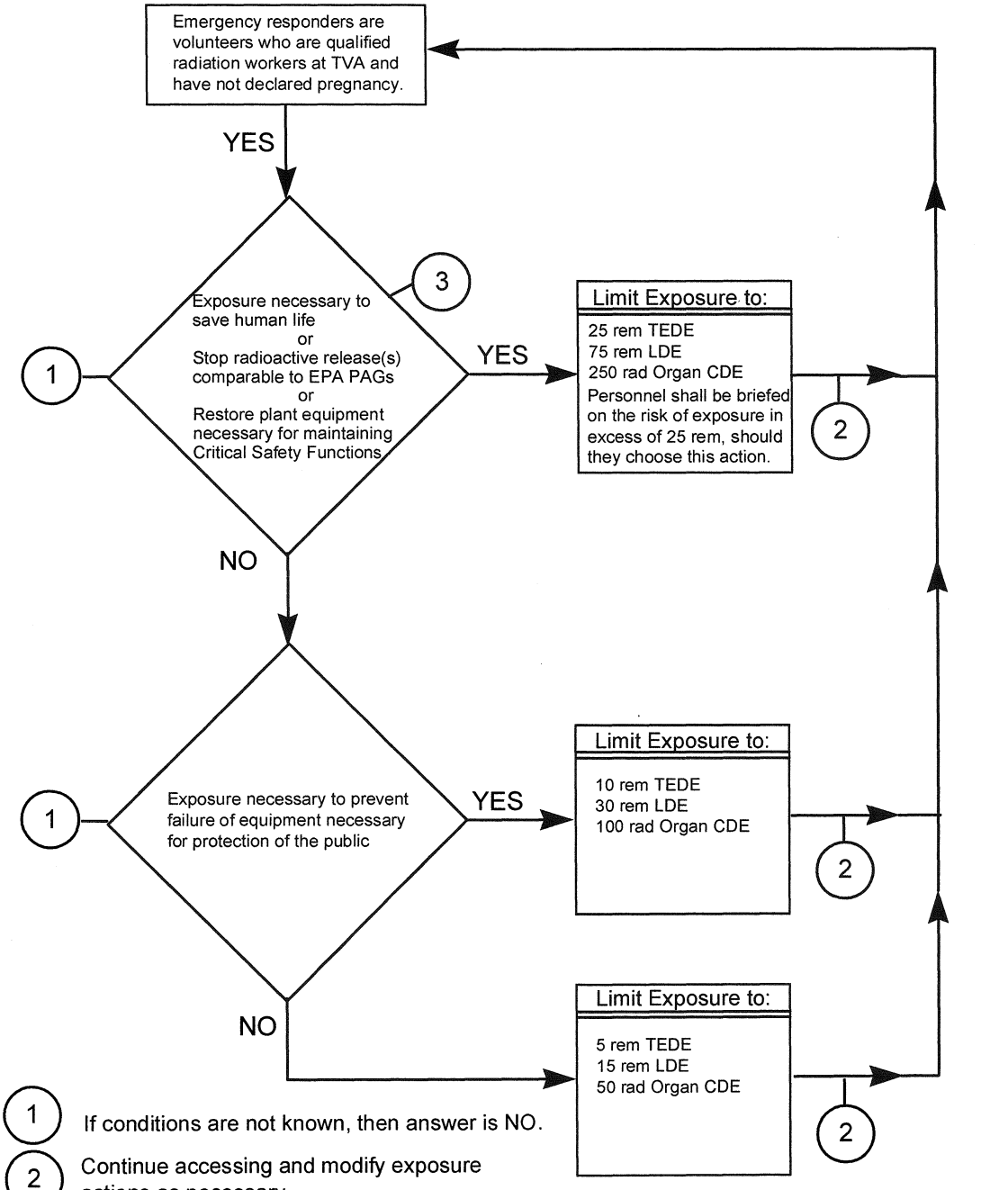
Site Emergency Director * **Date / Time**

* **Consult with the most senior Radiation Protection person prior to authorization**

After SED signs, hand carry or Fax to the OSC Radiation Protection Supervisor (843-6439). Upon completion, provide completed copy to the Emergency Preparedness Manager.

APPENDIX D

EMERGENCY EXPOSURE REFERENCE GUIDE



1 If conditions are not known, then answer is NO.

2 Continue accessing and modify exposure actions as necessary

3 **EPA PAGs** are: 1 rem TEDE or 5 rem Thyroid CDE

UPON DETERMINATION OF EXPOSURE LIMIT REFER TO INSTRUCTIONS PRIOR TO AUTHORIZING EXPOSURE

QUESTIONS REPORT

for BANK WBN Questions MARCH 2007

G2.3.4 001

Given the following plant conditions:

- A LOCA has occurred and a SAE has been declared.
- The TSC and OSC have been activated.
- To prevent core damage it is recommended that entry be made into Safety Injection Pump Room 1A.
- Projected dose rate in the pump room is 1.16×10^5 mr/hr.
- Duration of the exposure is expected to be 3 minutes.

Which ONE of the following must authorize this exposure?

a. Radcon Manager

b. ✔ Site Emergency Director

c. Plant Manager

d. Site Vice President

The correct answer is B

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.

73. G 2.4.13 073

Given the following:

- Unit 2 was at 100% power when an inadvertent reactor trip occurred.
- After completing the Immediate Actions of E-0, Reactor Trip or Safety Injection, the crew transitioned to ES-0.1, Reactor Trip Response.
- The STA was delayed from arriving in the MCR.

Who should be assigned to monitor the Critical Safety Function Status Trees until the STA arrives in accordance with EPM-4, User's Guide?

A. Extra Operator

B. OATC

C. Unit Supervisor

D. Shift Manager

DISTRACTOR ANALYSIS:

A. CORRECT, EPM-4, designates that an additional (extra) operator should be assigned to monitor status trees until the STA arrives in the MCR.

B. Incorrect, EPM-4 designates that an extra operator should be assigned to monitor status trees until the STA or an extra operator arrives in the MCR. The roles of the OATC and CRO are to continue performing EOP steps under direction of the US.

C. Incorrect, EPM-4, designates that an additional (extra) operator should be assigned to monitor status trees until the STA arrives in the MCR. The role of the US is to continue directing crew response in accordance with the EOPs.

D. Incorrect, EPM-4 designates that an additional (extra) operator should be assigned to monitor status trees until the STA arrives in the MCR. The Shift Manager's role is to maintain oversight of the plant and crew response.

Question No. 73

Tier 3 Group

K/A G2.4.13
Conduct of Operations:
Knowledge of crew roles and responsibilities during EOP usage.

Importance Rating: 4.0 / 4.6

Technical Reference: EPM-4, Rev 20

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271EPM-4 B.9
Identify general operating crew responsiblities during emergency operations including appropriate implementation of prudent operator actions.

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.10 / 45.13)

10CFR55.43.b (n/a)

Comments: Guidance for status tree monitoring when the STA has not arrived in the MCR was a recent change that occurred in EPM-4, Rev. 20.

3.10.5 Status Tree Rules of Usage (continued)

2. If status tree monitoring is required and the STA has not arrived in the MCR, the following guidance is provided:

   - An additional (extra) operator should be assigned to monitor status trees until the STA arrives.
   - If no other operator is available, the US and UOs should maintain awareness of the status trees by frequently monitoring ICS and control board indications until the STA (or an extra operator) arrives. If only the US and two UOs are available, hard-copy status tree monitoring using FR-0 should be performed as time permits.
   - If status tree monitoring is in effect and a red or orange path condition develops prior to the STA arriving, an operator should be assigned to verify the identified red or orange path condition exists (and no higher priority condition exists) using the hard copy FR-0. This verification should be made prior to transitioning based upon the status trees. (This requirement is not applicable for transitions to FRPs directly from E-0 steps).
   - If FR-S.1 is entered due to an ATWS condition, then the crew is already in the highest-priority FRP. Status trees should be monitored as time permits.

3. The status trees are monitored in order of priority (S, C, H, P, Z, I) using FR-0, *Status Trees*. Since they appear in FR-0 in this order, this monitoring order is procedurally enforced.

4. Status trees are designed to monitor for the most severe challenges first to shorten response time in addressing those conditions. Therefore, typically, RED paths will be at the top of a status tree, following by ORANGE, YELLOW, and GREEN as the status tree branches downward.

5. If any RED challenge is detected, the person monitoring status trees informs the procedure reader immediately before continuing with monitoring any subsequent status trees. Since they are monitored in order of importance, the first RED challenge encountered will be the highest priority RED and therefore, the highest priority challenge.

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.

74. G 2.4.23 074

In response to a Heat Sink Red Path condition, the crew entered FR-H.1, Loss Of Secondary Heat Sink. While progressing through FR-H.1, the STA reports the following Status Tree conditions:

- Subcriticality: Orange Path - FR-S.1, Nuclear Power Generation/ATWS
- Core Cooling: Green Path
- Heat Sink: Green Path
- Integrity: Green Path
- Containment: Red Path - FR-Z.1, High Containment Pressure
- Inventory: Green Path

Which ONE of the following describes the required procedural actions in response to the above conditions?

A. Immediately exit FR-H.1 and implement to FR-Z.1.

B. Immediately exit FR-H.1 and implement to FR-S.1.

C. Complete FR-H.1, then implement to FR-Z.1.

D. Complete FR-H.1, then implement to FR-S.1.

DISTRACTOR ANALYSIS:

A. Incorrect, Since FR-H.1 was entered on a Red path it must be completed unless a higher priority Red path condition is diagnosed and FR-Z.1 is lower in priortiy than FR-H.1. When transition is to be made, FR-Z.1 is the correct transition. Plausible because an additional RED path does exists and if the path had been to a higher priority FRP, then an immediate transition would be required.

B. Incorrect,Since FR-H.1 was entered on a Red path it must be completed unless a higher priority Red path condition is diagnosed and when transition is made, FR-S.1 is not the correct transition. Plausible because the current FR-H.1 path is currently green, an a higher priority FRP has an Orange path and an Orange paths normally require immediate implementation.

C. CORRECT, Once FR-H.1 has been entered on a Red path it must be completed unless a higher Red path condition is diagnosed. Upon completion the transition to FR-Z.1 is the correct action.

D. Incorrect, Remaining in FR-H.1until completion is correct, but upon completion the transition required is to FR-Z.1. Plausible because completing FR-H.1 is the correct action and the subcriticality status function would be higher priority function than containment if the challenges were equal.

Question No. 74

Tier 3

K/A G2.4.23
Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.

Importance Rating: 3.4 / 4.4

Technical Reference: EPM-4, User's Guide, Rev 20

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271EPM-4 B.11.a & .b
Given a set of conditions, analyze the EOP/FRP implementation:
a. identify the basis for implementation
b. determine the correct implementation heirarchy

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

Question History: WBN Bank question

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 (n/a)

Comments:

3.10.5 Status Tree Rules of Usage (continued)

2. If status tree monitoring is required and the STA has not arrived in the MCR, the following guidance is provided:

   - An additional (extra) operator should be assigned to monitor status trees until the STA arrives.
   - If no other operator is available, the US and UOs should maintain awareness of the status trees by frequently monitoring ICS and control board indications until the STA (or an extra operator) arrives. If only the US and two UOs are available, hard-copy status tree monitoring using FR-0 should be performed as time permits.
   - If status tree monitoring is in effect and a red or orange path condition develops prior to the STA arriving, an operator should be assigned to verify the identified red or orange path condition exists (and no higher priority condition exists) using the hard copy FR-0. This verification should be made prior to transitioning based upon the status trees. (This requirement is not applicable for transitions to FRPs directly from E-0 steps).
   - If FR-S.1 is entered due to an ATWS condition, then the crew is already in the highest-priority FRP. Status trees should be monitored as time permits.

3. The status trees are monitored in order of priority (S, C, H, P, Z, I) using FR-0, *Status Trees*. Since they appear in FR-0 in this order, this monitoring order is procedurally enforced.

4. Status trees are designed to monitor for the most severe challenges first to shorten response time in addressing those conditions. Therefore, typically, RED paths will be at the top of a status tree, following by ORANGE, YELLOW, and GREEN as the status tree branches downward.

5. If any RED challenge is detected, the person monitoring status trees informs the procedure reader immediately before continuing with monitoring any subsequent status trees. Since they are monitored in order of importance, the first RED challenge encountered will be the highest priority RED and therefore, the highest priority challenge.

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.

3.10.5 Status Tree Rules of Usage (Continued)

E. CSF challenges are addressed as follows:

1. When addressing RED or ORANGE challenges, all ORPs and lower priority FRPs are suspended. Status tree monitoring continues in case higher priority challenges occur.
2. The FRP associated with the highest priority challenge is entered. If an FRP is being performed and a higher priority RED or ORANGE path comes in, the current FRP should be suspended and a transition made to the higher priority FRP unless stated otherwise in the procedure. After the new FRP has been completed and guidance is provided to "RETURN TO procedure and step in effect", the operator should go back to the previous FRP which had been implemented and was, therefore, the procedure in effect. (DW-99-061)
3. If an FRP is in progress due to an ORANGE path condition and the same path turns to RED, then the following guidance is applicable:
    a. If the FRP in progress addresses both the RED and ORANGE condition, operators should continue in the guideline in progress, since the actions are the same. If the applicable FRP was exited prior to the condition degrading from ORANGE to RED, then operators should re-enter the FRP at step 1 since plant conditions have changed creating a higher priority challenge. (DW-97-001)
    b. If the FRP is different for the RED path condition, operators should transition to the applicable RED path FRP.
4. The initiation of FRPs is dependent upon current plant parameters. If a RED or ORANGE priority condition comes in and clears, the FRG does not need to be performed. If conditions degrade, the safety function will become a continuous RED or ORANGE condition, at which time the appropriate FRP should be implemented.
5. It is expected that FRP actions will clear the RED or ORANGE challenge before all the FRP actions are complete. The FRP should be performed to completion (until a defined exit point is reached) even if the RED or ORANGE challenge is cleared prior to completion of the FRP.
6. YELLOW path FRPs are considered lower in priority than ORPs (including applicable foldout page items). While performing YELLOW path actions, the ORP that the operator was in when he transitioned to the YELLOW path FRP is considered the controlling procedure. Continuous actions or foldout page items of the ORP in effect are still applicable and should be monitored by the operator.

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.

ZZG2.4.23 001

Unit 1 operating crew entered FR-H.1, "Loss of Secondary Heat Sink," in response to a Red Heat Sink condition. The crew is still progressing through FR-H.1 when critical safety function status tree conditions are reported as follows:

- Subcriticality: Orange path to FR-S.1, "Nuclear Power Generation/ATWS."
- Core Cooling: Green
- Heat Sink: Green
- Integrity: Green
- Containment: Red path to FR-Z.1, "High Containment Pressure."
- Inventory: Green

Which ONE of the following describes the actions the crew should take in response to the conditions given above?

a. Immediately exit FR-H.1 and transition to FR-Z.1.

b. Immediately exit FR-H.1 and transition to FR-S.1.

c. ✔ Complete FR-H.1, then transition to FR-Z.1.

d. Complete FR-H.1, then transition to FR-S.1.

75. G 2.4.39 075

Given the following:

- The Unit 1 CRO is in the Cafeteria eating lunch with an AUO who is assigned as an OSC responder.
- A Site Area Emergency is declared on Unit 1.

Which ONE of the following identifies responsibilities of the CRO and the AUO following the initiation of Assembly and Accountability.

A. CRO - Report to the Main Control Room, swipe badge in the MCR card reader.
AUO - Swipe in the Cafeteria card reader, and report to the OSC.

B. CRO - Report to the Main Control Room, swipe badge in the MCR card reader.
AUO - Report to the Main Control Room, swipe badge in the MCR card reader and then report to the OSC.

C. CRO - Swipe in the Cafeteria card reader, and report to the Main Control Room.
AUO - Swipe in the Cafeteria card reader, and report to the OSC.

D. CRO - Swipe in the Cafeteria card reader, Report to the Main Control Room.
AUO - Report to the Main Control Room, swipe badge in the MCR card reader and then report to the OSC.

DISTRACTOR ANALYSIS:

A. *CORRECT, the CRO 's designated assembly area is the Main Control Room and EPIP-8 directs the operator to report to the designated assembly area and to swipe badge in the card reader. Additionally some tasks are identified in procedures for the procedure to be continued if the Assembly and Accountability alarms sounds. The cafeteria is the designated assembly area for an AUO assigned to the OSC and the cafeteria card reader would be where the badge was swiped.*

B. *Incorrect, the CRO actions are correct, but the AUO would not report to the main Control Room to swipe the badge. The AUO would report to the OSC and swipe in the cafeteria card reader. Plausible because the CRO actions are correct and an AUO not assigned to the OSC would report to the main control room.*

C. *Incorrect, the AUO actions are correct, but the CRO would not swipe the card reader in the cafeteria. The CRO would report to the main control room and card in at the card reader in the MCR. Plausible because the AUO actions are correct and the CRO could swipe the cafeteria card reader(even though incorrect) and the CRO's assembly area is the main control room*

D. *Incorrect, the CRO and AUO actions are incorrect. The CRO would report to the MCR and swipe in and the AUO would report to the OSC and swipe in the cafeteria card reader. Plausible because both the CRO and AUO are reporting to their designated assembly areas and the card readers identified could be swiped (although incorrectly) by each ofthe individuals*

Question No. 75

Tier 3

K/A G 2.4.39
Knowledge of RO responsibilities in emergency plan implementation. |

Importance Rating: 3.9 / 3.8

Technical Reference: EPIP-8, Personnel Accountability and Evacuation, Rev 17

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271REP A
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).

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

Question History: New for SQN Exam 1/2009

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

10 CFR Part 55 Content: (41.10 / 45.11)

10CFR55.43.b (n/a)

Comments: New for SQN Exam 1/2009

3.4 Site Assembly and Accountability

A three-minute undulating siren (a siren that raises and lowers in volume and pitch), strobe lights, and public address announcements are the general methods for notifying personnel that emergency conditions exist requiring the assembly and accountability of site personnel. Upon recognition that the assembly and accountability process has been activated, all personnel shall immediately take applicable actions.

A. Non-Emergency Responders With Assigned Assembly Areas

1. Upon recognition of the assembly and accountability process, non-emergency responders with assigned assembly areas shall proceed immediately to their designated assembly areas as listed on Appendix A.

2. Upon arrival at the assembly area, personnel shall:

   a. Swipe their badge into the accountability card reader (applies only to those assembly areas within the protected area),

   b. Remain in the designated assembly area until released by the Shift Manager / Site Emergency Director (SED) or a plant evacuation is ordered, following the instructions of Nuclear Security.

3. Nuclear Security may release non-emergency responders with assigned assembly areas from the Access Control Portal (ACP) to go directly to their assembly areas. They are to be directed to card in upon arrival at the new assembly area and to remain in that area until released.

B. Non-Emergency Responders With No Assigned Assembly Area

1. Non-Emergency Responders with no assigned assembly area represent unescorted visitors, contractors/construction personnel, and others persons in public access areas on or passing within the Owner Controlled Area (OCA).

2. Upon recognition of the assembly and accountability process, non-emergency responders with no assigned assembly area shall proceed immediately to their vehicle and exit the OCA.

C. Emergency Responders

1. Upon recognition of the assembly and accountability process, emergency responders shall proceed immediately to their designated assembly area as listed on Appendix B.

2. Nuclear Security will allow ingress of personnel on the Emergency Access List. Personnel are to be released from the ACP to go directly to their Emergency Response Centers. They are to be directed to card in upon arrival at the new assembly area and to remain in that area until released. The Emergency Response Centers are typically the TSC, OSC (includes RP Lab and Chemistry Lab).

(Section 3.4.C Continued)

3. Arriving at the designated assembly area, personnel shall:

   a. Swipe their badge into the accountability card reader,

   b. Sign the Accountability Roster Form, Appendix I,

   c. Review their emergency responsibilities and begin work as applicable.

   d. If a plant evacuation is ordered, all remaining emergency responders will stay in their designated assembly area unless otherwise instructed.

4. If emergency responders are already dispatched for response activities when accountability is initiated, they should contact the OSC for instructions. The OSC should consider if continued response is necessary to mitigate the emergency, best actions to protect the health and safety of the public, and whether the response team is threatened. If continued response is necessary, the OSC should account for the individual(s).

D. Emergency Responders Having Escort Responsibilities

Emergency Responders will take the necessary steps to have their visitor transferred to a non-emergency responder for relocation to an appropriate assembly area.

E. Visitors

Visitors shall remain with escorts and swipe their badge into the appropriate accountability card reader.

F. Special Conditions Concerning Assembly and Accountability

1. If a person cannot reach his designated assembly area within 15 minutes, he should go to the nearest designated area and swipe his badge into the card reader. He should then remain in that assembly area. Appendix A and B list assembly area locations.

2. If the accountability card reader will not accept a badge, Nuclear Security should be contacted immediately at extension 6144, 6184, or 6568.

3. If a card reader or assembly area cannot be accessed, Nuclear Security should be contacted immediately at extension 6144, 6184, or 6568.

4. Personnel may be released to transfer from one assembly area to another. The TSC will notify Nuclear Security of such transfer of personnel when approved by the SED or his designee. They are to be directed to swipe their badge into the accountability card reader upon arrival at the new assembly area and to remain in that area until released.

(Section 3.4 Continued)

5. Personnel may be released from their Emergency Response Centers to exit the site by the SED or his designee on a case by case basis. The TSC will notify Nuclear Security of such egress of personnel when approved by the SED or his designee. They are to be directed to card out upon exiting the site and to immediately leave the TVA property.

G. Shift Manager/Site Emergency Director

When conditions have been met that require the activation of the assembly and accountability process, the Shift Manager/Site Emergency Director will implement Appendix C of this procedure.

H. Nuclear Security

When notified that conditions have been met that require the activation of the assembly and accountability process, or upon indications that assembly and accountability has been initiated, Nuclear Security will implement Appendix D of this procedure.

I. Radiation Protection (RP)

When notified that entry conditions have been met that require the activation of the assembly and accountability process, or upon indication that assembly and accountability has been initiated, RP will implement Appendix E of this procedure.

3.5 Evacuation of Non-Emergency Response Personnel

A site evacuation will be conducted upon an order issued by the Shift Manager/Site Emergency Director. This order will be issued to the TSC Nuclear Security Manager or the Nuclear Security Shift Supervisor or their designee, following the completion of assembly and accountability.

A. Non-Emergency Responders Within the Plant Protected Area.

1. All personnel assembled in designated assembly areas within the protected area shall remain in those areas until released for the purpose of evacuation. Visitors shall remain with escorts until they have exited the protected area.

2. Nuclear Security will, by public address announcement or dispatching security personnel, brief and release persons in assembly areas.

3. Once released, personnel shall go immediately to the protected area exit portal. Personnel shall swipe their badge into the exit card reader or as instructed by Nuclear Security. The protected area shall be exited in accordance with security procedures unless otherwise instructed.

   a. If for any reason personnel cannot go directly to the Protected Area exit portal, Nuclear Security should be contacted immediately.

   b. If for any reason the exit card reader will not properly acknowledge a badge, Nuclear Security should be contacted immediately.

APPENDIX B
Page 1 of 1

EMERGENCY RESPONDERS EMERGENCY FACILITY/ASSEMBLY AREAS

Designated Assembly Area	Reporting Organizations
Main Control Room	All Operations personnel in Main Control Room, AUOs not assigned to the OSC
Technical Support Center	TSC staff
Operations Support Center	OSC staff Maintenance personnel assigned to staging area Fire Protection personnel (gear and equipment to el. 706' fire cages) Tool Room personnel Operations personnel (AUOs) assigned to Staging Area RP personnel assigned to Staging Area
Radiation Protection (RP) Lab	RP Field Operations personnel
Chemistry Laboratory	Chemistry personnel (Use RP Accountability Reader)

APPENDIX D
AUO GUIDELINES
Page 1 of 1

Accountability:
AUOs should be under continual accountability either in the Main Control Room under the Shift Manager's control or, after reassignment, in the OSC under the Operations Advisor SRO's control from the time the emergency is declared. AUOs continue with their assigned tasks unless otherwise instructed. The MCR and/or OSC are responsible for knowing the location and maintaining frequent communications with in-plant AUOs under their control to ensure their safety. There are no additional actions required of the AUOs during accountability. (Reference- EPIP-8)

	Stage	AUO Control
1	**Declaration of the Emergency**	Upon staffing the emergency centers (or initiation of accountability) all AUOs, except two designated AUOs for OSC Maintenance support, should report immediately to and follow the direction of the Shift Manager (SM) in the Main Control Room. The SM may locate AUOs to other local rooms for noise/congestion control. The Shift Manager, as SED, directs all emergency related activities onsite. OSC activities under the Maintenance Shift Supervisor (MSS) prior to the On-Call OSC Operations Advisor SRO's arrival may require AUO support exceeding the two pre-assigned AUOs. The Shift Manager shall allocate AUOs as necessary between MCR actions and OSC tasks to support the highest priorities. Personnel from support departments dispatched by the Shift Manager are under his continual accountability.
2	**On-Call SED arrives**	When the On-Call SED arrives and assumes the SED role from the Shift Manager, the Shift Manager continues to manage the AUOs on emergency procedure driven tasks and maintains continual accountability over them (either personally or through the OSC Operations Advisor SRO). Emergency procedure related AUO tasks have been pre-approved by inclusion in the emergency procedures and do not require specific SED approval (unless otherwise instructed). If RP support is needed, this is coordinated through the OSC RP Supervisor (initially the RP Lab Supervisor relocated to the OSC). Personnel from support departments dispatched by the SED are under his continual accountability. This responsibility passes to the OSC Manager or Assistant OSC Manager (when staffed).
3	**OSC Operations Advisor SRO arrives**	When the OSC Operations Advisor SRO arrives in the OSC and is ready to assume responsibility for the AUOs in the field, the Shift Manager will transfer control of those AUOs not needed for Control Building and Board Room activities to the OSC Operations Advisor SRO. The OSC Operations Advisor SRO maintains control over the AUOs from the OSC and dispatches these AUOs to support the MCR as directed by the SM. The Shift Manager continues to maintain accountability and control over the AUOs in the Control Building and Board Rooms. The Control Building and Board Rooms are considered as part of the MCR from a risk perspective. The OSC Operations Advisor SRO will also coordinate radiological protection with RP, arrange for AUO support for maintenance teams, and manage hold orders. Emergency procedure related tasks have been pre-approved by inclusion in the emergency procedures and do not require specific SED approval. The Shift Manager and OSC Operations Advisor SRO may transfer AUOs to and from MCR and OSC as tasks and activities dictate.

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.