INITIAL SUBMITTAL

HARRIS EXAM 2000-301

DECEMBER 11 - 15, 2000

INITIAL SUBMITTAL
RO/SRO WRITTEN EXAMINATION

SUMMARY OF SHNPP NRC EXAMINATION LEVEL OF DIFFICULTY

Q #	COMP	MEM	DIFF	JUSTIFICATION
1		X	2	Knowledge of procedural guidance for diagnostics
2		X	3	Knowledge of administrative requirements
3		X	2	Knowledge of EOP transition criteria
4		X	3	Knowledge of failure mode of components
5		X	3	Knowledge of system response to plant conditions
6	X		3	Comparison of alternative flowpath alignments and effectiveness
7	X		3	Comparison of event magnitude to system capabilities
8		X	2	Knowledge of procedural requirements
9	X		3	Comparison of the effect of actions taken in response to an accident
10	X		3	Integration of system and procedural knowledge to determine actions
11	X		3	Integration of procedural and system knowledge to determine actions
12	X		3	Application of diagnostic tools contained in procedures
13		X	3	Knowledge of administrative requirements
14	X		3	Analysis of effects of transients on plant
15		X	2	Knowledge of procedural entry requirements
21	X		3	Application of procedural guidance to off-normal conditions
22		X	2	Knowledge of procedural entry requirements
23		X	3	Knowledge of symptoms of event on alternate plant indications
24	X		3	Analysis of effect of improper operator actions
25	X		3	Application of data provided to determine outcome
26		X	3	Knowledge of system interlocks and operations
27	X		3	Comparison of accident conditions to determine actions
28	X		3	Application of data to curve to determine outcome
29	X		3	Analysis of abnormal conditions to determine response
30	X		4	Analysis of plant response to failure - high difficulty due to requirement to integrate several knowledge requirements
31		X	3	Knowledge of system design and operations
32	X		3	Analysis of graphical data and computation of value
33		X	3	Knowledge of procedural requirements
34	X		3	Integration of system knowledge and changing plant effects on system
35	X		3	Integration of system knowledge and failure mode of components
41	X		3	Comprehension of operator actions on system and subsequent failure
42	X		3	Integration of system knowledge and effect of changing plant conditions
43	X		3	Integration of system knowledge and failure mode of components
44		X	3	Knowledge of system operation
45		X	2	Knowledge of system design and operations
46		X	3	Knowledge of system interrelationships
47	X		3	Integration of procedural and system knowledge dependent upon plant conditions
48		X	2	Knowledge of procedural requirements
49	X		3	Application of system knowledge to changing plant conditions
50	X		3	Application and interpretation of data on curve
51	X		3	Comparison of alternate actions based on plant conditions
52	X		3	Application of conditions to system knowledge to determine outcome
53	X		4	Analysis of effect of failure on plant response - high difficulty due to cascade of events required to analyze
54	X		3	Comprehension of system response following operator actions taken
55		X	2	Knowledge of procedural requirements
61	X		2	Application of procedural requirements to calculate required time

SUMMARY OF SHNPP NRC EXAMINATION LEVEL OF DIFFICULTY

Q #	COMP	MEM	DIFF	JUSTIFICATION
62		X	3	Knowledge of procedural transition requirements
63	X		3	Application of procedural requirements to determine limit
64	X		3	Analysis of plant response to abnormal conditions
65		X	2	Knowledge of system setpoints
66	X		3	Comprehension of the effects of multiple failures on plant equipment
67	X		3	Comprehension of system response to changing plant conditions
68		X	2	Knowledge of basis for procedural actions
69	X		3	Application of given data to curve to determine outcome
70	X		3	Comparison of given conditions and procedural requirements to determine actions
71	X		3	Analysis of given conditions to determine automatic response of system
72		X	3	Knowledge of system operation
73		X	2	Knowledge of procedural requirements
74	X		3	Comprehension of the effects of actions taken on plant conditions
75		X	3	Knowledge of system operation and basis
81	X		3	Analysis of given conditions to determine plant conditions
82		X	2	Knowledge of system design and operation
83	X		3	Comprehension of failure modes and effects of operator actions
84	X		3	Analysis of plant conditions to determine technical specification
85		X	2	Knowledge of system design and operation
86		X	3	Knowledge of system design and operation
87	X		3	Integration of system knowledge and procedural requirements
88	X		4	Application of procedural requirements and use of table - high difficulty due to knowledge requirement and potential for error in application of table
89	X		4	Application of given conditions to system knowledge - high difficulty due to requirement for recall of system knowledge
90		X	3	Knowledge of system design and operation
91		X	3	Knowledge of procedural requirements
92	X		3	Application of plant conditions using tables to determine if procedural requirements are met
93		X	2	Knowledge of system and procedural requirements
94	X		2	Application of given conditions to drawing to determine outcome
95	X		3	Analysis of component failure to determine effect on plant response
R16		X	3	Knowledge of procedural requirements
R17		X	3	Knowledge of system design and operations
R18		X	3	Knowledge of system design and operations
R19		X	2	Knowledge of procedural requirements
R20		X	2	Knowledge of procedural requirements
R36	X		3	Analyis of actions required to protect equipment based on plant conditions
R37	X		3	Comprehension of the effects of changing plant conditions on system operations
R38	X		3	Application of calculation based on plant parameters
R39	X		2	Application of given data to curve to determine required actions
R40		X	2	Knowledge of administrative procedural requirements
R56		X	3	Knowledge of system design and operations
R57		X	3	Knowledge of procedural requirements
R58		X	2	Knowledge of administrative procedural requirements
R59		X	3	Knowledge of system design and operations

SUMMARY OF SHNPP NRC EXAMINATION LEVEL OF DIFFICULTY

Q #	COMP	MEM	DIFF	JUSTIFICATION
R60	X		3	Integration of system knowledge and plant status based upon initial conditions
R76		X	3	Knowledge of system design and operation
R77	X		3	Comparision and prioritization of different conditions requiring operator actions
R78	X		3	Comparison and application of different conditions to technical specification requirements
R79	X		3	Analysis of plant conditions to determine required actions
R80		X	3	Knowledge of procedural requirements
R96	X		3	Analysis of given conditions to determine plant response
R97		X	2	Knowledge of system design and operations
R98		X	3	Knowledge of system operations and interlocks
R99		X	3	Knowledge of system design and operation
R100	X		3	Analysis of component failure to determine plant response
S16	X		3	Analysis of plant response based on improper actions taken
S17		X	2	Knowledge of procedural requirements
S18	X		3	Application of conditions to Tech Specs to determine proper actions
S19		X	3	Knowledge of administrative procedural requirements
S20		X	3	Knowledge of procedural requirements
S36		X	3	Knowledge of procedural requirements and basis
S37	X		3	Comparison of calculated value to technical specification requirements
S38	X		3	Comparison of plant conditions to determine proper operator actions
S39	X		3	Analysis of given conditions to discriminate between potential actions
S40		X	3	Knowledge of procedural purposes and flowpaths
S56	X		3	Application of data and calculation to determine requirements
S57		X	3	Knowledge of procedural requirements
S58		X	3	Knowledge of hierarchy of functional restoration procedures
S59		X	2	Knowledge of administrative procedural requirements
S60	X		3	Analysis of plant conditions to determine procedural requirements
S76	X		3	Interpretation and application of conditions to determine reporting requirements
S77		X	2	Knowledge of procedural transition requirements
S78	X		3	Comparison of given data sets to determine required procedural response
S79		X	3	Knowledge of procedural requirements
S80	X		2	Interpretation of plant data on curve and comparison to procedural requirements
S96	X		3	Comparison of different events to determine procedural requirements
S97	X		3	Calculation of data to determine procedural requirements met
S98	X		4	Analysis and use of tables to determine plant conditions - high difficulty due to unusual plant conditions
S99	X		3	Analysis of plant conditions to differentiate between operator responses
S100	X		3	Interpretation of plant data and calculation to meet procedural requirements

TOTALS			
RO	55	45	2.82
SRO	60	40	2.85

AOP-3.31 004

AOP-031, Loss of Refueling Cavity Integrity, has special instructions for a loss of seal ring integrity with a loss of off-site power.

a) What is/are the instruction(s)?
b) What is special about this case?

Question: 1

Given the following conditions:

- A Safety Injection has just occurred.
- Following the SI, leakage from the CCW system to the ESW system is suspected.

Which of the following sets of conditions would provide confirmation of this diagnosis in the **SHORTEST** period of time?

a. Decreasing CCW surge tank level **AND** ESW discharge radiation alarm

b. Automatic makeup to the CCW surge tank **AND** ESW discharge sample

c. Decreasing CCW surge tank level **AND** ESW discharge sample

d. Automatic makeup to the CCW surge tank **AND** ESW discharge radiation alarm

Answer:

c. Decreasing CCW surge tank level **AND** ESW discharge sample

QUESTION NUMBER: 1
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 062AA1.05

Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water: The CCWS surge tank, including level control and level alarms, and radiation alarm

K/A IMPORTANCE: ***RO*** 3.1 ***SRO*** 3.1

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.8

IDENTIFY symptoms that require entry into AOP-008, Accidental Release of Liquid Waste

REFERENCES: AOP-008
AOP-014

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.8 008

JUSTIFICATION:

a. Plausible since CCW surge tank decreasing supports outleakage and the NSW discharge is monitored.

b. Plausible since ESW discharge sample is required, but RMUW tank makeup requires manual alignment.

***c.* CORRECT** The ESW discharge to the lake is not monitored so the methodology for determining a leak is by sampling. Decreasing CCW surge tank supports outleakage.

d. Plausible since NSW discharge is monitored, but RMUW tank makeup requres manual alignment.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural guidance for diagnostics

REFERENCES SUPPLIED:

4.0 General

1. The RWST contains a minimum of 436,000 gallons (92%) of borated water in Modes 1 thru 4, and 106,000 gallons (12%) in Modes 5 and 6 for use during refueling operation or to supply the ECCS if required. For a release from the RWST, a one hour TS LCO will result if the minimum volume of 436,000 gallons is not available in Modes 1 thru 4. The RWST contains low levels of radioactivity dependent upon previous operations and decay time.

2. The RWST and RMWST are located in seismic structures that are designed to contain any leakage until it can be processed by the Floor Drain System. However, if leakage occurs and escapes the Tank Building, surveys and samples must be performed to determine the extent of spread of radioactivity and any possible exposure to the public. If required, appropriate reports must be prepared and submitted to the NRC.

3. The Radiation Monitoring System monitors the Service Water System leaving the WPB and NSW discharge to the cooling tower to detect liquid releases to the environment. These monitors alarm so the operator can act to prevent large quantities of radioactive water from being discharged to the environment. During accident situations (ESW in use), the ESW discharge to the lake is not monitored. The only method of finding a radiological release in ESW is via sampling.

4. The Radiation Monitoring System also monitors various liquid effluents to detect radiation levels and provide alarms in the Control Rooms. These monitors ensure that liquid effluent releases are less than the limits specified in 10CFR20

5. This procedure satisfies the requirements of FSAR Commitment 11.5.2, CP&L Document DIN 842960398 and ANSI 18.7 Section 5.3.9.

5.0 Diagrams/Attachments

None

3.2 Follow-up Actions (continued)

i. Shut the following:

- 1CS-7, 45 GPM LETDOWN ORIFICE A
- 1CS-8, 60 GPM LETDOWN ORIFICE B
- 1CS-9, 60 GPM LETDOWN ORIFICE C
- 1CS-460, EXCESS LETDOWN
- 1CS-461, EXCESS LETDOWN
- 1SP-948, RCS LOOPS B & C HOT LEG ISOL
- 1SP-949, RCS LOOP B & C HOT LEG ISOL
- 1SP-40, PRESSURIZER LIQUID SAMPLE ISOL
- 1SP-41, PRESSURIZER LIQUID SAMPLE CNMT ISOL
- 1SP-59, PRESSURIZER STM SPACE SAMPLE ISOL
- 1SP-60, PRESSURIZER STM SPACE SAMPLE ISOL

j. IF RHR Letdown is in service, THEN shut 1CS-28, RHR LETDOWN HC-142.1.

k. At the MCB, verify CCW PUMP green lights are lit and CCW Flow Indicator reads no flow:

- CCW PUMP A-SA - FI-652.1
- CCW PUMP B-SB - FI-653.1

3. IF surge tank level is less then 45%, THEN:

a. Verify 1DW-15, DEMIN WTR MAKE UP VLV TO CCW PUMP SUCTION, at MCB, open.

CAUTION

Reactor Makup Water Tank contains potentially tritiated water. Making up to the CCW System from the Reactor Makup Water Tank could result in CCW System contamination. Operation of the system while it is contaminated requires an evaluation per 10CFR50.59. (REF.: SHF/10-13510B, Serial: SHNPPO-85-040 (IE Bulletin No. 80-10), DIN 851331386)

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b. IF Reactor Makup Water is needed to maintain surge tank level greater than 4%, THEN perform the following:

(1) Verify one RMW pump running.

(2) Locally unlock and shut 1CC-122, RMWS SUPPLY TO CCW DR

AOP-3.8 008
Which of the following symptoms indicate a need to implement actions to address a Service Water System release in accordance with AOP-008?

A. ESW pump autostart

B. Turbine Building SW header low pressure

✓C. Decreasing CCW surge tank level

D. Cooling tower basin low level

Question: 2

Which of the following conditions would require that Attachment 2, "Cycle Log," of OMM-013, Cycle and Transient Monitoring Program, be completed?

a. During a reactor startup, a failed Source Range channel results in a Source Range High Flux Trip

b. With the plant at 100% power, a failed actuation relay results in Auxiliary Feedwater flow to the SGs

c. With the plant in Mode 3, a trip of Emergency Bus 1A-SA normal supply breaker 105 results in EDG 1A-SA starting automatically

d. With the plant at 100% power, a failed pressurizer level instrument results in normal letdown isolating

Answer:

b. With the plant at 100% power, a failed actuation relay results in Auxiliary Feedwater flow to the SGs

QUESTION NUMBER: 2

TIER/GROUP: ***RO*** 3 ***SRO*** 3

K/A: 2.1.1

Knowledge of conduct of operations requirements.

K/A IMPORTANCE: ***RO*** 3.7 ***SRO*** 3.8

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: PP-3.10-R8

DESCRIBE the proper actions of control room personnel in response to occurrence of a component cycle or plant design transient

REFERENCES: OMM-013

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number PP-3.10-R9 003

JUSTIFICATION:

a. Plausible since any reactor trip from above 15% power requires transient cycle logging, but power is below 15%.

b. **CORRECT** AFW nozzle temperature and flow cycles are required to be logged anytime AFW temperature is < 250°F while the average SG temperature is > 250°F.

c. Plausible since a loss of off-site power to both 1A-SA and 1B-SB simultaneously is required to be logged, but a loss of off-site power to a single bus is not.

d. Plausible since excessive spray differential temperatures are required to be logged and with letdown isolated the differential temperature would exceed the limitations to log, but auxiliary spray is not used at power.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of administrative requirements

REFERENCES SUPPLIED:

1.0 PURPOSE

This procedure establishes a tracking program for component cycles and performance of design transients to prevent exceeding design cyclic or transient limits. This procedure meets Tech Spec 5.7.

2.0 REFERENCES

1. Tech Spec 5.7

2. Systems Standard Design Criteria Nuclear Steam Supply System Design Transients (CQL-9185)

3. Steam Generator Auxiliary Feedwater Nozzle Fatigue Evaluation (CQL-91-067)

4. OP-134.01

5. 93H0849

6. PCR 06687

7. SHEARON HARRIS NUCLEAR PLANT STARTUPS/SHUTDOWN/TRIP RECORD

3.0 RESPONSIBILITIES

1. Superintendent - Operations Support - responsible for the administration and review of OMM-013, Cycle and Transient Monitoring Program.

2. Main Control Room Operators - responsible for the initiation of Attachment 2, Cycle Log.

3. Shift Technical Advisor(s) - responsible for the monthly evaluation of cyclic and transient data, completing Attachment 1, Total Cycle Summary Log, and documenting the review on Attachment 3, Cycle Review Log.

4.0 DEFINITIONS/ABBREVIATIONS

1. RCS Heatup Cycle - Heatup from less than or equal to 200°F to greater than or equal to 550°F at a rate of less than or equal to 100°F in any 1 hour period.

2. RCS Cooldown Cycle - Cooldown from 550°F or greater to less than or equal to 200°F at a rate of less than or equal to 100°F in any 1 hour period.

3. Pressurizer Cooldown Cycle - Pressurizer cooldown from 650°F or greater to less than or equal to 200°F at a rate of less than or equal to 200°F in any one hour period.

4. Loss of Load Cycle - Decrease in load from greater than or equal to 15% rated thermal power to 0% rated thermal power, due to a step load decrease in turbine power, without immediate Turbine or Reactor trip.

5. Loss of Off-Site Power - Loss of off-site AC electrical power to Emergency Buses 1A-SA and 1B-SB.

4.0 DEFINITIONS/ABBREVIATIONS (continued)

6. Loss of Flow in One Reactor Coolant Loop - Loss of only one Reactor Coolant Pump.

NOTE: The total number Reactor Trips from all conditions is recorded in the "SHEARON HARRIS NUCLEAR PLANT STARTUPS/SHUTDOWN/TRIP RECORD".

7. Reactor Trip - Any time the reactor trip breakers open causing one or more full length control rods to be inserted from greater than 15% power to 0% power.

8. Auxiliary Spray Transient - Spray water temperature differential greater than 320°F, but less than 625°F.

9. Main Feedwater Nozzle Temperature and Flow Cycle - Feedwater flow to the Main Feedwater Nozzle, when the temperature of the Feedwater is less than 250°F and the Steam Generator temperature is greater than 250°F. This includes Steam Generator Preheater Warm-up Flow Cycles.

10. Steam Generator Preheater Warm-up Flow Cycles - Preheater flow between 60 and 100 KPPH. Each interruption of longer than one minute produces another Main Feedwater Nozzle Temperature and Flow Cycle cycle.

11. Auxiliary Feedwater Nozzle Temperature and Flow Cycle - AFW flow or feedwater flow that is less than 250°F when the average Steam Generator temperature is greater than 250°F.

12. RCS Leak Test - RCS pressurized to greater than or equal to 2485 psig.

13. RCS Hydrostatic Pressure Test - RCS pressurized to greater than or equal to 3107 psig.

14. Steam Line Break - Break in greater than 6-inch steam line.

15. Secondary Side Hydrostatic Pressure Test - Secondary side of Steam Generator pressurized to greater than or equal to 1481 psig.

16. Pressurizer Thermal Transient - A Pressurizer heatup or cooldown in excess of Tech Spec Limits. Transients in excess of Tech Spec Limits require an engineering evaluation. There currently exists an evaluation in PCR6687 that supports Pressurizer transients up to ten cooldown or heatup transients in excess of the Tech Spec Limit.

5.0 PROCEDURE

5.1 Cycle Identification

1. If any of the following occur, perform steps 2 through 5:

- RCS Heatup Cycle
- RCS Cooldown Cycle
- Pressurizer Cooldown Cycle
- Loss of Load Cycle without immediate turbine or reactor trip

5.1 Cycle Identification (continued)

- Loss of Off-Site Power
- Loss of Flow in One Reactor Coolant Loop
- Reactor Trip (record both the total number of trips and the number of trips in that category)
- Auxiliary Spray Transient
- Main Feedwater Nozzle Temperature and Flow Cycle or Steam Generator Preheater Warm-up Flow Cycle
- Auxiliary Feedwater Nozzle Temperature and Flow Cycle
- RCS Leak Test
- RCS Hydrostatic Pressure Test
- Steam Line Break
- Secondary Side Hydrostatic Pressure Test
- Pressurizer Thermal Transient

2. Complete Attachment 2 including the following minimum information in the Comments/Sequence of Events section:

   - For any heatup or cooldown - minimum and maximum temperatures and maximum and average rate of temperature change
   - For any Loss of Load Cycle or Reactor Trip - initial power level
   - For any Auxiliary Spray Transient - maximum spray water temperature differential and duration of auxiliary spray flow
   - For any leak or hydrostatic pressure test - temperature, pressure, and duration
   - For any feedwater cycle - feedwater and steam generator temperature and duration

3. For Auxiliary Feedwater Nozzle Temperature and Flow Cycle, perform the following:

   a. Obtain the ERFIS data listed on Attachment 4, OMM-013 Computer Point List, by doing one of the following:

      (1) If the transient or cycle logging time is less that 1 hour, get one set of data by using CGAS.

      (2) If the transient or cycle logging time is greater that one hour, (as in a cooldown), start a GTLOG with an update rate of 600 seconds. Maintain this task running for the duration of the cycles.

PP-3.10-R9 003

What action(s) should a Control Operator take per OMM-013 for observed cycles and transients that are not of sufficient magnitude to meet the definition for a cycle but are similar?

Question: 3

Which of the following indications are **BOTH** used by EPP-013, LOCA Outside Containment, to identify that the leak is isolated?

a. RCS pressure increasing **AND** RAB radiation decreasing

b. RCS pressure increasing **AND** Local observation

c. PRZ level increasing **AND** Local observation

d. PRZ level increasing **AND** RAB radiation decreasing

Answer:

b. RCS pressure increasing **AND** Local observation

QUESTION NUMBER: 3
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/1

K/A: WE04EK1.3

Knowledge of the operational implications of the following concepts as they apply to the (LOCA Outside Containment) Annunciators and conditions indicating signals, and remedial actions associated with the (LOCA Outside Containment).

K/A IMPORTANCE: ***RO*** 3.5 ***SRO*** 3.9

10CFR55 CONTENT: ***55.41(b) RO*** 8/10 ***55.43(b) SRO***

OBJECTIVE: EOP-2.3-R2

Using appropriate plant procedures and prints, determine the following
a. Transitions to other EOPs

REFERENCES: EOP-013

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.3 024

JUSTIFICATION:

a. Plausible since RCS pressure increasing is one of two requirements, but radiation levels may not decrease until cleanup is completed.

b. CORRECT Procedural identification of isolation is determined by these two parameters.

c. Plausible since local observation is one of two requirements, but pressurizer level may be erroneous as indication if saturation conditions have been reached in RCS.

d. Plausible since a common misconception is that leak is isolated if pressurizer level increases, but pressurizer level may be erroneous as indication if saturation conditions have been reached in RCS.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of EOP transition criteria

REFERENCES SUPPLIED:

Instructions	Response Not Obtained
6. Isolate Break:	
a. Shut valves identified in Step 3 to isolate the break.	
7. Check Break Isolated:	
a. Check RAB radiological conditions - SAFE FOR ENTRY	a. GO TO Step 7d.
b. Check for both of the following: o RCS pressure - INCREASING o Check break isolated by local observation.	b. Continue attempts to isolate break. GO TO EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION", Step 1.
c. GO TO PATH-1, entry point C.	
d. Check RCS pressure - INCREASING	d. Continue attempts to isolate break. GO TO EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION", Step 1.
e. Consult plant operations staff for recommended actions AND continue with this procedure.	
f. GO TO PATH-1, entry point C.	

- END -

EOP-3.3 024
EPP-013, LOCA Outside Containment, select the two symptoms that indicate the leak is isolated.

a) RCS pressure increasing.
b) PRZ level increasing.
c) Local observation.
d) RAB radiation decreasing.

Question: 4

Given the following conditions:

- Control Room Ventilation is in a normal lineup with 'A' Train fans in operation.
- Power is lost to the 'B' Train North Emergency Intake Radiation Monitor.

What is the response of the Control Room Ventilation System to this failure?

a. Remains in the normal alignment, but a subsequent Train 'A' radiation monitor reaching the high alarm will cause an isolation

b. Isolation occurs and **CANNOT** be reset

c. Isolation occurs, but can be reset

d. Remains in the normal alignment, but a subsequent Train 'B' radiation monitor reaching the high alarm will cause an isolation

Answer:

c. Isolation occurs, but can be reset

QUESTION NUMBER: 4
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 072A2.01

Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system-and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences: Erratic or failed power supply

K/A IMPORTANCE: ***RO*** 2.7 ***SRO*** 2.9

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: RMS-R9

Given a system, PREDICT the automatic actions that occur as a result of the following:
c. Loss of power to RMS channel detector

REFERENCES: OP-173
LP-RMS-3.0

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number RMS-R9 001

JUSTIFICATION:

a. Plausible since most ESF functions require a coincidence of more than a single instrument, but this functions if any of 4 signals is received.

b. Plausible since an isolation occurs and actuation signals often have to be cleared before reset is possible, but isolation can be reset.

c. **CORRECT** Isolation does occur, but can be reset after 5 seconds.

d. Plausible since most ESF functions require a coincidence of more than a single instrument, but this functions if any of 4 signals is received.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of failure mode of components

REFERENCES SUPPLIED:

2.4 Drawings

1. 5-S-1017

2. 6-B-401 2947, 2949, 2972, 2973, 2975, 2976, 2978

3. CAR-2168-G-517S04

2.5 Technical Manuals

1. VM-PSL-V01, Air Handling Units, Safety-Related

2.6 Other

1. CAP Item 92H0134

2. ACFR 94-02472-7

3. ESR 96-00056

4. ESR 97-00534

5. ESR 98-00043

3.0 PREREQUISITES

1. AC Electrical power available per OP-156.02.

2. 125 VDC power available per OP-156.01.

3. Essential Services Chilled Water available per OP-148.

4. Instrument Air available per OP-151.01.

4.0 PRECAUTIONS AND LIMITATIONS

1. Air handling units, AH-15 A&B, maximum filter differential pressure is 0.75 INWG.

2. R Do not run the emergency filtration trains serving areas where paints, industrial solvents and/or chemicals are being used, except when needed in an emergency. If paint was used in the area, the emergency filtration trains should not be run for a minimum of 12 hours after such use. If the filtration trains are so used or fire, painting or chemical release occurs when a train is in use, EST-400 will need to be performed. Refer to CMP-003 and PGO-037.

3. A Control Room Isolation Signal may be manually reset after 5 seconds. This will allow the repositioning of valves and dampers. If this is done and the original signal is still greater than the alarm setpoint, the Control Room Area HVAC System will not automatically re-isolate until the original signal goes below its setpoint and another actuation signal is received.

4. Do not allow greater than 315 CFM of outside air into the Control Room Area HVAC System when modulating the post accident OAI valves for control room pressurization. This P&L is not applicable during check valve full flow testing such as in OST-1131.

5. Do not initiate smoke purge operation without permission from the Unit SCO and the Fire Team Leader.

(6) Uses flow, purge, filter and C/S function keys

(7) Either channel will automatically isolate normal purge on high rad or loss of power to monitor

(8) Safety monitor

(9) Tech. Spec. monitor

(a) 3/4.3.3 monitoring instrumentation

1) Requires one gaseous and particulate channel operable

2) Modes 1-4

3) Less than minimum channels operation may continue provided CNT purge makeup and exhaust are isolated

4) Also satisfies T/S 3/4.3.1 on ESFAS actuation for CNT ventilation isolation

(b) 3/4.4.6 RCS leak detection

1) Requires system operable

2) Modes 1-4

3) If either is 00S—grab sample required

4) Hot standby in 6 hours if both INOP for 72 hours

e. CCW rad monitors

(1) Safety, one RM-23 per train

(2) Used for Leak detection

(3) Liquid scintillation detector

(4) Labeled "LIQ" on one channel

(5) Uses "FLOW," "PURGE," and "C/S" function buttons

(6) No auto actions

(7) Not a Tech. Spec. monitor

f. Control Room Area rad monitor

(1) One RM-23 on A train only

(2) General area G-M tube monitor

Question: 5

Given the following conditions:

- The plant is operating at 100% power with 'A' Train equipment in service.
- The 1B-SB emergency bus supply breaker (125) opens.

Which of the following is expected to occur?

a. The 1B-SB EDG will start and breaker 125 will reclose

b. Both sequencers will run and load equipment selected by the UV program

c. 1MS-72, MS 'C' to Aux FW Turbine, will open

d. The 'B' ESW Header will be supplied by the NSW System

Answer:

c. 1MS-72, MS 'C' to Aux FW Turbine, will open

QUESTION NUMBER: 5
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 013K1.07

Knowledge of the physical connections and/or cause effect relationships between the ESFAS and the AFW System

K/A IMPORTANCE: ***RO*** 4.1 ***SRO*** 4.4

10CFR55 CONTENT: ***55.41(b) RO*** 4 ***55.43(b) SRO***

OBJECTIVE: AOP-3.25

RECOGNIZE automatic actions that are associated with AOP-025, Loss of One Emergency AC Bus (6.9-kV) or One Emergency DC (125-V) Bus

REFERENCES: AOP-025

SOURCE: ***New*** [ ] ***Significantly Modified*** [X] ***Direct*** [ ]

Bank Number AOP-3.25 001

JUSTIFICATION:

a. Plausible since the EDG will autostart, but the EDG output breaker, not the emergency bus supply breaker closes.

b. Plausible since the EDG will autostart and the sequencer will load the bus, but only the 1B-SB bus will be affected.

c. **CORRECT** The associated steam supply valve to the TDAFWP opens automatically on a safeguards bus undervoltage.

d. Plausible since ESW is normally supplied by NSW, but supply from NSW to ESW isolates during emergency operations.

DIFFICULTY:

Comprehensive/Analysis [ ] ***Knowledge/Recall*** [X] ***Rating*** 3

Knowledge of system response to plant conditions

REFERENCES SUPPLIED:

Section 1.0

1.0 SYMPTOMS

1. ALB-24-1-2, 6.9KV EMER BUS A-SA TROUBLE alarm
2. ALB-25-1-2, 6.9KV EMER BUS B-SB TROUBLE alarm
3. Alarms on busses fed from BUS 1A-SA or 1B-SB
4. Zero voltage indication on BUS 1A-SA or 1B-SB
5. Trouble alarms from the Start Up Xfmrs, Aux Xfmrs, BUS 1D, or BUS 1E

2.0 AUTOMATIC ACTIONS

1. Upon opening of associated bus feeder breaker, the UV condition will start the EDG to reenergize the bus. Equipment will be started via the Load Sequencer (ESW Pump starts in load block three).
2. Associated steam supply valve (1MS-70 or 1MS-72) to the TDAFW Pump will open.

NOTE: MDAFW FCVs are subject to automatic actuation signals. If manual pushbuttons for 1AF-49, 50, or 51 are depressed, the valve may not respond to ESFAS open/close signals from the AFW initiation or AFW override circuits. The valves will not move when both the "raise" and "lower" signals are present. If both ESFAS signals are present, the open signal will time out after 20 seconds, at which time the valve will close (Ref: ESR-9700475).

3. MDAFW FCVs will get an auto-open signal (unless an AFW isolation signal is present) if either breaker 105 or 125 opens.

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

AOP-3.25 001
The plant is operating at 100 percent power with ""A"" train equipment in service when the B-SB emergency bus supply breaker (125) opens. _________ is NOT an expected response to this problem.

A. The B-SB EDG starts and breaker 126 closes.

✓B. The ""A"" and ""B"" sequencers will run and load equipment selected by the UV program.

C. MS-72 (steam supply to the TD AFW) will open.

D. The ""B"" ESW header will isolate from the NSW System.

Question: 6

Given the following conditions:

- Emergency Boration is required.
- 1CS-278, Emergency Boric Acid Addition, **CANNOT** be opened.

Which of the following alignments will provide adequate boric acid flow?

	1CS-283 **Boric Acid to Boric Acid Blender FCV-113A**	**1CS-156** **Makeup to CSIP Suction FCV-113B**	**1CS-155** **Makeup to VCT FCV-114A**	**1CS-291** **CSIP Suction from RWST LCV-115B**	**1CS-292** **CSIP Suction from RWST LCV-115D**	**1CS-165** **VCT Outlet LCV-115C**	**1CS-166** **VCT Outlet LCV-115E**
a.	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	CLOSED	OPEN
b.	OPEN	CLOSED	OPEN	CLOSED	CLOSED	OPEN	CLOSED
c.	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	OPEN	OPEN
d.	OPEN	CLOSED	CLOSED	OPEN	CLOSED	OPEN	CLOSED

Answer:

d.	OPEN	CLOSED	CLOSED	OPEN	CLOSED	OPEN	CLOSED

QUESTION NUMBER: 6
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 024AK2.01

Knowledge of the interrelations between the Emergency Boration and the following: Valves

K/A IMPORTANCE: ***RO*** 2.7 ***SRO*** 2.7

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.2-R3

DESCRIBE the paths to deliver boric acid to the RCS via CSIPs as specified in AOP-002, Emergency Boration

REFERENCES: AOP-002
CPL-2165-S-1305

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.2-R3 002

JUSTIFICATION:

a. Plausible since makeup to CSIP suction is open, but this path also requires that boric acid to blender also be open.

b. Plausible since boric acid to blender is open, but this path also requires that makeup to CSIP suction also be open.

c. Plausible since makeup to CSIP suction is open, but this path also requires that boric acid to blender also be open.

d. **CORRECT** Only a single valve from the RWST is required to open to ensure adequate boric acid flow.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of alternative flowpath alignments and effectiveness

REFERENCES SUPPLIED:

3.2 Follow-up Actions (continued)

a. IF using emergency boration flowpath, THEN perform the following:

(1) Start a Boric Acid Pump.

(2) Perform one of the following:

(a) Open 1CS-278, EMERGENCY BORIC ACID ADDITION.

(b) Open the following valves:

- FCV-113A, BORIC ACID TO BORIC ACID BLENDER
- FCV-113B, MAKE UP TO CSIP SUCTION

(3) Verify at least 30 gpm boric acid flow to CSIP suction

- FI-110 for 1CS-278 flowpath
- Recorder panel for FCV-113A and FCV-113B flowpath

(4) Verify and maintain at least 30 gpm charging flow to RCS (FI-122A.1) until required boration is completed.

(5) IF at least 30 gpm boric acid flow cannot be established, THEN perform the following:

(a) Borate using RWST flowpath.

(b) Refer to AOP-003, Malfunction of Reactor Makeup Control or VCT Level Control.

b. IF using RWST flowpath, THEN perform the following:

(1) Open the following valves:

- LCV-115B, CSIP SUCTION FROM RWST
- LCV-115D, CSIP SUCTION FROM RWST

(2) Shut the following valves

- LCV-115C, VCT OUTLET
- LCV-115E, VCT OUTLET

(3) Verify and maintain at least 90 gpm charging flow to RCS (FI-122A.1) until required boration is completed.

(4) Monitor VCT level.

3.2 Follow-up Actions (continued)

R CAUTION

Low VCT level is a precursor to gas binding the CSIPs (Ref: SOER 97-1).

R (5) IF VCT level is less than 5% and can NOT be maintained on-scale, THEN locally torque shut the following (Ref: SOER 97-1, recommendation 3):

- 1CS-165, VCT OUTLET LCV-115C
- 1CS-166, VCT OUTLET LCV-115E

NOTE: The alternate boric acid flowpath source will supply sufficient boric acid for emergency boration but is slower to respond than the other flowpaths.

c. IF using alternate boric acid flowpath, THEN perform the following:

(1) Start a Boric Acid Pump.

(2) Open the following valves:

- FCV-113A, BORIC ACID TO BORIC ACID BLENDER
- FCV-114A, MAKE UP TO VCT

R NOTE: An inadvertent criticality may require initiation of the Emergency Plan (Ref: 4.0.5.c).

2. Refer to PEP-110, Emergency Classification and Protective Action Recommendations and entry point X for EAL network.

NOTE: If safe operation of the plant will NOT be compromised, procedure steps may be performed simultaneously or out of sequence at the discretion of the Unit SCO.

3. Control charging and letdown to maintain normal PRZ level.

4. IF necessary, THEN perform the following:

a. Transfer Rod Control to manual.

b. Position rods to re-establish normal Tavg.

c. Restore control rods to above rod insertion limit.

EMERGENCY BORATION

4.0 General

1. This procedure describes the methods of inserting negative reactivity into the RCS during positive reactivity transients. This necessitates the rapid injection of boric acid into the RCS via the Charging pumps. When using the RWST flowpath, it is preferred to open both RWST to CSIP valves but, either valve will supply sufficient boron. Flowpaths for delivering sufficient boric acid to the RCS are listed in order of preference, as follows:

   a. Emergency boration valve 1CS-278, to the CSIP suction.

   b. Normal path via FCV-113A and FCV-113B, to the CSIP suction.

   c. RWST path via LCV-115B or LCV-115D, to the CSIP suction.

   d. Alternate path via FCV-113A and FCV-114A, to the inlet of the VCT.

R 2. INPO SOER 97-1 addressed concerns for the potential loss of high pressure injection and charging capability from gas intrusion. The primary threat of this occurring is from the VCT, when CSIP suction is aligned to the RWST, with VCT pressure higher than CSIP suction pressure, and with fluid leaking by the VCT outlet valves. As long as some liquid level can be maintained in the VCT, gas intrusion into the CSIP suction should not occur. If level cannot be maintained in the VCT, the next best action to take is to ensure that the VCT outlet valves are fully (manually) shut.

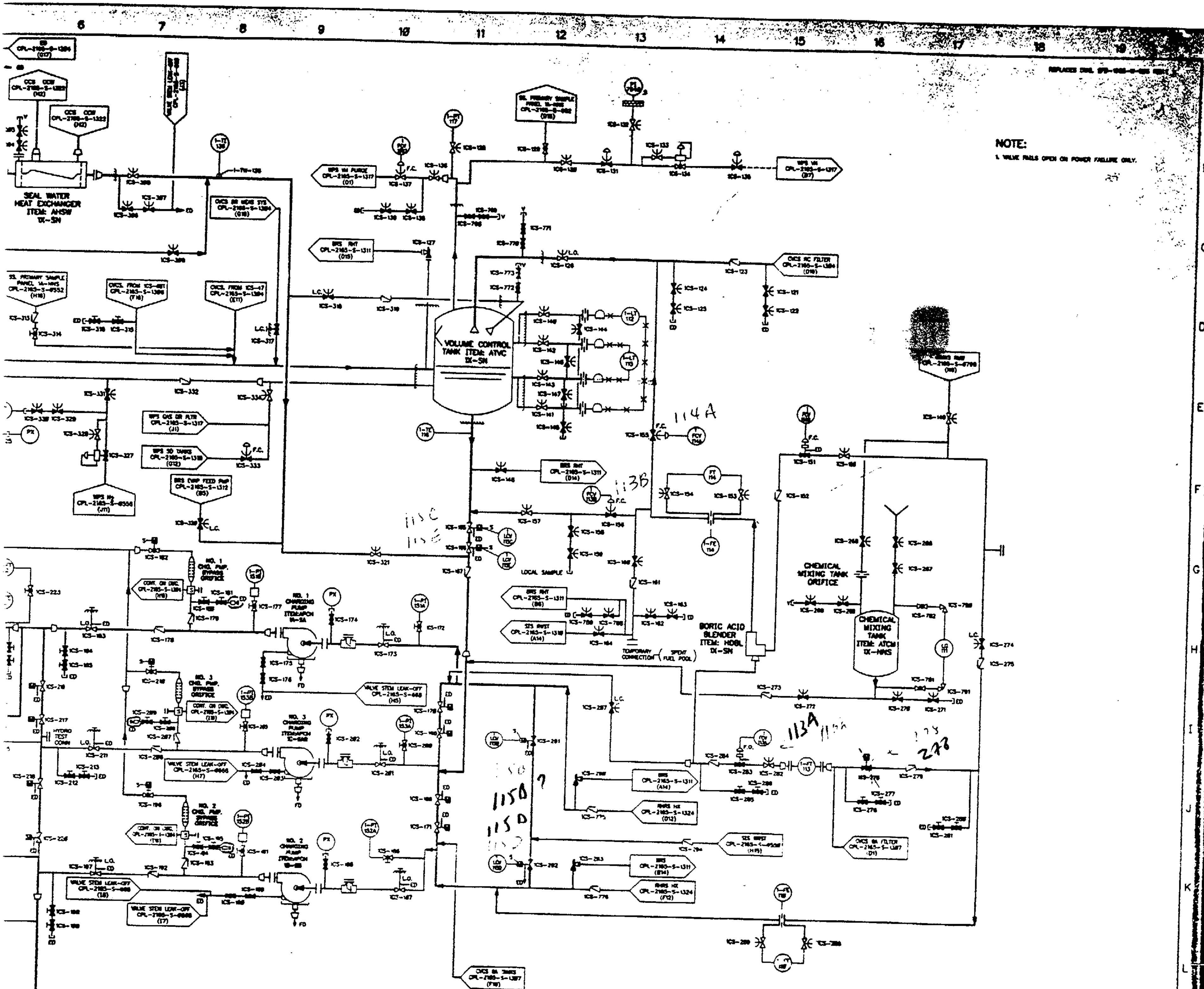
3. One of the purposes of Rod Insertion Limits is to ensure adequate SDM assuming certain conditions at the existing power level. Following a significant load rejection or rapid power reduction, a BANK LOW or LOW-LOW INSERTION LIMIT Alarm is expected to occur since Xenon is not at equilibrium or stable. The presence of this alarm following a load rejection does not indicate a loss of SDM. If rods were above the insertion limits before the load rejection and no abnormal conditions affecting reactivity (example: stuck/untrippable rod, uncontrolled dilution) are experienced; then SDM is still assured. Per Tech Spec 3.1.3.6, when rods go below the insertion limits, we have two hours to restore them. This allows time for a controlled boration and emergency boration is not required, unless the two hour limit is threatened. The use of 1CS-278 is allowed for a large boration as long as the operator tracks the total volume added by using the time the valve is open and flow delivered.

4. There are three paths for the charging pumps to deliver boric acid to the RCS, as follows:

   a. Normal charging to loop B cold leg.

   b. Alternate Charging Line to loop A cold leg.

   c. Seal injection to the RCPs.


NOTE:
1. VALVE FAILS OPEN ON POWER FAILURE ONLY.
SEAL WATER HEAT EXCHANGER ITEM: AHSW 1X-SN
VOLUME CONTROL TANK ITEM: ATVC 1X-SN
BORIC ACID BLENDER ITEM: HDBL 1X-SN
CHEMICAL MIXING TANK ORIFICE
CHEMICAL MIXING TANK ITEM: ATCM 1X-NNS
LOCAL SAMPLE
TEMPORARY CONNECTION (SPENT FUEL POOL)
HYDRO TEST CONN
114A
113B
113A
115C
115B
115D

AOP-3.2-R3 002

Which of the following is NOT a path for the charging pumps to deliver boric acid to the RCS per AOP-002, Emergency Boration?

A. Normal charging to Loop B cold leg

B. Alternate charging to Loop A cold leg

C. Seal injection to the RCPs

✓D. CSIP to auxiliary spray

Question: 7

Given the following conditions:

- The plant is in Mode 5 on RHR cooling.
- A 170 gpm leak develops from the RCS.
- Letdown has been isolated.

Which of the following methods of makeup is to be used?

a. Normal Charging from VCT

b. Normal Charging from RWST

c. Opening SI Accumulator Isolation valves

d. CSIP flow through the BIT valves

Answer:

d. CSIP flow through the BIT valves

QUESTION NUMBER: 7
TIER/GROUP: ***RO*** 2/3 ***SRO*** 2/3

K/A: 005K3.01

Knowledge of the effect that a loss or malfunction of the RHRS will have on RCS

K/A IMPORTANCE: ***RO*** 3.9 ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.20-R6

LIST and/or SELECT immediate operator actions for AOP-020, Loss of RCS Inventory or RHR While Shutdown

REFERENCES: AOP-020

SOURCE: ***New*** [ ] ***Significantly Modified*** [X] ***Direct*** [ ]

Bank Number AOP-3.20-R6 002

JUSTIFICATION:

a. Plausible since if leak were within capacity of makeup to VCT this would be an acceptable path.

b. Plausible since if leak were within the allowed limits of charging flow this would be an acceptable path.

c. Plausible since allowing the accumulators to dump to the RCS would provide cooling water to RCS.

***d.* CORRECT** Charging flow would be maximized (150 gpm) in attempt to maintain inventory, but RCS level would continue to lower, requiring higher flowpath alignment through BIT.

DIFFICULTY:

Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Comparison of event magnitude to system capabilities

REFERENCES SUPPLIED:

3.2 Follow-up Actions (continued)

NOTE: RCS level refers to either Pressurizer, RVLIS, Reactor Vessel (RV), or Cavity level.

e. IF charging flow is maximized (150 gpm), AND any of the following exist:

- RCS level lowering
- RCS pressure lowering OR is completely depressurized
- Core exit thermocouple temperature rising

THEN perform the following:

(1) Align CSIPs to the BIT as follows:

(a) Verify SUCTION FROM RWST valves are open:

- LCV-115B
- LCV-115D

(b) Verify VCT OUTLET valves are shut:

- LCV-115C
- LCV-115E

(c) Shut CHARGING LINE ISOLATION valves:

- 1CS-235
- 1CS-238

(d) Open CHARGING/SI PUMPS TO BORON INJECTION TANK valves:

- 1SI-1
- 1SI-2

(e) Open BORON INJECTION TANK OUTLET valves:

- 1SI-3
- 1SI-4

AOP-3.20-R6 002
With the plant in Mode 5 on RHR cooling, a leak develops from the RCS. All of the following are methods that AOP-020 will use to attempt to maintain inventory, EXCEPT:

A. Normal Charging from VCT
B. Normal Charging from RWST
✓C. Opening SI Accumulator Isolation valves
D. CSIP flow through the BIT valves

Question: 8

The generator is being taken off the line during a normal shutdown.

Which of the following describes the proper sequence for operation of the generator output breakers, 52-7 and 52-9?

a. Trip the turbine and verify the generator lockout opens both generator output breakers

b. Manually open one generator output breaker, trip the turbine, and manually open the second output breaker

c. Manually open both the generator output breakers, then trip the turbine

d. Manually open one generator output breaker, trip the turbine, and allow the generator lockout to open the second output breaker

Answer:

b. Manually open one generator output breaker, trip the turbine, and manually open the second output breaker

QUESTION NUMBER: 8
TIER/GROUP: ***RO*** 2/3 ***SRO*** 2/3

K/A: 0452.1.20

Ability to execute procedure steps (Main Turbine Generator System).

K/A IMPORTANCE: ***RO*** 4.3 ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: OSP

Given the applicable reference and a set of plant conditions, ANALYZE the situation and APPLY the correct procedural guidance
a. Normal operations, including start-up and shutdown

REFERENCES: GP-006

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number OSP 058

JUSTIFICATION:

a. Plausible since this occurs on a plant trip, but not method prescribed for normal shutdown.

b. **CORRECT** Proper sequence is to open south breaker, trip the turbine, then open north breaker when motoring pre-trip alarm is received.

c. Plausible since this would result in the breakers being opened, but not method prescribed for normal shutdown.

d. Plausible since this would occur if north breaker were not tripped when motoring pretrip alarm received, but not method prescribed for normal shutdown.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural requirements

REFERENCES SUPPLIED:

5.1 Turbine Shutdown (continued)

NOTE: During the period that the core is operating with a positive moderator temperature coefficient, the steam dumps should be used to load the Reactor to 5 to 7% power to make the evolution of separating from the grid smooth and controlled. The steam dumps will provide a cushion for controlling RCS temperature stable and prevent the heatup following the opening on the last generator output breaker from possibly raising Reactor power above 10% and generating a Reactor trip.

33. Notify the load dispatcher that the unit is ready to be separated from the grid. ______

NOTE: Opening 52-7, 52-9, and the Exciter Field Breaker after a Reactor Trip using the control switch will clear the associated alarms. The breakers themselves will already be open.

34. When Turbine load decreases to 25 MWe gross, open the Generator to South Bus Breaker 52-7.

** a. Open GENERATOR TO SOUTH BUS BREAKER 52-7.

Time Opened ______ ______

CAUTION

Tripping the Turbine with Reactor or Turbine power greater than or equal to 10% will cause a Reactor trip.

35. Perform the following to remove the Turbine from service:

NOTE: T_{avg} will recover rapidly after the Turbine is tripped.

a. Verify that T_{avg} is below T_{ref} and decreasing. ______

** b. Manually trip the Turbine. ______

** c. When ALB-22-9-3, GENERATOR MOTORING PRETRIP Alarm is received, open GENERATOR TO NORTH BUS BREAKER 52-9.

Time Opened ______ ______

** d. Open the EXCITER FIELD BREAKER. ______

36. Verify that the following Turbine Valves have shut:

a. Throttle Valves 1 through 4 SHUT ______

b. Governor Valves 1 through 4 SHUT ______

c. Reheat Valves 1 through 4 SHUT ______

d. Intercept Valves 1 through 4 SHUT ______

Question: 9

Which of the following is the most significant action the operator can take during a SGTR concurrent with a loss of off-site power to minimize the PTS challenge?

a. Maintain the RCS temperature at or below the required cooldown target temperature

b. Secure AFW flow to the affected SG once minimum required level is achieved

c. Ensure the affected SG does **NOT** become water solid

d. Terminate SI after meeting termination criteria

Answer:

d. Terminate SI after meeting termination criteria

(b) RCS pressure likely to equalize around secondary safety set pressure

(c) RCPs tripped

(d) SI flow

1) Higher because of lower RCS pressure

2) Faster and more severe cooldown

(e) More readily diagnosed than single failure

(f) PTS challenge

1) Minimal if proper recovery actions followed and SI terminated promptly after meeting criteria

2) More severe challenge than single failure

8. Excessive feedwater

a. Events with PTS implications

(1) Large amounts of feedwater to a one or more SGs

(a) At power

(b) Hot shutdown

(2) Not as severe as LOCA or secondary break

(3) Cause of failure

(a) Regulating failure

(b) Local equipment failure

(c) Decrease in feedwater temperature (loss of preheating)

b. Protection against excessive feed

(1) Automatic closure of feedwater isolation or control valves

(2) Tripping main feedwater pumps

(3) Isolation signals

(a) SG high-high level

(b) Coincident low T_{avg} and reactor trip signals closes feed control valves only

QUESTION NUMBER: 9
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: WE08EK1.2

Knowledge of the operational implications of the following concepts as they apply to the (Pressurized Thermal Shock) Normal, abnormal and emergency operating procedures associated with (Pressurized Thermal Shock).

K/A IMPORTANCE: ***RO*** 3.4 ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** 8/10 ***55.43(b) SRO***

OBJECTIVE: BD-3.14

Explain the major accidents and transients which can lead to PTS including
a. How each can cause PTS
b. How certain operator actions can increase or decrease the potential for PTS

REFERENCES: LP-BD-3.14

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number BD-3.14 025

JUSTIFICATION:

a. Plausible since this mixing RCS water with SI water with RCPs running will prevent excessive cooling of the downcomber, but will not prevent cold SI water from cooling the downcomber excessively with no RCPs.

b. Plausible since this will slow the cooldown of the RCS, but will not prevent cold SI water from cooling the downcomber excessively with no RCPs.

c. Plausible since this is a consideration in all SGTR events, but has little / no effect on PTS considerations.

***d.* CORRECT** Cold SI water is not mixed with RCS with no RCPs running, so downcomber region experiences rapid cooldown due to SI.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of the effect of actions taken in response to an accident

REFERENCES SUPPLIED:

Question: 10

Given the following conditions:

- A reactor trip and safety injection has occurred.
- Containment pressure is 4.5 psig.
- SI has **NOT** been reset.
- Phase A has **NOT** been reset.
- Phase B has **NOT** been reset.

Which of the following describes the conditions required to allow opening of the SG sample valves?

a. Containment pressure must be reduced below 3.0 psig before SI can be reset to allow opening the sample valves

b. SI can be reset to allow opening the sample valves

c. Containment pressure must be reduced below 3.0 psig before Phase A can be reset to allow opening the sample valves

d. Phase A can be reset to allow opening the sample valves

Answer:

b. SI can be reset to allow opening the sample valves

QUESTION NUMBER: 10

TIER/GROUP: ***RO*** 2/3 ***SRO*** 2/2

K/A: 103K1.08

Knowledge of the physical connections and/or cause-effect relationships between the containment system and the SIS, including action of safety injection reset

K/A IMPORTANCE: ***RO*** 3.6 ***SRO*** 3.8

10CFR55 CONTENT: ***55.41(b) RO*** 9 ***55.43(b) SRO***

OBJECTIVE: EOP-3.19-4

Given a set of conditions during EOP implementation, DETERMINE the correct response or required action based upon the EOP User's Guide general information
b. Criteria for resetting SI, Phase A, Phase B, and FWIS and the expected effect on plant systems

REFERENCES: EOP Users Guide
OMM-004

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a.		Plausible since some ESF signals cannot be reset until the initiating signal is clear, but SI can be reset under these conditions.
b.	CORRECT	Procedure allows resetting SI prior to being directed by EOPs and it can be reset with the signal present.
c.		Plausible since some ESF signals cannot be reset until the initiating signal is clear, but SI can be reset under these conditions. Valves are also affected by SI, not Phase A.
d.		Plausible since actuating signal can be reset, but actuating signal is SI, not Phase A.

DIFFICULTY:

Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Integration of system and procedural knowledge to determine actions

REFERENCES SUPPLIED:

6.2 RCS Subcooling (continued)

- o Highest active loop wide range T-hot (TI-413, 423, 433). An active loop is defined as one that has forced or natural circulation flow. If any RCPs are running, all loops will be active (backflow is available in loops where RCPs are not running). A classic example of a non-active loop would be a loop that has a SGTR since it is isolated and natural circulation flow in this loop would not be available.

2. Primary pressure is obtained using one of the following based on the range and availability of RCS and PRZ pressure indication:

   - o If ERFIS is available, then use the RCS pressure reading on SPDS, or ERFIS point PRC9455. If PRZ pressure is above 1700 PSIG, this reading is the average of the three PRZ pressure channels (PT-457, PT-456, and PT-455). If PRZ pressure is below 1700 PSIG, this reading is the average of the two RCS wide range pressure channels (PT-402 and PT-403).

   - o If PRZ pressure is greater than 1700 PSIG and CNMT conditions are normal, then use the lowest PRZ pressure indication (PI-457, PI-456, or PI-455.1).

   - o If PRZ pressure is off scale low or adverse CNMT conditions exist, then use the lowest of the two RCS wide-range pressure indications PI-402.1 or PI-403. Only PT-402 and PT-403 are used since these transmitters are located outside containment.

   - o When RCS pressure is less than 700 PSIG, PI-402A should be used. PI-402A receives input from qualified instrument PT-402 and its narrow range scale provides a more precise indication of pressure.

6.3 Resetting SI, Phase A, Phase B, and FW Isolation

In most events, these signals will be reset in PATH-1 after actuation of safeguards equipment has been verified. However, if the operator performs a manual actuation at some other time during the recovery, the operator may reset these signals whenever it is appropriate or required to operate equipment. For example, if the procedure directs the user to obtain SG activity samples and the sample valves are shut, the operator may reset SI and open the valves, prior to being directed to. There are no explicit requirements that must be met prior to resetting SI; however, some RAB ventilation will realign when SI is reset and the ventilation portion of SI verification attachment of OMM-004 should be completed or verified using the plant computer prior to resetting SI.

Safety Injection Actuation Verification

TRAIN - A Components		REQ POS	POS CK	TRAIN - B Components		REQ POS	POS CK
MLB 1A-SA				MLB 1B-SB			
8-1	RTN AUX RSVR OPEN 1SW-270	LIT		8-1	RTN AUX RSVR OPEN 1SW-271	LIT	
				8-2	SW RTN-A HDR SHUT 1SW-275	LIT	
				8-3	SW RTN B HDR SHUT 1SW-274	LIT	
9-1	SG A SMPL ISOL SHUT 1SP-217	LIT		9-1	SG A SMPL VLVS SHUT 1SP-214/216	LIT	
9-2	SG B SMPL ISOL SHUT 1SP-222	LIT		9-2	SG B SMPL VLVS SHUT 1SP-219/221	LIT	
9-3	SG C SMPL ISOL SHUT 1SP-227	LIT		9-3	SG C SMPL VLVS SHUT 1SP-224/226	LIT	
10-1	SG A BLDN ISOL SHUT 1BD-11	LIT		10-1	SG A BLDN VLVS SHUT 1BD-1/7	LIT	
10-2	SG B BLDN ISOL SHUT 1BD-30	LIT		10-2	SG B BLDN VLVS SHUT 1BD-20/26	LIT	
10-3	SG C BLDN ISOL SHUT 1BD-49	LIT		10-3	SG C BLDN VLVS SHUT 1BD-39/45	LIT	
MLB 2A-SA				MLB 2B-SB			
1-4	SAMPLE PNL ISOL SHUT 1CC-114	LIT		1-4	SAMPLE PNL ISOL SHUT 1CC-115	LIT	
3-1	BIT IN VLV OPEN 1SI-1	LIT		2-3	BIT IN VLV OPEN 1SI-2	LIT	
6-1	BIT OUT VLV OPEN 1SI-4	LIT		6-1	BIT OUT VLV OPEN 1SI-3	LIT	
MLB 3A-SA				MLB 3B-SB			
8-1	RWST-CSIP OPEN CS-LCV-115B	LIT		8-1	RWST-CSIP OPEN CS-LCV-115D	LIT	
8-2	AUX MINI CSIP OPEN 1CS-746	(1)		8-2	AUX MINI CSIP OPEN 1CS-752	(1)	

(1) Valves cycle on RCS pressure: OPEN above 2200 psig; SHUT below 1800 psig.

Question: 11

Given the following conditions:

- Condenser vacuum is 5.4 inches Hg and degrading.
- Turbine first stage pressure is 38% turbine load.
- Turbine load is being reduced.

Which of the following actions must be taken?

a. Continue reducing turbine load as necessary to maintain condenser vacuum

b. Trip the reactor and verify the turbine trips

c. Trip the turbine and verify the reactor trips

d. Trip the turbine and verify the plant stabilizes on the steam dumps

Answer:

b. Trip the reactor and verify the turbine trips

QUESTION NUMBER: 11
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 0512.4.11

Knowledge of abnormal condition procedures (Loss of Condenser Vacuum).

K/A IMPORTANCE: ***RO*** 3.4 ***SRO*** 3.6

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.12

RECOGNIZE automatic actions that are associated with AOP-012, Partial Loss of Condenser Vacuum

REFERENCES: AOP-012

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since actions are being taken to lower load in attempt to stabilize vacuum, but trip setpoint has been exceeded.

b. **CORRECT** An automatic turbine / reactor trip should have occurred based upon these conditions.

c. Plausible since trip setpoint has been exceeded, but above 10% reactor should be tripped and turbine verified trip. Below 10%, turbine is tripped.

d. Plausible since trip setpoint has been exceeded, but above 10% reactor should be tripped and turbine verified trip. Below 10%, turbine is tripped and plant stabilized.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Integration of procedural and system knowledge to determine actions

REFERENCES SUPPLIED:

2.0 AUTOMATIC ACTIONS

1. Turbine trips if Condenser Zone 1 pressure (PI-1900A) exceeds:

   a. 5 inches Hg AND Turbine first stage pressure is less than 60% TURBINE LOAD.

   b. 7.5 inches Hg AND Turbine first stage pressure is greater than 60% TURBINE LOAD.

2. Condenser Vacuum pumps trip (high discharge temperature of 210 °F).

3. Standby Condenser Vacuum pump starts if the running pump trips due to low lube oil pressure.

4. IF a Circulating Water pump trips, THEN the associated pump discharge valve shuts.

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

3.2 Follow-up Actions

1. IF the Turbine is in operation, THEN perform the following:

   a. Monitor Condenser pressure.

   b. Reduce Turbine load as necessary to maintain condenser vacuum per GP-006, Normal Plant Shutdown from Power Operation to Hot Standby.

   c. Continue Turbine load reduction until directed otherwise by the Unit SCO based on either of the following:

      - Cause of vacuum loss has been identified and corrected
      - Plant conditions require the Reactor or Turbine to be tripped

   d. IF at any time Reactor power is greater than P-10 (10%) AND either of the following occur, THEN trip the Reactor:

      - Condenser pressure in either zone exceeds 7.5 inches Hg absolute AND Turbine first stage pressure is greater than 60% TURBINE LOAD
      - Condenser pressure in either zone exceeds 5 inches Hg absolute AND Turbine first stage pressure is less than 60% TURBINE LOAD

   e. IF at any time Reactor power is less than P-10 (10%) AND Condenser pressure in either zone exceeds 5 inches Hg absolute, THEN trip the Turbine.

3.2 Follow-up Actions (continued)

NOTE: If safe operation of the plant will NOT be compromised, procedure steps may be performed simultaneously or out of sequence at the discretion of the Unit SCO.

2. IF necessary, THEN start the standby Condenser Vacuum pump.

3. Dispatch an Operator(s) to locally perform the actions of Attachment 1.

4. Verify the following valves are shut:

   - 1CE-475, CONDENSER VAC BREAKER
   - 1CE-447, CONDENSER VAC BREAKER

5. Contact Radwaste Control Room and determine if the loss of vacuum may be due to operation/restoration of Radwaste equipment.

6. Verify all available Circulating Water pumps running.

R NOTE: Complete failure of an expansion joint is determined by ALB-021-8-5, COMPUTER ALARM CIRC WATER SYSTEMS, in alarm due to Condenser Pit High Level AND either of the following conditions (Ref: FSAR Section 10.4.5.3):

- A known expansion joint failure exists
- CTMP-7-1, COOLING TOWER 1 LEVEL HI/LO, alarms due to low level

R 7. IF complete failure of a Condenser Circulating Water expansion joint has occurred, THEN proceed as follows (Ref: FSAR Section 10.4.5.3):

   a. IF the Turbine is in operation, THEN perform the following:

      (1) IF Reactor power is greater than P-10 (10%), THEN trip the Reactor.

      (2) IF Reactor power is less than P-10 (10%), THEN trip the Turbine.

   b. Trip all Circulating Water pumps.

   c. Trip the Normal SW pumps.

   d. Refer to AOP-022, Loss of Service Water.

   e. EXIT this procedure.

Question: 12

Given the following conditions:

- The plant is operating at 100% power.
- Bank 'C' control rod D12 DRPI is indicating 206 steps
- Bank 'C' Step Counters are indicating 228 steps

When comparing incore thermocouple positions to determine if the rod is actually out of position, which of the following thermocouples should be compared?

a. Compare incore thermocouple C12 to the average of incore thermocouples C08, D03, D05, and H13

b. Compare incore thermocouple C12 to the average of incore thermocouples F09, F11, F13, H11, and H13

c. Compare incore thermocouple E12 to the average of incore thermocouples E08, E10, E14, and G15

d. Compare incore thermocouple E12 to the average of incore thermocouples D05, E04, L12, and M11

Answer:

d. Compare incore thermocouple E12 to the average of incore thermocouples D05, E04, L12, and M11

QUESTION NUMBER: 12
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 0172.1.27

Knowledge of system purpose and or function (In-Core Temperature Monitoring System).

K/A IMPORTANCE: ***RO*** 2.8 ***SRO*** 2.9

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.1-4

LIST the indications of a misaligned rod specified in AOP-001, Attachment 1, Indications of Misaligned Rod

REFERENCES: AOP-001

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number B01 017

JUSTIFICATION:

a. Plausible since C12 is one of the two adjacent TCs, but listed TCs are listed adjacent to C12 instead of same row, so are not symetrical.

b. Plausible since C12 is one of the two adjacent TCs, but listed TCs are in same column instead of row, so are not symetrical.

c. Plausible since E12 is one of the two adjacent TCs, but listed TCs are in same column instead of row, so are not symetrical.

d. **CORRECT** Adjacent TCs to dropped rod are C12 and E12. Symetrical TCs to C12 are D03, M03, and N04. Symetrical TCs to E12 are D05, E04, L12, and M11. Average temp of symetrical TCs is compared to adjacent TC temps.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of diagnostic tools contained in procedures

REFERENCES SUPPLIED: AOP-001, Attachment 2

Affected And Symmetric Thermocouple Locations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A								T							
B					T	R		R		RT					
C							R	T	R		R	T			
D			T	R	T	R				R		R			
E			R	T	R		T	T		T	R	T		T	
F		R	T	R	T	R		R	T	R	T	R	T	R	
G	T	T	R			T	R	T	R				R		T
H		R	T		T	R		T	T	R	T		T	R	T
J		T	R				R		R	T		T	R		
K		R	T	R	T	R		RT		R	T	R		R	
L					R	T		T			R	T	R	T	
M			T	R		R			T	R	T	R			
N				T	R	T	R	T	R	T					
P						R	T	RT		R					
R							T								

R - Control Rod

T - Thermocouple

Affected Thermocouples

Affected And Symmetric Thermocouple Locations

NOTE: B10 E07 K08 P08 H08 have no symmetric locations

GRID	I		II		III		IV	
TRAIN	A	B	A	B	A	B	A	B
	A08				H15			
		G01		G15			R07	
S L	B05			E14		L14		
Y O		C08	H13				N08	H03
M C		D03	C12				N04	M03
M A	E04	D05		E12	M11	L12		
E T			H11	E08		L08		H05
T I		F05	F11	E10	K11		K05	L06
R O		F03	F13			N10	N06	K03
I N	G06		F09			J10		
C S		G08			H09			
	G02						J02	P07
					M09	J12		

1. Determine thermocouple location(s) adjacent to the misaligned rod using the core grid map (Sheet 1), and circle the locations(s) in the Table above. These are the affected thermocouple(s).

2. Record values for all operable affected and symmetric thermocouples using the RVLIS Console. Symmetric thermocouples are those in the same row.

   Affected TC #1 ______ Symmetric TC(s) ____________________

   Affected TC #2 ______ Symmetric TC(s) ____________________

   Affected TC #3 ______ Symmetric TC(s) ____________________

   Affected TC #4 ______ Symmetric TC(s) ____________________

3. Determine the average of symmetric thermocouples above, for each affected thermocouple.

B01 017

The plant is operating at 100% power with the DRPI for Bank D control rod H14 indicating 200 steps while the group counter indicates 220 steps. In an effort to determine if the rod is actually out of position, the shift is comparing incore thermocouple readings. Which of the following should be used in this effort?

A. Compare incore thermocouple H15 to the average reading from thermocouples M11, K11, H09, and M09.

B. Compare incore thermocouple G15 to the average reading from thermocouples G01, R07, and G15.

✔C. Compare incore thermocouple H13 to the average reading from thermocouples C08, N08, and H03.

D. Compare incore thermocouple H15 to the average reading from thermocouples H13 and G15.

Question: 13

Which of the following sets of conditions would **NOT** permit waiving the Independent Verification requirement for a clearance removal?

	EXPECTED DOSE	**AREA TEMPERATURE**
a.	12 mRem	105°F
b.	9 mRem	115°F
c.	6 mRem	125°F
d.	3 mRem	135°F

Answer:

b.	9 mRem	115°F

QUESTION NUMBER: 13

TIER/GROUP: ***RO*** 3 ***SRO*** 3

K/A: 2.3.10

Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.

K/A IMPORTANCE: ***RO*** 2.9 ***SRO*** 3.3

10CFR55 CONTENT: ***55.41(b) RO*** 12 ***55.43(b) SRO***

OBJECTIVE: PP-3.11-7

DISCUSS the following items concerning independent verification
e. When it may be waived for ALARA

REFERENCES: OPS-NGGC-1301

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since temperature is lowest, but IV can be waived if expected dose is greater than 10 mRem or area temperature is greater than 120°F.

b. CORRECT IV can only be waived if expected dose is greater than 10 mRem or area temperature is greater than 120°F.

c. Plausible since rad exposure is within limits, but IV can be waived if expected dose is greater than 10 mRem or area temperature is greater than 120°F.

d. Plausible since rad exposure is within limits, but IV can be waived if expected dose is greater than 10 mRem or area temperature is greater than 120°F.

DIFFICULTY:

Comprehensive/Analysis [ ] ***Knowledge/Recall*** [X] ***Rating*** 3

Knowledge of administrative requirements

REFERENCES SUPPLIED:

9.3.1 Administrative - Clearance Installation and Removal

7. Tags should be installed in an obvious location on the component to clearly indicate that operation of that component is prohibited.

8. If the component is designed to accept a lock to prevent operation, the tag should be installed at the lock out point.

9. If the tag cannot be installed on the component, it should be installed as close as safely possible and in a location that is immediately obvious to anyone attempting to operate the device.

10. Installed grounds or the ground tags should remain visible from outside the cabinet or cubicle. If the grounds or the ground tags are not readily visible, a sign shall be posted indicating that grounds are installed inside.

11. Fluids from a drain or vent path should be routed to an appropriate drainage location. The WCC should be contacted if any questions arise in determining a proper drainage location. The Radwaste Control Room (BNP) or the WCC (HNP, RNP) should be notified of the draining evolution, as applicable.

R
2.2.2

12. When draining plant systems, ensure that the drainage volume does not exceed the storage capacity of the drain system. This prevents equipment flooding.

13. Independent verification requirements may be waived by the Control Room Supervisor under the following situations:

    a. Excessive radiation exposures would result. As a guideline, an exposure of greater than 10 mrem to conduct the Independent Verification would be considered excessive. Individual situations should be determined on a case-by-case basis by the respective supervisor. In these situations, an alternate means of Independent Verification not involving radiation exposure (such as observing process parameters) should be utilized.

    b. Entry into any area where personnel safety is compromised or jeopardized due to the presence of extreme temperatures (greater than 120°F), or other hazards potentially dangerous to health are present.

9.3.1 Administrative - Clearance Installation and Removal

c. During clearance restoration when the system or components are not required to be operable. Prior to declaring the system or components operable, a lineup and Independent Verification is required.

The Control Room Supervisor should document waiving this requirement in the clearance Special Instructions.

14. If, during the removal of a clearance, the system integrity is not intact, it is permissible to reinstall the clearance. A clearance tag sheet should be printed to document the installation of the clearance tags. The clearance should be rolled back to the required status and a comment describing the event should be entered into the clearance Special Instructions.

15. Clearance tags should be accounted for. Tags should be recycled for reuse. If tags were hung in a contaminated area, they should be decontaminated as necessary.

16. Bus Potential Transformer Fuses are only to be removed or installed by qualified personnel.

9.3.2 Operations Clearances Installation and Removal

1. Each clearance shall be authorized by an SRO. This authorization indicates that the SRO has verified the following:

   - Plant conditions are correct for the clearance
   - Installation of the clearance will not adversely impact plant operation
   - Compensatory actions have been initiated
   - The Control Room has been notified, as necessary

2. After authorization, the clearance will be assigned to a Tag Hanger for clearance installation.

3. If necessary, place the component or system in proper configuration using the Operating Procedure prior to hanging the clearance.

Question: 14

Given the following conditions:

- The RCS is solid.
- 'B' RCP is running.
- Both trains of RHR cooling are in service.
- The RCS is at 300 psig and 160 °F

Which of the following describes the **INITIAL** effect of each of the following events on RCS pressure?

	HCV-142 (RHR to letdown) fails SHUT	**FCV-122 (charging flow control) fails OPEN**
a.	Increase	Increase
b.	Increase	Decrease
c.	Decrease	Increase
d.	Decrease	Decrease

Answer:

a.	Increase	Increase

QUESTION NUMBER: 14
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 004K5.30

Knowledge of the operational implications of the following concept as it applies to the CVCS: Relationship between temperature and pressure in CVCS components during solid plant operation

K/A IMPORTANCE: ***RO*** 3.8 ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: AOP-3.19-R4

Given a situation in solid plant operation affecting charging, letdown, or RCS temperature, EVALUATE the effect on RCS pressure per AOP-019

REFERENCES: AOP-019

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.19-R4 001

JUSTIFICATION:

a. **CORRECT** HCV-142 closing reduces letdown. FCV-122 opening increase charging. Both of these cause RCS pressure to increase.

b. Plausible since the HCV-142 failure will cause pressure to increase, but FCV-122 failure will also cause pressure increase.

c. Plausible since the FCV-142 failure will cause pressure to increase, but HCV-142 failure will also cause pressure increase.

d. Plausible since the failures will all cause changes, but HCV-142 failure will cause pressure to increase and FCV-122 failure will also cause pressure increase.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of effects of transients on plant

REFERENCES SUPPLIED:

SECTION 3.0 SOLID PLANT OPERATIONS

1.0 SYMPTOMS

1. Low or High RCS pressure indication on the MCB
2. Pressurizer PORVs PCV 445A or PCV 444B indicate open
3. "PRESSURIZER RELIEF DISCHARGE HIGH TEMP" alarm ALB-009-8-2
4. "PRESSURIZER RELIEF TANK HIGH-LOW LEVEL PRESS OR TEMP" alarm ALB-009-8-1
5. Charging and letdown flows not equal
6. "RC OVERPRESS" alarm ALB-010-5-1
7. "HIGH RCS PRESS AT LOW TEMP" alarm ALB-010-5-2
8. "RCP-A(B,C) SEAL #1 LOW ΔP" ALB-008-3-2 (008-4-2, 008-5-2)
9. Abnormally high or low RHR pump discharge pressure
10. "RHR LOOP A(B) DISCHARGE LOW FLOW" alarm ALB-004-4-1(004-5-1)
11. "RHR PUMP A(B) TRIP OR CLOSE CKT TROUBLE" alarm ALB-004-4-4(004-5-4)
12. "RHR LOOP A(B) DISCHARGE HIGH PRESS" alarm ALB-004-4-2(004-5-2)
13. "RHR HX A(B) CCW HI/LO FLOW" alarm ALB-005-2-4B(005-3-4B)
14. "1RH-1 (2, 39, 40) NOT SHUT AND RCS PRESS HIGH" alarm ALB-004-3-1 (004-3-2, 004-3-3, 004-3-4).

2.0 AUTOMATIC ACTIONS

1. PRZ PORVs PCV 444B and PCV 445A will open when RCS pressure reaches the Low Temperature PORV(s) setpoint.
2. RHR Hot Leg suction reliefs open at 450 psig.
3. RHR pump discharge reliefs open at 600 psig.

3.0 OPERATOR ACTION

3.1 Immediate Action

1. If RCS pressure is high, stop the running charging pump.

SECTION 3.0

3.2 Follow-Up Action

NOTE: If safe and efficient operation of the plant will not be compromised, procedure Steps may be performed simultaneously or out of sequence at the discretion of the SCO.

1. If the charging pump is secured, and RCP(s) are in service, monitor the RCP No. 1 seal ΔP.

2. Verify the appropriate automatic actions specified in 2.0 AUTOMATIC ACTIONS have occurred.

3. Verify RHR flows and pump discharge pressures are normal.

4. If RCS pressure is off normal as a result of a leak or loss of RHR, refer to AOP-020, Loss of RCS Inventory or RHR While Shutdown.

5. If RCS pressure is off normal as a result of a loss of CCW to RHR, refer to AOP-014, Loss of Component Cooling Water.

6. Verify RHR letdown and charging (if not isolated) flows are normal.

7. Locally, verify PCV-145 letdown pressure control valve and HCV-142 RHR letdown control valve are open and modulating properly.

8. If PCV-145 letdown pressure control valve is failed open, control letdown flow with HCV-142 RHR letdown control valve.

9. If PCV-145 letdown pressure control valve is stuck shut, perform the following:

   a. Shut HCV-142 RHR letdown control valve.

   b. Locally open 1CS-44, PCV-145 bypass.

   c. Locally shut 1CS-35, PCV-145 manual isolation.

   d. Establish letdown flow using HCV-142 to control flow and RCS pressure.

10. If HCV-142 RHR letdown control valve is failed shut, reduce or stop seal injection and charging.

11. If letdown is lost, establish excess letdown and re-establish charging per OP-107, Chemical Volume Control System.

12. If RCS pressure is high, verify all PRZ heaters are off.

SECTION 3.0

3.2 Follow-Up Action (continued)

13. If FCV-122 Charging Flow Control valve has failed, perform the following:

    a. Locally shut 1CS-228, FCV-122 manual isolation.

    b. Throttle 1CS-227, FCV-122 bypass as needed.

14. Refer to Tech. Spec. 3.4.9.4.

15. Initiate appropriate corrective actions.

16. If any valves were repositioned in this procedure, ensure they are documented according to OMM-001 and PLP-702.

4.0 GENERAL

1. During solid plant operations, RCS pressure may rapidly increase. If any letdown valve shuts, the charging flow increases, or RCS temperature increases.

2. During solid plant operations, RCS pressure may rapidly decrease. If any letdown valve fails open, the charging flow decreases, or RCS temperature decreases.

3. This procedure meets the requirements of ANSI Commitment 415-5.3.9 and 417-5.3.9.

5.0 DIAGRAMS/ATTACHMENTS

None Applicable

AOP-3.19-R4 001

With the primary plant solid, "B" RCP running, both trains of RHR cooling in service, and the RCS at 300 psig and 160° F, what intial effect (increase, decrease, or remain same) will the following events have on RCS pressure?

A) HCV-142 (RHR to letdown) fails shut
B) FCV-122 (charging flow control) fails open
C) "A" RHR HX discharge out flow control valve fails open
D) The "B" RCP is stopped

Question: 15

With the plant at 100 percent steady-state condition, the following occurs:

- ALB-07-4-3, VCT HIGH-LOW LEVEL, alarms.
- ALB-06-7-3, TOTAL MAKEUP WATER FLOW DEVIATION, alarms.
- ALB-06-8-4, BORIC ACID FLOW DEVIATION, alarms.
- VCT level is at 14.5% and decreasing at the same rate it has been for the last few days.

Which of the following procedures should be addressed?

a. AOP-002, Emergency Boration

b. AOP-003, Malfunction of Reactor Makeup Control

c. AOP-016, Excessive Primary Plant Leakage

d. AOP-017, Loss of Instrument Air

Answer:

b. AOP-003, Malfunction of Reactor Makeup Control

QUESTION NUMBER: 15
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: 0222.4.4

Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures (Loss of Reactor Coolant Makeup).

K/A IMPORTANCE: ***RO*** 4.0 ***SRO*** 4.3

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.3-R1

IDENTIFY symptoms that require entry into AOP-003, Malfunction of Reactor Makeup Control

REFERENCES: AOP-003

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AOP-3.3-R1 002

JUSTIFICATION:

a. Plausible since Emergency Boration entry conditions include any condition which is a result of an unexplained reactivity addition, which candidate may consider this to be.

b. CORRECT These are entry conditions for Reactor Makeup Control malfunction

c. Plausible since CVCS leakage, if suspected, would cause entry into AOP-016.

d. Plausible since normal boration flowpaths are not available during a loss of instrument air event.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural entry requirements

REFERENCES SUPPLIED:

1.0 SYMPTOMS

1.1 Symptoms of LT-115 Failed High

1. ALB-7-4-3, VCT HIGH-LOW LEVEL alarm
2. ALB-7-5-5, COMPUTER ALARM CHEM & VOL SYSTEMS
3. LI-115.1, VOL CONTR TANK LEV, indicates failed high
4. LCV-155A, LTDWN VCT OR HUT, diverted to HUT
5. LI-112, (local indication) indicates level decreasing
6. If auto makeup in progress, makeup terminates

1.2 Symptoms of LT-115 Failed Low

1. ALB-7-4-3, VCT HIGH-LOW LEVEL alarm
2. ALB-7-5-5, COMPUTER ALARM CHEM & VOL SYSTEMS
3. LI-115.1, VCT Level, indicates failed low
4. If in auto, makeup initiates

1.3 Symptoms of LT-112 Failed High

1. ALB-7-5-5, COMPUTER ALARM CHEM & VOL SYSTEMS
2. LCV-115A, LTDWN VCT OR HUT, diverted to HUT
3. LI-115.1, VCT Level, indicates level decreasing
4. If in auto, makeup starts and runs excessively to maintain VCT level
5. If makeup not in auto, level decrease results in ALB -7-4-3, VCT HIGH-LOW LEVEL alarm

1.4 Symptoms of LT-112 Failed Low

1. ALB-7-5-5, COMPUTER ALARM CHEM & VOL SYSTEMS
2. LCV-115A, LTDWN VCT OR HUT, fails to modulate at 70% VCT level
3. LI-112, (local indication) indicates level failed low

1.5 Symptoms of FK-114, Wtr To Blend Contr, Malfunction

1. Failure of makeup water flow to start upon initiation of auto makeup, dilute, or alternate dilute
2. Improper makeup water flow during auto makeup, dilute, or alternate dilute
3. ALB-6-7-3, TOTAL MAKE UP WATER FLOW DEVIATION alarm
4. Abnormal control rod response to auto makeup
5. Abnormal RCS temperature response to auto makeup with control rods in manual.

1.0 SYMPTOMS (continued)

1.6 Symptoms of FK-113, BA To Blend Contr, Malfunction

1. Failure of boric acid flow to start upon initiation of auto makeup or boration
2. Improper boric acid flow during auto makeup or boration
3. ALB-6-8-4, BORIC ACID FLOW DEVIATION, alarm
4. Abnormal control rod response to auto makeup
5. Abnormal RCS temperature response to auto makeup with control rods in manual

1.7 Symptoms of FT-114, Total Makeup Flow, Transmitter Failure

1. Failure of makeup water flow to start upon initiation of makeup, dilute, or alternate dilute
2. ALB-6-7-3, TOTAL MAKE UP WATER FLOW DEVIATION alarm
3. FIS-114, Total Makeup WTR Batch Counter, indicating abnormally for conditions

1.8 Symptoms of FT-113, Boric Acid To Blender Flow, Transmitter Failure

1. Failure of boric acid flow to start upon initiation of makeup or boration
2. ALB-6-8-4, BORIC ACID FLOW DEVIATION alarm
3. FIS-113, Boric Acid Batch Counter, indicating abnormally for conditions

1.9 Symptoms of RMCS Valve Failure (FCV-113A, FCV-113B, FCV-114A, FCV-114B)

1. Loss of Instrument Air
2. ALB-6-8-4, BORIC ACID FLOW DEVIATION alarm (FCV-113A)
3. ALB-6-7-3, TOTAL MAKE UP WATER FLOW DEVIATION alarm (FCV-113B or FCV-114B)
4. Failure of valve to respond to open signals from MCB

2.0 AUTOMATIC ACTIONS

None

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

Question: 21

Given the following conditions:

- A reactor trip and safety injection has occurred.
- ESW pump operation is being verified in PATH-1.
- Containment pressure is 7 psig.
- RCS pressure is 950 psig.
- SI Flow indicator FI-943, Normal HDR Flow, indicates 0 gpm.
- Both CSIPs are running and all SI valves are properly aligned.

Which of the following actions is to be taken?

a. Trip the RCPs immediately due to RCP Trip Criteria being met

b. Leave the RCPs running until a transition is made to Entry Point C

c. Leave the RCPs running until containment pressure reaches 10 psig

d. Trip the RCPs immediately due to a loss of CCW cooling to the pumps

Answer:

a. Trip the RCPs immediately due to RCP Trip Criteria being met

QUESTION NUMBER: 21
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/1

K/A: 011EA1.03

Ability to operate and monitor the following as they apply to a Large Break LOCA: Securing of RCPs

K/A IMPORTANCE: ***RO*** 4.0 ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: EOP-3.1

DEMONSTRATE the below-assumed operator knowledge from the SHNPP Step Deviation Documents and WOG ERGs that sup-port performance of EOP actions
c. RCP trip criteria applicability and importance

REFERENCES: EOP-GUIDE-1
EOP Users Guide

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number EOP-3.1 032

JUSTIFICATION:

a. **CORRECT** RCP trip criteria has been met even though FI-943 indicates 0 flow. Instrument is not safety-related and should not be relied upon to make decision to trip pumps if all other indications support SI flow exists.

b. Plausible since trip criteria addresses FI-943 flow indication, but instrument is not safety-related and should not be relied upon to make decision to trip pumps if all other indications support SI flow exists.

c. Plausible since trip criteria addresses FI-943 flow indication, but instrument is not safety-related and should not be relied upon to make decision to trip pumps if all other indications support SI flow exists.

d. Plausible since RCPs should be tripped if CCW flow is lost to the pumps, but CCW to containment does not isolate until containment pressure reaches Phase B setpoint.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of procedural guidance to off-normal conditions

REFERENCES SUPPLIED:

FOLDOUT A

- RCP TRIP CRITERIA

  IF both of the following occur, THEN stop all RCPs:

  - SI flow - GREATER THAN 200 GPM
  - RCS pressure - LESS THAN 1360 PSIG

- AFW SUPPLY SWITCHOVER CRITERIA

  IF CST level decreases to less than 10%, THEN switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

- RHR RESTART CRITERIA

  IF RCS pressure decreases to less than 190 PSIG, THEN restart RHR pumps to supply water to the RCS.

- ALTERNATE MINIFLOW OPEN/SHUT CRITERIA

  - IF RCS pressure decreases to less than 1800 PSIG, THEN verify alternate miniflow isolation OR miniflow block valves - SHUT
  - IF RCS pressure increases to greater than 2200 PSIG, THEN verify alternate miniflow isolation AND miniflow block valves - OPEN

Instructions	Response Not Obtained
6. Foldout A Applies.	
7. Check RHR System Status - ALIGNED IN ECCS MODE	Continue using AOP-020, "LOSS OF RCS INVENTORY OR RESIDUAL HEAT REMOVAL WHILE SHUTDOWN" while referring to PATH-1.
8. Verify All CSIPs <u>AND</u> RHR pumps - RUNNING	
9. Verify Two CCW Pumps - RUNNING	
10. Verify all ESW <u>AND</u> ESW Booster Pumps - RUNNING	
11. Check CNMT Pressure - HAS REMAINED LESS THAN 10 PSIG	Perform the following: a. Verify CNMT spray - ACTUATED b. Verify the following: o CNMT spray pumps - RUNNING o CNMT spray valves - PROPERLY ALIGNED o Phase B isolation valves - SHUT (Refer to OMM-004, "POST TRIP/SAFEGUARDS REVIEW", Attachment 9.) c. Stop all RCPs.

6.29 Loss of SI Flow Indication:

Lack of flow indication on FI-943 should not be interpreted as a failure of the high head SI piping and should not be used as the basis to establish an alternate injection flow path. In the absence of flow indication, the operator should rely on the valve position indication to determine the status of SI flow. If a flow path through the BIT is available, the operator should assume the high head SI system is intact. Also, SI flow should be assumed to be available when evaluating the RCP trip criteria.

Establishing an alternate flow path is not appropriate for the following reasons:

(1) Failure of the high head SI piping is not considered plausible by the EOPs and is not a significant contributor to the core damage frequency (CDF) in the SHNPP Individual Plant Evaluation (IPE).

(2) FI-943 is not safety related. It is a non-conservative action to realign the SI system in a configuration different from that assumed in the FSAR based on a non-safety related instrument that potentially has failed.

(3) In the unlikely case of a failure of the high head SI piping, absence of flow on FI-943 would indicate a failure upstream of the associated flow transmitter. Shutting the BIT inlet and outlet valves would not isolate the failure. Opening an alternate injection valve with the failure unisolated would force the CSIPs to discharge through two flow paths simultaneously, potentially causing the CSIPs to experience runout.

Appropriate diagnostics for failures of the SI system are included in the EOPs with associated contingency actions. If a flow path through the BIT can not be established in PATH-1, the operator is directed to establish an alternate injection path. Guidance for establishing an alternate injection path is given in PATH-1 GUIDE. In the event no high head SI flow can be established, the cooldown and depressurization strategy employed by the EOPs should be successful in maintaining adequate core cooling. If adequate core cooling can not be maintained, FRP-C.1 and FRP-C.2 provide guidance to preclude core damage. This guidance includes aligning alternate high head injection flow paths (Reference 2.2.2.4).

EOP-3.1 032
Following a reactor trip and safety injection, PATH-1 is implemented. During performance of the SI verification, the reactor operator reports that RCP trip criteria has been satisfied. What actions should be taken?

✓A. Trip the RCPs.

B. Trip the RCPs after verifying Phase B isolation.

C. Do not trip the RCPs until immediate actions are complete.

D. Do not trip the RCPs until a transition is made to entry Point C.

Question: 22

Given the following conditions:

- The plant is in Mode 5.
- ALB-08-1-4, RWMU STORAGE TANK MINIMUM/HIGH LEVEL, alarms.
- RWMU tank level is decreasing with **NO** VCT makeup in progress.

Which one of the following procedures would be the most appropriate to implement?

a. AOP-003, Malfunction of Reactor Makeup Control

b. AOP-008, Accidental Release of Liquid Waste

c. AOP-016, Excessive Primary Plant Leakage

d. AOP-020, Loss of Reactor Coolant Inventory / RHR While Shutdown

Answer:

b. AOP-008, Accidental Release of Liquid Waste

QUESTION NUMBER: 22
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/1

K/A: 0592.4.4

Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures (Accidental Liquid Radwaste Release).

K/A IMPORTANCE: ***RO*** 4.0 ***SRO*** 4.3

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.8

IDENTIFY symptoms that require entry into AOP-008, Accidental Release of Liquid Waste

REFERENCES: AOP-008

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AOP-3.8 001

JUSTIFICATION:

a. Plausible since RMUW tank supplies makeup to VCT, but AOP-003 addresses conditions regarding valve / transmitter failures, not loss of tank source.

b. **CORRECT** Entry conditions have been met for AOP-008.

c. Plausible since RMUW tank supplies makeup to RCS and candidate may imply that loss of supply results in a loss of primary inventory, but conditions are met for entry into AOP-008.

d. Plausible since RMUW tank supplies makeup to RCS and candidate may imply that loss of supply results in a loss of primary inventory with plant shutdown, but conditions are met for entry into AOP-008.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural entry requirements

REFERENCES SUPPLIED:

ACCIDENTAL RELEASE OF LIQUID WASTE

1.0 SYMPTOMS

1. Radiation alarm on any of the following:

   a. Turbine Area Drains / Tank Area Drains monitors:

      - REM-1MD-3528, Turbine Building Drains monitor
      - REM-1MD-3530, Tank Area Drain Transfer Pumps monitor

   b. Service Water Return monitors:

      - REM-1SW-3500A, SW from WPB to Circ. Water monitor
      - REM-1SW-3500B, RAB from Cont Turb Bldg. to CW monitor

   c. WPB Liquid Effluent monitors:

      - REM-1WL-3540, Treated Laundry and Hot Shower Tank Pump Discharge monitor
      - REM-21WL-3541, WST Tank Discharge monitor
      - REM-21WS-3542, Secondary Waste Sample Tank Pump Discharge monitor

2. RWST or RMWST level decreasing

3. ALB-04-2-2, REFUELING WATER STORAGE LOW LEVEL alarm

4. ALB-08-1-4, RWMU STORAGE TANK MINIMUM-HIGH LEVEL alarm

5. Notification to the Control Room of an accidental liquid release

2.0 AUTOMATIC ACTIONS

None

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

Question: 23

Given the following conditions:

- Fuel cladding failure has occurred.
- The CVCS Cation Bed demineralizer has been placed in service.

Which of the following **ALL** provide positive indications of the fuel cladding failure?

a.
- RCS boron decreasing
- Chemistry samples
- Volume Control Tank Room radiation monitor alarming

b.
- RCS boron decreasing
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

c.
- Chemistry samples
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

d.
- RCS boron decreasing
- Chemistry samples
- Gross Failed Fuel Detector alarming

Answer:

c.
- Chemistry samples
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

QUESTION NUMBER: 23

TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 076AA1.04

Ability to operate and / or monitor the following as they apply to the High Reactor Coolant Activity: Failed fuel-monitoring equipment

K/A IMPORTANCE: ***RO*** 3.2 ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.32

STATE the methods of determining RCS activity and the cause of high RCS activity

REFERENCES: AOP-032

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.32 004

JUSTIFICATION:

a. Plausible since chemistry samples and radiation levels increasing are symptoms, but failed fuel will not change RCS boron concentration.

b. Plausible since failed fuel detector and radiation levels increasing are symptoms, but failed fuel will not change RCS boron concentration.

c. **CORRECT** All are entry symptoms of fuel cladding failure which would require entry into AOP-032, High RCS Activity.

d. Plausible since chemistry samples and failed fuel detector levels increasing are symptoms, but failed fuel will not change RCS boron concentration.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of symptoms of event on alternate plant indications

REFERENCES SUPPLIED:

High RCS Activity

1.0 SYMPTOMS

1. Fuel Breach Area Monitors (EAL Table 2) shows increased radiation levels:

Monitor Description	Instrument Tag No.	RM-11 Channel ID	ERFIS Point ID
Volume Control Tank Rm	RM-1RR-3595	1AA056	RRR3595A
Charging Pump 1A Rm	RM-1RR-3599A	1AA060	RRR3599A
Charging Pump 1B Rm	RM-1RR-3599B	1AA061	RRR3599B
Charging Pump 1C Rm	RM-1RR-3599C	1AA062	RRR3599C
Recycle Evap Vlv Gal	RM-1RR-3600	1AA063	RRR3600A
Letdown Hx Vlv Gal	RM-1RR-3601	1AA064	RRR3601A
Moderating Hx Vlv Gal	RM-1RR-3602	1AA065	RRR3602A

2. ALB-26-2-1, GROSS FAILED FUEL DET TROUBLE

3. Notification by Chemistry of an abnormal increase in RCS Dose Equivalent I-131 activity or high gross activity.

2.0 AUTOMATIC ACTIONS

2.1 None

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

3.2 Follow-up Actions

R NOTE: High RCS activity resulting from a loss of the fuel fission product barrier or the Gross Failed Fuel Detector alarm may require the initiation of the Emergency Plan. (Ref.: DIN 84296-398)

1. Refer to PEP-110, "Emergency Classification and Protective Action Recommendations," and enter EAL network at entry point X.

2. IF Fuel Handling is in progress, THEN refer to AOP-013, Fuel Handling Accident.

3. IF NOT previously performed, THEN request Chemistry sample the RCS for:

- Dose Equivalent I-131
- Gross activity (100/E Bar)
- Isotopic analysis

AOP-3.32 004

List the two methods per AOP-032, High RCS Activity, used to assess RCS activity.

Question: 24

Given the following conditions:

- The plant is at 30% power.
- A dropped control rod has just been re-aligned.
- While attempting to reset the Rod Control Urgent Failure alarm, the operator inadvertently operates the Rod Control Start Up switch.

Which of the following describes the effect of operating the incorrect switch?

a. All Control Bank control rods drop into the core, causing an automatic reactor trip

b. All rods, including Control Bank and Shutdown Bank rods, drop into the core, causing an automatic reactor trip

c. All rods remain in their current position and there is **NO** effect on the Rod Control System circuitry

d. All rods remain in their current position, but the Rod Control System circuitry senses all rods are fully inserted

Answer:

d. All rods remain in their current position, but the Rod Control System circuitry senses all rods are fully inserted

QUESTION NUMBER: 24
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 001A4.14

Ability to manually operate and/or monitor in the control room: Resetting rod control logic while recovering from misaligned rod, using instrument Tech Specs

K/A IMPORTANCE: ***RO*** 3.0 ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: RODCS-3.0-R7

DISCUSS the effects of manipulating each of the following rod control-related switches
a. ROD CONTROL START-UP RESET switch
b. ROD CONTROL ALARM RESET switch

REFERENCES:
RODCS-LP-3.0
OP-104
AOP-001

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number RODCS-3.0-R7 001

JUSTIFICATION:

a. Plausible since improper operation of correct switch could result in rods dropping into core, but operated switch only resets starting points for rod control circuitry.

b. Plausible since improper operation of correct switch could result in rods dropping into core, but operated switch only resets starting points for rod control circuitry.

c. Plausible since switch is normally only operated prior to withdrawing any rods so candidate may imply that effect is nothing if performed at power.

d. CORRECT Operating switch at power does not affect actual rod position, but resets rod control such that circuitry senses rods are at "full inserted" position.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of effect of improper operator actions

REFERENCES SUPPLIED:

Section 4.0

3.2 Follow-up Actions (continued)

o. IF the dropped rod was in Group 1, THEN perform the following:

(1) Withdraw the affected rod one step.

(2) Insert the affected rod one step.

p. Check the DRPI for the affected rod is aligned within 12 steps of the step counter demand position.

q. Locally close the lift coil disconnect switches that were opened in Step 3.2.7.c.

8. Reset the negative rate trip alarm at the NIS cabinets.

NOTE: Resetting the P/A converter may cause a Rod Insertion Limit alarm.

9. IF the dropped rod was in a control bank, THEN direct the operator to locally reset the P/A converter to the value recorded in Step 3.2.7.e per OP-104, Rod Control System.

10. Consult with Maintenance as needed and perform the following:

a. Inspect all Rod Control Power and Logic cabinets.

b. Verify NO Urgent alarms exist, except for the expected regulation failure in the unaffected rod group associated with the affected bank.

c. IF any other urgent alarm exists, THEN obtain Maintenance concurrence before resetting the Rod Control Urgent Failure alarm.

d. Place the Rod Control Alarm Reset lever momentarily to RESET, to reset the Rod Control Urgent Failure alarm.

11. Update Bank Demand Pulse Counters sub-function on ERFIS using the turn on code RODS.

12. Place the Rod Bank Selector switch in the desired position.

13. Verify the power distribution limits are within Tech Spec 3.2.1 and 3.2.4 limits.

14. EXIT this procedure.

5.3 <u>Withdrawal of Shutdown Rod Banks</u>
R (Reference 2.3.0.01)

5.3.1 <u>Initial Conditions</u>

1. A Rod Drive MG Set has been started per Section 5.1.

CAUTION

Before closing the Reactor Trip Breakers, the Turbine must be manually tripped to prevent the possibility of the Turbine latching automatically.

5.3.2 <u>Procedural Steps</u>

1. At the MCB, verify closed the Reactor Trip Breakers by taking REACTOR TRIP BREAKERS TRAINS A&B Switch to CLOSE and release.

2. At the MCB, take ROD CONTROL START UP Switch to RESET and release.

3. Check the following:

   a. All Group Step Counters are reset to zero.

   b. All individual Digital Rod Position Indicators indicate rods on the bottom.

   c. Rod Control IN-OUT Direction Lamps are extinguished.

   d. ROD CONTROL URGENT ALARM annunciator is extinguished.

   e. ROD CONTROL NON-URGENT ALARM annunciator is extinguished.

   f. ROD DRIVE MG SET TROUBLE annunciator is extinguished.

   g. Pulse-Analog Converter is reset to zero.

4. Withdraw Shutdown Rod Banks to 228 steps as follows:

   a. At the MCB, rotate the ROD BANK SELECTOR Switch to SBC.

   b. At the MCB, position ROD MOTION Switch to WITHDRAW and verify the RODS OUT Direction Lamp lights.

   c. Observe that Shutdown Bank C Group Step Counter SC-SBC1 indicates withdrawal steps.

   d. Verify the rods in Shutdown Bank C are moving on the Digital Rod Position Indication display.

   e. At the MCB, when Shutdown Rod Bank C reaches 228 steps release the ROD MOTION Switch allowing it to return to the neutral position and verify the RODS OUT Direction Lamp extinguishes.

   f. At the MCB, rotate the ROD BANK SELECTOR Switch to SBA.

   g. At the MCB, position ROD MOTION Switch to WITHDRAW and verify the RODS OUT Direction Lamp lights.

   h. Verify rod speed of 64 steps per minute on SI-408.

(4) Coincidence—one out of one (PT-446 or PT-447)

f. C-11, Rods Out Rod Stop

(1) Function—stops Control Bank D outward rod motion in automatic control

(2) Input—P/A converter

(3) Setpoint—Control Bank D at 220 steps

11. Main control board indications and controls

a. Bank Selector Switch—discussed previously

b. ROD CONTROL START-UP switch

(1) Resets

(a) Group step counters

(b) Pulse-to-analog converter

(c) Bank Overlap Unit

(d) Slave cyclers

(e) Master Cycler

(f) Internal memory

(g) Alarms

(2) Ensure proper rod sequencing and data logging during a start-up

(3) If inadvertently depressed at-power

(a) Rod Control System circuitry would be reset to an all-rods-in condition

(b) Each affected component would have to be manually reset

c. ROD CONTROL ALARM RESET switch

(1) Urgent alarms

(2) Does not reset counters

d. Indications

(1) Rod speed indicator (SI-408)

(a) Displays speed signal that will be sent to the pulser when the rods-in or rods-out relay energizes

(b) Scale—0 to 75 spm

RODCS-3.0-R7 001

Which of the following Rod Control System components is NOT affect by operation of the ROD CONTROL START-UP switch?

A. Bank overlap counter

B. Master Cycler

C. Slave Cyclers

✓D. Pulser

Question: 25

Given the following conditions:

- ALB-26-1-4, ANNUN SYS 1 POWER SUPPLY FAILURE, alarms.
- Investigation determines a 12 VDC (1C#1) power supply has failed.

Which of the following ALBs should be considered inoperable?

a. Containment Spray & Accumulator System

b. Chemical Volume Control System

c. Reactor First Out System

d. Auxiliary Feedwater System

Answer:

c. Reactor First Out System

QUESTION NUMBER: 25
TIER/GROUP: ***RO*** 3 ***SRO*** 3

K/A: 2.4.32

Knowledge of operator response to loss of all annunciators.

K/A IMPORTANCE: ***RO*** 3.3 ***SRO*** 3.5

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.37-R3

Given a set of plant conditions involving a Main Control Room annunciator problem and a copy of AOP-037, Loss of Main Control Room Annunciators, EVALUATE the information provided and DESCRIBE the necessary actions to best stabilize the plant

REFERENCES: AOP-37

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.37-R3 002

JUSTIFICATION:

a. Plausible if candidate neglects sheet 1 of attachment and correlates loss of 1C1 to loss of ALB-001.

b. Plausible if candidate incorrectly identifies supply on sheet 1 of attachment and correlates loss to ALBs 5-8.

c. CORRECT Referencing sheet 1 of attachment 3 identifies ALBs 9-12 being affected, which is Pressurizer, RCS, and Reactor First Out annunciators.

d. Plausible if candidate incorrectly identifies supply on sheet 1 of attachment and correlates loss to ALBs 17-20.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of data provided to determine outcome

REFERENCES SUPPLIED: AOP-037, Attachment 3

Affected ALB Determination

POWER SUPPLIES	NUMBER OF AFFECTED WINDOWS	AFFECTED ALBs
System 1		
125 VDC 1A and 1C	306	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
System 2		
125 VDC 2A#1 and 2D#3	240	13, 14 (49 of 52), 15 (2 of 22), 16, 17, 19, 20 (37 of 39), 21 (24 of 37), 22 (15 of 48), 24 (2 of 10), 25 (2 of 10), 26 (1 of 14)
125 VDC 2C#1 and 2D#1	160	14 (3 of 52), 15 (20 of 22), 18 (10 of 24), 22 (30 of 48), 23 (8 of 97), 26 (13 of 14), 27, 28, 29, 30 (17 of 31), 24 (8 of 10), 25 (8 of 10)
125 VDC 2E#1 and 2D#2	135	18 (14 of 24), 20 (2 of 39), 21 (13 of 37), 22 (3 of 48), 23 (89 of 97), 30 (14 of 31)
System 1		
24 VDC or 12 VDC 1A#1	97	1, 2, 3, 4
24 VDC or 12 VDC 1A#2	108	5, 6, 7, 8
24 VDC or 12 VDC 1C#1	101	9, 10, 11, 12
System 2		
24 VDC or 12 VDC 2A#1	145	13, 14, 15, 20
24 VDC or 12 VDC 2A#2	84	17, 21, 30
24 VDC or 12 VDC 2C#1	121	23, 25, 26
24 VDC or 12 VDC 2C#2	91	22, 27, 28, 29
24 VDC or 12 VDC 2E#1	94	16, 18, 19, 24

NOTE:

- When ( ) follow the ALB number, the first number indicates the affected windows, and the second number indicates the total number of windows for that ALB.
- Total number of annunciators is 841 in Modes 1-4 and 592 in Modes 5-6.
- A given ALB has 3 power supplies. For multiple power supply failures, care must be taken to not count an ALB twice.

Affected ALB Determination

General Description of Systems Associated with ALBs:

ALB-1	Containment Spray & Accumulator System
ALB-2	Emergency Service Normal Service Water System
ALB-3	Misc. Systems
ALB-4	RHR/RWST System
ALB-5	Component Cooling Water System
ALB-6	Chemical Volume Control System
ALB-7	Chemical Volume Control System
ALB-8	RCP System
ALB-9	Pressurizer System
ALB-10	Reactor Coolant System
ALB-11	Reactor First Out System
ALB-12	Reactor First Out System
ALB-13	Nuclear Instrumentation System and Rod Control System
ALB-14	Steam Generator System
ALB-15	Various Protective Panels Trouble Alarm
ALB-16	Feedwater System
ALB-17	Auxiliary Feedwater System
ALB-18	Turbine First Out System
ALB-19	Heater Drain Pump & Condensate System
ALB-20	MSR & Turbine System
ALB-21	LP/HP Heaters & Circulating Water System
ALB-22	Generator Exciter, Startup & Unit Transformer
ALB-24	Diesel Generator - A System
ALB-25	Diesel Generator - B System
ALB-26	Control Panels Trouble Alarm System
ALB-27	HVAC System (DG & Containment)
ALB-28	HVAC System (Containment)
ALB-29	HVAC System (Containment)
ALB-30	HVAC System (Control Room)

AOP-3.37-R3 002
Using a copy of AOP-037, Loss of Main Control Room Annunciators, Attachment 2; determine the affected ALBs when 12-VDC (2C#1) power supply has failed.

A. 14, 15, 18, 22, 23, 26, 27, 28, 29, 30

B. 9, 10, 11, 12

✓C. 23, 25, 26

D. 22, 27, 28, 29

Question: 26

Given the following conditions:

- Several Fuel Handling Building (FHB) area radiation monitors on both trains have reached the high alarm setpoint.
- AOP-005 has directed the operator to verify that the FHB ventilation has shifted to the emergency exhaust lineup.
- Both FHB Emergency Exhaust Fans, E-12 and E-13, are RUNNING.
- FHB Emergency Exhaust Fan Inlets, 1FV-2 SA and 1FV-4 SB, are OPEN

Which of the following additional alignments is expected?

a.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **OPEN**

b.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **RUNNING**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **OPEN**

c.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

d.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **RUNNING**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

Answer:

c.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

QUESTION NUMBER: 26
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: 061AK3.02

Knowledge of the reasons for the following responses as they apply to the Area Radiation Monitoring (ARM) System Alarms: Guidance contained in alarm response for ARM system

K/A IMPORTANCE: ***RO*** 3.4 ***SRO*** 3.6

10CFR55 CONTENT: ***55.41(b) RO*** 5/10 ***55.43(b) SRO***

OBJECTIVE: RMS-LP-3.0-9

Given a system, PREDICT the automatic actions that occur as a result of the following:
a. Alert and/or high alarm on RMS channel

REFERENCES: OP-170
AOP-005

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98RO-16

JUSTIFICATION:

a. Plausible since these FHB components get an actuation signal, but the FHB Normal Exhaust Isolation Dampers are not properly aligned.

b. Plausible since these FHB components get an actuation signal, but the FHB Normal Exhaust Isolation Dampers and the FHB Operating Floor Supply Fans are not properly aligned.

c. CORRECT Both trains of FHB will be in the emergency ventilation alignment, which includes emergency exhaust fans running with inlet dampers open, all normal fans secured and operating floor dampers shut.

d. Plausible since these FHB components get an actuation signal, but the FHB Operating Floor Supply Fans are not properly aligned.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system interlocks and operations

REFERENCES SUPPLIED:

RADIATION MONITORING SYSTEM

1.0 SYMPTOMS

1. Increasing radiation level on radiation monitors
2. ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE alarm
3. ALB-10-3-4, WPB EFFLUENT RAD MONITOR TROUBLE alarm
4. ALB-10-5-4, RAB/TB STACK ACCIDENT RAD MONITOR TROUBLE alarm
5. Notification to the Control Room of increasing radiation levels or alarms

2.0 AUTOMATIC ACTIONS

1. High alarm on the following Containment monitors initiates Containment Ventilation Isolation on 2/4 logic:
   - RM-1CR-3561A-SA
   - RM-1CR-3561B-SB
   - RM-1CR-3561C-SA
   - RM-1CR-3561D-SB
2. High alarm on REM-1LT-3502A-SA, CNMT RCS Leak Detection monitor, isolates Normal Containment Purge
3. High alarm on REM-1LT-3502B, CNMT Pre-Entry Purge monitor, isolates Containment Pre-entry Purge
4. High alarm on any of the following FHB Spent Fuel Pool Area monitors initiates FHB Emergency Exhaust mode of operation:
   - RM-1FR-3564A-SA
   - RM-1FR-3564B-SB
   - RM-1FR-3565A-SA
   - RM-1FR-3565B-SB
   - RM-1FR-3566A-SA
   - RM-1FR-3566B-SB
   - RM-1FR-3567A-SA
   - RM-1FR-3567B-SB
5. High alarm on REM-1WV-3546, WPB Stack 5 PIG monitor, shuts 3WG -229, WG DECAY TANKS E & F TO PLANT VENT VLV
6. High alarm on REM-1WC-3544, WPB CCW HX Inlet monitor, shuts 3WC -4, WPB CCW Surge Tank Overflow valve

7.3 Spent Fuel Pool Pump Room Ventilation System Shutdown

7.3.1 Initial Conditions

1. System in operation as per Section 5.3.

7.3.2 Procedural Steps

1. At AEP-1, stop the SFP PUMP ROOM FAN COOLER AH-17 1-4A SA (AH-17 1-4B SB).

8.0 INFREQUENT OPERATIONS

8.1 Auto Start of Emergency Exhaust System

8.1.1 Initial Conditions

1. High radiation signal (100 mr/hr) received from the SFP Area Rad. Monitors (1 out of 12 coincidence on either train).

NOTE:
- High radiation levels on Rad Monitor Train A (B) will automatically start EMERGENCY EXHAUST FAN E-12 1-4X-SA (EMERGENCY EXHAUST FAN E-13 1-4X-SB).
- High radiation levels on Rad Monitor Train A or B in the FHB will secure and isolate normal ventilation.

8.1.2 Procedural Steps

NOTE: E-84 may require securing from the MCC breaker if high radiation levels exist at it the control switch.

CAUTION

E-84 needs to be secured upon receiving a FHB Ventilation Isolation Signal to prevent the potential spread of contamination through the Fuel Handling Building.

---

1. Verify E-84 is secured upon receipt of high radiation signal (1-4B1021-5B).

2. Ensure the following dampers and fans have properly realigned as follows:

   a. If a Train A high radiation signal was received, at AEP-1:

      (1) EMERGENCY EXHAUST FAN E-12 1-4X-SA — ON

      (2) EMER EXH FAN E-12 INLET 1FV-2 SA — OPEN

      (3) LOADING AREA ISOL DAMPERS FL-D35SA/D37SA — SHUT

   b. If a Train B high radiation signal was received, at AEP-1:

      (1) EMERGENCY EXHAUST FAN E-13 1-4X-SB — ON

      (2) EMER EXH FAN E-13 INLET 1FV-4 SB — OPEN

      (3) LOADING AREA ISOL DAMPERS FL-D36SB/D38SB — SHUT

8.1.2 Procedural Steps (continued)

c. At AEP-1 on SLB-11 (TRAIN A):

(1)	EXH ISOL FL-D4	SHUT
(2)	EXH ISOL FL-D21	SHUT
(3)	SUP ISOL FL-D8	SHUT
(4)	SUP ISOL FL-D11	SHUT

d. At AEP-1 on SLB-9 (TRAIN B):

(1)	EXH ISOL FL-D5	SHUT
(2)	EXH ISOL FL-D22	SHUT
(3)	SUP ISOL FL-D9	SHUT
(4)	SUP ISOL FL-D12	SHUT

e. At AEP-2:

(1)	OPERATING FLOOR EXHAUST FAN E-23 1-4X-NNS	OFF
(2)	OPERATING FLOOR EXHAUST FAN E-24 1-4X-NNS	OFF
(3)	OPERATING FLOOR EXHAUST FAN E-25 1-4X-NNS	OFF
(4)	OPERATING FLOOR EXHAUST FAN E-26 1-4X-NNS	OFF
(5)	OPERATING FLOOR SUPPLY FAN AH-56 1-4X-NNS	OFF
(6)	OPERATING FLOOR SUPPLY FAN AH-57 1-4X-NNS	OFF
(7)	OPERATING FLOOR SUPPLY FAN AH-58 1-4X-NNS	OFF
(8)	OPERATING FLOOR SUPPLY FAN AH-59 1-4X-NNS	OFF

3. Log fan starts in Attachments 3 and 4 as necessary.

Question: 27

Why do actions concerning CNMT spray operation contained in EPP-12, Loss of Emergency Coolant Recirculation, take precedence over the actions contained in FRP-J.1, Response to High Containment Pressure?

a. Actions required by EPPs always have priority over those in FRPs

b. CNMT spray is **NOT** used if the plant is in a recirculation mode

c. CNMT pressure should be too low to require CNMT spray

d. Conservation of RWST inventory has priority over containment pressure control

Answer:

d. Conservation of RWST inventory has priority over containment pressure control

QUESTION NUMBER: 27
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: WE11EK3.2

Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation) Normal, abnormal and emergency operating procedures associated with (Loss of Emergency Coolant Recirculation).

K/A IMPORTANCE: ***RO*** 3.5 ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** 5/10 ***55.43(b) SRO***

OBJECTIVE: EOP-3.13

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis
- CNMT spray operation (EPP-012 or FRP-J.1)

REFERENCES: FRP-J.1
LP-EOP-3.13

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.13 011

JUSTIFICATION:

a. Plausible since hierarchy does exist between FRPs and EPPs, but FRPs normally take precedence.

b. Plausible since EPP-012 makes check to see if plant is running in recirc mode, but if so FRP-J.1 operation of spray is implemented.

c. Plausible since containment spray will only be required if pressure is above 10 psig, but FRP-J.1 and EPP-012 make no assumptions regarding operation of spray.

d. **CORRECT** Operation of containment spray will be limited to conserve RWST inventory if other methods, such as containment fan coolers, are available.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of accident conditions to determine actions

REFERENCES SUPPLIED:

Instructions	Response Not Obtained
3. Check CNMT Spray Requirements:	
a. CNMT pressure - HAS INCREASED TO GREATER THAN 10 PSIG	a. RETURN TO procedure and step in effect.
b. EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION" - PREVIOUSLY IN EFFECT	b. GO TO Step 3e.
c. Operate CNMT spray using EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION".	
d. GO TO Step 4.	
e. Verify CNMT spray pumps - RUNNING	
f. Check RWST level - GREATER THAN 23.4% (2/4 Low-Low alarm)	f. Verify CNMT spray system valves aligned for recirculation: o Verify the following valves - OPEN: 1CT-102 1CT-105 1CT-50 1CT-88 GO TO Step 3h.
g. Verify CNMT spray system valves aligned for injection: o Verify the following valves - OPEN: 1CT-26 1CT-71 1CT-50 1CT-88 1CT-11 1CT-12	
h. Verify Phase B isolation valves - SHUT. (Refer to OMM-004, "POST TRIP/SAFEGUARDS REVIEW" Attachment 9.)	
i. Stop all RCPs.	
4. Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED	

EOP-TP-145.0

d. Procedure will perform the following major actions

  (1) Verify containment isolation and heat removal

  (2) Check for and isolate faulted SG

  (3) Check for excessive containment hydrogen concentration and determine appropriate action

4. Use FRP-J.1 to support the following discussion

EOP-TP-22.0

a. Flow path—use TP to discuss sequence

b. Procedure review

  (1) Foldouts—none

  (2) Procedure steps

  (3) Note/cautions

  (4) Exit conditions

c. Situational application—implement the FRP in the following situations

  (1) EPP-012 has been implemented and CNMT pressure is 30 psig

  (2) Failure of an ESW booster pump

d. Required operator knowledge

  (1) Need to implement FRP-J.1—(ERG) completed once, reimplementation is not required

e. Selected EOP step basis—presented in question format to facilitate class discussion

  <u>Question 1</u> Which has higher priority for operation of CNMT spray, EPP-012 or FRP-J.1?

  <u>Answer 1</u> EPP-012 since RWST volume is limited

  <u>Question 2</u> Why are CNMT fan coolers run in slow speed?

  <u>Answer 2</u> To prevent the fan from stalling under higher density accident atmospheric conditions

Question: 28

Following a load reduction, Axial Flux Difference (AFD) is being verified.

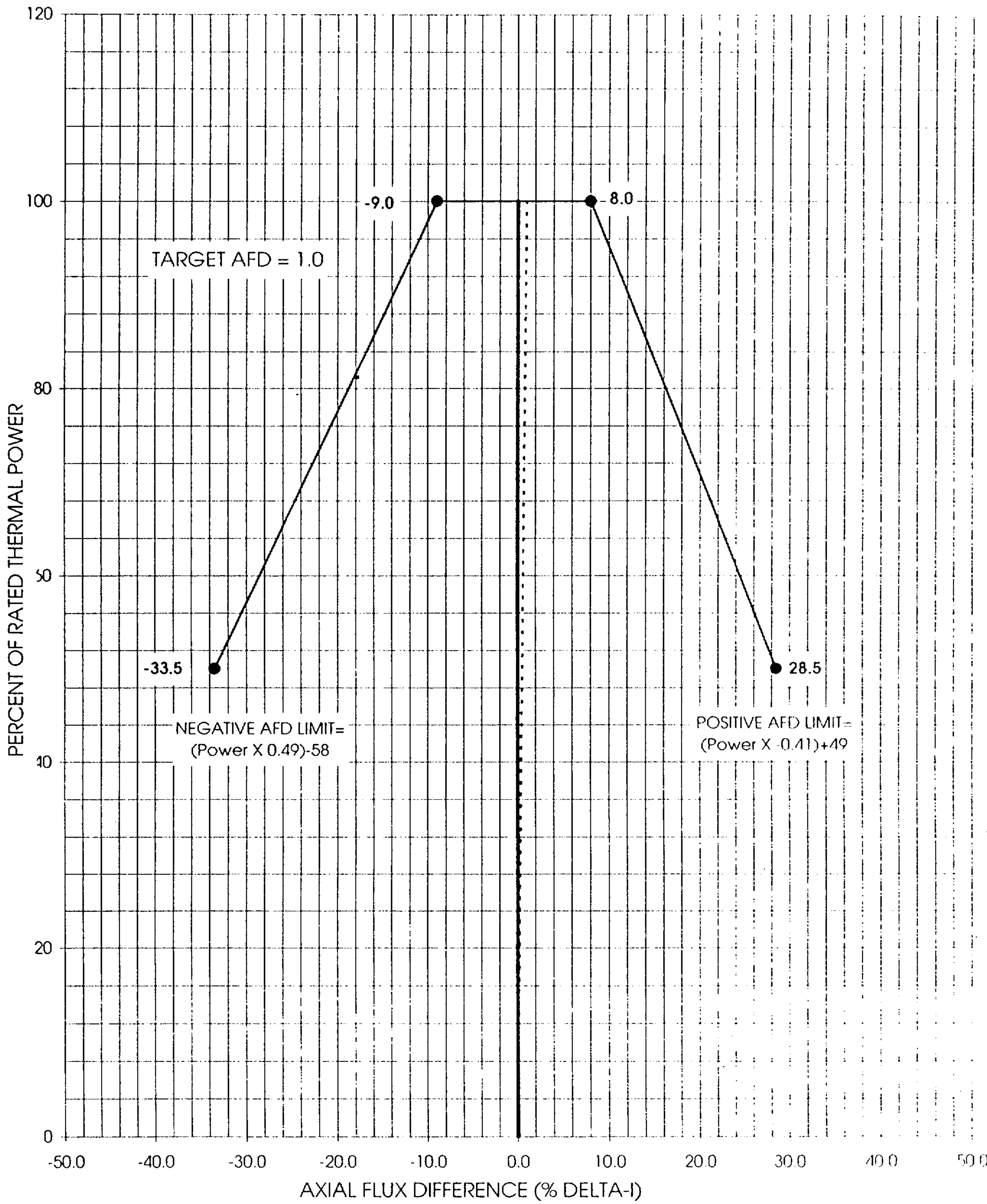
Using the attached curve numbered F-10-2, which of the following combinations of power and AFD are outside the acceptable operating limits?

	POWER	**AFD**
a.	82%	-17
b.	77%	-21
c.	63%	-27
d.	56%	-30

Answer:

b.	77%	-21

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER



Curve No.	F-10-2	Rev. No.	2
Originator	Andrea E. Gross. [illegible]	Date	6/14/00
Supervisor	Andrew [illegible] for D. Bakza	Date	6-14-00
Superintendent-Shift Operations	[illegible]	Date	6-14-00

QUESTION NUMBER: 28
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/1

K/A: 0012.1.25

Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data (Continuous Rod Withdrawal).

K/A IMPORTANCE: ***RO*** 2.8 ***SRO*** 3.1

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: NIS-R13

Discuss the cautions associated with monitoring NI power levels during plant start-up and power operations

REFERENCES: LP-NIS-3.0
OP-105
Curve F-10-2

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number 98RO-66

JUSTIFICATION:

a. Plausible since negative limit at 82% power is -17.82 and candidate may read curve incorrectly or calculate value incorrectly.

b. CORRECT Negative limit at 77% power is -20.27 and given AFD value is more negative than this.

c. Plausible since negative limit at 63% power is -27.13 and candidate may read curve incorrectly or calculate value incorrectly.

d. Plausible since negative limit at 56% power is -30.56 and candidate may read curve incorrectly or calculate value incorrectly.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of data to curve to determine outcome

REFERENCES SUPPLIED: Curve F-10-2

A plant startup is in progress per GP-005. Prior to exceeding 50% power, the RO is directed to verify AFD is within limits. The 100% target value is -2%.

The AFD limits at 50% power are …

A. -33 to +29..

B. -34 to +28.

C. -35 to + 27.

D. -36 to +26.

Answer:

C -35 to + 27.

NOTE: PLP-106, FIGURE 3, AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER, IS REQUIRED TO ANSWER THIS QUESTION.

Question: 29

Given the following conditions:

- The unit is operating at 50% power.
- LT-460, Channel III Pressurizer Level, has failed and all associated bistables are in the tripped condition.
- Power is subsequently lost to UPS Bus IDP-1A-SI.

Which train(s) of Reactor Protection will actuate, if any, resulting in a Reactor Trip?

a. Neither train

b. Train SA **ONLY**

c. Train SB **ONLY**

d. Both trains

Answer:

d. Both trains

QUESTION NUMBER: 29
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 012K2.01

Knowledge of bus power supplies to the following: RPS channels, components, and interconnections

K/A IMPORTANCE: ***RO*** 3.3 ***SRO*** 3.7

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.24-2

RECOGNIZE automatic actions that are associated with loss of an instrument bus or loss of NNS UPS

REFERENCES: AOP-024

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since some ESF features are energized to actuate, but RPS features are all de-energized to actuate.

b. Plausible since an ESF actuation would not occur on both trains if required since slave relays require power to actuate, but RPS is de-energized to actuate.

c. Plausible since an ESF actuation would not occur on both trains if required since slave relays require power to actuate, but RPS is de-energized to actuate.

d. **CORRECT** Bus 1A-SI supplies Channel I pressurizer level and a loss of this supply will result in 2 channels being tripped. Each channel inputs both trains of RPS, so both trains of RPS will actuate.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Analysis of abnormal conditions to determine response

REFERENCES SUPPLIED:

1.0 SYMPTOMS (continued)

1.4 Symptoms Specific to Loss of SI

ALB-15-2-5, CHANNEL I UPS TROUBLE alarm

1.5 Symptoms Specific to Loss of SII

ALB-15-3-5, CHANNEL II UPS TROUBLE alarm

1.6 Symptoms Specific to Loss of SIII

ALB-15-4-5, CHANNEL III UPS TROUBLE alarm

1.7 Symptoms Specific to Loss of SIV

ALB-15-5-5, CHANNEL IV UPS TROUBLE alarm

2.0 AUTOMATIC ACTIONS

1. IF all the following conditions exist:
   - Power lost to Instrument Bus SI (IDP-1A-SI) or SII (IDP-1B-SII)
   - Source and intermediate range trips not blocked by SSPS

   THEN a reactor trip will occur.

2. IF all the following conditions exist:
   - Power lost to any Instrument Bus
   - Any ESFAS or RPS instruments loops out of service

   THEN a reactor trip or safeguards actuation may occur.

3. IF all the following conditions exist:
   - Power lost to Instrument Bus SIII (IDP-1A-SIII) or SIV (1DP-1B-SIV)
   - Reactor power less than 10%
   - Turbine tripped

   THEN a reactor trip will occur.

SI Instrument Bus Power Supplies and Loads

	Loads:	Comment:
PIC Cabinet 1 (Protection I) (continued):		
FT-414	RCS Flow Loop A	
FT-424	RCS Flow Loop B	
FT-434	RCS Flow Loop C	
TE-413	RCS Hot Leg Temp Loop A	
TE-423	RCS Hot Leg Temp Loop B	
TE-433	RCS Hot Leg Temp Loop C	
PT-402	RCS WR Press Loop C	
PT-455	PRZ Pressure	
LT-459	PRZ Level	
TE-674	CCW HX A Disch Temp	
PT-649	CCW HX A Disch Press	
LT-670	CCW Surge Tk Level	Isolates GFFD & sampling.
PT-950	CNMT Press	Lose input into CNMT spray logic.
LT-990	RWST Level	Lose SI auto swap-over input.
LI-106	Boric Acid Tank Level	
PIC Cabinet 17 (Reference 1364-92079 S01):		Also powered from App. R Inverter PP-1A312.
PT-308A	SG A PORV Press Control	
LT-477	SG A Level (Wide Range)	
PT-455	PRZ Pressure	
PT-444	PRZ Press Control	Lose heaters.
LT-459	PRZ Level	
PT-402	RCS WR Press Loop C	
TE-413	RCS Hot Leg Temp Loop A	Lose LTOPs permissive.
TE-423	RCS Hot Leg Temp Loop B	

SII Instrument Bus Power Supplies and Loads

PIC Cabinet 2 (Protection II) (continued):

	Loads:	Comment:
TE-410	RCS Cold Leg Temp Loop A	
TE-420	RCS Cold Leg Temp Loop B	
TE-430	RCS Cold Leg Temp Loop C	
TE-422B1	ΔT/Tavg Loop B Hot Leg	
TE-422B2	ΔT/Tavg Loop B Hot Leg	
TE-422B3	ΔT/Tavg Loop B Hot Leg	
TE-422D	ΔT/Tavg Loop B Cold Leg	
PT-456	PRZ Press	
LT-460	PRZ Level	
LT-161	Boric Acid Tank Level	
LT-991	RWST Level	Lose SI auto swap-over input.

PIC Cabinet 10 (BOP Safety B) (Reference 1364-47241 S01):

PT-2001B	FW to SG B Press	
FT-2050B	AFW to SG B Flow	
FK-2071C	AFW Turb to SG C Man Cont	Will not shut on AFW isolation.
PT-0430	Stm to TDAFW Pump Press	
PT-2270	AFW Turb Pump Suct Press	
PT-2170	AFW Turb Pump Disch Press	
PDT-2180	AFW Turb Diff Press	
PT-2250B	AFW Pump B Suct Press	
PT-2150B	AFW Pump B Disch Press	Lose auto pressure control.
LT-7166	CS Additive Tank Level	Chem add valves will not shut.
FT-7152	CS Additive Tank Out Flow	
PT-7131B	CS Pump B Disch Press	

Question: 30

Given the following conditions:

- Reactor power is 80% and stable.
- Tavg is stable.
- Pressurizer level is stable with the control system in AUTO.
- A small leak develops across the differential pressure bellows for the controlling channel of pressurizer level, resulting in pressure equalizing across the bellows.

How will this leak affect the operation of FCV-122, Charging Flow Control Valve?

a. It will throttle open slightly during the course of the pressure equalization and then return to its original position

b. It will throttle closed slightly during the course of the pressure equalization and then return to its original position

c. It will throttle open slightly during the course of the pressure equalization and remain in that position

d. It will throttle closed slightly during the course of the pressure equalization and remain in that position

Answer:

d. It will throttle closed slightly during the course of the pressure equalization and remain in that position

QUESTION NUMBER: 30
TIER/GROUP: ***RO*** 1/3 ***SRO*** 1/3

K/A: 028AK1.01

Knowledge of the operational implications of the following concepts as they apply to Pressurizer Level Control Malfunctions: PZR reference leak abnormalities

K/A IMPORTANCE: ***RO*** 2.8 ***SRO*** 3.1

10CFR55 CONTENT: ***55.41(b) RO*** 8/10 ***55.43(b) SRO***

OBJECTIVE: PZRLC-3.0-4

DESCRIBE how various errors would affect the pressurizer level indication in the Main Control Room

REFERENCES: SD-100.03

SOURCE: ***New*** ☒ ***Significantly Modified*** ☐ ***Direct*** ☐

Bank Number NA

JUSTIFICATION:

a. Plausible since common misconception is that variable leg is high pressure side of transmitter, but variable leg is low pressure side and charging will decrease.

b. Plausible since common misconception is that variable leg is high pressure side of transmitter, but variable leg is low pressure side and charging will decrease.

c. Plausible since charging flow will decrease, but level sensed will always be above program causing charging flow to remain low.

d. **CORRECT** The differential pressure equalizing across the bellows will cause indication that the level in the pressurizer has increased, resulting in a decrease in charging flow. Indicated level will eventually be 100% and controls will continue lower charging.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 4

Analysis of plant response to failure - high difficulty due to requirement to integrate several knowledge requirements

REFERENCES SUPPLIED:

4.1.5 Power-Operated Relief Valve Control (continued)

controller, the actual pressure at which the PORV will open is dependent on the duration of the error signal. The bistables for the other two PORVs receive a signal directly from pressure transmitter 1PT-445, at 2335 psig. When pressure reduces to 2315 psig, the bistable resets and the PORVs shut.

The PORVs are blocked from automatically opening whenever the P-11 permissive bistable is tripped. The P-11 permissive only allows automatic PORV operation whenever two out of three pressure channels (PT-455, PT-456, PT-457) are greater than 2000 psig. When PT-455, PT-456 and PT-457 (2 of 3) detect pressure less than 2000 psig, the P-11 bistable will trip and block the automatic open signal to all PORVs.

Manual operation of the PORV control switches from either the MCB or the ACP overrides the automatic control circuits and bypasses the P-11 block signal.

PORV PCV-444B receives a separate automatic control signal from PT-444 at the ACP.

4.2 Pressurizer Level Control

There are three level transmitters (LT-459, LT-460 and LT-461) associated with the PRZLCS circuits (see Figure 7.9). A fourth transmitter (LT-462) provides cold calibrated level indication. Refer to Figures 7.14 and 7.15 for the layout of MCB panel 1A2. Figure 7.13 illustrates the PRZLCS setpoints.

4.2.1 Level Detector Operation

To arrive at a level signal, a differential pressure sensor measures the pressure difference between the height of water in the PRZ and the constant height of water in the reference leg. The level in the reference leg is maintained constant due to continuous steam condensation in the lower temperature condensing pot (see Figure 7.10). The pressure difference is measured by a connection from the PRZ to the low pressure side of the detector and a connection from the reference leg to the high pressure side. The reference leg connection is near the top of the PRZ. If PRZ level is at this connection, the differential pressure across the detector will be zero. But at normal operating level, the higher pressure exerted by the height of the water in the reference leg creates a differential pressure across the level detector. The resulting differential pressure is inversely proportional to PRZ level.

A level error can result from a reference leg leak. PRZ level indication would be erroneously high because the pressure sensed by the reference leg would decrease, and the resulting differential pressure would decrease. This can be detected by comparison of other level indications to find the incorrect channel. A similar error is introduced if the reference leg is heated above the temperature assumed for calibration (120°F). This could occur during post-accident conditions and would affect all three channels.

4.2.3 Master Level Controller (continued)

The PRZ Master Level Controller can be operated in two modes, AUTO and MANUAL. When in AUTO, the auctioneered high T_{avg} provides a setpoint signal for reference PRZ level (L_{ref}). The reference level circuit is electronically limited such that L_{ref} will never exceed 60% or fall below 25%. This limit in the circuit minimizes potential level transients due to operator error or failure of a loop T_{avg} instrument. Reference level and controlling PRZ level are provided on a recorder located in the control room. The reference level is compared to the actual PRZ level to generate a level error signal.

When in MANUAL, the level error signal can be varied by the operator by use of pushbuttons on controller LK-459F1 (F2 at ACP) to vary the signal sent to the "Charging Flow Control Valve Controller" (FC-122).

The PRZ level error signal is sent to the "Charging Flow Control Valve Controller" (FC-122). The "Charging Flow Control Valve Controller" is a P+I controller and varies the position of charging flow control valve 1CS-231 (FCV-122). The "Charging Flow Control Valve Controller" compares the charging flow demand signal to actual charging flow measured from a flow detector in the charging line.

"Charging Flow Control Valve Controller" FC-122 is operated from the MCB panel 1A2. This controller has two modes of operation, AUTO and MANUAL. In AUTO, the position of 1CS-231 (FCV-122) is varied to maintain PRZ level at reference level. In MANUAL, the operator can manually control the position of the valve by use of the "Increase" and "Decrease" pushbuttons, thus allowing backup operation during a controller failure or when it is desired to have PRZ level at other than programmed reference level. An example of this is when it is desirable to take the PRZ solid.

Additional information on control of charging flow and letdown flow may be found in SD-107, Chemical and Volume Control.

4.2.4 Level Control During Shutdown

During shutdown conditions, when the PRZ is to be filled to water solid conditions, the CVCS charging rate must be controlled to assure a continuous outsurge through the PRZ surge line is maintained. This prevents an excessive PRZ cooldown due to the relatively cold loop coolant suddenly entering the PRZ.

4.3 Presurizer Pressure Protection

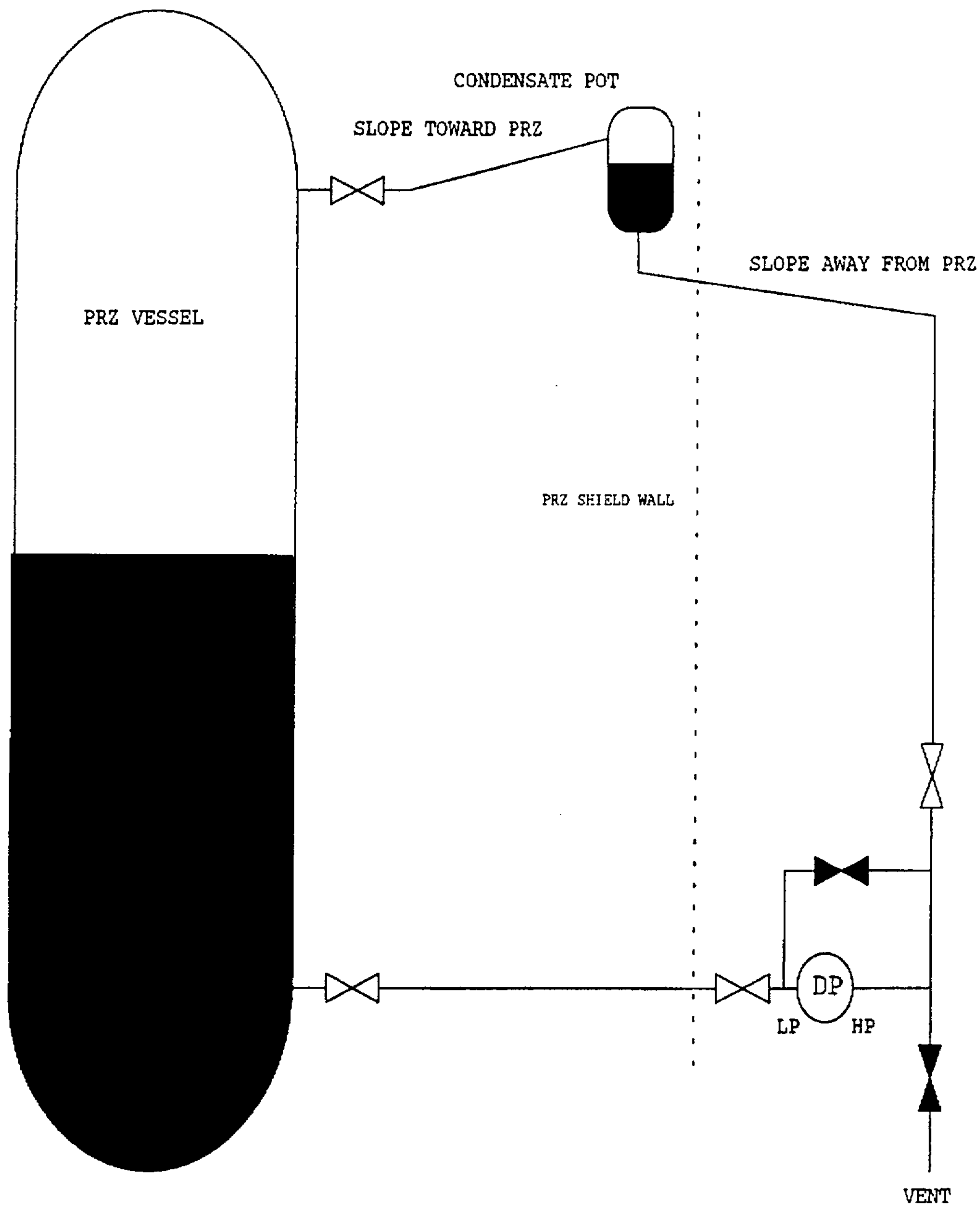
Three pressure transmitters (PT-455, PT-456, and PT-457) provide inputs for the pressure protection circuits. Figure 7.8 illustrates the protection circuit associated with PT-455 (protection set I). The other two channels (protection sets II and III) are identical.

Five protection signals are generated by PRZ pressure.

1. A low pressure reactor trip on a coincidence of two out of three channels at 1960 psig. This trip is generated by a lead-lag compensated circuit so that the pressure at which the trip occurs may be higher than 1960 psig. The lead-lag compensation takes into account the rate that the pressure is dropping. The low pressure reactor trip is automatically blocked whenever power is less than 10%. This block is provided from a permissive bistable (P-7) that is discussed in more detail in SD-103, Reactor Protection System.

Figure 7.10
Sheet 1 of 1

Pressurizer Level Measurement



Question: 31

Which of the following describes the results if 1B Condensate Pump trips on motor overcurrent at 80% power?

	CONDENSATE BOOSTER PUMPS	MAIN FEED PUMPS
a.	1A and 1B Remain Running	1A and 1B Remain Running
b.	1B Trips	1B Trips
c.	1B Trips	1A and 1B Remain Running
d.	1A and 1B Remain Running	1B Trips

Answer:

b.	1B Trips	1B Trips

QUESTION NUMBER: 31

TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 056A2.04

Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences: Loss of condensate pumps

K/A IMPORTANCE: ***RO*** 2.6 ***SRO*** 2.8

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: CFW-R1

Given a hypothetical plant situation and SD-134 figures and tables of trips and start permissives for the following pumps, PREDICT CFW System response to a pump trip or start signal
a. Condensate pump

REFERENCES: AOP-010

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number CFW-R1 001

JUSTIFICATION:

a. Plausible since the MFW pump will autostart on a trip of the running MFW pump, but a trip of a condensate pump will not cause this.

b. **CORRECT** Normal configuration at this power level is all pumps running. A loss of a single condensate pump causes a trip of the associated booster pump, resulting in a trip of the associated MFW pump.

c. Plausible since the response of the CBPs is correct, but the associated MFW pump will also trip.

d. Plausible since the response of the MFW Pumps is correct, but a condensate booster pump will also trip.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operations

REFERENCES SUPPLIED:

Section 1.0

2.0 AUTOMATIC ACTIONS

1. Loss of one Main FW Pump above 60% turbine load will cause a turbine runback to less than 60% load.

2. Trip of last Main FW Pump will start the MDAFW Pumps and send an auto -open signal to MDAFW Pump's FCVs.

3. If two MFW Pumps are running, loss of a Condensate Booster Pump will trip the associated Main FW Pump.

4. If one MFW Pump is running, a loss of both Condensate Booster Pumps will trip the MFW Pump

5. The standby MFW Pump will auto-start if the running MFW Pump trips on low lube oil pressure or electrical fault.

6. If two Condensate Booster Pumps are running, loss of a Condensate Pump will trip the associated Condensate Booster Pump.

7. If one Condensate Booster Pump is running, a loss of both Condensate Pumps will trip the Condensate Booster Pump

8. Loss of both Heater Drain Pumps above 90% turbine load will cause a turbine runback to less than 90% load.

9. Low level in any SG (38.5%) coincident with feed flow/steam flow mismatch (feed flow 1627 kpph less than steam flow) for that SG will cause a reactor trip.

10. Low level in one SG (2/3 detectors less than 38.5%) will cause the following:

    - Reactor trip
    - Start of both MDAFW Pumps
    - MDAFW Pump's FCVs receive an auto-open signal

11. Low level in two SGs (2/3 detectors/SG less than 38.5%) will start the TDAFW Pump.

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

IF a Main FW Pump trips above 80% power, THEN perform the following:

- Verify turbine runback to less than 60% load in progress.
- Isolate SG Blowdown.

Question: 32

Given the following conditions:

- A Loss of Coolant Accident (LOCA) has occurred.
- Containment pressure is 2 psig.
- Containment hydrogen concentration is 3.5%.
- Containment temperature is 140 °F.
- Containment temperature prior to the accident was 90 °F.

Which one of the following is the required power setting for the 1A Hydrogen Recombiner?

a. 44.7 kW

b. 45.8 kW

c. 46.7 kW

d. 47.9 kW

Answer:

d. 47.9 kW

QUESTION NUMBER: 32
TIER/GROUP: ***RO*** 2/3 ***SRO*** 2/2

K/A: 028A2.01

Ability to (a) predict the impacts of the following malfunctions or operations on the CIRS; and (b) based on those predictions, correct, control, or mitigate the consequences: Hydrogen recombiner power setting, determined by using plant data book

K/A IMPORTANCE: ***RO*** 3.4 ***SRO*** 3.6

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: HR-R5

Given the applicable reference and a set of plant conditions, ANALYZE the situation and APPLY the correct procedural guidance
b. Determination of power setting

REFERENCES: OP-125

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number HR-R5 001

JUSTIFICATION:

a. Plausible since usage of incorrect temperature curve used to intersect 2 psig line and 1B power settings will give this result.

b. Plausible since usage of incorrect temperature curve used to intersect 2 psig line and 1A power settings will give this result.

c. Plausible since usage of correct temperature curve used to intersect 2 psig line, incorrect usage of 1B power settings will give this result.

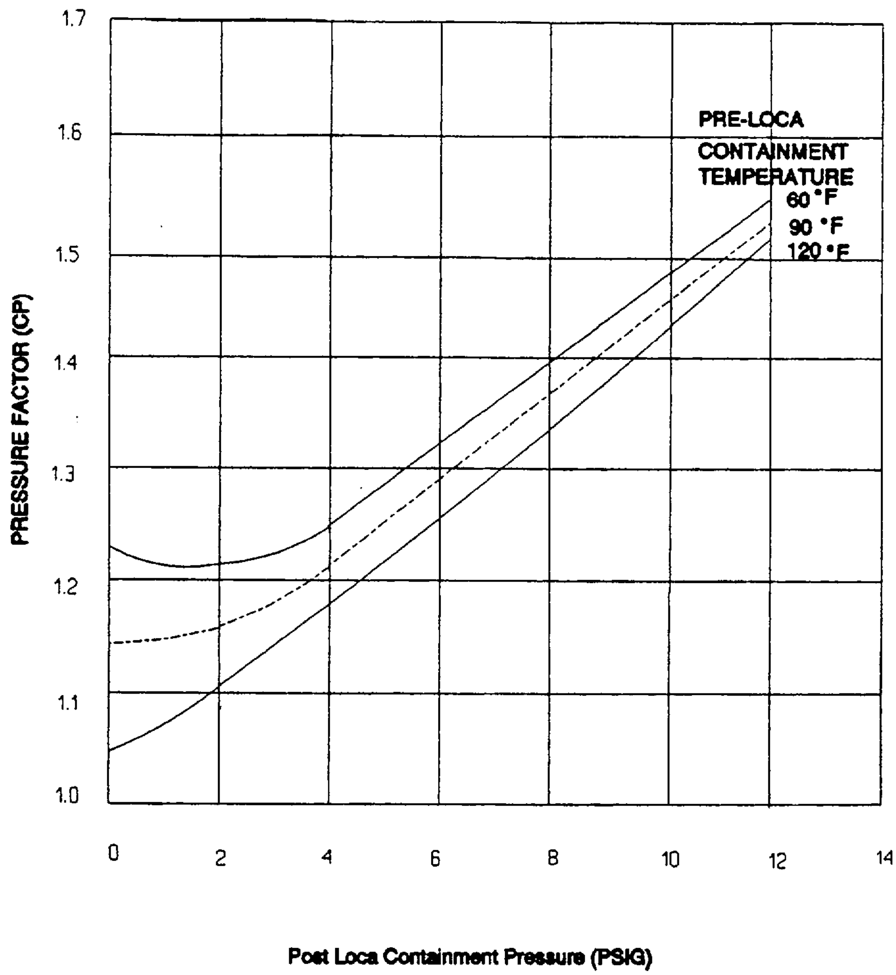
d. **CORRECT** Intersection of 90 °F curve and 2 psig results in a pressure factor of 1.16. Applying this to the 1A recombiner results in a power setting of 47.9 kW.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of graphical data and computation of value

REFERENCES SUPPLIED: OP-125, Attachment 8

Pressure Factor Determination



Reference Power X CP = Required Power

'A' Recombiner 41.28 KW X ______ = ______________

'B' Recombiner 40.24 KW X ______ = ______________

HR-R5 001

A Loss of Coolant Accident (LOCA) has occurred and the SCO has directed you to place the "A" Hydrogen Recombiner in service. The following conditions exist:

> Containment Pressure is 4 psig.
> Hydrogen concentration is 3.5%.
> Containment temperature is 140 °F.
> Containment PreLOCA temperature was 90 °F.

Which one of the following is the required power for the "A" Hydrogen Recombiner?
(OP-125, Attachment 8, Pressure Factor Determination is provided)

A. 41 kW
B. 48 kW
✓C. 50 kW
D. 53 kW

Question: 33

During operation at 100% power, an inadvertent SI occurs on 'B' Train **ONLY**.

Which of the following actions is required?

a. Manually actuate SI on 'A' Train

b. Continue in PATH-1 noting which 'A' Train ESF equipment is **NOT** running

c. Start ONLY the 'A' Train of ESF equipment for which the redundant 'B' Train equipment failed

d. Transition directly to EPP-008, SI Termination

Answer:

a. Manually actuate SI on 'A' Train

QUESTION NUMBER: 33
TIER/GROUP: ***RO*** 3 ***SRO*** 3

K/A: 2.4.14

Knowledge of general guidelines for EOP flowchart use.

K/A IMPORTANCE: ***RO*** 3.0 ***SRO*** 3.9

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: IE-3.10-R4

Describe the expected operator actions associated with an imminent RPS or ESFAS actuation

REFERENCES: EOP Users Guide

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number IE-3.10-R4 001

JUSTIFICATION:

a. **CORRECT** Preferred method of manual actuation although it would be acceptable to start / reposition all equipment which would be actuated regardless of the perceived need since diagnostics have not yet been performed.

b. Plausible since only a single train actuation is analyzed, but efforts are to be made to initiate both trains.

c. Plausible since starting equipment as needed would provide adequate protection, but since diagnostics have not yet been completed the equipment required may not yet be known.

d. Plausible since one of the goals following an inadvertent SI is to terminate SI as soon as criteria are met to prevent overfilling / pressurizing the RCS, but procedures are written assuming both trains started.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural requirements

REFERENCES SUPPLIED:

5.1.10 Manual Initiation of Safeguards Actions

R If a safeguards actuation setpoint is reached or exceeded and the associated safeguards signal does not actuate or actuates incompletely, operators are expected to manually initiate the signal. Examples of incomplete actuations are as follows:

(1) An SI signal occurs, but one train of SI does not actuate. (Reference 2.2.2.15)

(2) A Main Steam Line Actuation signal occurs on low steamline pressure, but SI, Phase A, etc. do not actuate.

The preferred method of manual actuation is by manipulation of the safeguards signal control switches. (References 2.2.3.8 and 2.2.3.11) If manual actuation of the signal is unsuccessful, components must be aligned individually. Additionally, if a safeguards actuation setpoint is being approached and time allows, operators are expected to manually initiate the associated safeguards signal to avoid challenging the safeguards function. For example, if RCS pressure is decreasing in an uncontrolled manner towards 1850 PSIG the operator is expected to manually actuate SI. (See Section 6.4 for guidance regarding individual components that fail to start on the Emergency Safeguards Sequencer.)

Question: 34

Given the following conditions:

- The plant is at 22% power during a shutdown.
- Intermediate Range Channel N-35 has been declared inoperable as a result of failing to meet Operational Test Criteria of MST-I0167.
- The test was performed, per GP-006, during a Tech Spec 3.0.3 required shutdown (i.e., the shutdown must continue).
- OWP-RP-21 has been performed, which places the LEVEL TRIP BYPASS switch in the BYPASS position and verifies the associated light on the Bypass Permissive Light Panel.
- The I&C Supervisor states that both control and instrument power must be removed from the drawer to replace a bistable module.

Assuming the instrument and control power are removed for the remainder of the shutdown, the shutdown continues and ...

a. the reactor trips when the fuses are removed.

b. the reactor trips when power is reduced below P-10.

c. the reactor trips when power is reduced below P-6.

d. **NO** reactor trip occurs.

Answer:

b. the reactor trips when power is reduced below P-10.

QUESTION NUMBER: 34
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 015K3.01

Knowledge of the effect that a loss or malfunction of the NIS will have on the following: RPS

K/A IMPORTANCE: ***RO*** 3.9 ***SRO*** 4.3

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: NIS-R10

ASSESS MCB and NI drawer indications to determine if (and at what power level) a reactor trip will occur during a power transient

REFERENCES: OWP-RP

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number NIS-R10 002

JUSTIFICATION:

a. Plausible since a trip would occur if power level were below P-10 when both sets of fuses were removed, but above P-10 the manual block would still be installed.

b. **CORRECT** The Level Trip Bypass switch requires control power available. Removing the control power fuses would result in a trip since the trip would not be bypassed when power is reduced below P-10.

c. Plausible since a trip will occur as power is reduced, but the trip will occur below P-10, not P-6.

d. Plausible since the plant could be shut down normally with the trip bypassed, but removing the control power fuses removes the trip bypass.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Integration of system knowledge and changing plant effects on system

REFERENCES SUPPLIED:

EIR Number: __________
WR/JO Number: __________
Clearance Number: __________

1. OWP - RP-21

2. System: Nuclear Instrumentation

3. Component: INTERMEDIATE RANGE N-35

4. Scope: LCO action required due to inoperable Channel 1 Intermediate Range Nuclear Instrumentation

5. Applicable Requirements: 3.3.1 (Mode 1 below P-10 and Mode 2)

6. Precautions: IR Rx Trip is 1 of 2 coincidence. If control power fuses are pulled when the channel is NOT BLOCKED (MCB), a Rx trip will occur. If instrument power fuses are pulled when the channel is NOT BYPASSED (Drawer) or NOT BLOCKED (MCB), a Rx trip will occur. The LEVEL TRIP BYPASS function requires control power fuses to be installed.

7. Component lineups completed per attached sheet(s). ________ / ______
   Signature Date

8. Testing required on redundant equipment while the component is inoperable. None

9. Testing/Action required to restore operability. (N/A if tracked on EIR)

   - OST-1021, 1022 or 1033 ________ / ______
   - MST-I0048 ________ / ______

   Signature Date

10. Component lineups returned per attached sheet(s). ________ / ______
    Signature Date

11. Remarks: ____________________

12. Reviewed By: ________________ ________
    Superintendent - Shift Operations Date

After receiving the final review signature, this OWP becomes a QA RECORD and should be submitted to Document Services.

Question: 35

Given the following conditions:

- A reactor trip and safety injection has occurred.
- Instrument Bus SIII de-energizes, causing a loss of power to PT-2250A, AFW Pump A Suct Press.

Which of the following describes the effect of the loss of this instrument on MDAFW Pump 1A-SA?

	MDAFW PUMP 1A-SA ALREADY RUNNING	**MDAFW PUMP 1A-SA NOT RUNNING**
a.	Automatically Trips	Can Be Started
b.	Automatically Trips	**CANNOT** Be Started
c.	Remains Running	Can Be Started
d.	Remains Running	**CANNOT** Be Started

Answer:

c.	Remains Running	Can Be Started

QUESTION NUMBER: 35
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 057AA1.05

Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Backup instrument indications

K/A IMPORTANCE: ***RO*** 3.2 ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** 8/10 ***55.43(b) SRO***

OBJECTIVE: AOP-024-4

DETERMINE the following
b. Effects on the AFW System with the loss of an instrument bus

REFERENCES: AOP-024

SOURCE: ***New*** ☒ ***Significantly Modified*** ☐ ***Direct*** ☐

Bank Number NA

JUSTIFICATION:

a. Plausible since the pump can be started and most instrument power losses result in the function going to the tripped state, but power is required for this function.

b. Plausible since most instrument power losses result in the function going to the tripped state, but power is required for this function.

c. CORRECT Although the instrument will read low, the pump will not trip on low suction pressure and can be started since power is required for this function.

d. Plausible since the pump will not auto trip and most instrument power losses result in the function going to the tripped state, but power is required for this function.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Integration of system knowledge and failure mode of components

REFERENCES SUPPLIED:

4.0 General (continued)

5. If power is lost to instrument bus SII (B Train and TDAFW) or SIII (A Train) the associated AFW pump suction pressure instrument will read low. If the AFW pump is running it will not trip on Lo-Lo suction pressure nor will it be prevented from being started.

6. A(B) Train ESFAS slave relays are powered from instrument bus SI (SIV). A loss of SI or SIV will result in a loss of ESFAS functions driven by slave relays for that train.

7. PIC 17 (SI) and PIC 18 (SII) have backup power supplies from the Appendix R Inverters. If power to SI or SII is lost, these PICs should continue to function.

8. If power is lost to instrument bus SII (B Train) or SIII (A Train), the associated CNMT Spray Additive Tank level indicators will read empty but their associated CNMT Spray Chemical Addition Valve will not automatically shut. If necessary the valve(s) may be manually operated.

9. Placing the PRZ Master Pressure controller in manual when controlling PRZ heaters and sprays in manual will prevent an integrating signal from lifting the PRZ PORVs.

10. This procedure meets the requirements of CP&L document DIN 842960398, CAP 92H0786 and ANSI 18.7 Section 5.3.9.

5.0 Diagrams/Attachments

Attachment 1 - SI Instrument Bus Power Supplies and Loads

Attachment 2 - SII Instrument Bus Power Supplies and Loads

Attachment 3 - SIII Instrument Bus Power Supplies and Loads

Attachment 4 - SIV Instrument Bus Power Supplies and Loads

Question: 41

Following a steam break inside containment, the Containment Spray System actuated.

Containment pressure has been reduced to 2.5 psig. The following signals have been reset:

- Safety Injection
- Phase A
- Phase B
- Containment Spray

Several minutes after securing Containment Spray, containment pressure increases to 11 psig due to a subsequent large break LOCA.

Which of the following describes the expected response of the Containment Spray System?

	CS PUMPS	CS DISCHARGE VALVES
a.	Automatically Start	Automatically Open
b.	Automatically Start	Must be Manually Opened
c.	Must be Manually Started	Automatically Open
d.	Must be Manually Started	Must be Manually Opened

Answer:

a.	Automatically Start	Automatically Open

QUESTION NUMBER: 41
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/1

K/A: 026A3.01

Ability to monitor automatic operation of the CSS, including: Pump starts and correct MOV positioning

K/A IMPORTANCE: ***RO*** 4.3 ***SRO*** 4.5

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: CSS-R2

EXPLAIN the response of Containment Spray System components to each of the following signals: a. Containment Spray Actuation Signal (CSAS)

REFERENCES: 108D831, Sh 8
SD-112

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98RO-50

JUSTIFICATION:

a. **CORRECT** An automatic spray signal (at 10 psig) starts both pumps, opens the discharge valves, and opens the spray additive tank valves, regardless of any previous reset actions taken.

b. Plausible since the reset signals have been actuated and the valves will automatically start, but the pumps will also automatically start.

c. Plausible since the reset signals have been actuated and the pumps will automatically start, but the valves will also automatically open.

d. Plausible since the reset signals have been actuated, but the pumps will automatically start and the valves will automatically open.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comprehension of operator actions on system and subsequent failure

REFERENCES SUPPLIED:

4.1 System Actuation (continued)

5. Automatically - Automatic initiation will occur on a containment pressure signal of 10 psig (Hi-3 signal) on two out of four instrument channels. See SD-103.

Two containment spray reset switches are provided on the MCB (see Figure 7.5). If the operator determines that the CSAS initiation was inadvertent, he may reset both CSS trains (one reset for each train), thus terminating spray flow. This will minimize the amount of caustic water entering containment.

4.2 Injection Mode

Upon receipt of the CSAS, the injection mode of operation begins. The CSAS will automatically start the containment spray pumps and open the following valves:

1. Containment Spray Headers Isolation Valves (1CT-50 and 1CT-88) and,

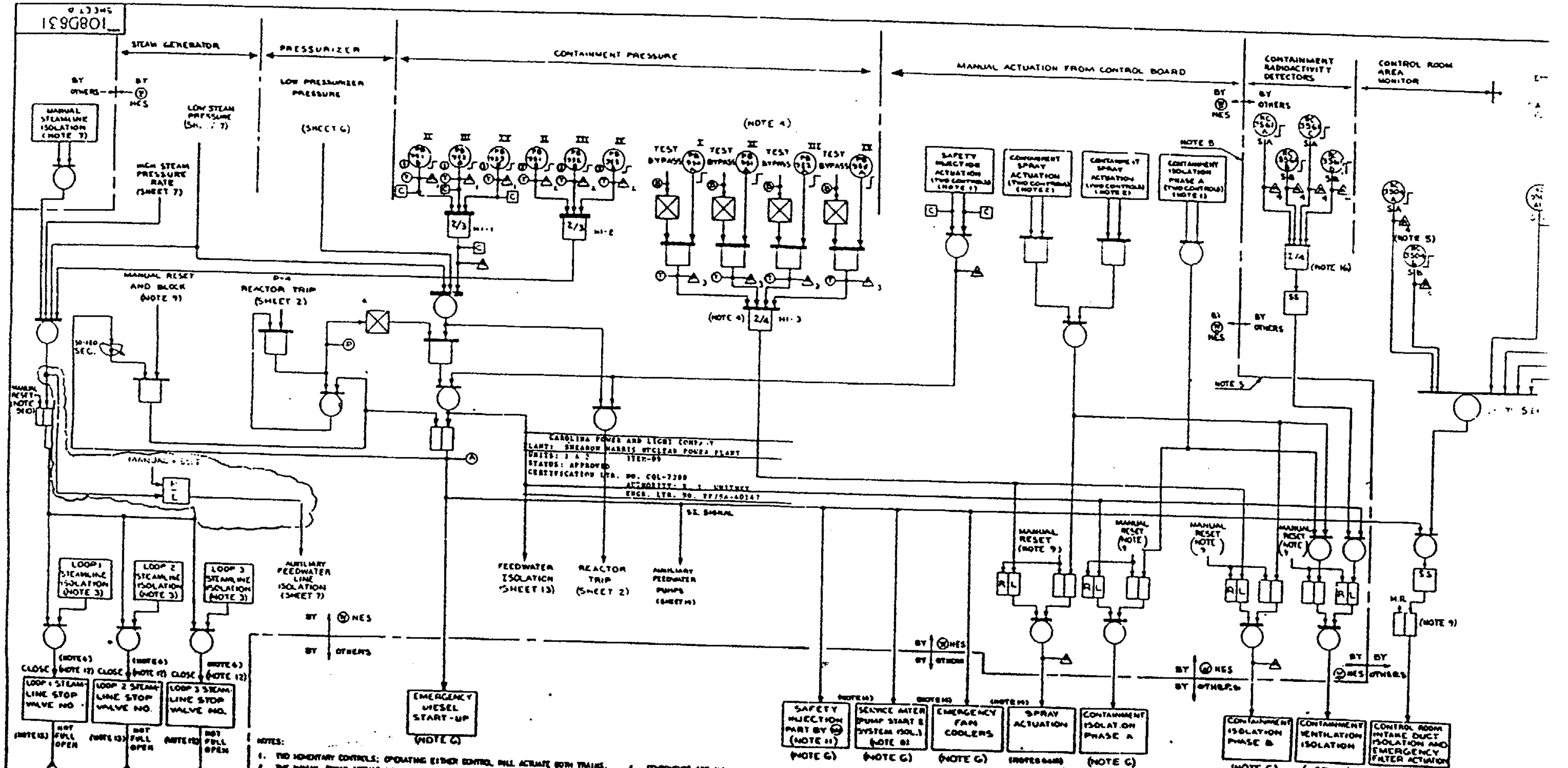
2. Containment Spray Chemical Additive Valves (1CT-11 and 1CT-12).

Concurrent with the pump starts, the 28 to 30 wt % sodium hydroxide solution will be drawn through the eductors and mixed with the 2400 - 2600 ppm boric acid solution (from the RWST). The mixture enters the mainstream flow upstream of the containment spray pumps and 32 seconds following system actuation will reach the spray nozzles. The CSS will operate in this manner until its switchover to the recirculation mode.

During a main steam or feedwater line break, sodium hydroxide addition will not be necessary or desirable. Valves 1CT-11 and 1CT-12 may be closed from the MCB in these cases.

4.3 Recirculation Mode

The switchover from injection to recirculation is an automatic action which transfers the containment spray pumps suction from the RWST to the recirculation sumps. This automatic action, which is triggered by a low-low level (23.4%) in the RWST (coincident with a CSS pump running), involves the opening of the Containment Sump Recirculation Valves (1CT-102 and 1CT-105) and the closing of the Injection Line Isolation Valves (1CT-26 and 1CT-71). A time delay is present between the opening of the recirculation line valves and the closing of the injection line valves to allow sufficient time for the recirculation line to fill. This assures there will be an available NPSH for the containment spray pumps at all times.



NOTES:

1. TWO MOMENTARY CONTROLS; OPERATING EITHER CONTROL WILL ACTUATE BOTH TRAINS.
2. THE MANUAL SPRAY ACTUATION CONSISTS OF FOUR MOMENTARY CONTROLS. ACTUATION IN BOTH TRAINS WILL OCCUR ONLY IF TWO ASSOCIATE CONTROLS ARE OPERATED SIMULTANEOUSLY.
3. ONE MOMENTARY CONTROL PER LOOP ON THE CONTROL BOARD.
4. CONTAINMENT PRESSURE BISTABLES FOR SPRAY ACTUATION ARE ENERGIZE-TO-ACTUATE (OTHER BISTABLES ARE DE-ENERGIZE-TO-ACTUATE).
5. ENCLOSED CIRCUITRY IS NOT PART OF THE SAFEGUARDS SYSTEM AND IS REDUNDANT.
6. COMPONENTS ARE ALL INDIVIDUALLY SEALED IN (LATCHED), SO THAT LOSS OF THE ACTUATION SIGNAL WILL NOT CAUSE THESE COMPONENTS TO RETURN TO THE CONDITION HELD PRIOR TO THE ADVENT OF THE ACTUATION SIGNAL.
7. TWO MOMENTARY CONTROLS ON THE CONTROL BOARD; EACH CONTROL ACTUATES BOTH TRAINS.
8. SERVICE WATER SYSTEM ISOLATION IS USED ONLY IF REQUIRED.
9. THE REDUNDANT MANUAL RESET CONSISTS OF TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
10. SUPPLIED BY (W)
11. NUCLEAR STEAM SUPPLY SYSTEM SEQUENCE REQUIREMENTS SPECIFIED BY (W)
12. ALSO CLOSES THE BYPASS VALVE IN PARALLEL WITH THE ASSOCIATED STEAM LINE STOP VALVE.
13. LIGHTS SHOULD BE PROVIDED IN THE CONTROL ROOM FOR EACH STEAMLINE STOP VALVE TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
14. THE ACTUATION MAY BE DELAYED AND SEQUENCED IF THE EMERGENCY DIESEL POWER CAPABILITY IS LESS THAN THE TOTAL LOAD WITH ALL SYSTEMS STARTING. THE TIME DELAY(S), IF USED, MAY NOT EXCEED THE MAXIMUM STARTING TIME REQUIREMENTS FOR EACH SYSTEM.
15. THE SPRAY ACTUATION SYSTEM MUST BE SEALED IN (LATCHED) SO THAT ONCE INITIATED, THE LOSS OF THE ACTUATION SIGNAL WILL NOT PREVENT THE CONTAINMENT SPRAY.
16. CONTROL LOGIC IS DEVELOPED BY OUTPUTS FROM BOTH SAFETY TRAIN A AND B SENSORS. TRAIN A OUTPUTS ARE ELECTRICALLY ISOLATED FROM TRAIN B, AND TRAIN B OUTPUTS ARE ELECTRICALLY ISOLATED FROM TRAIN A FOR THAT DEVELOPMENT.

WESTINGHOUSE PROPRIETARY DATA

P. CRALLE

Westinghouse Electric Corporation

CAROLINA POWER & LIGHT CO.
SHEARON HARRIS UNITS 1,2,3 & 4
FUNCTIONAL DIAGRAMS
SAFEGUARD ACTUATION SIGNALS

108D831
SHEET 8

Question: 42

Given the following conditions:

- A load rejection has occurred, causing RCS pressure to increase.
- The PRZ Spray Valves and PRZ PORVs have opened.
- During the pressure transient, PRZ pressure transmitter PT-445 failed high.

Which of the following will occur?

a. PRZ PORVs 445A and 445B will close as PT-444 senses a lowering pressure; PRZ PORV 444B will close when RCS pressure drops below 2000 psig

b. All PRZ PORVs will remain open as PT-444 senses a lowering pressure and must be manually closed

c. PRZ PORVs 445A and 445B will close as PT-444 senses a lowering pressure; PRZ PORV 444B will remain open and must be manually closed

d. PRZ PORV 444B will close as PT-444 senses a lowering pressure; PRZ PORVs 445A and 445B will close when RCS pressure drops below 2000 psig

Answer:

d. PRZ PORV 444B will close as PT-444 senses a lowering pressure; PRZ PORVs 445A and 445B will close when RCS pressure drops below 2000 psig

QUESTION NUMBER: 42
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: 008AA2.22

Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: Consequences of loss of pressure in RCS; methods for evaluating pressure loss

K/A IMPORTANCE: ***RO*** 3.8 ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** 3 ***55.43(b) SRO***

OBJECTIVE: AOP-3.19

RECOGNIZE automatic actions that are associated with AOP-019, Malfunction of RCS Pressure Control

REFERENCES: AOP-019
108D831, Sh 6, 11

SOURCE: ***New*** ☒ ***Significantly Modified*** ☐ ***Direct*** ☐

Bank Number NA

JUSTIFICATION:

a. Plausible since this is the plant response, except that the channels are reversed.

b. Plausible since PORVs 445A and 445B will remain open until the open permissive interlock is removed when RCS pressure drops below 2000 psig.

c. Plausible since the PORV controlled by the controlling channel will close as pressure lowers, but PORVs 445A and 445B will close when the open permissive interlock is removed when RCS pressure drops below 2000 psig.

d. **CORRECT** PT-445 controls PORVs 445A and 445B. With PT-445 failed high the PORVs will remain open until the open permissive interlock is removed when RCS pressure drops below 2000 psig.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Integration of system knowledge and effect of changing plant conditions

REFERENCES SUPPLIED:

Pressurizer Pressure Controller PK-444A

1. SETPOINT

Normally set at 66.88% corresponding to 2235 psig

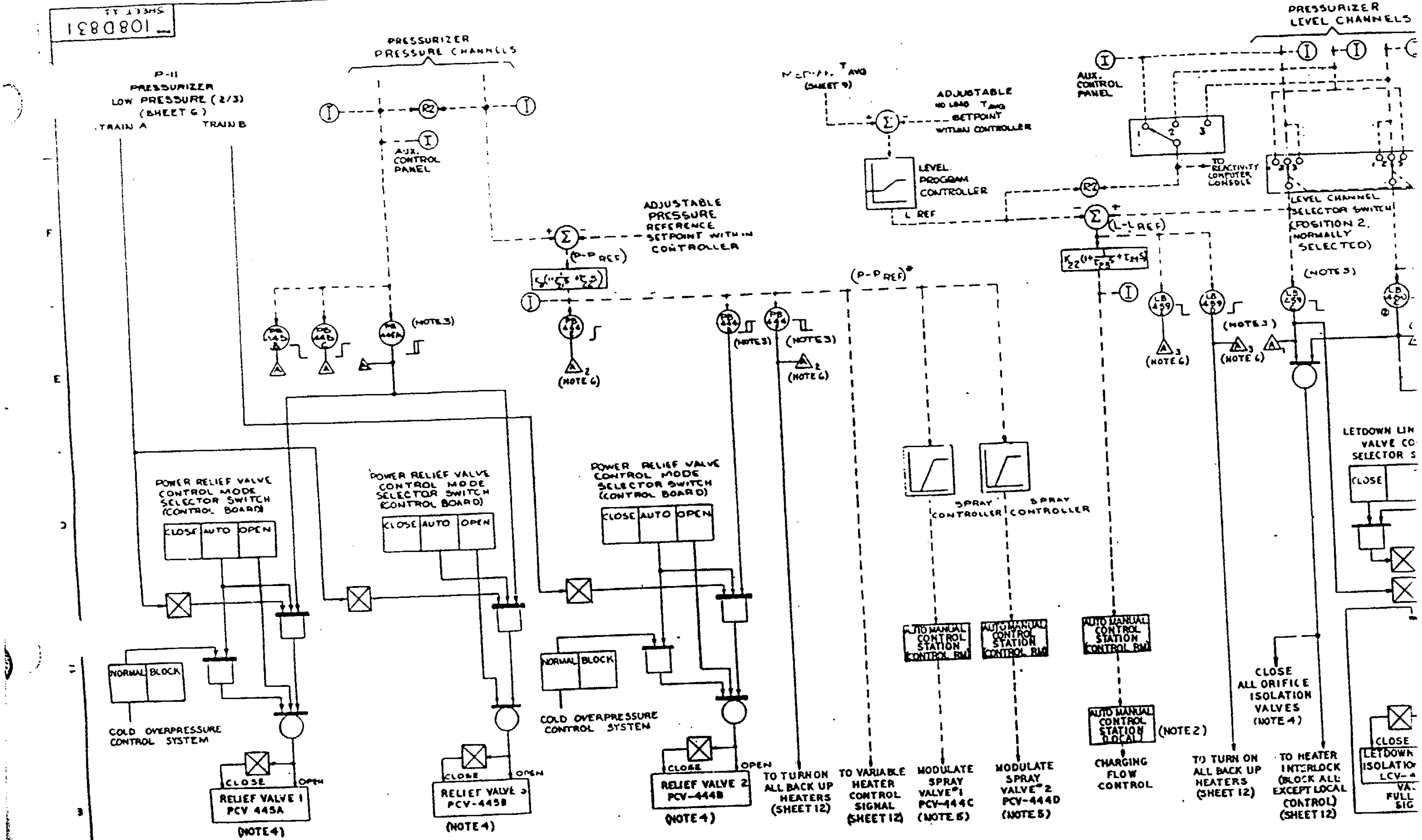
In AUTO, raising the setpoint 1% will result in an initial 5% reduction in Output signal, resulting in an equilibrium pressure increase of 8 psig.

2. OUTPUT

The following will occur at the given output in AUTO or MAN:

87.5%	PCV-444B opens
75%	PCV-444B shuts
71.87%	Spray valves full open
40.62%	Spray valves full shut
34.56%	Proportional heaters full off
25%	Nominal output at 2235 psig
15.62%	Proportional heaters full on
14.38%	Backup heaters off
9.4%	Backup heaters on

1080831



NOTES:

1. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT.
2. LOCAL CONTROL OVERRIDES ALL OTHER SIGNALS. LOCAL OVERRIDE ACTUATES ALARM IN CONTROL ROOM.
3. PRESSURE BISTABLES* PB-444B, PB-444F AND PB-445A AND LEVEL BISTABLES LB-459C, LB-459D AND LB-460C ARE "ENERGIZE TO ACTUATE".
4. OPEN/SHUT INDICATION IN CONTROL ROOM.
5. A LIGHT SHOULD BE PROVIDED IN THE CONTROL ROOM FOR EACH SPRAY VALVE TO INDICATE WHEN IT IS NOT FULLY CLOSED.
6. ALARM 2 AND ALARM 3 MUST HAVE REFLASH CAPABILITY.

CAROLINA POWER AND LIGHT COMPANY
PLANT: SHEARON HARRIS NUCLEAR POWER PLANT
UNIT: 1 ITEM-09
STATUS: APPROVED
CERTIFICATION LTR. NO. CQL-8518
AUTHORITY: A. T. PARKER
ENGR. LTR. NO. EP/SA-46750

WESTINGHOUSE PROPRIETARY DATA

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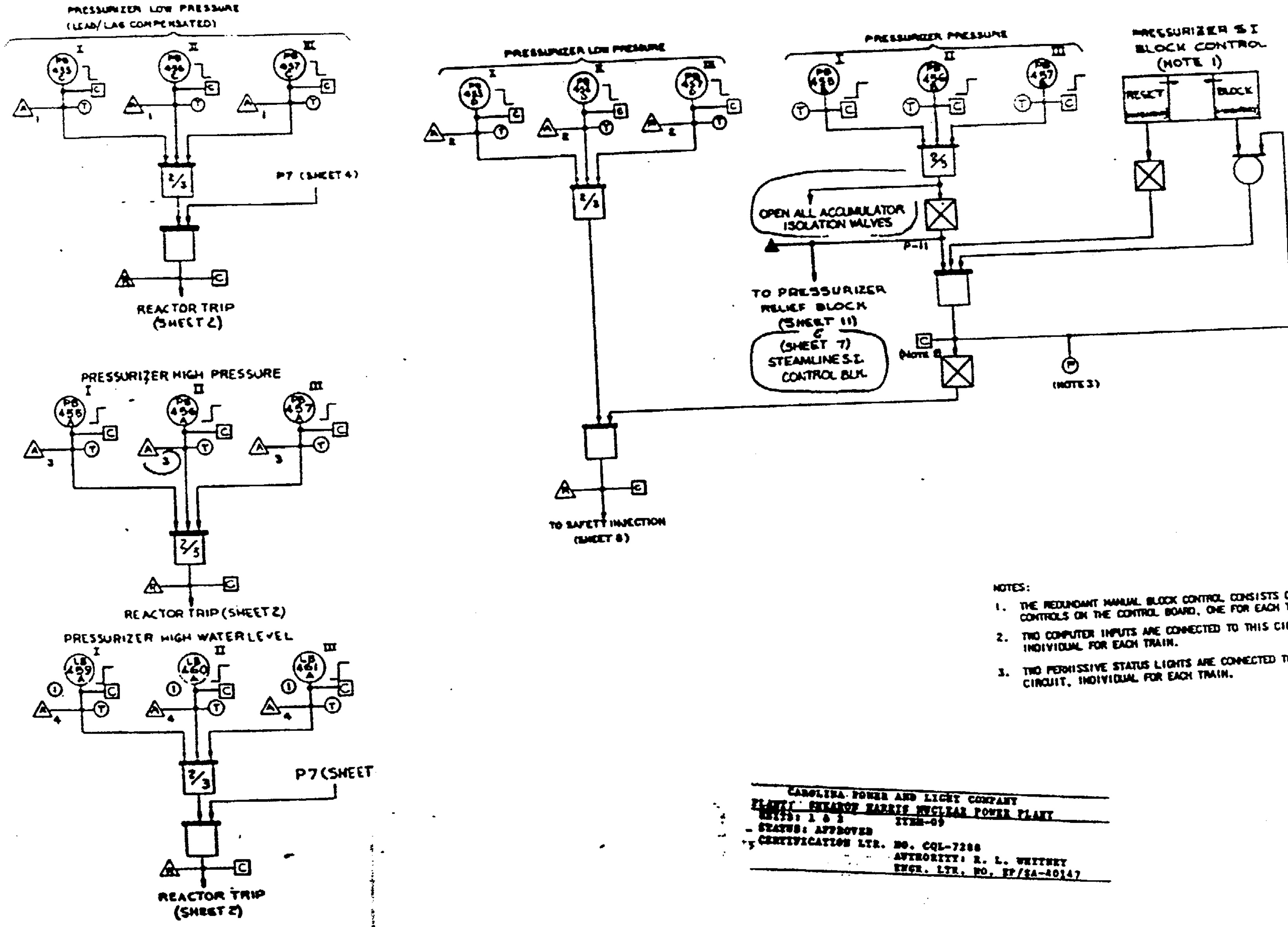


NOTES:

1. THE REDUNDANT MANUAL BLOCK CONTROL CONSISTS OF TWO CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
2. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.
3. TWO PERMISSIVE STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.

CAROLINA POWER AND LIGHT COMPANY
PLANT: SHEARON HARRIS NUCLEAR POWER PLANT
UNITS: 1 & 2 ITEM-09
STATUS: APPROVED
CERTIFICATION LTR. NO. CQL-7288
AUTHORITY: R. L. WHITNEY
ENGR. LTR. NO. ST/SA-40147

Westinghouse Electric Corporation

R CRALLE

CAROLINA POWER & LIGHT CO.
SHEARON HARRIS UNITS 1,2,3 & 4
FUNCTIONAL DIAGRAMS
PRESSURIZER TRIP SIGNALS

108D831
SHEET 6

CHANGES CIRCLED

Question: 43

Given the following conditions:

- Instrument Bus SI is de-energized.
- A reactor trip and safety injection occurs.

Which of the following describes the plant response AND required operator actions?

a.
- 'A' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'A' Train equipment

b.
- 'B' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'B' Train equipment

c.
- 'A' Train safeguards equipment will **NOT** automatically function
- 'A' Train equipment must be manually aligned/started **ONLY** if the corresponding 'B' Train equipment fails

d.
- 'B' Train safeguards equipment will **NOT** automatically function
- 'B' Train equipment must be manually aligned/started **ONLY** if the corresponding 'A' Train equipment fails

Answer:

a.
- 'A' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'A' Train equipment

4.0 General (continued)

5. If power is lost to instrument bus SII (B Train and TDAFW) or SIII (A Train) the associated AFW pump suction pressure instrument will read low. If the AFW pump is running it will not trip on Lo-Lo suction pressure nor will it be prevented from being started.

6. A(B) Train ESFAS slave relays are powered from instrument bus SI (SIV). A loss of SI or SIV will result in a loss of ESFAS functions driven by slave relays for that train.

7. PIC 17 (SI) and PIC 18 (SII) have backup power supplies from the Appendix R Inverters. If power to SI or SII is lost, these PICs should continue to function.

8. If power is lost to instrument bus SII (B Train) or SIII (A Train), the associated CNMT Spray Additive Tank level indicators will read empty but their associated CNMT Spray Chemical Addition Valve will not automatically shut. If necessary the valve(s) may be manually operated.

9. Placing the PRZ Master Pressure controller in manual when controlling PRZ heaters and sprays in manual will prevent an integrating signal from lifting the PRZ PORVs.

10. This procedure meets the requirements of CP&L document DIN 842960398, CAP 92H0786 and ANSI 18.7 Section 5.3.9.

5.0 Diagrams/Attachments

Attachment 1 - SI Instrument Bus Power Supplies and Loads

Attachment 2 - SII Instrument Bus Power Supplies and Loads

Attachment 3 - SIII Instrument Bus Power Supplies and Loads

Attachment 4 - SIV Instrument Bus Power Supplies and Loads

5.1.10 Manual Initiation of Safeguards Actions

R If a safeguards actuation setpoint is reached or exceeded and the associated safeguards signal does not actuate or actuates incompletely, operators are expected to manually initiate the signal. Examples of incomplete actuations are as follows:

(1) An SI signal occurs, but one train of SI does not actuate. (Reference 2.2.2.15)

(2) A Main Steam Line Actuation signal occurs on low steamline pressure, but SI, Phase A, etc. do not actuate.

The preferred method of manual actuation is by manipulation of the safeguards signal control switches. (References 2.2.3.8 and 2.2.3.11) If manual actuation of the signal is unsuccessful, components must be aligned individually. Additionally, if a safeguards actuation setpoint is being approached and time allows, operators are expected to manually initiate the associated safeguards signal to avoid challenging the safeguards function. For example, if RCS pressure is decreasing in an uncontrolled manner towards 1850 PSIG the operator is expected to manually actuate SI. (See Section 6.4 for guidance regarding individual components that fail to start on the Emergency Safeguards Sequencer.)

QUESTION NUMBER: 43
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 013K2.01

Knowledge of bus power supplies to the ESFAS/safeguards equipment control

K/A IMPORTANCE: ***RO*** 3.6 ***SRO*** 3.8

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-024-4

DETERMINE the following
c. Effects on ESFAS slave relays with the loss of an instrument bus

REFERENCES: AOP-024
EOP Users Guide

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. **CORRECT** Instrument Bus SI supplies power to the ESF slave relays on Train 'A'. These relays require power to actuate. If the train fails to actuate all equipment must be started manually.

b. Plausible since required actions would be taken to align/start train which failed to actuate, but 'A' Train is the train which fails to actuate.

c. Plausible since 'A' Train equipment fails to actuate, but requirements are that all equipment be aligned/started regardless of the condition of the other train.

d. Plausible since one train fails to actuate, but it is 'A' Train that fails and equipment must be aligned/started regardless of the condition of the other train.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Integration of system knowledge and failure mode of components

REFERENCES SUPPLIED:

Question: 44

Given the following conditions:

- Reactor power is 8% during a plant startup.
- 1A Main Feed Pump is operating.
- The Main Feed Regulating Valves are in MAN and are throttled open.
- The Main Feed Regulating Bypass Valves are in AUTO and are throttled open.
- 'C' SG level rises to 85%.

Which of the following will occur?

a. 1A Main Feed Pump trips **AND** MFW is isolated to 'C' SG **ONLY**

b. 1A Main Feed Pump trips **AND** MFW is isolated to all SGs

c. 1A Main Feed Pump remains running **AND** MFW is isolated to 'C' SG **ONLY**

d. 1A Main Feed Pump remains running **AND** MFW is isolated to all SGs

Answer:

b. 1A Main Feed Pump trips **AND** MFW is isolated to all SGs

QUESTION NUMBER: 44
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 035K1.12

Knowledge of the physical connections and/or cause-effect relationships between the S/GS and the following systems: RPS

K/A IMPORTANCE: ***RO*** 3.7 ***SRO*** 3.9

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: SGWLC-3.0-4

STATE the narrow range SG water levels that correspond to each of the following actions:
- SG high-level turbine trip and feedwater isolation (P-14)

REFERENCES: 108D831, Sh 13

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number SGWLC 008

JUSTIFICATION:

a. Plausible since the MFW pump is tripped, but flow is isolated to all SGs.

b. **CORRECT** A high-high SG level, P-14, trips the MFW pumps and closes all MFW valves which could provide flow to the SG.

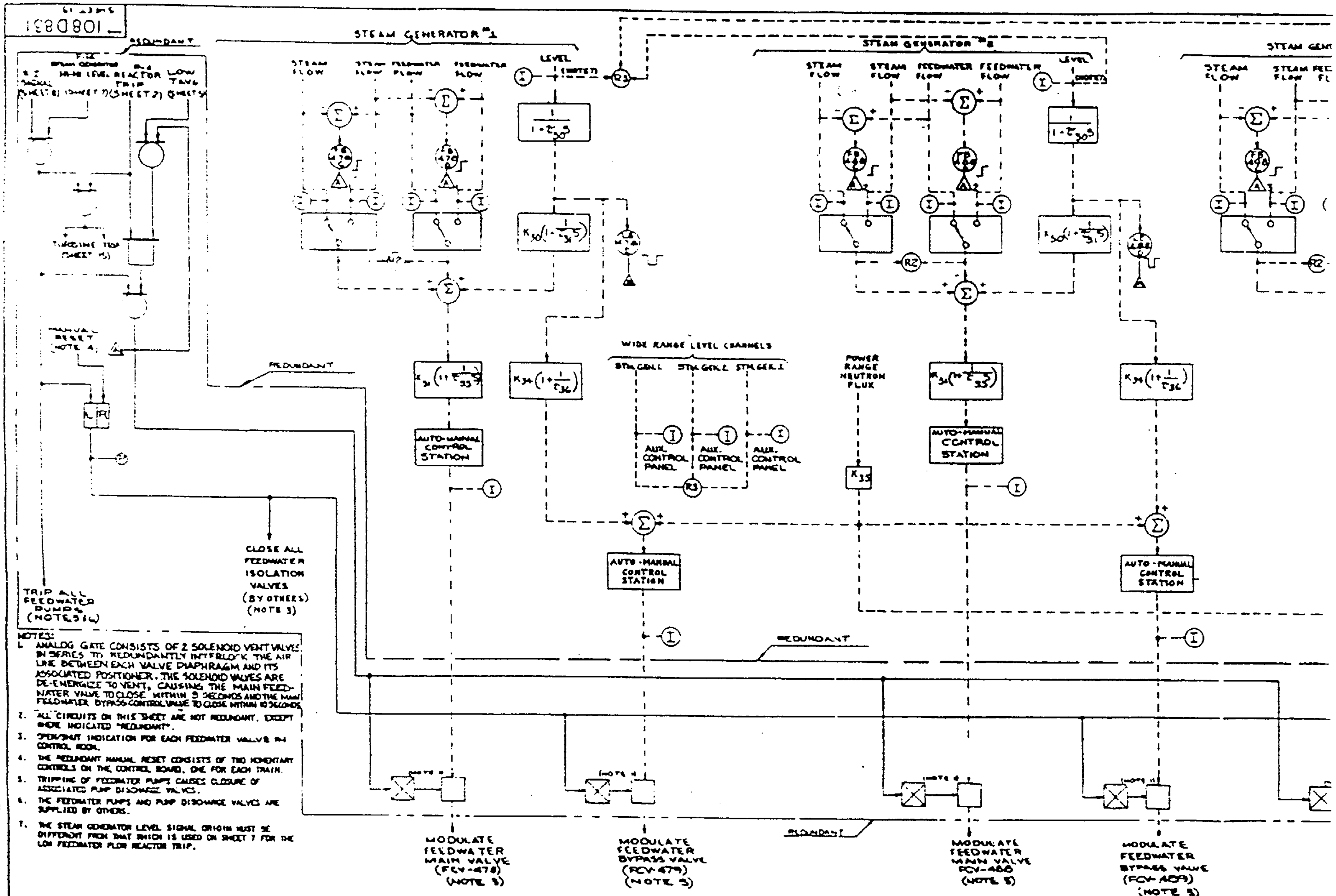
c. Plausible since flow would be isolated to the SG with the high-high level, but all SGs are isolated.

d. Plausible since flow is isolated to all SGs, but the MFW pump would also trip.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system operation

REFERENCES SUPPLIED:



NOTES:

1. ANALOG GATE CONSISTS OF 2 SOLENOID VENT VALVES IN SERIES TO REDUNDANTLY INTERLOCK THE AIR LINE BETWEEN EACH VALVE DIAPHRAGM AND ITS ASSOCIATED POSITIONER. THE SOLENOID VALVES ARE DE-ENERGIZE TO VENT, CAUSING THE MAIN FEEDWATER VALVE TO CLOSE WITHIN 5 SECONDS AND THE MAIN FEEDWATER BYPASS CONTROL VALVE TO CLOSE WITHIN 10 SECONDS.
2. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT, EXCEPT WHERE INDICATED "REDUNDANT".
3. OPEN/SHUT INDICATION FOR EACH FEEDWATER VALVE IN CONTROL ROOM.
4. THE REDUNDANT MANUAL RESET CONSISTS OF TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
5. TRIPPING OF FEEDWATER PUMPS CAUSES CLOSURE OF ASSOCIATED PUMP DISCHARGE VALVES.
6. THE FEEDWATER PUMPS AND PUMP DISCHARGE VALVES ARE SUPPLIED BY OTHERS.
7. THE STEAM GENERATOR LEVEL SIGNAL ORIGIN MUST BE DIFFERENT FROM THAT WHICH IS USED ON SHEET 7 FOR THE LOW FEEDWATER FLOW REACTOR TRIP.

CAROLINA POWER AND LIGHT COMPANY
PLANT: SHEARON HARRIS NUCLEAR POWER PLANT
UNIT: 1 ITEM-3
STATUS: APPROVED
CERTIFICATION LTR. NO. CQL 4318
AUTHORITY: A. T. PARKER
ENGR. LTR. NO. SP/SA-44730

WESTINGHOUSE PROPRIETARY DATA

SGWLC 008

Which one of the following statements describes the plant response when any steam generator level is greater than 82.4 percent?

A. Reactor trip and safety injection

✓B. SG high-level turbine trip and feedwater isolation (P-14)

C. Auxiliary feedwater actuation

D. MFW pump trip and turbine runback

Question: 45

A high (red) alarm on the Containment Leak Detection Monitor particulate channel (3502A-SA) causes which of the following automatic isolations/trips to occur?

a.
- Containment Normal Purge
- Containment Pre-Entry Purge
- Containment Vacuum Relief

b.
- Containment Normal Purge **ONLY**

c.
- Containment Pre-Entry Purge **ONLY**

d.
- Containment Vacuum Relief **ONLY**

Answer:

b.
- Containment Normal Purge **ONLY**

QUESTION NUMBER: 45
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 029K4.03

Knowledge of design feature(s) and/or interlock(s) which provide for the following: Automatic purge isolation

K/A IMPORTANCE: ***RO*** 3.2 ***SRO*** 3.5

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.16

RECOGNIZE automatic actions that are associated with AOP-016, Excessive Primary Plant Leakage

REFERENCES: AOP-005
AOP-016

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AOP-3.16 004

JUSTIFICATION:

a. Plausible since all isolate on CVI signal, but only normal purge and supply isolate on leak detection monitor alarm.

b. **CORRECT** Containment normal purge and supply will isolate on high rad level from leak detection monitor.

c. Plausible since all isolate on CVI signal and only one system isolates on leak detection monitor alarm, but it is normal purge and supply.

d. Plausible since all isolate on CVI signal and only one system isolates on leak detection monitor alarm, but it is normal purge and supply.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of system design and operations

REFERENCES SUPPLIED:

2.0 AUTOMATIC ACTIONS

1. Reactor trip will occur if PRZ pressure drops below 1960 psig (rate compensated).

2. SI will actuate from either of the following:

   - PRZ pressure signal of 1850 psig
   - CNMT pressure signal of 3 psig

3. CNMT ventilation isolation will actuate on 2/4 high radiation level signal from CNMT ventilation isolation monitors (REM-3561A,B,C,D).

4. CNMT normal purge and supply will isolate on a high radiation level signal from RM 3502A, RCS leak detection radiation monitor (Ref: FSAR Section 12.3.4).

5. Letdown will isolate on low PRZ level (17%).

6. RWST valves to charging pumps will open on low-low VCT level (5%) and VCT outlet valves will shut after RWST valves open.

7. RCP thermal barrier flow control valve (1CC-252) will close on a high flow (174 gpm) signal from the RCP thermal barrier heat exchangers.

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

3.2 Follow-up Actions

R NOTE: RCS leakage in excess of Tech Spec limits may require initiation of the Emergency Plan.

1. IF RHR is in operation, THEN Go To AOP-020, Loss of RCS Inventory or Residual Heat Removal While Shutdown.

2. Refer to PEP-110, Emergency Classification and Protective Action Recommendations, and enter the EAL Network at entry point X.

R 3. IF at anytime, RCS leakage is determined to be greater than automatic OR manual VCT makeup capability, THEN perform the following:

   a. Trip the reactor.

   b. Manually initiate safety injection (Ref: CAP 91H0993).

   c. Go To EOP Path-1.

4. Verify Reactor Makeup Control System operates to maintain VCT level.

RADIATION MONITORING SYSTEM

1.0 SYMPTOMS

1. Increasing radiation level on radiation monitors
2. ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE alarm
3. ALB-10-3-4, WPB EFFLUENT RAD MONITOR TROUBLE alarm
4. ALB-10-5-4, RAB/TB STACK ACCIDENT RAD MONITOR TROUBLE alarm
5. Notification to the Control Room of increasing radiation levels or alarms

2.0 AUTOMATIC ACTIONS

1. High alarm on the following Containment monitors initiates Containment Ventilation Isolation on 2/4 logic:
   - RM-1CR-3561A-SA
   - RM-1CR-3561B-SB
   - RM-1CR-3561C-SA
   - RM-1CR-3561D-SB
2. High alarm on REM-1LT-3502A-SA, CNMT RCS Leak Detection monitor, isolates Normal Containment Purge
3. High alarm on REM-1LT-3502B, CNMT Pre-Entry Purge monitor, isolates Containment Pre-entry Purge
4. High alarm on any of the following FHB Spent Fuel Pool Area monitors initiates FHB Emergency Exhaust mode of operation:
   - RM-1FR-3564A-SA
   - RM-1FR-3564B-SB
   - RM-1FR-3565A-SA
   - RM-1FR-3565B-SB
   - RM-1FR-3566A-SA
   - RM-1FR-3566B-SB
   - RM-1FR-3567A-SA
   - RM-1FR-3567B-SB
5. High alarm on REM-1WV-3546, WPB Stack 5 PIG monitor, shuts 3WG -229, WG DECAY TANKS E & F TO PLANT VENT VLV
6. High alarm on REM-1WC-3544, WPB CCW HX Inlet monitor, shuts 3WC -4, WPB CCW Surge Tank Overflow valve

Question: 46

Which of the following events would result in increasing radiation levels in the Plant Vent Stack?

a. Steam Generator Tube Rupture

b. Waste Gas Decay Tank Rupture

c. Fuel Handling Accident

d. Radioactive Spill in the Chemistry Hot Lab

Answer:

c. Fuel Handling Accident

QUESTION NUMBER: 46
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: 0602.4.31

Knowledge of annunciators alarms and indications, and use of the response instructions (Accidental Gaseous Radwaste Release).

K/A IMPORTANCE: ***RO*** 3.3 ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.9

IDENTIFY symptoms that require entry into AOP-009, Accidental Release of Waste Gas

REFERENCES: AOP-009
ALB-010

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AOP-3.9 007

JUSTIFICATION:

a. Plausible since a SGTR will cause increasing radiation levels, but levels will increase in the Turbine Building Vent Stack.

b. Plausible since a WGDT rupture will cause increasing radiation levels, but levels will increase in the WPB Vent Stack.

c. **CORRECT** A fuel handling accident will result in increasing rad levels in the FHB ventilation system which discharges to the Plant Vent Stack.

d. Plausible since a spill in the chem lab will cause increasing radiation levels, but levels will increase in the WPB Vent Stack.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system interrelationships

REFERENCES SUPPLIED:

ACCIDENTAL RELEASE OF WASTE GAS

1.0 SYMPTOMS

1. Notification of a gas system leak or rupture
2. Increasing radiation level on radiation monitors or recorders
3. Notification to the Control Room of increasing radiation levels or alarms
4. ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE alarm
5. ALB-10-3-4, WPB EFFLUENT RAD MONITOR TROUBLE alarm
6. ALB-10-5-4, RAB/TB STACK ACCIDENT RAD MONITOR TROUBLE alarm

2.0 AUTOMATIC ACTIONS

None

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

3.2 Follow-up Actions

NOTE:
- If safe operation of the plant will NOT be compromised, procedure steps may be performed simultaneously or out of sequence at the discretion of the Unit SCO.
- R A radiological effluent or hydrogen release may require the initiation of the Emergency Plan (Ref: DIN 842960398).

1. Refer to PEP-110, Emergency Classification and Protective Action Recommendations and entry point X for EAL network.
2. Refer to AOP-005, Radiation Monitoring System.
3. Monitor WPB, RAB and Containment radiation monitors to locate the leak source.

ALARM

RAD MONITOR SYSTEM TROUBLE

AUTOMATIC ACTIONS

1. Automatic Actions are dependent upon which RM-23 Radiation Monitor is in ALARM

CAUSE

1. Any radiation monitor on RM-23 in alarm condition.

OBSERVATIONS

1. RM-23, Radiation Monitoring Panel

ACTION

1. R If the alarm is a Fuel Handling Building High Radiation alarm, then the Spent Fuel Pool Purification System must be manually started per OP-116, Fuel Pool Cooling and Cleanup. (Ref. 5).

2. Refer to AOP-005, Radiation Monitoring System.

3. If necessary initiate a WR/JO.

4. If maintenance is to be performed, refer to OWP-RM.

DEVICE/SETPOINTS

1. Refer to HPP-500, Radiation Monitoring System Data Base Manual for the setpoints for any RM-23 monitor.

POSSIBLE PLANT EFFECTS

1. Radiation hazard to personnel

2. Release of radioactive material to the environment

3. LCO

REFERENCES

1. Tech. Specs. 3.3.3.1, 3.3.3.6, 3.3.3.10, 3.3.3.11, and 3.9.9

2. 6-B-401 0798, 0799

3. HPP-500

4. AOP-005

5. FSAR Section 9.1.3

6. OP-116

7. OWP-RM

ALARM

RAB/TB STACK ACCIDENT RAD MONITOR TROUBLE

AUTOMATIC ACTIONS

1. None Applicable

CAUSE

1. High airborne activity sensed through any of the following ventilation stack radiation monitors:
   a. Plant Stack Accident Radiation Monitor
   b. Turbine Building Vent Stack Radiation Monitor
2. Turbine Building WRGM operate status
3. Alarm circuit or instrument malfunction

OBSERVATIONS

1. At the RM-11 Cabinet:
   a. Turbine Building Vent Stack WRGM
   b. Plant Vent Stack WRGM

ACTION

1. If any of the above stack monitors exceed their associated setpoint, refer to AOP-009, Radiation Monitoring System.
2. If necessary initiate a WR/JO for maintenance support.
3. If maintenance is to be performed, refer to OWP-RM.

DEVICE/SETPOINTS

1. Plant Vent Stack WRGM
   a. ALERT - RM-21AV-3509-1SA — per HPP-500
2. Turb. Bldg. Vent Stack WRGM
   a. ALERT - RM-1TV-3536-1 — PER HPP-500
   b. HIGH - RM-1TV-3536-1 — PER HPP-500
   c. OPERATE STATUS

POSSIBLE PLANT EFFECTS

1. Atmospheric release of radioactivity in excessive amounts
2. Plant shutdown
3. LCO

REFERENCES

1. Tech. Spec. 3.3.3.6
2. 6-B-401 0740, 0743 (DCN 251-546)
3. AOP-005
4. AOP-009
5. HPP-500
6. OWP-RM
7. ODCM

Question: 47

Given the following conditions:

- The plant is operating at 22% power.
- PRZ pressure transmitter PT-444 has failed high.
- 1RC-107, PRZ Spray Valve 444C, has stuck open.

Which of the following actions is to be taken?

a. Stop 1A RCP and stabilize the plant at power

b. Trip the reactor and stop 1A RCP

c. Stop 1C RCP and stabilize the plant at power

d. Trip the reactor and stop 1C RCP

Answer:

a. Stop 1A RCP and stabilize the plant at power

QUESTION NUMBER: 47
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/2

K/A: 027AA2.15

Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: Actions to be taken if PZR pressure instrument fails high

K/A IMPORTANCE: ***RO*** 3.7 ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.19-R3

LIST and/or SELECT the immediate operator actions required for AOP-019, Malfunction of RCS Pressure Control

REFERENCES: AOP-019
SD-100.03

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.19-R3 001

JUSTIFICATION:

a. **CORRECT** A stuck open spray valve requires the associated RCP to be stopped. Stopping an RCP below P-8 will not result in a reactor trip.

b. Plausible since this would be the correct action if a reactor trip would occur due to stopping the RCP, but below P-8 a reactor trip will not occur.

c. Plausible since stabilizing the plant is the correct action, but RCP 1A should be stopped.

d. Plausible since this would be the correct action if a reactor trip would occur due to stopping the RCP, but below P-8 a reactor trip will not occur and RCP 1A should be stopped.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Integration of procedural and system knowledge dependent upon plant conditions

REFERENCES SUPPLIED:

3.2 Follow-up Actions (continued)

9. IF at any time, all the following exist:

- Either PRZ Spray valve failed full or partially open
- PRZ pressure can NOT be maintained above 2185 psig

THEN perform the following:

a. IF above P-8, THEN perform the following:

(1) Trip the reactor.

(2) Go To EOP Path-1 while continuing with this procedure.

(3) Stop the RCP associated with the failed PRZ Spray Valve:

PRZ Spray Valve	RCP
1RC-107 (PCV-444C)	Loop A
1RC-103 (PCV-444D)	Loop B

(4) If pressure is less than 2000 psig, and continues to decrease in an uncontrolled manner, stop additional RCPs.

b. IF below P-8, THEN perform the following:

(1) Stop the RCP associated with the failed PRZ Spray Valve:

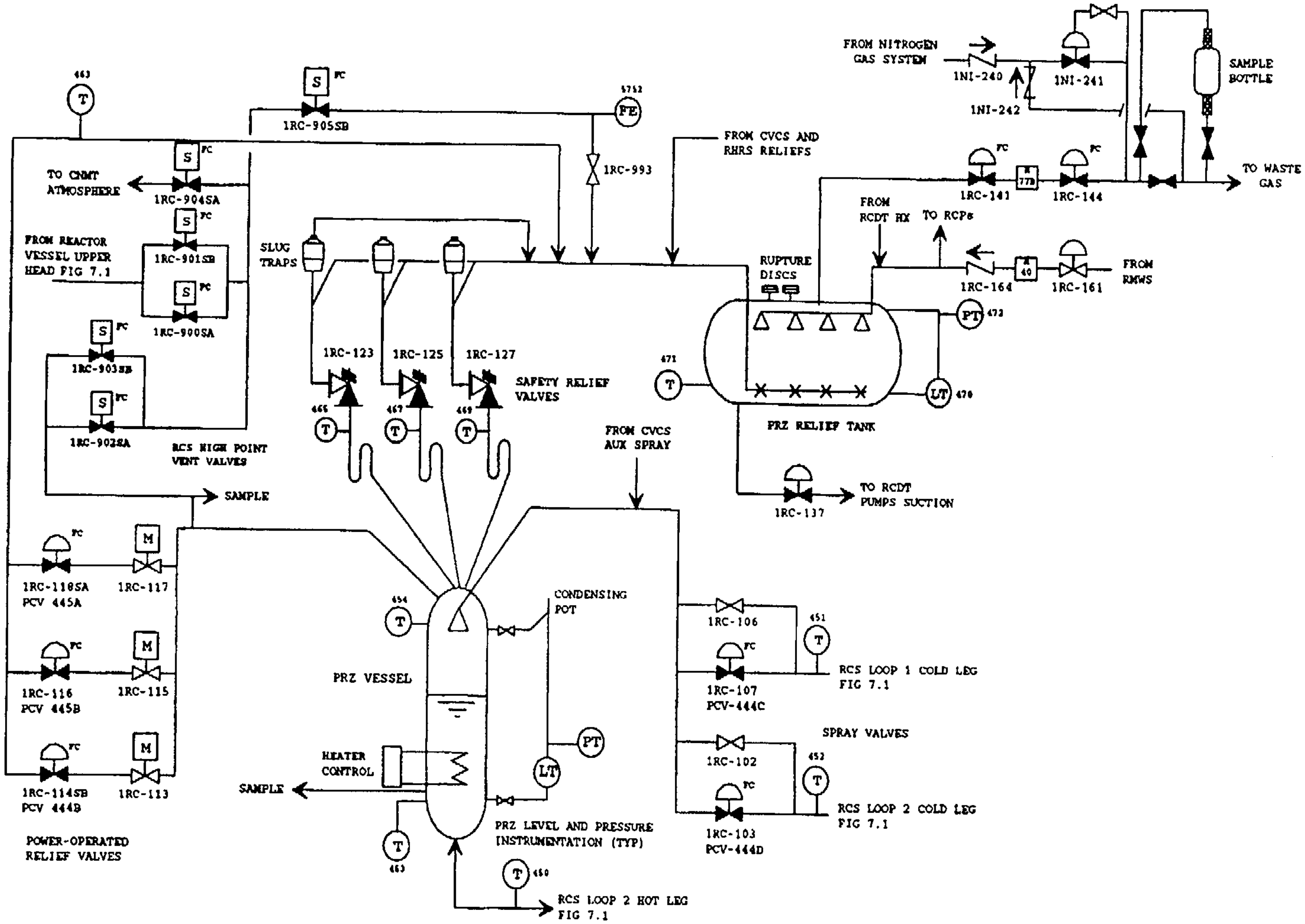
PRZ Spray Valve	RCP
1RC-107 (PCV-444C)	Loop A
1RC-103 (PCV-444D)	Loop B

(2) If pressure is less than 2000 psig, and continues to decrease in an uncontrolled manner, do the following:

(a) Trip the reactor.

(b) Go To EOP Path-1 while continuing with this procedure.

(3) Stop additional RCPs.



Pressurizer and Relief Tank Schematic

Figure 7.2
Sheet 1 of 1

AOP-3.19-R3 001
List the immediate action(s) per AOP-019 for high RCS pressure.

Question: 48

Which of the following gives the parameters monitored for SI Reinitiation criteria on the EPP-009, Post LOCA Cooldown and Depressurization, foldout page?

a. RCS subcooling and RVLIS level

b. Pressurizer level and RCS pressure

c. RCS pressure and RVLIS level

d. RCS subcooling and pressurizer level

Answer:

d. RCS subcooling and pressurizer level

QUESTION NUMBER: 48

TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: WE03EK2.1

Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

K/A IMPORTANCE: ***RO*** 3.6 ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: EOP-2.3-R2

Given the title of an EOP foldout item, state the parameters to be monitored for implementation

REFERENCES: EPP-009

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.3 001

JUSTIFICATION:

a. Plausible since RCS subcooling is monitored, but RVLIS is only monitored for criteria in those procedures where no pressurizer level is expected to exist.

b. Plausible since pressurizer level is monitored, but RCS pressure can be maintained over a wide range as a function of temperature to maintain subcooling.

c. Plausible since RVLIS is monitored in some procedures for SI Reinitiation criteria, but only where pressurizer level is expected to be lost, and RCS pressure can be maintained over a wide range as a function of temperature to maintain subcooling.

d. **CORRECT** RCS subcooling and pressurizer level are the parameters monitored to determine SI Reinitiation criteria.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural requirements

REFERENCES SUPPLIED:

FOLDOUT

- o SI REINITIATION CRITERIA

  IF any of the following occurs:

  - o RCS subcooling - LESS THAN 10°F [42°F] - C
    20°F [50°F] - M
  - o PRZ level - CAN NOT BE MAINTAINED GREATER THAN 10% [45%]

  THEN perform the following:

  a. Shut charging line isolation valves AND open BIT valves.

  b. IF necessary to restore conditions, THEN restart standby CSIP.

  c. IF reinitiation due to RCS subcooling, THEN GO TO Step 24.

  d. IF reinitiation due to PRZ level, THEN observe CAUTION prior to Step 10 AND GO TO Step 10.

- o SECONDARY INTEGRITY CRITERIA

  IF any of the following occurs, THEN GO TO EPP-014, "FAULTED STEAM GENERATOR ISOLATION", Step 1 (unless faulted SG is needed for RCS cooldown):

  - o Any SG pressure - DECREASES IN AN UNCONTROLLED MANNER AND THAT SG HAS NOT BEEN ISOLATED
  - o Any SG - COMPLETELY DEPRESSURIZED AND THAT SG HAS NOT BEEN ISOLATED

- o PATH-2 TRANSITION CRITERIA

  IF any intact SG level increases in an uncontrolled manner OR any intact SG has abnormal radiation levels, THEN GO TO PATH-2, entry point J.

- o COLD LEG RECIRCULATION SWITCHOVER CRITERIA

  IF RWST level decreases to less than 23.4% (2/4 Low-Low alarm), THEN GO TO EPP-010, "TRANSFER TO COLD LEG RECIRCULATION", Step 1.

- o AFW SUPPLY SWITCHOVER CRITERIA

  IF CST level decreases to less than 10%, THEN switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

- o RHR RESTART CRITERIA

  IF RCS pressure decreases to less than 190 PSIG, THEN restart RHR pumps to supply water to the RCS.

- o LOSS OF EMERGENCY COOLANT RECIRCULATION

  IF emergency coolant recirculation is established AND subsequently lost, THEN GO TO EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION," Step 1.

Question: 49

The plant was operating at 100% power when an accident occurred.

Assuming **NO** operator action is taken, a Main Steam Line Isolation Signal (MSIS) will be generated when ...

a. PRZ pressure drops below 1850 psig.

b. containment pressure rises to 2.0 psig.

c. steam line pressure drops below 601 psig.

d. steam line pressure drops faster than 100 psig/sec.

Answer:

c. steam line pressure drops below 601 psig.

QUESTION NUMBER: 49

TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 039A3.02

Ability to monitor automatic operation of the MRSS, including: Isolation of the MRSS

K/A IMPORTANCE: ***RO*** 3.1 ***SRO*** 3.5

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: MSSS-3.0-R3

DESCRIBE the conditions which will cause a main steam isolation signal including the setpoints and coincidence for each signal and LIST the valves that close when the signal occurs

REFERENCES: EOP Guide-1

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number MSSS-3.0-R3 002

JUSTIFICATION:

a. Plausible since this pressure is the low pressurizer pressure SI setpoint, but a main steamline isolation will not occur as a result of this signal.

b. Plausible since a steamline isolation will occur on high containment pressure, but pressure must be above 3 psig.

c. **CORRECT** Main Steam Line isolation will occur with no operator action when steamline pressure drops below 601 psig.

d. Plausible since this signal will cause a steamline isolation after low steamline pressure SI is blocked, but no operator actions have been taken to block the SI.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of system knowledge to changing plant conditions

REFERENCES SUPPLIED:

Instructions	Response Not Obtained
15. Verify AFW Pumps Running:	
a. Verify both MDAFW pumps - RUNNING	
b. IF necessary to control SG level, THEN verify TDAFW pump - RUNNING	
16. Check Main Steam Isolation:	
a. Main steam isolation - ACTUATED	a. Check main steam isolation actuation criteria by observing any of the following: o Steam line pressure - LESS THAN 601 PSIG o CNMT pressure - GREATER THAN 3.0 PSIG o Manual closure of all MSIVs AND bypass valves is desired. GO TO Step 16c.
b. GO TO Step 16d.	
c. Main steam isolation - REQUIRED	c. GO TO Step 17.
d. Verify main steam isolation - ACTUATED (Refer to OMM-004, "POST TRIP/SAFEGUARDS REVIEW", Attachment 8.)	
17. Verify Both EDGs - RUNNING	
18. Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED	

Question: 50

Given the following conditions:

- Power is at 45% during a power increase following a short maintenance outage.
- Rod K-6 in Control Bank 'D' is determined to be inoperable due to a power cabinet malfunction.
- The rod, determined to be at 153 steps, is **NOT** capable of being moved, but is considered to be trippable.
- The crew realigns the remaining rods in Control Bank 'D' with the inoperable rod.

What is the maximum power level that can be achieved under these conditions while maintaining **ALL** associated alarms clear?

a. 45%

b. 50%

c. 75%

d. 80%

Answer:

c. 75%

QUESTION NUMBER: 50
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 005AK3.05

Knowledge of the reasons for the following responses as they apply to the Inoperable / Stuck Control Rod: Power limits on rod misalignment

K/A IMPORTANCE: ***RO*** 3.4 ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** 5/10 ***55.43(b) SRO***

OBJECTIVE: RODCS-11

STATE the following with respect to Technical Specifications associated with the rod control system: b. The conditions which require actions to be taken within one hour

REFERENCES: Curve F-10-1

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number RO98-18

JUSTIFICATION:

a. Plausible since this is current power level and candidate believes power cannot be raised under these conditions, but power can be raised per TS.

b. Plausible since other power distribution limits require power be maintained below 50%, but TS allows continued operation up to level equivalent to rod position.

c. **CORRECT** Low alarm would occur at 150 steps for power level of 75%.

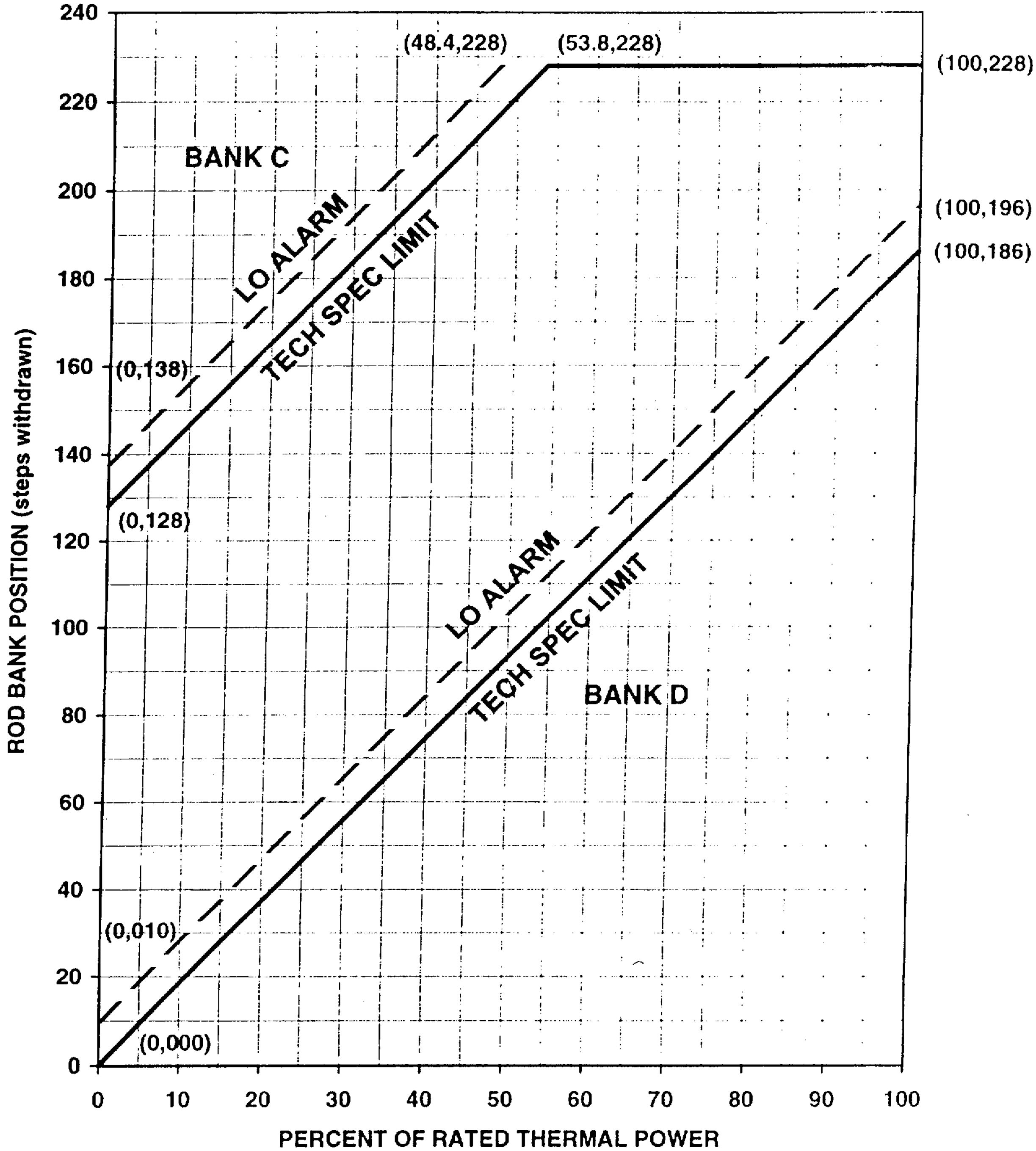
d. Plausible since TS allows continued operation up to this power provided rods are aligned and power is limited to that dictated by the RIL, but alarm would be RIL low alarm would be in.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application and interpretation of data on curve

REFERENCES SUPPLIED: Curve F-10-1

HARRIS UNIT 1 CYCLE 10
ROD INSERTION LIMITS



CURVE NO.	F-10-1	REV NO.	0
ORIGINATOR	Andrew Howe	DATE	4/17/00
SUPERVISOR	[signature]	DATE	4-22-00
SUPERINTENDENT - SHIFT OPERATIONS	[signature]	DATE	4-23-00

Power is at 36% during a power increase following a short maintenance outage. Rod K-6 in Control Bank 'D' is determined to be inoperable due to a power cabinet malfunction. The rod, determined to be at 120 steps, is not capable of being moved, but is considered to be trippable. The crew realigns the remaining rods in Control Bank 'D' with the inoperable rod.

What is the maximum power level that can be achieved under these conditions?

A. 36%

B. 50%

C. 64%

D. 75%

Answer:

C 64%

NOTE: PLP-106, ATT. 9, FIG. 2, ROD INSERTION LIMITS VS. THERMAL POWER, IS REQUIRED TO ANSWER THIS QUESTION.

Question: 51

Given the following conditions:

- The plant was operating at 100% power when an accident occurred.
- All feedwater is isolated to three faulted SGs IAW EPP-015, Uncontrolled Depressurization of All SGs.
- The STA reports a red path requirement for the heat sink CSF.

Which of the following describes why FRP-H.1, Response to Loss of Secondary Heat Sink, would **NOT** be used in this situation?

a. FRPs are implemented only after completion of PATH-1, entry Point C

b. Feed flow has been reduced by operator action

c. RHR is capable of providing an adequate heat sink

d. Heat transfer coupling has been lost between the RCS and the SGs

Answer:

b. Feed flow has been reduced by operator action

QUESTION NUMBER: 51

TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: WE12EK3.2

Knowledge of the reasons for the following responses as they apply to the (Uncontrolled Depressurization of all Steam Generators) Normal, abnormal and emergency operating procedures associated with (Uncontrolled Depressurizaiton of all Steam Generators).

K/A IMPORTANCE: ***RO*** 3.3 ***SRO*** 3.9

10CFR55 CONTENT: ***55.41(b) RO*** 5/10 ***55.43(b) SRO***

OBJECTIVE: EOP-3.11

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis
a. CSF decision points

REFERENCES: FRP-H.1

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.11 020

JUSTIFICATION:

a. Plausible since this point is first time PATH-1 addresses implementation of CSFs, but an earlier transition out of PATH-1 would require that CSFs be implemented.

b. CORRECT FRP-H.1 is not performed if required AFW flow capability exists and flow has been reduced due to operator action. EPP-015 would direct that AFW flow be isolated or reduced.

c. Plausible since RHR would be available if RCS pressure were low enough, but performance of FRP-H.1 would still be required.

d. Plausible since excessive steaming of the SGs could result in a temporary loss of NC flow, but performance of FRP-H.1 would still be required.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of alternate actions based on plant conditions

REFERENCES SUPPLIED:

Instructions	Response Not Obtained

****

CAUTION

This procedure should NOT be performed if total feed flow capability of 222.5 KPPH is available AND total feed flow has been reduced due to operator action.

****

1. Implement Function Restoration Procedures As Required.

2. Check Secondary Heat Sink Requirements:

Instructions	Response Not Obtained
a. RCS pressure - GREATER THAN ANY NON-FAULTED SG PRESSURE	a. GO TO PATH-1, entry point C.
b. RCS temperature - GREATER THAN 350°F [330°F]	b. GO TO Step 2d.
c. Observe CAUTION prior to Step 3 AND GO TO Step 3.	
d. Check RHR system status - ALIGNED IN SHUTDOWN COOLING MODE	d. Place RHR system in service using GP-007, "NORMAL PLANT COOLDOWN" AND OP-111, "RESIDUAL HEAT REMOVAL SYSTEM", Section 5.1 while continuing with this procedure. IF RHR cooling is subsequently established, THEN RETURN TO procedure and step in effect. Observe CAUTION prior to Step 3 AND GO TO Step 3.
e. RETURN TO procedure and step in effect.	

Question: 52

ALB-15-1-3, Protection System A/B Trouble, has alarmed.

Local indications are as follows:

	Train A	Train B
General Warning Light	On	Off
#1 48-V DC Power Supply	On	On
#1 15-V DC Power Supply	On	On
#2 48-V DC Power Supply	Off	On
#2 15-V DC Power Supply	Off	On
Trip Bypass Breaker	Racked Out/Open	Racked Out/Open

These conditions would be caused by ...

a. a loss of instrument Channel SIII power supply.

b. a loss of instrument Channel SIV power supply.

c. a logic test switch being out of position inside an SSPS 'A' Train cabinet.

d. a logic test switch being out of position inside an SSPS 'B' Train cabinet.

Answer:

a. a loss of instrument Channel SIII power supply.

QUESTION NUMBER: 52
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 012A1.01

Ability to predict and/or monitor Changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including: Trip setpoint adjustment

K/A IMPORTANCE: ***RO*** 2.9 ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: RPS-A3

Using external cabinet indications, DIAGNOSE the cause of an SSPS train General Warning alarm to the maximum extent possible as an AO

REFERENCES: ALB-015
OP-156.02

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number RPS-A3 002

JUSTIFICATION:

a. **CORRECT** Instrument Channel III supplies power to #2 'A' Train RPS 15 VDC and 48 VDC power supplies.

b. Plausible since a loss of either one of these power supplies would cause the alarm, but indication would be on #2 'B' Train.

c. Plausible since this would cause the alarm, but only the General Warning light would be lit.

d. Plausible since this would cause the alarm, but only the General Warning light would be lit and it would be lit on 'B' Train.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of conditions to system knowledge to determine outcome

REFERENCES SUPPLIED: AOP-018, Attachments 1 and 2

5.7.2 Procedural Steps (continued)

NOTE: The Secondary Power Supply should already be energized for PICs 17 and 18. These PICs have Secondary Power Supplies from the Appendix R Inverters and should be in operation.

17. At the appropriate PIC, place the Primary Power Supply (Upper Power Supply) ON.

	Instrument	Process Instrument Cabinet
a.	1DP-1A-SI	PIC Cab 17
b.	1DP-1B-SII	PIC Cab 18

NOTE: If any Power Supply LED is NOT lit, a WR/JO should be initiated for Maintenance to investigate.

18. At the appropriate PIC, check cards to ensure Power Supply LEDs (top LED on card) are lit.

	Instrument Bus	Process Instrument Cabinet
a.	IDP-1A-SI	PIC Cab 1 & Cab 17
b.	IDP-1B-SII	PIC Cab 2, Cab 10 & Cab 18
c.	IDP-1A-SIII	PIC Cab 3, Cab 9 & Cab 13
d.	IDP-1B-SIV	PIC Cab 4 & Cab 14

NOTE: If any SC (short circuit) Trip LED is lit, a WR/JO should be initiated for Maintenance to remove and re-insert the associated cards.

19. At the appropriate PIC Bays 1 and 3, check the NAL cards to ensure SC Trip LEDs are NOT lit. (Refer to Step 5.7.2.018 for affected PICs.)

20. For each Instrument Bus that was energized in this Section, verify the associated SSPS and ESFAS power supply remained energized as indicated by the respective Input Channel POWER light (both trains) and the 15 VDC and 48 VDC power supply lights (on respective train Logic Cabinet) being lit.

	Instrument Bus	Power Supply
a.	1DP-1A-SI	Bus No. 1 Power trains A and B – Input bay 15 and 48V Power Supply #1 Train A – Logic cab
b.	1DP-1B-SII	Bus No. 2 Power trains A and B 15 and 48V Power Supply #1 Train B
c.	1DP-1A-SIII	Bus No. 3 Power trains A and B 15 and 48V Power Supply #2 Train A
d.	1DP-1B-SIV	Bus No. 4 Power trains A and B 15 and 48V Power Supply #2 Train B

ALARM

PROTECTION SYS A/B TROUBLE

AUTOMATIC ACTIONS

1. Reactor trip on simultaneous trouble alarms on both trains due to General Warning.

CAUSES

1. Test switches not in normal position
2. Loss of train internal power (48V & 15V)
3. Printed circuit card removal
4. Bypass breaker for train is closed
5. Loss of AC power to either output relay cabinet
6. Alarm circuit malfunction

OBSERVATIONS

1. Verify Reactor Trip Bypass breakers open.

ACTIONS

1. If Protection System Testing is not in progress, dispatch operator to verify the lineup in OP-103, Reactor Protection.
2. Proper breaker position for 48V & 15V internal power for each train in logic bay.
3. AC power available to Output Relay Cabinet by checking fuses 6FU1, 6FU2, FU61, FU62.
4. Prepare a WR/JO for malfunctioning alarm circuit.

DEVICE/SETPOINTS

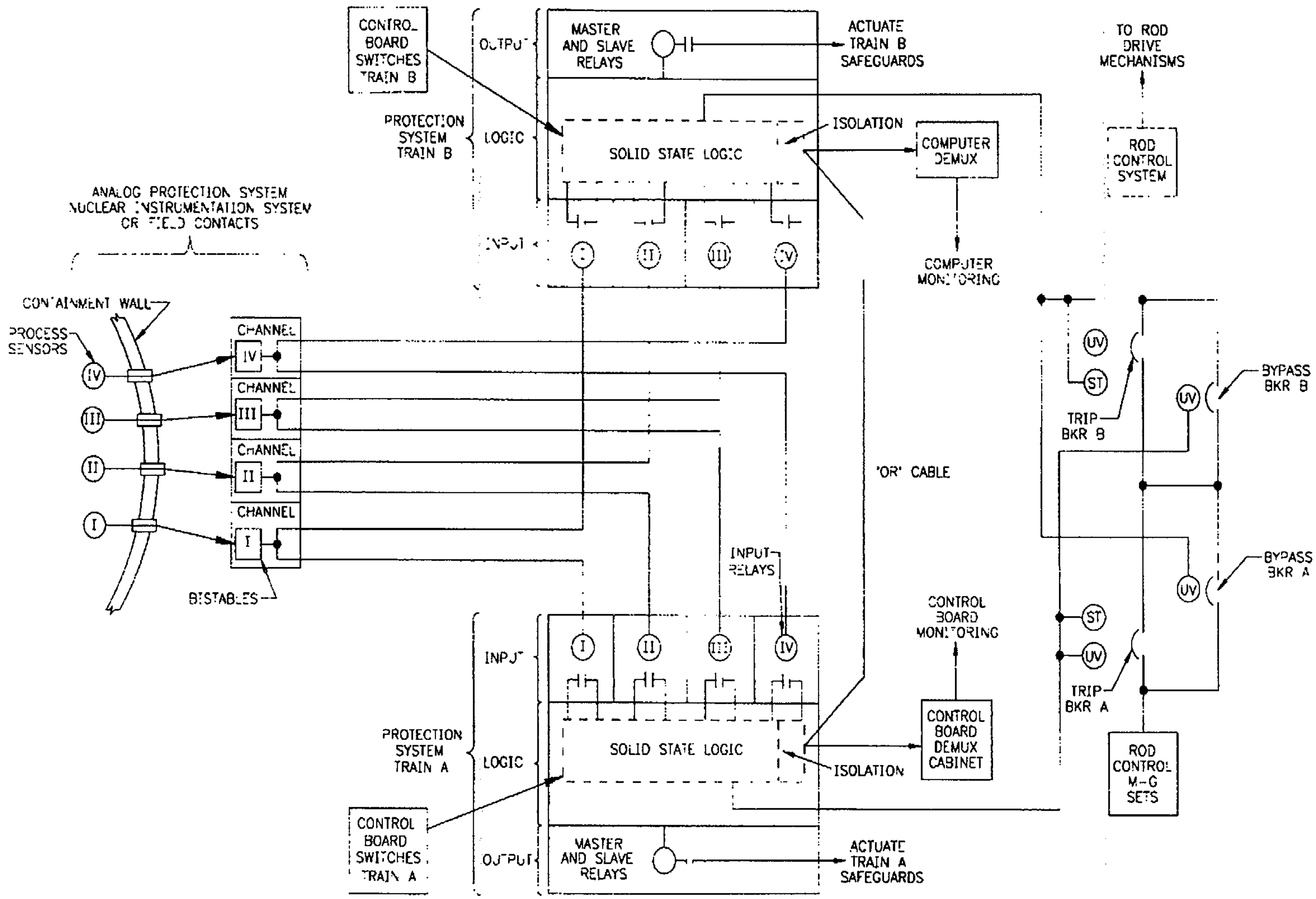
1. None applicable

POSSIBLE PLANT EFFECTS

1. Loss of coincidence protection
2. Reactor trip

REFERENCES

1. 6-B-401 0635
2. 1364-02776 Sh. 26
3. OP-103 Reactor Protection
4. SD-103 Reactor Protection/Engineered Safety Features Actuation System
5. VM-PRL-V02, Solid State Protection System



SD 103
SSPS INTERFACE DIAGRAM
FIGURE 7.

Question: 53

Given the following conditions:

- Reactor power is at 30% and stable.
- Control Bank 'D' rods are at 185 steps.
- RCS Tavg is 564 °F.
- All control systems are in automatic.
- TE-144, Letdown HX Outlet Temp, fails high.

Which of the following describes the expected response of RCS temperature and rod position?

	RCS TAVG	BANK 'D' POSITION
a.	Greater than 564 °F	Greater than 185 steps
b.	Greater than 564 °F	Less than 185 steps
c.	Less than 564 °F	Greater than 185 steps
d.	Less than 564 °F	Less than 185 steps

Answer:

b.	Greater than 564 °F	Less than 185 steps

QUESTION NUMBER: 53
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 004K3.01

Knowledge of the effect that a loss or malfunction of the CVCS will have on CRDS (automatic)

K/A IMPORTANCE: ***RO*** 2.5 ***SRO*** 2.9

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: CVCS-2.0-R5

PREDICT the response of the CVCS to the following failures
f. TE-143 or TE-144 failure (high or low)

REFERENCES: ALB-005
LP-CVCS-2.0

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since RCS temperature will rise but as a result of dilution which will cause rods to step inward.

b. **CORRECT** Failure results in lower letdown temperature into demineralizers, causing resin to absorb boron, dilution of RCS with resultant rise in temperature and rod insertion.

c. Plausible since RCS temperature will change with resultant change in rod position, but dilution occurs causing temperature to rise.

d. Plausible since rods will be inserted further than at start of transient but in response to increase in RCS temperature due to dilution.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 4

Analysis of effect of failure on plant response - high difficulty due to cascade of events required to analyze

REFERENCES SUPPLIED:

ALARM

LTDN HX CCW HIGH FLOW

AUTO ACTIONS

None

CAUSE

1. CCW pipe break or leakage downstream of FE-640B
2. Reactor Coolant leakage into the Component Cooling Water System
3. Temperature control valve TCV-144 malfunction
4. Defective flow switch FIS-640B
5. Alarm circuit malfunction

OBSERVATIONS

1. CCW radiation alarm:
   a. REM-3501A
   b. REM-3501B
2. Letdown HX outlet temperature on TI-144.1 and TCV-144 demand position.

ACTION

1. If it is determined that the high flow condition is caused by Reactor Coolant leakage into the CCW system, take appropriate steps to isolate the Letdown Heat Exchanger and refer to AOP-016, Excessive Primary Plant Leakage.
2. If high flow condition is due to pipe break or leakage, refer to AOP-014, Loss of Component Cooling Water.
3. Prepare a WR/JO if necessary.
4. Take manual control of TCV-144 if flow is high due to instrument malfunction.

DEVICE/SETPOINTS

1. FIS-640B 1350 gpm

POSSIBLE PLANT EFFECTS

1. Contamination of the CCW system
2. High radiation levels in the CCW system
3. RCS Dilution
4. LCO

REFERENCES

1. AOP-014, Loss of Component Cooling Water
2. 5-S-1322, Component Cooling Water System
3. 6-B-401 0974
4. Tech. Spec. 3.4.6.2 and 3.7.3

(c) FCV-122 opens

(d) Actual charging flow increases

(e) Letdown temperature decreases

(f) Pressurizer level increases

e. TE-143

(1) High failure

(a) Demin flow diversion high temperature alarm

(b) MCB indication

(c) TCV-143 positions to bypass demineralizers

(d) Decreased piping head loss should cause PCV-145 to reposition

(2) Low failure

(a) MCB indication

(b) Automatic demineralizer bypass not possible

f. TE-144

(1) High failure

(a) MCB indication

(b) TCV-144 opens fully, increasing CCW flow through the letdown heat exchanger

(c) Letdown temperature decreases as indicated by TI-143

(d) Lower letdown temperature could result in absorption of boric acid in the demineralizers, resulting in uncontrolled dilution

(2) Low failure

(a) MCB indication

(b) TCV-144 shuts fully, decreasing CCW flow through the letdown heat exchanger

(c) Letdown temperature increases as indicated by TI-143

(d) TK-143 setpoint is reached and TCV-143

Question: 54

A large break LOCA has occurred and PATH-1 is being performed.

The following have been reset:

- Safety Injection
- Phase A Isolation
- Phase B Isolation

The RWST level subsequently decreases to the Low-Low level setpoint.

Which of the following describes the response of the RHR Pump and the Containment Spray Pump Suction Valves?

	RHR CONTAINMENT SUMP SUCTION VALVES	RWST TO RHR SUCTION VALVES	CONTAINMENT SPRAY CONTAINMENT SUMP SUCTION VALVES	RWST TO CONTAINMENT SPRAY SUCTION VALVES
a.	Must be manually opened	Must be manually closed	Automatically open	Must be manually closed
b.	Automatically open	Automatically close	Automatically open	Must be manually closed
c.	Automatically open	Must be manually closed	Must be manually opened	Must be manually closed
d.	Automatically open	Must be manually closed	Automatically open	Automatically close

Answer:

d.	Automatically open	Must be manually closed	Automatically open	Automatically close

QUESTION NUMBER: 54
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 006K4.08

Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the Recirculation flowpath of reactor building sump

K/A IMPORTANCE: ***RO*** 3.2 ***SRO*** 3.6

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: RHR

EXPLAIN the response of the RHRS components to each of the following signals:
a. SIAS
b. LOSP
c. RWST low-low level

REFERENCES: EOP-GUIDE-1
EPP-010

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98RO-07

JUSTIFICATION:

a. Plausible since RWST to RHR valves and Spray sump valves respond correctly, but RHR sump suctions auto open and RWST to spray suctions auto close.

b. Plausible since sump suction valves open automatically as required, but RWST suction to RHR must be manually closed and to spray auto closes.

c. Plausible since RHR valves respond correctly, but spray valves will operate automatically.

d. **CORRECT** RHR auto swaps on low-low RWST level with SI, requiring manual closing of the RWST suctions. SI signal reset independently. CS auto swaps on RWST low-low level with CS pump running, with RWST suctions auto closing when sump suctions open.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comprehension of system response following operator actions taken

REFERENCES SUPPLIED:

Instructions	Response Not Obtained

****

CAUTION

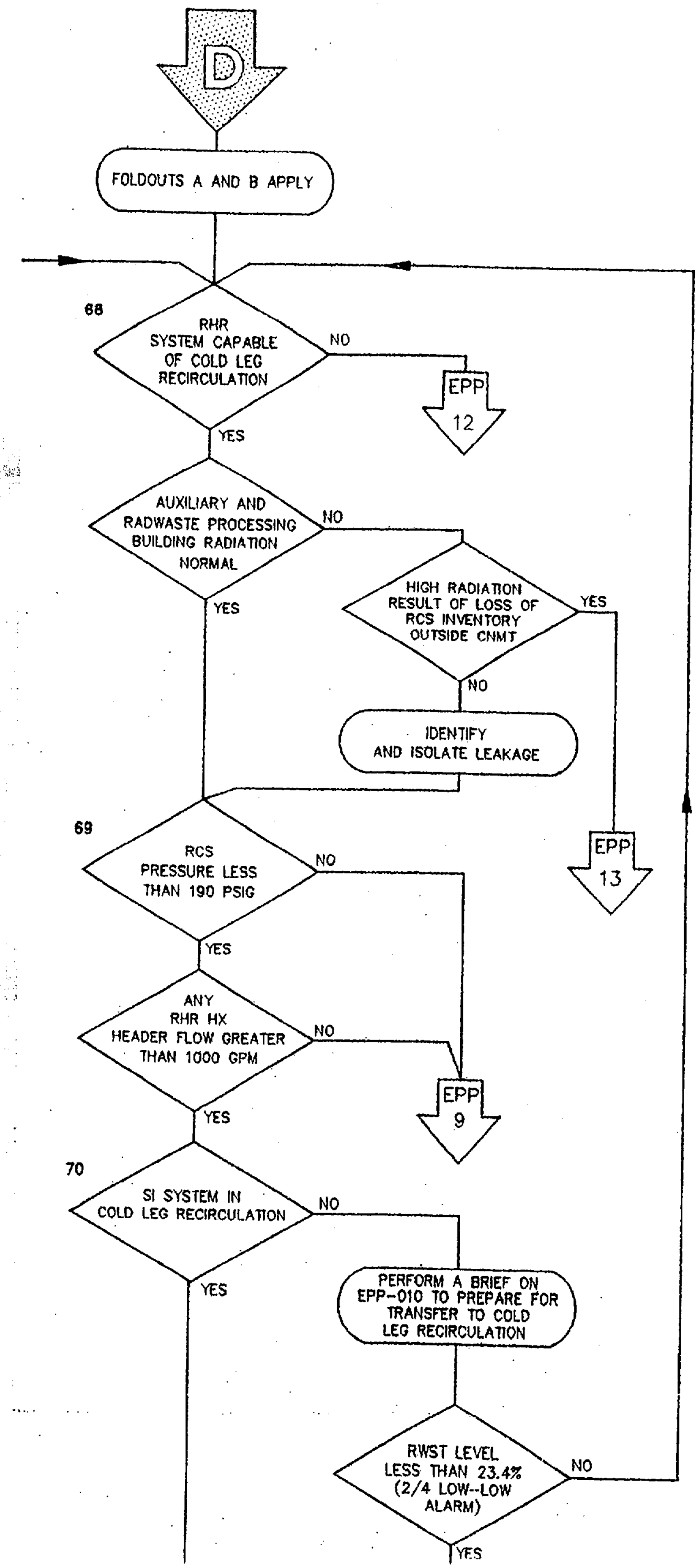
The following sequence of steps to transfer to cold leg recirculation assumes operability of all safeguards equipment. The sequence may have to be revised to establish recirculating SI flow depending on equipment operability.

****

NOTE: CNMT wide range sump level of greater than 137.5 INCHES should ensure a long term recirculation suction source.

Instructions	Response Not Obtained
3. Establish RHR Pump Recirculation Alignment:	
a. Verify CNMT sump to RHR pump suction valves - OPEN:	
o Train A RHR pump:	
1SI-300 AND 1SI-310	
o Train B RHR pump:	
1SI-301 AND 1SI-311	
b. Shut RWST to RHR pump suction valves:	
1SI-322 (Train A) 1SI-323 (Train B)	
c. Shut low head SI Train A to cold leg valve:	c. Shut low head SI Train B to cold leg valve:
1SI-340	1SI-341
d. Check both RHR pumps - RUNNING	d. Start RHR pumps with adequate suction source. GO TO Step 3f.
e. GO TO Step 4.	
f. Check any RHR pump - RUNNING	f. GO TO EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION", Step 1.

Instructions	Response Not Obtained
NOTE: Additional foldout item, "AFW SUPPLY SWITCHOVER CRITERIA", applies.	
11. Implement Function Restoration Procedures As Required.	
12. Align CNMT Spray For Recirculation:	
a. Any CNMT spray pump - RUNNING	a. GO TO Step 13.
b. Verify CNMT sump to CNMT spray suction valves - OPEN 1CT-105 1CT-102	
c. Verify RWST to CNMT spray pump suction valves - SHUT 1CT-26 1CT-71	


D
FOLDOUTS A AND B APPLY
68
RHR SYSTEM CAPABLE OF COLD LEG RECIRCULATION
NO
EPP 12
YES
AUXILIARY AND RADWASTE PROCESSING BUILDING RADIATION NORMAL
NO
HIGH RADIATION RESULT OF LOSS OF RCS INVENTORY OUTSIDE CNMT
YES
NO
IDENTIFY AND ISOLATE LEAKAGE
YES
EPP 13
69
RCS PRESSURE LESS THAN 190 PSIG
NO
YES
ANY RHR HX HEADER FLOW GREATER THAN 1000 GPM
NO
EPP 9
YES
70
SI SYSTEM IN COLD LEG RECIRCULATION
NO
YES
PERFORM A BRIEF ON EPP-010 TO PREPARE FOR TRANSFER TO COLD LEG RECIRCULATION
RWST LEVEL LESS THAN 23.4% (2/4 LOW-LOW ALARM)
NO
YES

Question: 55

How is the clearance preparer notified of a Temporary Modification which affects an item being placed under clearance?

a. The standard clearances in PTR are updated with Temporary Modification information

b. The 400 screen of EDBS for each component affected lists the applicable Temporary Modifications

c. The Category A drawings are annotated with the ESR number of the applicable Temporary Modifications

d. During the schedule review, the responsible engineer notifies the WCC of any Temporary Modifications which may affect clearances needed for the current schedule

Answer:

c. The Category A drawings are annotated with the ESR number of the applicable Temporary Modifications

QUESTION NUMBER: 55
TIER/GROUP: ***RO*** 3 ***SRO*** 3

K/A: 2.2.11

Knowledge of the process for controlling temporary changes.

K/A IMPORTANCE: ***RO*** 2.5 ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: PP-3.5

DESCRIBE the following regarding Handwritten Revision and Temporary Change Process
- Identification of steps affected

REFERENCES: EGR-NGGC-0005

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number PP-3.4 022

JUSTIFICATION:

a. Plausible since temporary modification information is provided to impacted organizations, but drawings are identified by annotation.

b. Plausible since data pertaining to components can be obtained from this source, but drawings are not included on this screen.

c. **CORRECT** Category A drawings are identified by annotation or revision for significant changes.

d. Plausible since temporary modification information is provided to impacted organizations, but drawings are identified by annotation.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural requirements

REFERENCES SUPPLIED:

b. For ESRs that involve more than one quality classification level, define the boundaries of each quality class including part level differentiation if appropriate.

8. Prepare precautions and limitations which warrant clear identification to impacted organizations who will review or implement the TEM ESR.

a. Identify any precautions, limitations, work-arounds, significant plant conditions, hold points, or other controls required as identified during the preparation of the ESR.

b. Identify condition requirements, as appropriate, associated with the installation and testing of the TEM ESR (for example, an outage is required for implementation or work may be performed on line). Also, any operability concerns, such as Train A(B) required to be operable during some evolution of the implementation of the work should be identified.

c. Identify appropriate limitations on operation, including mode and/or other restrictions, which will be imposed by the TEM ESR. Limitations shall be identified in terms of conditions which can be monitored, including the method for determining that the conditions are met.

9.4.2 The RE shall identify Category A drawings and procedures affected by the TEM ESR to be listed on the TEM Log (Form 12). Category A drawings will be identified by annotation, however, a revision to the drawing may be performed for significant changes if the benefit of clear documentation outweighs the cost of performing a subsequent revision when the TEM ESR is restored. Similarly, procedures may be temporarily changed, a temporary procedure may be issued, or a procedure revision may be performed.

9.4.3 The RE shall identify if the TEM ESR would result in a change to the (U)FSAR. If the change is intended to be installed beyond the end of the next refueling outage, prepare a change to the (U)FSAR in accordance with applicable procedures.

9.4.4 The RE shall identify the plan for restoring the TEM ESR, including an expiration date by when the TEM ESR will be removed.

9.4.5 The RE shall identify installation requirements which will be used by the installing organization to plan the installation *work package*, including the following as applicable:

- **Installation Requirements** for accomplishing the changes
- **Installation Sketches**
- **Testing Requirements** for verifying the changes work as expected
- **Bill of Materials** (Form 3)

1. Identify installation requirements that are unique to the design, installation, and start-up of the TEM ESR not covered by existing plant procedures. Special installation requirements include but are not limited to:

    - unique prerequisites that must be met before and/or during installation such as plant operational mode limitations, etc. Generic prerequisites should not be provided
    - unique precautions sufficiently detailed for Operations, Maintenance and Implementation personnel to safely/correctly install and test the TEM ESR assuming normal execution of responsibilities and accountabilities. Generic Precautions should not be provided
    - other special requirements that are not covered by existing procedures such as inspections, hold points, interfaces (Security, Fire Protection, Chemistry, etc.), special equipment or contractors, and special prerequisites, precautions, limitations and clearances
    - required sequencing of steps if sequencing activities is relevant to proper installation, testing, or start-up
    - approved documents that should be used (procedures, generic design details, etc.) for implementing the requirements provided in this section

2. Prepare installation and/or removal (rip-out) sketches including mark-ups of current approved drawings indicating clearly/legibly the required changes (clouding or other suitable means).

9.4 Temporary Modification ESR (TEM)

NOTE:	If, subsequent to approval, a revision is required to the 10CFR50.59 Safety Evaluation performed in accordance with REG-NGGC-0002, the safety evaluation revision must be captured in the ESR through an ESR revision. If the need for revision to the Safety Evaluation is identified subsequent to ESR closure, the evaluation of impact and required resolution activities will be performed using the Corrective Action Program.

9.4.15 If conditions require a revision to the TEM ESR, the RE shall perform the following:

1. Initiate the ESR revision in ESRTS.

    a. Do not revise ESRs statused as "CLOSED".

    b. Process ESR revisions as the same product type as the original ESR.

    c. Document the basis for revision in the "Request" field and summarize the revision in the "Response" field.

2. Prepare the revision using the methodology described for initial preparation of a TEM ESR (sections 9.4.1 through 9.4.5). Refer to the ESR master file to identify any existing Rapid Field Release revisions or administrative corrections which should be incorporated into the revision.

    a. Include only the List of Effective Pages (LEP) and affected pages in the ESR revision package.

    b. Develop the revision so that a page-for-page replacement can take place.

    c. Cloud the change(s) or provide a bar in the right margin indicating the areas changed.

    d. Initial and date strike-throughs.

    e. If previous administrative corrections have been made to the pages affected by the ESR revision, capture the administrative corrections in the ESR revision.

3. Based on the scope of the revision and using Attachment 6 as a guide, determine the discipline, program or customer reviews which are required for the revision.

Question: 61

Given the following conditions:

- At 1315, the Reactor Operator must leave the Control Room for a short period of time.
- All requirements for this short term relief have been conducted
- An entry has been made into OMM-002, Attachment 14, Documentation of Short Term Assumption of Duties.

An entry must also be made in the Control Operators Log if the relieved operator does **NOT** resume the watch by ...

a. 1330.

b. 1345.

c. 1415.

d. 1515.

Answer:

c. 1415.

QUESTION NUMBER: 61
TIER/GROUP: ***RO*** 3 ***SRO*** 3

K/A: 2.1.3

Knowledge of shift turnover practices.

K/A IMPORTANCE: ***RO*** 3.0 ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: PP-3.1-3

DESCRIBE the requirements identified for Short-term reliefs

REFERENCES: OMM-002

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98RO-17

JUSTIFICATION:

a. Plausible since time limit of 15 minutes is used which is reasonable, but limit is 60 minutes.

b. Plausible since time limit of 30 minutes is used which is reasonable, but limit is 60 minutes.

c. **CORRECT** Per the requirements of OMM-002, a licensed operator who is relieved for a short-term relief must assume the watch within one hour or a log entry must be made. 1315 + 1 hour = 1415.

d. Plausible since time limit of 2 hours is used which is reasonable and used as time limit for absent personnel replacement, but limit is 60 minutes.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 2

Application of procedural requirements to calculate required time

REFERENCES SUPPLIED:

5.1 Shift Relief/Turnover Process (continued)

12. During outage periods the brief will include shutdown safety function status and any unique vulnerabilities which are expected to exist during the shift. The consequences of failure of key components should be discussed, as well as the time until core boiling. Industry events should be included if they were not already discussed in a PLP-100 briefing. (Reference 2.2.1, 2.4.2)

13. R Any person needing to be relieved for a short period of time will do an oral turnover as needed to make his relief aware of plant conditions. Whenever a licensed watch station (RO, BOP, Unit SCO, S-SO) is relieved for greater than 1 hour, this information shall be entered in the Control Operators Log. If required by the S-SO a shift turnover sheet will be completed and the logs signed over. (Reference 2.2.1)

14. R The following limitations and communication process shall be followed when control room personnel (S-SO, Unit SCO, RO, or BOP) are assuming the duties of other control room positions: (Reference 2.4.3)

   a. When a control board operator (RO/BOP) must exit the "at the controls" area, the following shall occur:

      (1) The person exiting shall communicate this to the remaining operator at the controls, along with an oral turnover of pertinent information.

      (2) The operator to remain at the controls shall acknowledge with an appropriate repeat back of the message.

      (3) The Unit SCO shall be informed and grant permission for the RO/BOP to leave and shall acknowledge who is to remain at the controls.

      (4) If leaving the control room then complete Attachment 14.

      (5) The Unit SCO and the remaining board operator must ensure that sufficient attention to plant controls is being maintained for evolutions in progress.

   b. When the Unit SCO must exit the control room in MODE 1, 2, 3, or 4, the following shall occur:

      (1) The person leaving shall communicate this to the remaining SRO licensed person along with an oral turnover of pertinent information.

      (2) The SRO licensed individual remaining in the control room shall acknowledge with an appropriate repeat back of the message.

      (3) The control board operator(s) shall be informed and shall acknowledge who is filling the Unit SCO position.

      (4) Complete Attachment 14.

   c. R In the cases above, only the assigned RO or BOP should assume each others position. The Unit SCO should be relieved by an SRO licensed individual. Cases of using the Unit SCO to assume a board operator position or an SRO licensed RO/BOP to assume the Unit SCO position should only be used in rare or extreme circumstances. If these circumstances are deemed necessary and the unit is in MODE 1, 2, 3, or 4, the Unit SCO shall **NOT** assume the position as the only licensed operator at the controls area (only board operator) unless the S-SO is also in the main control room. (Reference 2.5.3)

Question: 62

Given the following conditions:

- A loss of off-site power has occurred.
- The plant is being cooled down and depressurized per EPP-005, Natural Circulation Cooldown.
- The RCS cooldown rate is 40 °F/hour.
- RVLIS Upper Range indication is 96% and lowering slowly.
- The S-SO has determined that RCS depressurization must continue.

Which of the following actions should be taken?

a. Continue in EPP-005, Natural Circulation Cooldown, AND maintain the cooldown rate <50 °F/hour

b. Initiate safety injection to collapse the vessel head voids

c. Transition to EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, AND continue the cooldown and depressurization

d. Transition to EPP-007, Natural Circulation Cooldown with Steam Void in Vessel without RVLIS, AND continue the cooldown and depressurization

Answer:

c. Transition to EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, AND continue the cooldown and depressurization

QUESTION NUMBER: 62

TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 055EK1.02

Knowledge of the operational implications of the following concepts as they apply to the Station Blackout: Natural circulation cooling

K/A IMPORTANCE: ***RO*** 4.1 ***SRO*** 4.4

10CFR55 CONTENT: ***55.41(b) RO*** 8/10 ***55.43(b) SRO***

OBJECTIVE: EOP-3.8-4

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis
c. Transitioning to EPP-006/EPP-007 (EPP-005)

REFERENCES: EPP-005

SOURCE: ***New*** ☒ ***Significantly Modified*** ☐ ***Direct*** ☐

Bank Number NA

JUSTIFICATION:

a. Plausible since cooldown rate is within limits of EPP-005, but transition required due to indications of head voiding.

b. Plausible since this will repressurize RCS to cause voids in head to collapse, but EPP-005/006/007 assumes no accident requiring SI in progress.

c. **CORRECT** Transition is required to EPP-006 since RVLIS is available and indicates voids are being formed in head even though cooldown is within limits of EPP-005.

d. Plausible since transition is required from EPP-005, but transition should be to EPP-006.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural transition requirements

REFERENCES SUPPLIED:

FOLDOUT

- <u>EPP-006 AND EPP-007 TRANSITION CRITERIA</u>

  <u>IF</u> any of the following occurs, <u>THEN</u> GO TO EPP-006, "NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL WITH RVLIS", Step 1, OR EPP-007, "NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL WITHOUT RVLIS", Step 1, based on RVLIS availability:

  - It is necessary to cooldown and depressurize the RCS at a rate that exceeds the limits of this procedure.

  - Unexpected large variations in PRZ level are observed <u>AND</u> RCS depressurization must continue.

  - RVLIS upper range can <u>NOT</u> be maintained greater than 100% <u>AND</u> RCS depressurization must continue.

- <u>SI ACTUATION CRITERIA</u>

  <u>IF</u> any of the following occurs, <u>THEN</u> actuate SI AND GO TO PATH-1, entry point A:

  - RCS Subcooling - LESS THAN 10°F - C
20°F - M

  - PRZ Level - CAN <u>NOT</u> BE MAINTAINED GREATER THAN 10%

- <u>AFW SUPPLY SWITCHOVER CRITERIA</u>

  <u>IF</u> CST level decreases to less than 10%, <u>THEN</u> switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

- <u>RCP RESTART CRITERIA</u>

  <u>IF</u> at any time conditions for starting an RCP can be established, <u>THEN</u> RETURN TO Step 3.

Question: 63

Given the following conditions:

- CP&L hired an employee on May 5th of this year.
- The employee's TEDE for this year prior to May 5th was 400 mRem.
- The employee's TEDE at SHNPP for this year is 1500 mRem.

Which of the following describes the **MAXIMUM ADDITIONAL** exposure allowed at CP&L facilities for this employee for the remainder of the year, without receiving an extension, **AND** what is the **LOWEST** level of authorization required if an extension is required during non-emergency conditions?

	MAXIMUM ADDITIONAL EXPOSURE W/OUT EXTENSION	**LOWEST LEVEL OF AUTHORIZATION FOR EXTENSION**
a.	100 mRem	E&RC Manager
b.	100 mRem	Site Vice President
c.	500 mRem	E&RC Manager
d.	500 mRem	Site Vice President

Answer:

d.	500 mRem	Site Vice President

QUESTION NUMBER: 63
TIER/GROUP: *RO* 3 *SRO* 3

K/A: 2.3.4

Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.

K/A IMPORTANCE: *RO* 2.5 *SRO* 3.1

10CFR55 CONTENT: *55.41(b) RO* 12 *55.43(b) SRO*

OBJECTIVE: PP-3.7-R1

State the 10CFR20 and corporate occupational dose limits for individuals

REFERENCES: NGGM-PM-0002

SOURCE: *New* ☐ *Significantly Modified* ☒ *Direct* ☐

Bank Number PP-3.7-R1 004

JUSTIFICATION:

a. Plausible since total dose for year is 1900 mrem and CP&L dose limit is 2000 mrem per year, but this limit is just for CP&L dose, allowing up to 4000 mrem total dose.

b. Plausible since total dose for year is 1900 mrem and CP&L dose limit is 2000 mrem per year, but this limit is just for CP&L dose, allowing up to 4000 mrem total dose.

c. Plausible since allowed additional dose is calculated correctly, but Site VP must authorize extension.

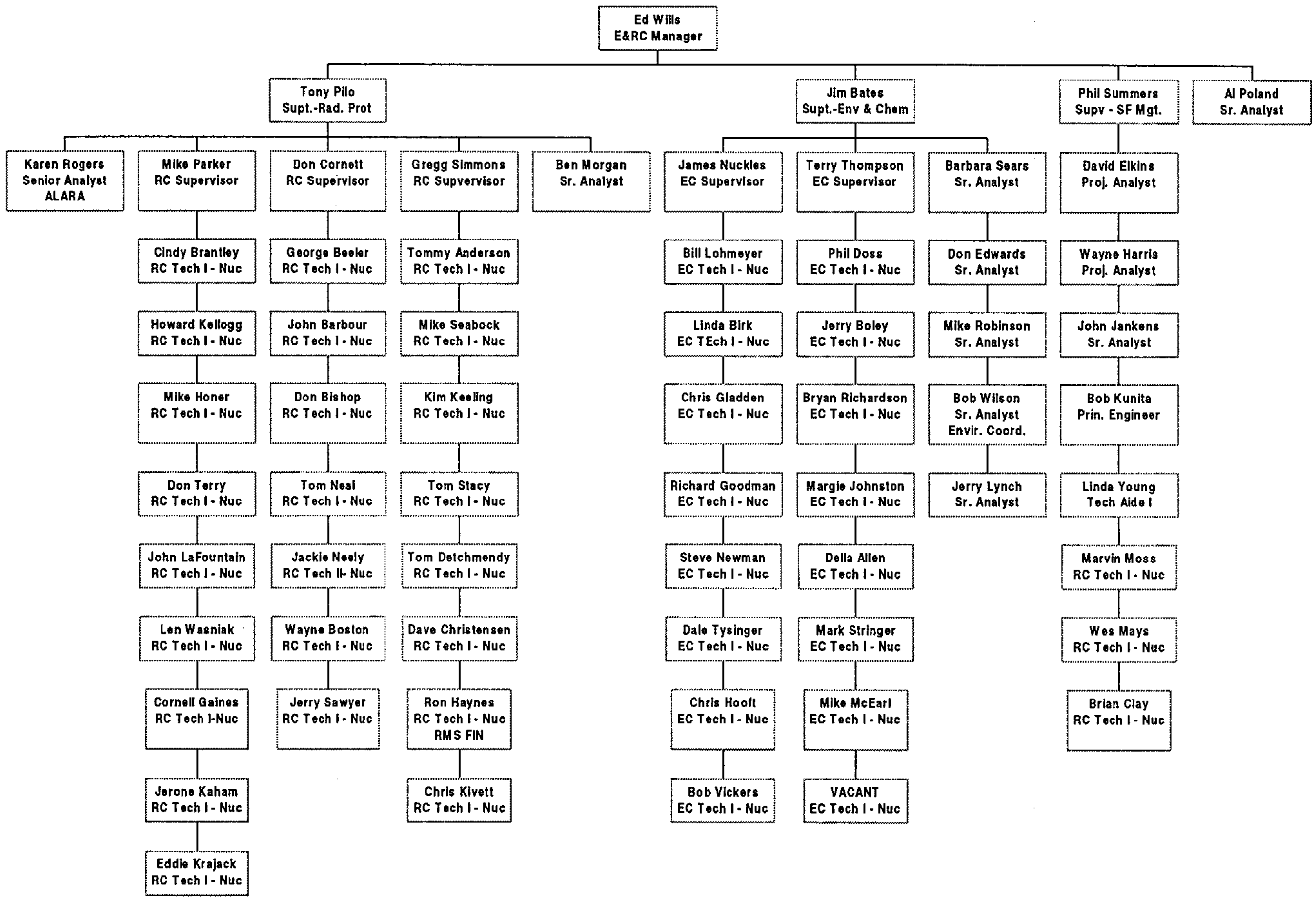
d. **CORRECT** Maximum allowable limit is 2000 mrem per year CP&L dose and up to 4000 mrem per year total dose for CP&L and other dose. 2000 - 1500 = 500 mrem allowed. Site VP approval to exceed 2000 required.

DIFFICULTY:
Comprehensive/Analysis ☒ *Knowledge/Recall* ☐ *Rating* 3

Application of procedural requirements to determine limit

REFERENCES SUPPLIED:

E&RC ORGANIZATIONAL CHART



2/11/00 y:\envir~\erc\E&RC org chart.ppt

6.7.3 The prior dose history shall be documented on NRC Form 4 or equivalent. The record shall show each period in which the individual received occupational dose and shall be signed by the individual.

6.7.4 As a record of current year dose, a written, signed statement from the individual or the most recent employer may be accepted.

6.7.5 As documentation of cumulative lifetime dose, a written estimate signed by the individual or an up-to-date NRC Form 4 or equivalent signed by the individual or the most recent employer may be accepted.

6.7.6 Prior dose reports may be obtained by letter or electronic means (e.g. fax). However, if the authenticity of the data cannot be ascertained or the reliability is questionable, written verification shall be requested. Orally transmitted dose reports shall not be accepted.

6.7.7 Any period for which the prior dose is not obtained must be noted on the NRC Form 4 or equivalent. In establishing the allowable dose for the current year, assume that the individual received 1.25 rem (TEDE) in each quarter for which records are missing, but do not record the assumed dose values on the NRC Form 4 or equivalent.

6.8 Annual Administrative Dose Limits

6.8.1 The Company goal is that no individual shall exceed the following annual administrative limits for total effective dose equivalent:

1. 0.5 rem CP&L dose if non-CP&L dose for the current year has not been determined (no dose extension permitted).

2. 2 rem CP&L dose and 4 rem total dose if non-CP&L dose for the current year has been determined.

6.8.2 Administrative Dose Limit Extensions

1. The individual's supervisor must provide written justification for the need to extend the individual's dose limit.

2. Site Vice President approval is required to authorize an individual to receive more than 2 rem CP&L dose in a year. This responsibility will not be delegated except during a

PP-3.7-R1 004
The General Manager-Harris plant must approve a CP&L dose in excess of ______rem TEDE.

A. 1

✓B. 2

C. 3

D. 4

Question: 64

Given the following conditions:

- The unit is operating at 20% power with all systems in automatic.
- Bank 'D' control rods are at 130 steps.
- Control Bank 'C' rod H6 drops to the bottom of the core.
- **NO** rod control urgent failure alarms occur.

Where will thermal power and RCS Tavg stabilize in response to the dropped rod **WITHOUT** any operator action?

a.
- Reactor thermal power will be lower than prior to the dropped rod
- RCS Tavg will be more than 5 ^{o}F lower than the temperature prior to the dropped rod

b.
- Reactor thermal power will be lower than prior to the dropped rod
- RCS Tavg will be within 1 ^{o}F of the temperature prior to the dropped rod

c.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be within 1 ^{o}F of the temperature prior to the dropped rod

d.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be more than 5 ^{o}F lower than the temperature prior to the dropped rod

Answer:

c.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be within 1 ^{o}F of the temperature prior to the dropped rod

QUESTION NUMBER: 64
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/1

K/A: 003AK1.03

Knowledge of the operational implications of the following concepts as they apply to Dropped Control Rod: Relationship of reactivity and reactor power to rod movement

K/A IMPORTANCE: ***RO*** 3.5 ***SRO*** 3.8

10CFR55 CONTENT: ***55.41(b) RO*** 8/10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.1-2

RECOGNIZE automatic actions that are associated with AOP-001, Malfunction of Rod Control and Indication Systems

REFERENCES: AOP-001

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98RO-10

JUSTIFICATION:

a. Plausible since temperature would be lower if rods were not capable of stepping outward, but with rods in auto and no apparent rod stop, rods will step outward.

b. Plausible since rods will step out to restore temperature, but power will also be restored to prior value.

c. CORRECT Power will initially decrease, causing temperature to decrease. As temperature decreases, positive reactivity is added to restore power. Bank D rods in auto will cause rods to step out, restoring power and temperature to the original value.

d. Plausible since power will be restored to prior value, but rods will also step out to compensate for drop in temperature to restore temperature.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of plant response to abnormal conditions

REFERENCES SUPPLIED:

DROPPED CONTROL ROD(S)

Section 4.0

1.0 SYMPTOMS

1. Individual Rod Bottom Light on DRPI
2. Decreasing Reactor power
3. Decreasing Tavg
4. ALB-13-7-4, ONE ROD AT BOTTOM alarm
5. ALB-13-7-3, TWO OR MORE RODS AT BOTTOM alarm
6. ALB-13-7-1, ROD CONTROL URGENT ALARM alarm
7. ALB-13-4-2, POWER RANGE HIGH NEUTRON FLUX RATE ALERT alarm
8. ALB-12-4-3, REACTOR TRIP POWER RANGE HIGH FLUX RATE alarm
9. ALB-13-5-3, POWER RANGE UPPER DETECTOR HIGH FLUX DEV OR AUTO DEFEAT alarm
10. ALB-13-5-4, POWER RANGE LOWER DETECTOR HIGH FLUX DEV OR AUTO DEFEAT alarm
11. ALB-13-4-5, POWER RANGE CHANNEL DEVIATION alarm
12. ALB-13-8-5, COMPUTER ALARM ROD DEV/SEQ NIS PWR RANGE TILTS alarm

2.0 AUTOMATIC ACTIONS

1. Reactor trip will occur if negative rate trip is actuated by two or more power range NI channels.

NOTE: If a dropped rod is in the controlling bank, a Rod Control Urgent alarm may be received and automatic rod motion may be blocked.

2. IF Rod Control is in automatic, THEN the rods will be withdrawn to restore Tavg to Tref.

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

1. IF two or more Control Rods have dropped, THEN trip the Reactor and Go To EOP-PATH-1.
2. Position the Rod Bank Selector Switch to MAN.

Question: 65

Which of the following identifies when the Diesel and Motor Fire Pumps will start on lowering Fire Header pressure?

	MOTOR FIRE PUMP	**DIESEL FIRE PUMP**
a.	93 psig	83 psig
b.	83 psig	93 psig
c.	93 psig	105 psig
d.	105 psig	83 psig

Answer:

a.	93 psig	83 psig

QUESTION NUMBER: 65
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 086A2.02

Ability to (a) predict the impacts of the following malfunctions or operations on the Fire Protection System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences: Low FPS header pressure

K/A IMPORTANCE: ***RO*** 3.0 ***SRO*** 3.3

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: FP

STATE the function, location and operation of the following components:
b. Motor-driven fire pump
c. Diesel-driven fire pump

REFERENCES: LP-FP-3.0
SD-149

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number FP 033

JUSTIFICATION:

a. **CORRECT** Motor fire pump starts at 93 psig decreasing and diesel fire pump at 83 psig.

b. Plausible since setpoints are correct, but starting sequence is reversed.

c. Plausible since motor fire pump setpoint is correct, but 105 psig is pressure maintained by jockey fire pump, not start of diesel fire pump.

d. Plausible since diesel fire pump setpoint is correct, but 105 psig is pressure maintained by jockey fire pump, not start of motor fire pump.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of system setpoints

REFERENCES SUPPLIED:

5) Power supply MCC-1-4A101

6) Location—emergency SW intake screening structure

7) Motor-driven fire pump local indications

   a) Pump discharge pressure gage

   b) Bearing oil level (upper and lower) sight glasses

   c) Motor-driven control panel

   d) Audible alarm (horn)

   e) Power available light

8) Local control panel

   a) Start push button

   b) Stop push button

   c) Circuit breaker release push button

   d) Emergency start lever

NOTE: Operating instructions for operation of the motor-driven pump controls, including the emergency start lever are displayed on front of the local control panel

SLIDE: 4.14.5

(c) Diesel-driven fire pump

1) 100 percent capacity pump- rated 2500 gpm at 125 psi

   a) Gear box driven

2) The diesel fire pump starts automatically at 83 psig

3) Pump must be manually stopped

4) 3000 gpm at 100 psig- system demand

5) Fuel oil from 550-gallon tank located adjacent to pump area

6) Starting power from two independent 24-V DC battery units

7) Power supply for heaters, chargers, and controls is 120-V AC PP-1-4A10121

8) Diesel engine

   a) Manf.—Cummins

   b) Self-contained unit

   c) Electric start (battery)

   d) Cooling water with radiator and engine-driven pump

   e) Lube oil reservoir with engine-driven pump

   f) Fuel system has engine-driven pump with supply from storage tank

9) Diesel-driven fire pump local indications

   a) Pump discharge pressure two gages

   b) Pump gear box

   c) Gear drive oil level sight glass

   d) Gear drive inlet pressure gage

   e) Control panel

   f) Battery charger volts (one for each charger)

   g) Battery charger amps (one for each charger)

   h) Control power available light (White)

   i) Battery power available lights (2)(Blue)

   j) Alarm lights (Red)

   k) Low lube oil press

   l) High water temperature

   m) Engine failed to start

Question: 66

Given the following conditions:

- The plant is at 100% power.
- One minute ago, the normal feeder breaker to 6.9kV bus 1A-SA (BKR 105) tripped open.
- The 1A-SA EDG failed to start.

Which of the following actions is required?

a. Start 1B-SB MDAFW Pump to supply the SGs

b. Manually start RHR pump 1A-SA in Load Block 9

c. Open all load breakers on 6.9kV bus 1A-SA

d. Place the 1A-SA EDG Emergency Stop switch to EMER STOP

Answer:

d. Place the 1A-SA EDG Emergency Stop switch to EMER STOP

QUESTION NUMBER: 66

TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 064A4.06

Ability to manually operate and/or monitor in the control room: Manual start, loading, and stopping of the ED/G

K/A IMPORTANCE: ***RO*** 3.9 ***SRO*** 3.9

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.25

Given plant conditions, discuss the following notes, cautions, and procedural steps as they apply
e. Actions to be taken if power is completely lost to an emergency AC bus

REFERENCES: AOP-025

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AOP-3.25 014

JUSTIFICATION:

a. Plausible since the 1A-SA MDAFW pump would have started due to the sequencer operation, but main feedwater will still be supplying the SGs since no reactor trip should occur.

b. Plausible since this is a major action of concern if the plant is on cold leg recirculation following SI reset and a loss of power causes the sequencer to actuate.

c. Plausible since this would be performed if the EDG had loaded and then tripped, but since the EDG did not start no loads are tied to the bus.

d. **CORRECT** Placing the EDG emergency stop ensures the EDG will not start unexpectedly while maintenance investigates the cause of failure to start.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comprehension of the effects of multiple failures on plant equipment

REFERENCES SUPPLIED:

Section 1.0

3.2 Follow-up Actions

1. IF EDG did NOT start OR started and tripped before energizing 1A-SA (1B-SB), THEN perform the following:

   a. Place EMERGENCY STOP switch in EMER STOP.

   b. IF EDG has tripped, THEN dispatch operator to inspect EDG for cause of trip.

   c. Contact maintenance for assistance as necessary.

   d. Locally reset EDG trip signals per OP-155, Diesel Generator Emergency Power Operation.

   e. Start EDG from MCB or locally per OP-155, Diesel Generator Emergency Power Operation.

NOTE: If DC control power is not available, local manual operation of the EDG breaker and 6.9KV breakers will be necessary.

   f. WHEN EDG is started, THEN verify EDG breaker is closed.

2. IF any of the following exist:

   - EDG running AND 1A-SA (1B-SB) remains deenergized
   - EDG has tripped after re-energizing 1A-SA (1B-SB)

   THEN perform the following:

   a. Place EMERGENCY STOP switch in EMER STOP.

   b. IF EDG has tripped, THEN dispatch operator to inspect 1A-SA (1B-SB) for the following:

      - Ground fault flags
      - Overcurrent flags

NOTE: If DC control power is not available, local manual operation of the EDG breaker and 6.9KV breakers will be necessary.

R c. Verify EDG breaker and 6.9KV load breakers on 1A-SA (1B-SB) are open (Ref: SOER 81-15).

   d. Contact maintenance for assistance as necessary.

Question: 67

Given the following conditions:

- The plant is at 100% power.
- 1A and 1B ESW Pumps are off.
- 'A' and 'B' ESW headers are being supplied from NSW.
- 1A NSW Pump is running.
- 1B NSW Pump is off.

Subsequently, the following events occur:

- A breaker failure results in a loss of power to 1A-SA.
- The 'A' EDG starts, re-energizes the bus, and sequences the loads properly.

Which of the following describes how the ESW alignment is affected?

	'A' TRAIN ESW HEADER SUPPLY	**'B' TRAIN ESW HEADER SUPPLY**
a.	1A ESW Pump	1B ESW Pump
b.	1A ESW Pump	1A NSW Pump
c.	1A NSW Pump	1B ESW Pump
d.	1A NSW Pump	1A NSW Pump

Answer:

b.	1A ESW Pump	1A NSW Pump

QUESTION NUMBER: 67
TIER/GROUP: ***RO*** 2/3 ***SRO*** 2/3

K/A: 076K1.16

Knowledge of the physical connections and/or cause- effect relationships between the SWS and the ESF

K/A IMPORTANCE: ***RO*** 3.6 ***SRO*** 3.8

10CFR55 CONTENT: ***55.41(b) RO*** 8 ***55.43(b) SRO***

OBJECTIVE: ESW-R8

Given a particular set of plant conditions during an emergency, OUTLINE the response of the ESW System including
a. ESW pumps

REFERENCES: SD-139
OP-139

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number ESW-R8 001

JUSTIFICATION:

a. Plausible since the 'A' ESW pump will be running, but no start signal exists for the 'B' train pump so this train will continue to be supplied by NSW.

b. **CORRECT** The EDG sequencing will cause the 'A' train ESW system to start, isolating NSW from the train. NSW will continue to supply the 'B' train of ESW since no actuation has occurred on this train and the 'A' NSW pump will continue to run.

c. Plausible since the running NSW pump will continue to supply one train of ESW, but the train supplied will be 'B' train.

d. Plausible since the running NSW pump will continue to supply 'B' train, but 'A' train ESW pump will start and the train will isolate from NSW.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comprehension of system response to changing plant conditions

REFERENCES SUPPLIED:

2.1.3.7 Plant Air Compressors

Emergency Service Water can be aligned to supply cooling water to all three plant air compressor aftercoolers. Either train can be aligned to supply the air compressor aftercoolers with cooling water. When in Modes 1 through 4, the ESW header supplying the air compressor aftercoolers is declared inoperable. At no time should both trains be aligned to the air compressor aftercoolers as this would cross connect the ESW headers.

2.2 Normal Service Water (NSW) System

The Normal Service Water System supplies cooling water from the cooling tower basin and Cooling Tower Makeup System to various plant components and systems. The Normal Service Water System consists of the intake structure, the distribution header, two 100 percent capacity pumps, self-cleaning strainers, motor-operated valves, and the supply and return headers to/from the Waste Processing Building, Turbine Building, Reactor Auxiliary Building, and the Containment Building. Figure 7.3 provides a flow diagram of the NSW system and identifies the components supplied by NSW.

2.2.1 NSW Main Flow Path

Water from the cooling tower basin is supplied to the NSW intake chamber by a 6-foot diameter underground concrete conduit. The NSW intake chamber is located north of the cooling tower. Additional water is supplied to this conduit from a 3-foot diameter Cooling Tower Makeup Line. One of the two 100 percent capacity NSW pumps (design flow 50,000 gpm) takes suction on the water in the chamber and pumps it through a motor-operated discharge valve and into a 48-inch diameter steel pipe which contains a self-cleaning strainer. This strainer is designed to filter debris down to 1/16-inch diameter and contains isolation and bypass valves to allow maintenance without interruption of NSW flow.

From the strainer, the NSW flows through approximately 1200 feet of 4-foot diameter steel pipe to the power block area of the plant where branch headers go to the Turbine Building, Waste Processing Building, and the Reactor Auxiliary Building. The NSW supply header in the Reactor Auxiliary Building divides to supply the containment non-safety ventilation fan coil units and to ESW safety train A and/or B supply header via a motor-operated isolation valve to provide cooling water to the safety-related components in the Containment Building (i.e., containment fan coolers) and in the Reactor Auxiliary Building. The NSW System supply to ESW Safety train A and/or B is selectable from the main control board in the control room.

During normal operation, the NSW return flows from the branch headers (including the ESW header), with the exception of the Waste Processing Building, are discharged into the circulating water return lines in the Turbine Building north of the main condenser. The return flow from the Waste Processing Building joins the circulating water lines in the yard between the Turbine Building and the Cooling Tower.

Upon the start of an ESW Pump, the NSW supply to the ESW header (that will be supplied by the running ESW Pump) is automatically isolated. In addition, the return flow from the ESW header is automatically realigned to discharge to the Auxiliary Reservoir instead of the Cooling Tower.

The general location of NSW System piping between the plant buildings and the cooling tower is shown in Figure 7.4.

Service Water System Electrical Lineup Checklist

COMPONENT NUMBER	COMPONENT DESCRIPTION	POSITION	CHECK	VERIFY
	6.9 KV Aux Bus 1D			
1D-9	NSW Pump 1A-NNS	RACKED IN	______	N/A
1D-9	NSW Pump 1A-NNS Motor Heater	ON	______	N/A
	6.9 KV Aux Bus 1E			
1E-7	NSW Pump 1B-NNS	RACKED IN	______	N/A
1E-7	NSW Pump 1B-NNS Motor Heater	ON	______	N/A
	6.9 KV Emerg Bus 1A-SA			
1A-SA-9	ESW Pump 1A-SA	RACKED IN	______	______
1A-SA-9	ESW Pump 1A-SA Motor Heater	ON	______	______
	6.9 KV Emerg Bus 1B-SB			
1B-SB-1	ESW Pump 1B-SB	RACKED IN	______	______
1B-SB-1	ESW Pump 1B-SB Motor Heater	ON	______	______
	480V Emerg Bus 1A2-SA			
1A2-SA-5B	SW Booster Pump 1A-SA	RACKED IN	______	______
1A2-SA-4A	SW Booster Pump 1A-SA Motor Heater	ON	______	______
	480V Emerg Bus 1B2-SB			
1B2-SB-2D	SW Booster Pump 1B-SB	RACKED IN	______	______
1B2-SB-2A	SW Booster Pump 1B-SB Motor Heater	ON	______	______
	MCC 1A21-SA (RAB 286)			
1A21-SA-11C	ESW Inlet to AH-2 (1SW-91)	ON	______	______
1A21-SA-11D	ESW Inlet to AH-3 (1SW-92)	ON	______	______
1A21-SA-12C	ESW Outlet from AH-2 (1SW-109)	ON	______	______
1A21-SA-12D	ESW Outlet from AH-3 (1SW-97)	ON	______	______
	MCC 1B21-SB (RAB 286)			
1B21-SB-9C	ESW Outlet from AH-1 (1SW-98)	ON	______	______
1B21-SB-9D	ESW Inlet to AH-1 (1SW-225)	ON	______	______
1B21-SB-10D	ESW Outlet from AH-4 (1SW-110)	ON	______	______
1B21-SB-11C	ESW Inlet to AH-4 (1SW-227)	ON	______	______

Question: 68

During FRP-C.1, Response to Inadequate Core Cooling, the steam generators are depressurized to 90 psig.

Which of the following is the basis for stopping at 90 psig?

a. To prevent N2 injection into the RCS from the Cold Leg Accumulators

b. To maintain gases in solution while low head SI recovers core cooling

c. To ensure the SG U-Tubes remain covered

d. To maintain adequate pressure for running any available RCPs

Answer:

a. To prevent N2 injection into the RCS from the Cold Leg Accumulators

QUESTION NUMBER: 68
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 074EK3.02

Knowledge of the reasons for the following responses as the apply to the Inadequate Core Cooling: Maintaining S/G level and pressure within specified limits

K/A IMPORTANCE: ***RO*** 3.7 ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** 5/10 ***55.43(b) SRO***

OBJECTIVE: EOP-3.10

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis
g. Stopping SG depressurization at 90 psig

REFERENCES: FRP-C.1
LP-EOP-3.10

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.10 024

JUSTIFICATION:

a. **CORRECT** The gas pressure in the CLA will be near 90 psig after all useable water is discharged to the RCS. Stopping the depressurization at this pressure allows CLA isolation to prevent N-2 injection.

b. Plausible since a lower pressure will cause gases to come out of solution, but reason is to prevent injecting nitrogen from CLA.

c. Plausible since lowering pressure increases boiling rate in SG, but feed will be adequate to compensate and reason is to prevent injection of nitrogen from CLA.

d. Plausible since lowering pressure on secondary side of SG will cause RCS to be at a higher pressure to allow RCP operation, but reason is to prevent nitrogen injection from CLA.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of basis for procedural actions

REFERENCES SUPPLIED:

Instructions	Response Not Obtained

NOTE:

- Partial uncovery of SG tubes is acceptable in the following step.
- After the low steam pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.

11. Depressurize All Intact SGs To 90 PSIG:

Instructions	Response Not Obtained
a. Dump steam to condenser at maximum rate.	a. Dump steam at maximum rate using SG PORVs.
b. SG pressure - GREATER THAN 90 PSIG	b. GO TO Step 11e.
c. SG pressure - DECREASING	c. Observe NOTE prior to Step 19 AND GO TO Step 19.
d. Observe CAUTION prior to Step 9 AND RETURN TO Step 9.	
e. RCS hot leg temperatures - AT LEAST TWO GREATER THAN 370°F	e. Stop SG depressurization. GO TO Step 12.
f. RCS hot leg temperature - DECREASING	f. Observe NOTE prior to Step 19 AND GO TO Step 19.
g. Observe CAUTION prior to Step 9 AND RETURN TO Step 9.	

12. Verify RHR Pumps - RUNNING

Instructions	Response Not Obtained
13. Isolate SI Accumulators:	
a. Locally unlock AND close both breakers for each SI accumulator discharge valve: 1SI-246 (MCC-1A21-SA-5C) 1SI-247 (MCC-1B21-SB-5C) 1SI-248 (MCC-1A21-SA-3D)	
b. Shut SI accumulator discharge valves: 1SI-246 1SI-247 1SI-248	b. Vent any unisolable accumulator using OP-110. "SAFETY INJECTION", Section 8.3 while continuing with this procedure.
c. Locally open AND lock both breakers for each SI accumulator discharge valve.	
14. Stop All RCPs.	
15. Depressurize All Intact SGs To Atmospheric Pressure: o Dump steam to condenser at maximum rate.	Dump steam at maximum rate using SG PORVs.
16. Check SI Status:	
a. Check for any of the following: o SI flow - GREATER THAN 200 GPM o Any RHR HX header flow - GREATER THAN 1000 GPM	a. Continue efforts to establish SI flow. Establish charging flow to RCS. GO TO Step 16c.
b. GO TO Step 17.	
c. Core exit TCs - LESS THAN 1200°F	c. Observe NOTE prior to Step 19 AND GO TO Step 19.
d. RETURN TO Step 15.	

(3) Depressurize all intact SGs

- Stop at 90 psig to isolate accumulators
- RCS temp checked for saturation pressure prior to point where N^2 will inject

(4) Stop all RCPs

- Loss of No. 1 seal ΔP is expected with further SG depressurization

(5) Depressurize all SGs to atmospheric pressure

- This should reduce RCS pressure to allow accumulators to inject and to below the shutoff head of the RHR pumps (low head SI)

(6) Core cooling is verified

- If cooling has not been established, more drastic actions must be taken

d. Start RCPs and depressurize the RCS

(1) Support conditions are desired but not required

(2) With a secondary heat sink, RCPs will maintain core cooling as long as they run

(3) Continued RCP operation cannot be expected under highly voided conditions

(4) SI flow must be established

(5) Open all PRZ PORVs once the RCPs are running and if necessary, all RCS vent valves

e. If core exit temperature is increasing and RCPs are running in all available cooling loops, go to SAMG-SACRG-001

EOP-TP-5

4. Review flow path

5. Required operator knowledge to implement FRP

a. Realignment of pumps/valves to restore SI flow (SDD)

b. Understanding of RCP behavior under saturated conditions

(1) Large variations in pump current due to liquid density variations during start

Question: 69

The plant is operating at 100% power with the following conditions:

Time	Ambient Temp	CT Basin Temp
1200	40 °F	64 °F
1600	30 °F	60 °F
2000	25 °F	55 °F

Which of the following describes the correct CT Deicing Gate Valve alignment for these conditions?

	1600	2000
a.	Full Open	Full Open
b.	Full Open	Half Open
c.	Half Open	Full Open
d.	Half Open	Half Open

Answer:

b.	Full Open	Half Open

QUESTION NUMBER: 69
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 0752.1.20

Ability to execute procedure steps (Circulating Water System).

K/A IMPORTANCE: ***RO*** 4.3 ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: CT-R3

Given OP-141, Attachment 5, ANALYZE a set of adverse weather conditions and DESCRIBE the operation of the Cooling Tower System to prevent ice damage to the fill material

REFERENCES: OP-141

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number CT-R3 001

JUSTIFICATION:

a. Plausible since no change is required between 1200 and 1600 positions, but change is required for 2000 position.

b. **CORRECT** At 1200 conditions call for valves to be full open, at 1600 conditions call for no change in position, and at 2000 conditions call for change to half open.

c. Plausible since at 1600 operation is no longer in normal operation region, but valves should remain same as 1200 position which is full open.

d. Plausible since at 1600 operation is no longer in normal operation region, but valves should remain same as 1200 position which is full open.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of given data to curve to determine outcome

REFERENCES SUPPLIED: OP-141, Attachment 5

8.5 Cooling Tower Cold Weather Operations

8.5.1 Initial Conditions

1. Cooling Tower De-icing Slide Gates Nº1, Nº2, Nº3, and Nº4 are open.

2. Ambient air temperature is or will be, at or below 32°F.

3. Cooling Tower filled per Section 8.1, or in operation.

8.5.2 Procedural Steps

NOTE: If just starting the Circulating Water System per OP-138.01, heat load should be added to the Cooling Tower as rapidly as practical to raise basin temperature. Time should be allowed for basin temperature to heat up and stabilize prior to determining the operating point in the following steps.

1. Monitor ERFIS computer points TCW1930, Cooling Tower Basin Temperature; and MMT1011, Ambient Air Temperature.

2. Determine the operating point of the Cooling Tower Basin Temperature versus Ambient Air Temperature on the graph in Attachment 5.

3. As the operating point determined in Step 8.5.2.02 changes, perform the following per the Attachment 5 legend:

   a. If the operating point is in either the NORMAL OPERATION or the AS-IS region, the Cooling Tower Deicing Gate Valves Nº1, Nº2, Nº3, and Nº4 should remain open.

   b. If the operating point enters the HALF OPEN region, shut the Cooling Tower Deicing Gate Valves Nº1, Nº2, Nº3, and Nº4 to HALF OPEN position.

   c. If, with the Cooling Tower Deicing Gate Valves Nº1, Nº2, Nº3, and Nº4 HALF OPEN, the operating point enters the AS-IS region, the valves should remain HALF OPEN.

   d. If, with the Cooling Tower Deicing Gate Valves Nº1, Nº2, Nº3, and Nº4 HALF OPEN, the operating point enters the NORMAL OPERATION region, the Cooling Tower Deicing Gate Valves Nº1, Nº2, Nº3, and Nº4, should be opened to FULL OPEN position.

CT-R3 001

The plant is operating at 100% power with the following conditions:

Time	Ambient Temp	CT Basin Temp
1600	40° F	64° F
2300	25° F	60° F

Which of the following describes the correct valve alignment for current conditions: (Refer to the attached copy of OP-141, Attachment 5.)

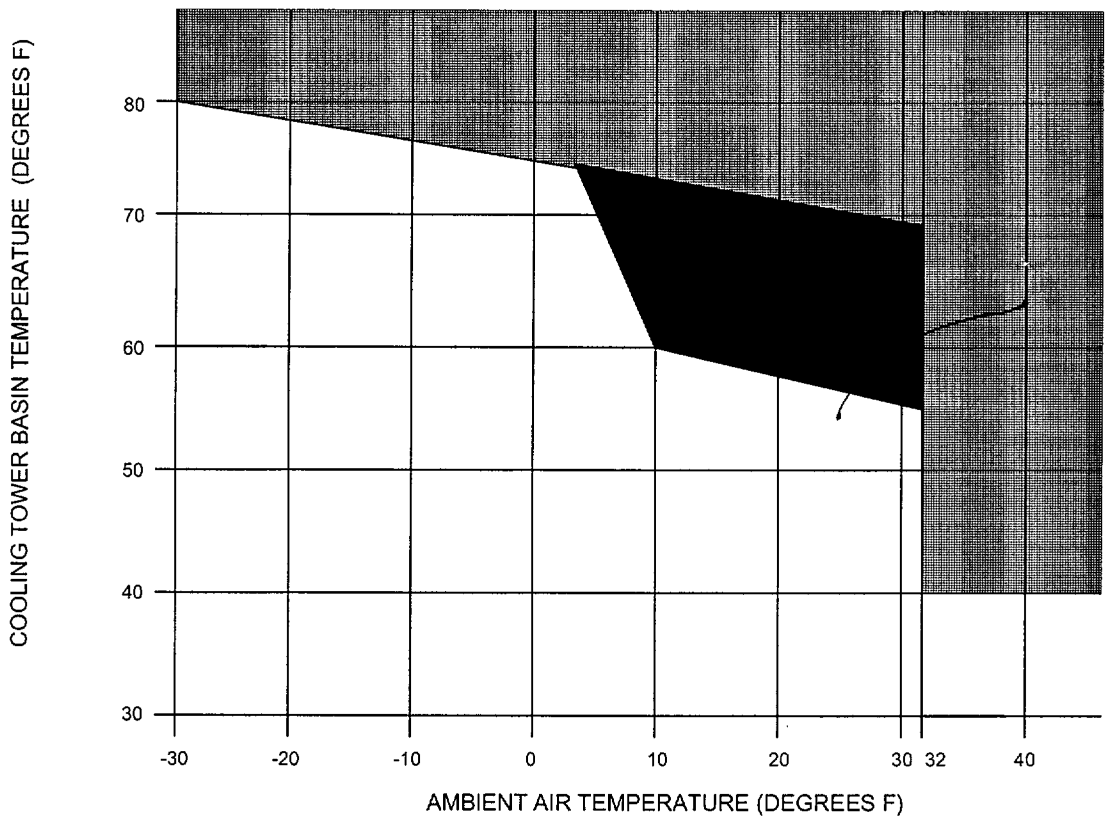
A. Both bypass valves fully shut; slide gates on inner two risers half open; slide gates on outer two risers fully open.

B. Both bypass valves fully shut; slide gates on outer two risers half open; slide gates on inner two risers fully open.

✓C. Both bypass valves fully shut; all side gates fully open.

D. Either bypass valve fully open; slide gates on any two risers half open; slide risers half open; slide gates on other two risers fully open.

Cooling Tower Cold Weather Operation



NORMAL OPERATION - COOLING TOWER DEICING GATE VALVES OPEN

AS IS - COOLING TOWER DEICING GATE VALVES REMAIN AS IS

HALF OPEN - COOLING TOWER DEICING GATE VALVES HALF OPEN

Question: 70

Reactor power is being increased and is at 37%.

All indications for 1A and 1C RCPs are normal.

Given the following conditions for 1B RCP:

- ALB-008-4-3, RCP 'B' SEAL #1 LEAKOFF HIGH/LOW FLOW, alarms.
- #1 seal leakoff flow has increased to 6.8 gpm.
- Shaft vibration levels are 6 mils and increasing at 0.4 mil/hr.
- Frame vibration levels are 2.1 mils and increasing at 0.3 mil/hr.
- Motor upper radial bearing temperature is 172 °F and stable.
- Motor lower radial bearing temperature is 176 °F and stable.
- Motor upper thrust bearing temperature is 168 °F and stable.
- Motor lower thrust bearing temperature is 178 °F and stable.
- Pump radial bearing temperature is 193 °F and increasing slowly.
- Seal inlet water temperature is 198 °F and increasing slowly.
- Pump bearing water temperature is 158 °F and increasing slowly.
- Motor stator winding temperature is 310 °F and increasing slowly.

Which of the following actions should be taken, in accordance with AOP-018?

a. Trip the reactor and trip 1B RCP immediately

b. Trip 1B RCP immediately and perform a plant shutdown

c. Be in Hot Standby within 6 hours, then stop 1B RCP

d. Trip 1B RCP within 10 minutes and perform a plant shutdown

Answer:

b. Trip 1B RCP immediately and perform a plant shutdown

QUESTION NUMBER: 70
TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 015/017AA2.09

Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): When to secure RCPs on high stator temperatures

K/A IMPORTANCE: ***RO*** 3.4 ***SRO*** 3.5

10CFR55 CONTENT: ***55.41(b) RO*** 3/10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.18-7

Given a set of plant conditions and a copy of AOP-018, Reactor Coolant Pump Abnormal Conditions, EVALUATE the conditions and DETERMINE the appropriate response

REFERENCES: AOP-018

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number 98RO-47

JUSTIFICATION:

a. Plausible since the stator temperature has exceeded limits, but reactor trip is not required.

***b.* CORRECT** RCP must be stopped immediately due to the stator temperature having exceeded limits. Since power is below P-8 a reactor trip is not required.

c. Plausible since the pump TS requires plant be placed in Hot Standby within 6 hours of stopping RCP, but pump must be stopped immediately.

d. Plausible since the pump must be stopped within 10 minutes of a loss of CCW and seal injection, but pump must be stopped immediately.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of given conditions and procedural requirements to determine actions

REFERENCES SUPPLIED:

1.3 RCP C Symptoms (continued)

5. ERFIS computer alarms for the following:

- RCP Thrust Bearing High Temp
- RCP Radial Bearing High Temp
- RCP Stator Winding High Temp

2.0 AUTOMATIC ACTIONS

None

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

1. None.

3.2 Follow-up Actions

NOTE: If safe operation of the plant will not be compromised, procedure steps may be performed simultaneously or out of sequence at the discretion of the Unit SCO.

R 1. IF at any time, any of the limits in Attachment 1 are exceeded for any RCP, THEN perform the following (Ref: FSAR Section 5.4.1):

a. IF greater than P-8 (49%) OR more than one RCP is affected, THEN verify reactor is tripped.

b. Stop affected RCP(s).

c. IF a reactor trip was initiated, THEN Go To EOP-Path-1 while continuing with this procedure.

2. IF at any time an RCP is stopped, THEN perform the following:

a. IF RCP A is stopped, THEN shut 1RC-107, PRZ SPRAY LOOP A.

b. IF RCP B is stopped, THEN shut 1RC-103, PRZ SPRAY LOOP B.

c. Verify SG levels being maintained between 61% and 71%.

d. IF the reactor is NOT tripped, THEN perform the following:

(1) Monitor rod insertion limits.

(2) Initiate a plant shutdown per GP-006, Normal Plant Shutdown from Power Operation to Hot Standby.

Reactor Coolant Pump Trip Limits

NOTE: False indications such as step changes or spikes on both the upper and lower thrust bearings are signs that the instrumentation transient may not be valid.

Validation of the temperatures should be performed by observing positive indications of any of the following:

- Simultaneous temperature increases in upper and lower thrust bearing and upper guide bearing (may indicate loss of CCW cooling or oil viscosity problems common to the upper reservoir).
- Vibration levels increasing along with increasing bearing temperatures.
- High or Low RCP oil level alarms along with increasing bearing temperatures.

R 1. **Any of the following Motor Bearing temperatures exceeding 190°F** (Ref: FSAR Section 5.4.1):

	ERFIS Points		
	RCP A	RCP B	RCP C
Mtr Upper Thrust Brg Temp	TRC0417A	TRC0427A	TRC0437A
Mtr Lower Thrust Brg Temp	TRC0417B	TRC0427B	TRC0437B
Mtr Upper Radial Brg Temp	TRC0418A	TRC0428A	TRC0438A
Mtr Lower Radial Brg Temp	TRC0419	TRC0429	TRC0439

R 2. **Any of the following Pump temperatures exceeding 230°F** (Ref: FSAR Section 5.4.1):

	ERFIS Points		
	RCP A	RCP B	RCP C
Pump Radial Brg Temp	TRC0131	TRC0128	TRC0125
Seal Water Inlet Temp	TRC0132	TRC0129	TRC0126

3. **RCP Stator Winding temperature exceeding 300°F**:

	ERFIS Points		
	RCP A	RCP B	RCP C
Mtr Stator Windg Temp	TRC0418B	TRC0428B	TRC0438B

Reactor Coolant Pump Trip Limits (Cont.)

NOTE: ALB-5-1-2B, RCP THERM BAR HDR LOW FLOW, indicates loss of CCW to all RCP thermal barriers

4. **Loss of RCP seal injection when:**

   a. CCW flow is lost to associated RCP Thermal Barrier HX.

   b. RCS temperature is greater than or equal to 400°F AND CCW HX outlet temperature is greater than 105°F.

   c. RCS temperature is less than 400°F AND CCW HX outlet temperature is greater than 120°F.

R 5. **RCP vibration in excess of the following** (Ref: FSAR Section 5.4.1):

   - 20 mils shaft
   - 15 mils shaft and increasing greater than 1 mil/hr.
   - 5 mils frame
   - FOR A and C RCPs ONLY: 3 mils frame and increasing greater than 0.2 mil/hr.
   - FOR B RCP ONLY: 3.5 mils frame and increasing greater than 0.2 mil/hr.

6. **RCP Motor current fluctuations of 40 amps peak-to-peak:**

	ERFIS Points		
	RCP A	RCP B	RCP C
Motor Current	IRC0160	IRC0161	IRC0162

7. **Loss of CCW to an RCP or RCP Motor when:**

R - An RCP has operated for 10 minutes without CCW flow to either motor oil cooler (Ref: FSAR Section 9.2.2)
   - Isolation of CCW to an RCP is necessary to stop excessive CCW System leakage

Specific Symptoms of Seal Malfunctions

Seal Malfunction	Symptoms
#1 Seal Failed	Any of the following exist for the affected RCP: • Both #1 and #2 seal leakoff high flow alarms in • Total #1 seal flow greater than or equal to 8 gpm (See note 1,3) • Total #1 seal flow greater than 6.5 gpm with either the RCP seal water inlet or radial bearing temperature steadily increasing (See notes 1 and 2) • Total #1 seal flow less than 0.8 gpm with either the RCP seal water inlet or radial bearing temperature steadily increasing (See notes 1 and 2))
#1 Seal Degraded	All the following exist for the affected RCP: • #1 seal leakoff flow greater than 6.5 gpm • Total #1 seal flow less than 8 gpm (See note 1) • RCP seal water inlet temperature stable (See note 2) • RCP radial bearing temperature stable (See note 2)
#1 Seal Blocked	#1 seal leakoff flow less than 0.8 gpm (3) (Assumes normal operating pressure and #2 seal leakoff flow is zero or negligible. At low RCS pressures, seal parameters are given in OP-100, Reactor Coolant System.)
#2 Seal Failed	High #2 seal leakoff flow condition with a corresponding reduction in #1 seal leakoff flow. #3 seal leakoff should remain fairly constant.
#3 Seal Failed	Frequent (more often than every 14 hours) need for filling the standpipe. May also detect an increase in CNMT sump level.

Notes	
1	Total #1 seal flow is defined as the sum of #1 and #2 seal leakoff flows. When calculating total #1 seal flow and #1 seal leakoff flow is greater than 6.5 gpm, #2 seal leakoff flow should be considered negligible until it can be read locally unless #2 high leakoff flow alarm is in, then assume total seal flow is greater than 8 gpm.
2	RCP seal water inlet and RCP radial bearing temperatures are indicative of a #1 seal failure. Normal 100% power values for these temperatures are 140°F to 150°F. An increase in #1 seal leakoff flow will result in an increase in these temperatures but the increase should taper off and stabilize well below 230°F. "Steadily increasing" - An increase at a constant or increasing rate that will result in exceeding 230°F. "Stable" - A slow increase in temperature or an increase in temperature but at a decreasing rate and well below 230°F. Under these conditions, additional time is available to evaluate the trend and contact Engineering. In the absence of additional guidance, if temperature has increased to greater than 190°F and is still increasing, it should be considered "steadily increasing".
3	Validate reading using diverse indications.

Question: 71

Given the following conditions:

- The plant is in Mode 3.
- ALB 5-6-1, CCW SURGE TANK HIGH-LOW LEVEL, alarms.
- ALB 10-4-5, RAD MONITOR SYSTEM TROUBLE, alarms.
- ALB 5-1-2A, RCP THERM BAR HDR HIGH FLOW, alarms.
- ALB 5-2-2B, RCP THERM BAR HDR HIGH TEMP, alarms.
- CCW RAD monitor alarm on RM-11 console, alarms.
- CCW surge tank level is increasing.

Which of the following actions should have automatically occurred?

a. 1CC-251, CCW From RCP Thermal Barrier Coolers, CLOSES

b. CCW Holdup Tank Transfer Pump, STARTS

c. CCW Drain Tank Transfer Pump, STARTS

d. 1CC-252, RCP Thermal Barriers Flow Control, CLOSES

Answer:

d. 1CC-252, RCP Thermal Barriers Flow Control, CLOSES

QUESTION NUMBER: 71

TIER/GROUP: ***RO*** 1/1 ***SRO*** 1/1

K/A: 0262.4.24

Knowledge of loss of cooling water procedures (Loss of Component Cooling Water).

K/A IMPORTANCE: ***RO*** 3.3 ***SRO*** 3.7

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.14-2

RECOGNIZE automatic actions that are associated with AOP-014, Loss of Component Cooling Water

REFERENCES: AOP-014

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since CCW from the thermal barrier coolers isolates, but flow control valve is isolation

b. Plausible since pump is interlocked with high level in CCW surge tank, but pump stops on high level instead of starting.

c. Plausible since pump is interlocked with high level in CCW surge tank, but pump stops on high level instead of starting.

d. **CORRECT** 1CC-252 closes on high flow which is indicative of a thermal barrier cooler failure, preventing RCS from leaking into CCW.

DIFFICULTY:

Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Analysis of given conditions to determine automatic response of system

REFERENCES SUPPLIED:

Section 1.0

1.0 SYMPTOMS

1. ALB 5-6-1, CCW SURGE TANK HIGH-LOW LEVEL
2. ALB 10-4-5, RAD MONITOR SYSTEM TROUBLE
3. CCW flow alarms for individual components:
    a. ALB 5-1-2A, RCP THERM BAR HDR HIGH FLOW
    b. ALB 5-1-2B, RCP THERM BAR HDR LOW FLOW
    c. ALB 5-1-3A, EXCESS LTDN HX CCW HIGH FLOW
    d. ALB 5-1-3B, EXCESS LTDN HX CCW LOW FLOW
    e. ALB 5-1-4A, LTDN HX CCW HIGH FLOW
    f. ALB 5-2-2B, RCP THERM BAR HDR HIGH FLOW
    g. ALB 5-2-4B, RHR HX A CCW HI/LO FLOW
    h. ALB 5-3-4B, RHR HX B CCW HI/LO FLOW
4. CCW RAD monitor alarm on RM-11 console.
5. CCW surge tank level increasing.

2.0 <u>AUTOMATIC ACTIONS</u>

1. 1CC-252, RCP THERMAL BARRIERS FLOW CONTROL, will shut at 174 gpm total flow from the RCP Thermal Barrier coolers.
2. The CCW Holdup Tank Transfer Pump and the CCW Drain Tank Transfer Pump will trip on CCW Surge Tank Level greater than or equal to 75 %. (ALB 5-6-1, CCW SURGE TANK HIGH-LOW LEVEL).

3.0 <u>OPERATOR ACTIONS</u>

3.1. <u>Immediate Actions</u>

1. None

Question: 72

Given the following conditions:

- The plant is in Mode 3.
- 1A-SA CCW Pump is running.
- 1B-SB CCW Pump is in standby.
- A leak occurs, causing a low pressure condition in the CCW system.

Which of the following describes the response of the CCW system?

	A' TRAIN CCW HEADER SUPPLY	**NON-ESSENTIAL HEADER**
a.	1A-SA Pump **ONLY**	Isolated
b.	1A-SA Pump **ONLY**	**NOT** Isolated
c.	1A-SA **AND** 1B-SB Pumps	Isolated
d.	1A-SA **AND** 1B-SB Pumps	**NOT** Isolated

Answer:

d.	1A-SA **AND** 1B-SB Pumps	**NOT** Isolated

QUESTION NUMBER: 72
TIER/GROUP: ***RO*** 2/3 ***SRO*** 2/3

K/A: 008K4.01

Knowledge of CCWS design feature(s) and/or interlock(s) which provide for the following: Automatic start of standby pump

K/A IMPORTANCE: ***RO*** 3.1 ***SRO*** 3.3

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: CCWS-R2

STATE how the CCWS responds during each of the following conditions:
- Low discharge pressure on operating CCW pump

REFERENCES: AOP-014
OP-145

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number CCWS-A4 004

JUSTIFICATION:

a. Plausible since the non-essential header has automatic isolation features, but not on a low pressure.

b. Plausible since the non-essential header does not isolate, but the standby pump automatically starts.

c. Plausible since a low pressure condition starts the standby pump and the non-essential header has automatic isolation features, but not on a low pressure.

d. **CORRECT** A low pressure condition starts the standby pump, the running pump continues to run, and the trains remain cross-connected through the non-essential header.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system operation

REFERENCES SUPPLIED:

1.0 SYMPTOMS (continued)

8. ALB 5-8-3, CCW PUMPS B TROUBLE

9. ALB 5-8-4, CCW PUMPS B TRIP OR CLOSE CKT TROUBLE

2.0 AUTOMATIC ACTIONS

1. Standby CCW pump starts at 61 psig discharge pressure.

3.0 OPERATOR ACTIONS

3.1. Immediate Actions

1. None

3.2. Follow-up Actions

NOTE: The loss of CCW may require the initiation of the SHNPP Emergency Plan (DIN 842960398)

1. Refer to PEP-110 and enter the EAL Network at entry point X.

NOTE: AOP-018, Reactor Coolant Pump Abnormal Conditions, may be performed simultaneously due to alarms on RCP bearing CCW flow through oil coolers.

2. IF header pressure decreased to less than or equal to 61 psig, THEN:

   a. Attempt to start standby CCW pump.

   b. IF CCW header pressure is restored, THEN Go to Step 3.2.2.d.

   c. IF CCW is lost or expected to be lost for greater than or equal to 10 minutes, THEN:

      (1) Verify reactor is tripped.

R   (2) Stop operating RCPs and refer to AOP-018, Reactor Coolant Pump Abnormal Conditions. (Ref.: FSAR 9.2.2.5)

      (3) IF a reactor trip was initiated, THEN refer to EOP-Path-1 while continuing with this procedure.

4.0 PRECAUTIONS AND LIMITATIONS (continued)

20. When CCW flow to the RCPs upper bearing oil coolers is isolated for a period of greater than 2 months, the oil coolers should be drained. This will reduce the effects of corrosion.

21. CCW Flow to the GFFD and the Primary Sample Panel will isolate on a low CCW Surge Tank level of 40%.

22. The Anti-Pumping Lockout will auto-reset when the associated CCW pump breaker control power is cycled. Caution should be exercised any time that control power is closed when system pressure is less than 61 psig.

23. If total CCW flow in the Reactor Coolant Pumps thermal barrier return line exceeds 174 gpm, 1CC-252 will auto shut.

24. Adding chemicals to the CCW system, without splitting the CCW headers makes both trains of CCW inoperable. This would result in a voluntary entry into Tech Spec 3.0.3. For this reason, the CCW headers are split when performing this evolution.

25. CCW flow to the RHR HXS has been set at greater than 6050 gpm and less than 6150 gpm with the nonessential header isolated. This flow rate will ensure adequate CCW flow is provided to the RHR HX when the CCW is restored to the Spent Fuel Pool HX subsequent to initiation of cold leg recirculation. This flow setting must be maintained in Modes 1 - 4. (Reference 2.8.0.0.11)

26. CCW flow to the RHR pump coolers has been set between 7 gpm and 10 gpm with the nonessential header isolated. This flow rate will ensure adequate CCW flow is provided to the RHR pump coolers when CCW is restored to the Spent Fuel Pool HX subsequent to initiation of cold leg recirculation. This flow setting must be maintained in Modes 1 - 4. (Reference 2.8.0.0.11)

CCWS-A4 004

The main Control Room has announced that the "A" CCW pump has tripped, and the "B" CCW pump has automatically started. You investigate and determine that there is an overcurrent flag on the "A" CCW pump breaker. The plant is at 100 percent power. What caused the automatic start of the "B" CCW pump?

✓A. Low pressure in the ""A"" CCW header

B. Low pressure in the ""B"" CCW header

C. Electrical trip of ""A"" CCW pump

D. Program C of the safeguards sequencer

Question: 73

Given the following conditions:

- The unit is in a Refueling Outage.
- A spent fuel assembly is attached to the manipulator crane.
- A failure of the Reactor Vessel permanent cavity seal ring causes cavity level to drop approximately 3" every minute.
- Non-essential personnel have been evacuated from Containment.
- The Refueling Crew is in the process of placing the assembly in the Reactor Vessel when a Loss of Off-Site Power occurs.

Refueling Crew members are immediately evacuated from Containment because there are **NO** means for ...

a. making up to the cavity.

b. monitoring radiological levels inside Containment.

c. placing the fuel assembly in the vessel.

d. providing ventilation to Containment.

Answer:

c. placing the fuel assembly in the vessel.

QUESTION NUMBER: 73
TIER/GROUP: ***RO*** 1/3 ***SRO*** 1/3

K/A: 036AK3.03

Knowledge of the reasons for the following responses as they apply to the Fuel Handling Incidents: Guidance contained in EOP for fuel handling incident

K/A IMPORTANCE: ***RO*** 3.7 ***SRO*** 4.1

10CFR55 CONTENT: ***55.41(b) RO*** 5/10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.31

DESCRIBE personnel evacuations as addressed in AOP-031, Loss of Refueling Cavity Integrity, for nonrefueling personnel and refueling personnel

REFERENCES: AOP-031

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.31 004

JUSTIFICATION:

a. Plausible since a loss of off-site power has occurred, but makeup pumps (RHR) are powered by safeguards buses which have the EDGs available for power.

b. Plausible since power is lost, but rad monitors are supplied by instrument buses which have DC supplies in the event of a loss of AC.

c. **CORRECT** Cavity level will be lowering with an assembly in the manipulator mast when power is lost to the manipulator so no means of moving the assembly to a safe location exists and rad levels will rise as the assembly uncovers.

d. Plausible since power is lost, but containment ventilation isolation would be desirable anyway since rad levels will be increasing.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural requirements

REFERENCES SUPPLIED:

3.2 Follow-up Actions (continued)

NOTE:

- If safe operation of the plant will NOT be compromised, procedure steps may be performed simultaneously or out of sequence at the discretion of the Unit SCO.

R
- Loss of the refueling cavity integrity may require the initiation of the Emergency Plan (Ref: DIN 842960398).

2. Refer to PEP-110, Emergency Classification and Protective Action Recommendations and entry point X for EAL network.

3. IF offsite power AND refueling cavity integrity are lost, THEN evacuate all personnel from the CNMT and FHB.

NOTE: The CNMT Ventilation Isolation radiation monitor alarms are set less than or equal to 150 mR/hr for fuel movement.

4. IF radiation levels on the manipulator crane area reach 150 mR/hr, THEN evacuate all personnel from CNMT.

5. IF the CNMT or FHB have been evacuated, THEN notify Security to verify all personnel have evacuated the affected area(s).

6. IF Refueling cavity level is decreasing, THEN refer to AOP-020, Loss of RCS Inventory or RHR While Shutdown.

7. Makeup to the following, as necessary:
   - Spent/New Fuel pools and Transfer Canal per OP-116, Fuel Pool Cooling and Clean Up
   - RWST per OP-107, Chemical and Volume Control System

8. Monitor radiation levels.

9. Notify Health Physics of the following, as necessary:
   - Existence of leak
   - Affected area(s)
   - Evacuated area(s)
   - Elevated radiation levels

Question: 74

Given the following conditions:

- A Loss of Off-Site Power has occurred.
- EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, is being performed.
- RVLIS indicates that voids exist in the upper head of the vessel.
- An hour later, Off-Site power is restored.
- Conditions are being established to start an RCP.

Prior to starting the RCP, pressurizer level must be ...

a. increased to accommodate the expected outsurge when the voids in the head are collapsed.

b. decreased to accommodate the expected insurge when the RCS heats up.

c. increased to accommodate the expected outsurge when the RCS cools down.

d. decreased to accommodate the expected insurge when PRZ spray flow lowers pressure.

Answer:

a. increased to accommodate the expected outsurge when the voids in the head are collapsed.

QUESTION NUMBER: 74
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 011K5.10

Knowledge of the operational implications of the Indications of reactor vessel bubble

K/A IMPORTANCE: ***RO*** 3.7 ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: EOP-3.8-4

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis
d. RCP starting requirements (EPP-006 and EPP-007)
e. Pressurizer level requirements (EPP-006 and EPP-007)

REFERENCES: EPP-006
LP-EOP-3.8

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. **CORRECT** Starting an RCP will cause subcooled water to be supplied to the head region, collapsing any voids and causing an outsurge from the pressurizer as the voids are filled with RCS.

b. Plausible since starting an RCP will cause a change in RCS temperature, but the change is a slow change which does not require any change in pressurizer level to accommodate it.

c. Plausible since starting an RCP will cause a change in RCS temperature, but the change is a slow change which does not require any change in pressurizer level to accommodate it.

d. Plausible since one of the primary reasons for having RCPs available during EOP implementation is to allow for normal pressure control, but the change in pressure when sprays are used will be accommodated by normal level.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Comprehension of the effects of actions taken on plant conditions

REFERENCES SUPPLIED:

NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL WITH RVLIS

Instructions	Response Not Obtained

NOTE:
- o RCPs should be run in order of priority (B,A,C) to provide normal PRZ spray.
- o Foldout applies.

1. Check RCP Status:

Instructions	Response Not Obtained
a. Check all of the following - IN SERVICE o CCW to motor oil coolers o CCW to thermal barrier HXs o Seal injection	a. Establish cooling to RCPs using OP-100, "REACTOR COOLANT SYSTEM", Section 8.10.
b. Establish conditions for running an RCP using OP-100, "REACTOR COOLANT SYSTEM", Section 8.11.	b. Observe <u>NOTE</u> prior to Step 2 AND GO TO Step 2.
c. RVLIS upper range - GREATER THAN 100%	c. Perform the following prior to starting an RCP: o Increase PRZ level greater than 65% o Increase RCS subcooling greater than 32°F - C 45°F - M
d. Start one RCP using OP-100, "REACTOR COOLANT SYSTEM", Section 8.12.	d. Observe <u>NOTE</u> prior to Step 2 AND GO TO Step 2.
e. Perform the appropriate plant procedure:	
1) Check plant status - RCS COOLDOWN REQUIRED	1) Perform one of the following procedures (based on plant conditions): o GP-002, "NORMAL PLANT HEATUP FROM COLD SOLID TO HOT SUBCRITICAL" o GP-004, "REACTOR STARTUP"
2) GO TO GP-007, "NORMAL PLANT COOLDOWN".	

(d) Maintain subcooling after anticipated pressure drop

(5) Start one RCP

(6) Continuous action—foldout item

(7) Transition to GP-002 (Heat-up), GP-004 (SU), or GP-007 (Cooldown) when RCP started

c. Cooldown and depressurize

Objective 4e

(1) Establish PRZ level to accommodate void growth

(a) Twenty-five to thirty-five percent within level controller in manual

(b) Low enough to accommodate void growth

(c) High enough to cover PRZ heaters and prevent letdown from isolating

(d) Manual control allows increase in PRZ level due to void growth

(e) Do not continue with procedure until PRZ level requirements met

(2) Cool down at < 100°F/hr

(a) Subcooling > 30°F-C, 40°F-M—ensures subcooling in hot legs

Objective 4b

(b) Should restrict void growth to head/upper plenum region (above top of the hot legs) so as not to disrupt NC

(c) Maintain temperature and pressure within Tech Spec cooldown curve

(3) Depressurize RCS

(a) Order of priority—auxiliary spray and one PRZ PORV

(4) Control PRZ level 25 to 90 percent

(a) Prevents loss of pressure control

Objective 2c

(b) PRZ level will not respond in normal manner if void is present

1) Letdown > charging—PRZ pressure decreases, voids will grow, PRZ level increases

2) Charging > letdown—PRZ pressure increases, voids will shrink, PRZ level decreases

(5) RVLIS level > 76 percent full range

Objective 4f

(a) Limits void growth to top of hot legs

(b) If < 76 percent, repressurize to maintain RVLIS level > 76 percent

(c) Loop until > 76 percent

d. Lock out SI System

(1) When RCS pressure < 1000 psig, isolate SI accumulators

(2) When RCS temperature < 350°F (but prior to 325°F), rack out standby CSIP

e. Place RHR in service

(1) Loop until RCS hot leg < 350°F and RCS pressure < 360 psig

(2) Place RHR in service using GP-007

(3) Place LTOP in service prior to 325°F

(4) Maintain cooldown rate < 50°F/hr

f. Continue cooldown

(1) Prior to 200°F

(a) Open breaker for standby reactor makeup water pump

(b) Place clearance on standby reactor makeup water pump

(c) Reset high flux at SD alarm per GP-007

Question: 75

Which of the following describes the automatic actions performed by the AMSAC system **AND** the basis for each action?

a.
- Reactor is tripped to remove the heat source
- Turbine is tripped to preserve SG inventory

b.
- Reactor is tripped to remove the heat source
- AFW is initiated in anticipation of a loss of SG inventory

c.
- Turbine is tripped to preserve SG inventory
- AFW is initiated in anticipation of a loss of SG inventory

d.
- Turbine is tripped to establish a Tave-Tref deviation to force auto rod insertion
- AFW is initiated in anticipation of a loss of SG inventory

Answer:

c.
- Turbine is tripped to preserve SG inventory
- AFW is initiated in anticipation of a loss of SG inventory

QUESTION NUMBER: 75
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/1

K/A: 029EK3.12

Knowledge of the reasons for the following responses as the apply to the ATWS: Actions contained in EOP for ATWS

K/A IMPORTANCE: ***RO*** 4.4 ***SRO*** 4.7

10CFR55 CONTENT: ***55.41(b) RO*** 5/10 ***55.43(b) SRO***

OBJECTIVE: BD-3.15

Describe the basis for the AMSAC System

REFERENCES: LP-BD-3.15

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number BD-3.15 008

JUSTIFICATION:

a. Plausible since turbine is tripped to conserve SG inventory, but AMSAC does not generate reactor trip.

b. Plausible since AFW is initiated to maintain SG inventory, but AMSAC does not generate reactor trip.

c. **CORRECT** AMSAC actuates turbine trip and AFW actuation to minimize RCS pressure rise due to loss of secondary heat sink.

d. Plausible since turbine is tripped and AFW actuated, but turbine is tripped to conserve SG inventory.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system operation and basis

REFERENCES SUPPLIED:

(2) Failure to trip turbine permits greater steam release from SGs and level is lost faster

(a) More heat removed early

(b) Power remains relatively high

(c) Pressure reaches higher max value

2. Westinghouse position

a. ATWS not a DBA

b. With turbine trip and AFW

(1) ATWS acceptable

(2) Emergency stress limit of 3200 psig not exceeded

3. NRC position—unresolved safety issue, NUREG-0460

a. Want modifications to separate RPS from AFW, turbine trip, and containment isolation

b. Example

(1) Redundant turbine trip and AFW pump start signals generated independent of RPS

(2) Not possible for a common mode failure by RPS

4. ATWS Mitigating System Actuation Circuitry (AMSAC)

a. Installed at SHNPP

b. Independent of RPS

Fig. 7.1

c. Inputs are three SG NR levels and two turbine first stage pressures

d. Two redundant trains

e. Output initiates AFW and turbine trip

f. Actuates when SG NR levels < 33.3 percent (2/3) and turbine power > 40 percent (2/2)

g. Basis for AMSAC—allows a two-step pressure rise instead of the pressure rise occurring all at once

(1) With AMSAC—first pressure rise occurs when the turbine is tripped and the second pressure rise occurs after the SGs looses significant heat transfer capabilities

BD-3.15 008
The AMSAC system minimizes the ATWS risks by performing which of the following?

A. Tripping the reactor and tripping the turbine

B. Tripping the reactor and initiating AFW

✓C. Tripping the turbine and initiating AFW

D. Tripping the turbine and initiating emergency boration

QUESTION NUMBER: 81
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: WE05EK2.2

Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and proper operation of these systems.

K/A IMPORTANCE: ***RO*** 3.9 ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: EOP-3.11

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis
d. Requirements for a heat sink

REFERENCES: FRP-H.1
LP-EOP-3.11

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.11 023

JUSTIFICATION:

a. Plausible since a large break LOCA has occurred, but a secondary heat sink is not required.

b. **CORRECT** With RCS pressure less than SG pressure a large break LOCA has occurred and adequate heat removal will occur from SI/break flow.

c. Plausible since a LOCA has occurred, but the LOCA is a large break and a secondary heat sink is not required.

d. Plausible since a secondary heat sink is not required, but the LOCA is a large break.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of given conditions to determine plant conditions

REFERENCES SUPPLIED:

Instructions	Response Not Obtained

****

CAUTION

This procedure should NOT be performed if total feed flow capability of 222.5 KPPH is available AND total feed flow has been reduced due to operator action.

****

Instructions	Response Not Obtained
1. Implement Function Restoration Procedures As Required.	
2. Check Secondary Heat Sink Requirements:	
a. RCS pressure - GREATER THAN ANY NON-FAULTED SG PRESSURE	a. GO TO PATH-1, entry point C.
b. RCS temperature - GREATER THAN 350°F [330°F]	b. GO TO Step 2d.
c. Observe CAUTION prior to Step 3 AND GO TO Step 3.	
d. Check RHR system status - ALIGNED IN SHUTDOWN COOLING MODE	d. Place RHR system in service using GP-007, "NORMAL PLANT COOLDOWN" AND OP-111, "RESIDUAL HEAT REMOVAL SYSTEM", Section 5.1 while continuing with this procedure. IF RHR cooling is subsequently established, THEN RETURN TO procedure and step in effect. Observe CAUTION prior to Step 3 AND GO TO Step 3.
e. RETURN TO procedure and step in effect.	

d. Required operator knowledge

(1) Effect of bleed path on PRZ level—increases with possibility of going water solid

(2) Impact of charging flow on solid PRZ (ERG)—mass imbalance causes large change in pressure

e. Basis for selected EOP steps

(1) Tripping of RCPs—reduces heat input and extend time to bleed and feed

(2) Feed restoration with different SG conditions—use Attachment 1

(3) When a heat sink is not required—LOCA or on RHR cooling

D. FRP-H.2, Response to SG Overpressure

1. Purpose—Provides actions for an overpressure condition affecting any steam generators where pressure has increased above the highest stream-line safety valve setpoint

2. Entry conditions—heat sink status tree yellow condition; pressure in any SG greater than 1230 psig

WOG-FR-H.2

3. General description

a. Following reactor trip, steam generator pressures until steam dumps, SG PORVs or safeties open

(1) Pressure increase amount dependent in

(a) Number and type of valves available to limit pressure increase

(b) Decay heat levels

(2) One safety valve on an SG is sufficient to remove decay heat

(3) All safeties must fail to overpressurize the affected SGs

b. Overpressure could also be caused by overfill

- If so, operator directed to FRP-H.3

c. Recovery method of FRP-H.2 assumes MSIVs are closed

- If not, SGs would be cross-connected and any safety lifting would limit pressure in all SGs

Question: 81

Given the following conditions:

- A reactor trip with SI has occurred.
- The immediate action steps, ECCS flow verifications, and AFW flow verifications are performed.
- SG levels are < 10% and the required AFW flow **CANNOT** be established.
- FRP-H.1, Response to Loss of Secondary Heat Sink, is entered.
- RCS pressure is checked and determined to be less than intact SG pressure.

Which of the following describes the plant conditions?

a. A large break LOCA is in progress **AND** a secondary heat sink is required

b. A large break LOCA is in progress **AND** a secondary heat sink is **NOT** required

c. A small break LOCA is in progress **AND** a secondary heat sink is required

d. A small break LOCA is in progress **AND** a secondary heat sink is **NOT** required

Answer:

b. A large break LOCA is in progress **AND** a secondary heat sink is **NOT** required

Question: 82

If the suction pipe from the 'B' Spent Fuel Pool to the Spent Fuel Pool Cooling Pump completely severed, level in the Spent Fuel Pool would decrease ...

a. to 18 feet above the fuel assemblies before the Emergency Makeup would automatically start.

b. to 18 feet above the fuel assemblies and stabilize without any automatic action.

c. to 12 feet above the fuel assemblies before the Emergency Makeup would automatically start.

d. to 12 feet above the fuel assemblies and stabilize without any automatic action.

Answer:

b. to 18 feet above the fuel assemblies and stabilize without any automatic action.

QUESTION NUMBER: 82
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 033K4.03

Knowledge of design feature(s) and/or interlock(s) which provide for the following: Anti-siphon devices

K/A IMPORTANCE: ***RO*** 2.6 ***SRO*** 2.9

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: FPC-A3

LIST the systems needed to support the Spent Fuel Pool Cooling System and STATE the function provided by each system

REFERENCES: SD-116

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number FPC-A2 006

JUSTIFICATION:

a. Plausible since the pool will only drain to this level, but no automatic makeup is available.

b. **CORRECT** The location of the piping precludes draining the pool down below this level.

c. Plausible since the pool will drain to a level above the assemblies and stop, but level is above this and no automatic makeup is available.

d. Plausible since the draining of the pool will stop without any automatic action, but will drain to a level above this.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of system design and operation

REFERENCES SUPPLIED:

2.2 Cooling System (continued)

The cooling loops are protected from externally generated missiles and the effects of high and moderate energy fluid piping ruptures.

The fuel pool cooling water return piping terminates at elevation 279'6". The spent fuel pool suction piping exits at 278'6" and the new fuel pool suction piping exits at 277'6". Normal water level in the pool is 284'6" with the top of the spent fuel racks at approximately 260.08'. This design thus precludes uncovering the fuel as a result of a suction line rupture since approximately 18' of water is over the fuel at all times. The location of the cooling inlet and outlet connections to the fuel pools preclude the possibility of coolant flow short circuiting the pool. If, due to a gross valve misalignment, one pool was aligned to the suction of both fuel pools cooling water pumps with no makeup the pumps would loose suction in approximately 7.5 minutes for the spent fuel pools "B" and "C", 2.7 minutes for new fuel pool "A", and 3.5 minutes for spent fuel pool "D".

Normal makeup for evaporative losses and small amounts of system leakage from the fuel pools is accomplished using the Demineralized Water System (DWS), although other sources, such as from the reactor makeup water storage tank or the recycle holdup tank, may also be used.. The DWS connects to the fuel pools and refueling water purification pumps, spent fuel pools cooling pumps, and fuel pools skimmer pumps to permit makeup to the fuel pools, or may be directly added to the pools via hoses. The seismic category I refueling water storage tank (RWST) may also be aligned to provide borated makeup water to the fuel pools, and a seismic category I source of emergency makeup water is available from the emergency service water (ESW) system, by connecting flexible hoses to connections on the ESW and fuel pool cooling and cleanup system piping.

In the event of a single failure in one spent fuel pool cooling loop, the other loop will provide adequate cooling. The concrete forming the pools is designed for 150 degrees F, however, HVAC considerations make 137 degrees F the upper allowable pool temperature. A low flow alarm is provided to warn of interruption of cooling.

2.3 Cleanup System

(Reference Figures 7.5 through 7.7 for flow diagram)

The fuel pool cleanup system is comprised of two separate systems. Each of the cleanup systems consists of a fuel pool demineralizer, a fuel pool demineralizer filter, a fuel pool and refueling water purification filter, and two fuel pool purification pumps. The cleanup system is not safety related nor is it designed to seismic Category I requirements. Valving is provided between the cooling system and cleanup system to permit isolation of this non safety related system.

The fuel pool cleanup system can be used to maintain the purity and clarity of fuel pool water by diverting approximately 6% of the cooling system flow through the cleanup system. The clean-up loop can also take a suction from the refueling cavity at elevation 246.00 ft. and clean the refueling water through the demineralizer and discharge back to the refueling cavity at elevation 285.00 ft. This is done, independently of the cooling loop. The cleanup system is also used to purify the reactor coolant drain tank heat exchanger effluent prior to discharging into the recycle holdup tank, to purify the contents of the RWST, and to drain and purify the reactor cavity.

Question: 83

Given the following conditions:

- The plant is solid in Mode 5 with one (1) RCP in operation.
- RHR Pump A-SA is providing letdown flow with PK-145.1, LTDN PRESSURE 1CS-38, in **MAN**.
- CSIP A-SA is providing RCS makeup and seal injection.

If instrument air is lost to 1CS-38 (PCV-145), the operator should ...

a. trip CSIP A-SA.

b. trip RHR Pump A-SA.

c. control letdown flow using HC-142.1, RHR Letdown 1CS-28.

d. open one PRZ PORV.

Answer:

a. trip CSIP A-SA.

QUESTION NUMBER: 83
TIER/GROUP: ***RO*** 1/3 ***SRO*** 1/2

K/A: 065AA2.08

Ability to determine and interpret the following as they apply to the Loss of Instrument Air: Failure modes of air-operated equipment

K/A IMPORTANCE: ***RO*** 2.9 ***SRO*** 3.3

10CFR55 CONTENT: ***55.41(b) RO*** 7/10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.19-4

Given a situation in solid plant operation affecting charging, letdown, or RCS temperature, EVALUATE the effect on RCS pressure per AOP-019

REFERENCES: AOP-019

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number RO98-31

JUSTIFICATION:

a. **CORRECT** PCV-145 fails open on a loss of instrument air, causing pressure to lower. Running RCPs and CSIPs are to be stopped.

b. Plausible since PCV-145 failing open will result in RCS pressure dropping below required value to operate RHR.

c. Plausible since closing this valve will attempt to raise pressure, but actions are to stop RCPs and CSIPs and then restore pressure by correcting problem.

d. Plausible since a PORV would open if pressure were to rise, but pressure will be lowering.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comprehension of failure modes and effects of operator actions

REFERENCES SUPPLIED:

Section 2.0

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

IF RCS narrow range pressure exceeds 360 psig, THEN stop the Charging Pump.

3.2 Follow-up Actions

1. WHEN RCS narrow range pressure is less than 360 psig, THEN verify PRZ PORVs PCV-445A and PCV-444B are shut.
2. Stop any running RCPs.
3. Verify Charging Pump is stopped.
4. Minimize RCS pressure.
5. Stop letdown using one or more of the following:
   - PCV-145, Letdown Pressure Control Valve
   - HCV-142, RHR Letdown Control Valve
6. Maintain stable RHR temperature.
7. Refer to Tech Spec 3.4.9.4.
8. Determine and correct cause of pressure control failure.
9. WHEN cause of pressure control failure has been corrected, THEN perform the following:
   a. Verify the following PRZ PORVs are in AUTO:
      - PCV-445A
      - PCV-444B

   b. Verify the following are shut:
      - PCV-145, Letdown Pressure Control Valve
      - HCV-186, Seal Injection Flow Control Valve
      - FCV-122, Charging Flow Control Valve

   c. Verify low pressure letdown in service per OP-111, Residual Heat Removal System.

   d. Start a Charging Pump per OP-107, Chemical and Volume Control System.

Failure Positions for Major Instrument Air Controlled Valves

Chemical Volume Control System

1CS-38	Ltdn Pressure (PK-145.1)	Fail Open
1CS-98	BTRS Bypass	Fail Open
1CS-231	Charging Flow (FK-122.1)	Fail Open
1CS-243	RCP Seal Wtr Inj Flow (HC-186.1)	Fail Open
1CS-283	Boric Acid to Boric Acid Blender (FCV-113A)	Fail Open
1CS-480	Alternate Charging Line	Fail Open
1CS-492	Normal Charging Line	Fail Open
1CS-1	Letdown Isolation LCV-459	Fail Shut
1CS-2	Letdown Isolation LCV-460	Fail Shut
1CS-7	45 gpm Letdown Orifice A	Fail Shut
1CS-8	60 gpm Letdown Orifice B	Fail Shut
1CS-9	60 gpm Letdown Orifice C	Fail Shut
1CS-11	Letdown Isolation	Fail Shut
1CS-151	RMW to Boric Acid Blender FCV-114B	Fail Shut
1CS-155	Make Up to VCT FCV-114A	Fail Shut
1CS-156	Make Up to CSIP Suction FCV-113B	Fail Shut
1CS-460	Excess Letdown Isolation	Fail Shut
1CS-461	Excess Letdown Isolation	Fail Shut
1CS-487	Pressurizer Aux Spray	Fail Shut
1CS-50	Letdown to VCT/Demin TCV-143	Fail to VCT
1CS-120	Letdown to VCT/Hold Up Tank LCV-115A	Fail to VCT

Chill Water System

1CH-115	Chilled Water to NESSR Fan Clrs Isol	Fail Shut
1CH-116	Chilled Water to NESSR Fan Clrs Isol	Fail Shut
1CH-125	Chilled Water from NESSR Fan Clrs Isol	Fail Shut
1CH-126	Chilled Water from NESSR Fan Clrs Isol	Fail Shut
1CH-148	Chilled Water to NESSR Fan Clrs Isol	Fail Shut
1CH-149	Chilled Water to NESSR Fan Clrs Isol	Fail Shut
1CH-196	Chilled Water from NESSR Fan Clrs Isol	Fail Shut
1CH-197	Chilled Water from NESSR Fan Clrs Isol	Fail Shut

Component Cooling Water System

1CC-114	CCW To Sample Heat Exchanger SA	Fail Shut
1CC-115	CCW To Sample Heat Exchanger SB	Fail Shut

Question: 84

RCS temperature is 220 °F.

Which of the following sets of conditions is the **MINIMUM** required to meet the Technical Specification requirements for DC Electrical Sources?

	125 VDC BATTERIES		**BATTERY CHARGERS**			
	1A-SA	**1B-SB**	**1A-SA**	**1B-SA**	**1A-SB**	**1B-SB**
a.	Operable	Operable	Operable	Operable	Operable	Operable
b.	Operable	Operable	Operable	**NOT** Operable	**NOT** Operable	Operable
c.	Operable	**NOT** Operable	Operable	Operable	**NOT** Operable	**NOT** Operable
d.	**NOT** Operable	Operable	**NOT** Operable	Operable	Operable	Operable

Answer:

b.	Operable	Operable	Operable	**NOT** Operable	**NOT** Operable	Operable

QUESTION NUMBER: 84
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/1

K/A: 0632.1.11

Knowledge of less than one hour technical specification action statements for systems (DC Electrical Distribution).

K/A IMPORTANCE: ***RO*** 3.0 ***SRO*** 3.8

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: DCP-R1

Given the name of a component in the DC Power System, STATE whether or not that component is Technical Specification related

REFERENCES: TS 3.8.2

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number DC 011

JUSTIFICATION:

a. Plausible since this would meet the operability requirements, but this is more than the minimum since only one battery charger in each train is required.

b. **CORRECT** The battery in each train and at least one of the two battery chargers in each train must be operable.

c. Plausible since this would meet the operability requirements in Mode 5, but two trains are required operable in Mode 4.

d. Plausible since this would meet the operability requirements in Mode 5, but two trains are required operable in Mode 4.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of plant conditions to determine technical specification requirements

REFERENCES SUPPLIED:

ELECTRICAL POWER SYSTEMS

3/4.8.2 D.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.2.1 As a minimum, the following D.C. electrical sources shall be OPERABLE:

a. 125-volt Emergency Battery Bank 1A-SA and either full capacity charger, 1A-SA or 1B-SA, and,

b. 125-volt Emergency Battery Bank 1B-SB and either full capacity charger, 1A-SB or 1B-SB.

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

ACTION:

With one of the required D.C. electrical sources inoperable, restore the inoperable D.C. electrical source to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.2.1 Each 125-volt Emergency Battery and charger shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that:

   1. The parameters in Table 4.8-2 meet the Category A limits, and

   2. The total battery terminal voltage is greater than or equal to 129 volts on float charge.

b. At least once per 92 days and within 7 days after a battery discharge with battery terminal voltage below 110 volts, or battery overcharge with battery terminal voltage above 150 volts, by verifying that:

   1. The parameters in Table 4.8-2 meet the Category B limits,

   2. There is no visible corrosion at either terminals or connectors, or the connection resistance of these items is less than 150×10^{-6} ohm, and

   3. The average electrolyte temperature of 10 connected cells is above 70° F.

Question: 85

Given the following conditions:

- A liquid waste discharge from a Treated Laundry and Hot Shower (TL&HS) Tank is in progress.
- REM-1WL-3540, Treated Laundry and Hot Shower Tank Pump Discharge Monitor, goes into high alarm.

Which of the following terminates the discharge?

a. The running TL&HS Tank Pump will automatically trip.

b. An operator must take manual action to shut the TL&HS Tank Pump Discharge Isolation Valve.

c. The running TL&HS Tank Pump Recirc Valve will automatically open.

d. The TL&HS Tank Pump Discharge Isolation Valve will automatically close.

Answer:

d. The TL&HS Tank Pump Discharge Isolation Valve will automatically close.

QUESTION NUMBER: 85

TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 068A3.02

Ability to monitor automatic operation of the Liquid Radwaste System, including: Automatic Isolation

K/A IMPORTANCE: ***RO*** 3.6 ***SRO*** 3.6

10CFR55 CONTENT: ***55.41(b) RO*** 7/13 ***55.43(b) SRO***

OBJECTIVE: LWPS-LP-3.0-7

DESCRIBE the automatic protection features associated with discharges to the environment from the LWPS

REFERENCES: AOP-005

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number 98RO-12

JUSTIFICATION:

a. Plausible since the pump will stop the discharge, but there is no auto trip due to high rad.

b. Plausible since manual isolation will stop the discharge, but an auto isolation will not require operator action.

c. Plausible since placing the tank in recirc will stop discharge, but only because of the isolation valve, as the recirc valve does not have an auto function.

d. **CORRECT** On a high rad level as sensed by REM 3540, the discharge isolation valve will automatically close, terminating any release in progress.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of system design and operation

REFERENCES SUPPLIED:

2.0 AUTOMATIC ACTIONS (continued)

7. High alarm on any of the following Control Room monitors initiates Control Room Isolation:
   - RM-1CZ-3504A-SA, Control Room Normal OAI
   - RM-1CZ-3504B-SB, Control Room Normal OAI
   - RM-1CZ-3505A1-SA, Control Room Emergency OAI
   - RM-1CZ-3505A2-SA, Control Room Emergency OAI
   - RM-1CZ-3505B1-SB, Control Room Emergency OAI
   - RM-1CZ-3505B2-SB, Control Room Emergency OAI
8. High alarm on RM-1TS-3653C, TSC OAI monitor, initiates the following:
   - Places the TSC in the emergency recirculation mode
   - Directs 10% makeup air from the OAI through the HEPA filter bank
9. High alarm on the EOF OAI monitor initiates the following:
   - Places the EOF in the emergency recirculation mode
   - Directs air from the OAI through the HEPA filter bank
10. High alarm on any of the following Auxiliary Steam Condensate monitors isolates the Auxiliary Steam Condensate System:
    - REM-21AC-3525, Aux Steam Condensate Tank
    - REM-21AC-3543A, WPB Aux Stm Condensate
    - REM-21AC-3543B, WPB Aux Stm Condensate
11. High alarm on REM-1MD-3528, Turbine Building Drains monitor, initiates the following:
    - Shuts 1MD-285, TB Indus Waste to Yard Oil Separator valve
    - Trips Condensate Pump Area Sump Pumps and Industrial Waste Sump Pumps unless 1SWT-420, TB Indus Waste to WS Treatment Isol Vlv, is open.
12. High alarm on REM-1MD-3530, Tank Area Drain Transfer Pump monitor, trips the Tank Area Drain Transfer Pump if the pump is aligned to the Storm Drain System
13. High alarm on REM-1WL-3540, Treated Laundry and Hot Shower Tank Pump Discharge monitor, shuts 3LHS-296, Treated LHS Tk Disch Isol valve
14. High alarm on REM-21WL-3541, WST Tank Discharge monitor, shuts 3FD-421, FD Wst Mon Tks Disch Isol valve

A liquid waste discharge from a Waste Monitor Tank is in progress when a high radiation condition is detected in the discharge stream.

Which of the following terminates the discharge on a high radiation condition?

A. The running Waste Monitor Tank pump will automatically trip.

B. An operator must take manual action to shut the discharge isolation valve.

C. The running Waste Monitor Tank Pump recirc valve will automatically open.

D. The discharge isolation valve will automatically close.

Answer:

D The discharge isolation valve will automatically close.

Question: 86

The unit is in Mode 3 with the reactor trip breakers closed.

If 125 VDC Bus 1A-SA deenergizes due to a fault on the bus ...

a. Train SA reactor trip breaker will open due to an undervoltage (UV) trip.

b. Train SA reactor trip breaker will open due to a shunt trip.

c. an undervoltage (UV) trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

d. a shunt trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

Answer:

d. a shunt trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

QUESTION NUMBER: 86
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 001K2.02

Knowledge of bus power supplies to the One-line diagram of power supply to trip breakers

K/A IMPORTANCE: ***RO*** 3.6 ***SRO*** 3.7

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: RPS-3.0-R3

Using SD-103, Figure 7.8, DESCRIBE the effect of an automatic trip signal and a manual trip signal on each of the following components: a. Trip breaker UV coil; b. Trip breaker shunt coil

REFERENCES: SD-103

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98RO-94

JUSTIFICATION:

a. Plausible since a loss of power to the UV coil will cause a trip, but UV coil power is supplied by 48 VDC via RPS.

b. Plausible since power will be lost to the shunt trip coil, but the shunt trip is energized to actuate.

c. Plausible since power is supplied to the UV coil normally, but the UV trip is deenergized to actuate.

d. **CORRECT** 125 VDC bus 1A-SA supplies the shunt trip coil for Train 'A' trip breaker. UV coils and shunt trip relays supplied 48 VDC from SSPS. Shunt trip coil is normally deenergized and without power, a shunt trip of Train 'A' trip breaker is not possible.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operation

REFERENCES SUPPLIED:

The logic inputs are applied to the universal logic circuits and multiplexing gates inside the logic bay. The integrated circuits use MC 660 series Motorola High Threshold Logic which provides positive NAND functions. The circuits require an excitation voltage of 15 volts DC. The wide logic swing of 15 volts provides noise immunity in the electronically noisy plant environment. For more discussion on the logic cards see the SSPS Technical Manual listed in the Reference Section of this S.D.

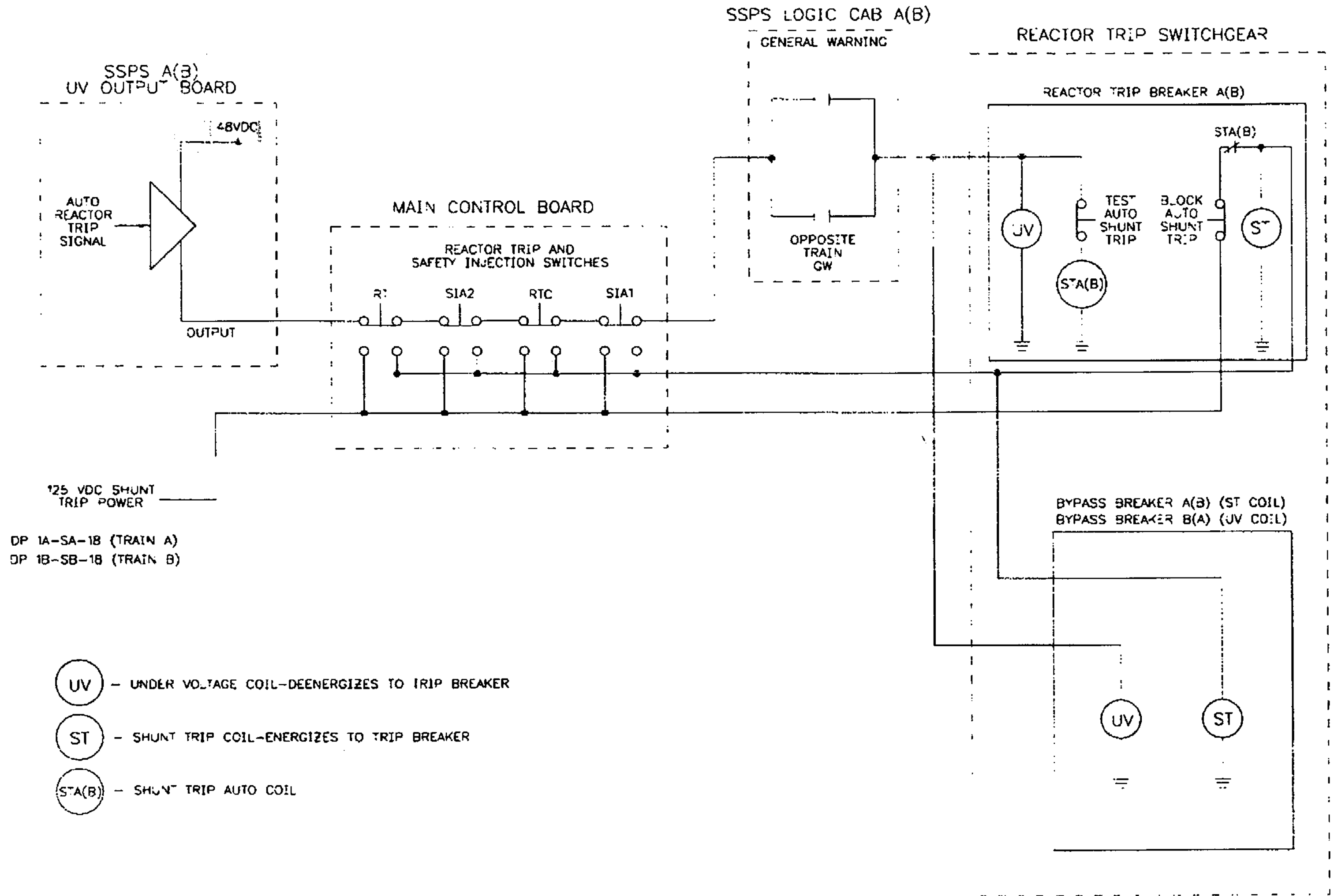
Outputs of the universal logic circuits are connected to other logic circuits, the Under Voltage (UV) Output Circuit or Safeguards Output Circuits.

If certain plant conditions require a Reactor Trip, the UV Output Printed Circuit Board will interrupt current to the UV Reactor Trip and Bypass Breaker Trip coils, tripping the Reactor Trip Breakers, thereby removing Control Rod Drive Mechanism power.

Each of the Reactor Trip Breakers is capable of being tripped by an undervoltage coil and a shunt trip coil. The undervoltage coil is maintained/energized by the UV Output Card output which passes through the manual trip switches and the SSPS General Warning contacts (and the STA relay for Main Reactor Trip Breakers). De-energizing the UV coil releases a trip lever that strikes the breaker trip bar to open the breaker. The shunt trip coil is energized from the REACTOR TRIP and SAFETY INJECTION switches (for the Main Reactor Trip Breakers only, the shunt trip coil is also energized by an auxiliary relay (STA) whose contacts are maintained open by the same 48 VDC that supplies the UV Coil). Energizing the shunt trip coil operates a lever that also strikes the breaker trip bar to open the breaker. Reference Figure 7.32.

To allow on-line testing of the trip breakers, a bypass breaker can be closed in parallel with each reactor trip breaker. When a bypass breaker is racked in and closed, the General Warning alarm is generated for the main trip breaker that is bypassed. The train A SSPS de-energizes the train A reactor trip breaker (RTA) and train B bypass breaker (BYB) undervoltage coils. The train B SSPS de-energizes the train B reactor trip breaker (RTB) and train A bypass breaker (BYA) undervoltage coils.

When a reactor trip breaker is bypassed, the protective train associated with that breaker is considered to be inoperative. The bypass breakers are interlocked such that if an attempt is made to close a second bypass breaker while one breaker is already closed, all Reactor Trip and bypass breakers will trip open by means of the Train A & B General Warning Interlock. This prevents both trains from being bypassed simultaneously. Additional information on the Rod Control System is located in SD-104.



SD 103
REACTOR TRIP CIRCUIT TRAIN A (B)
FIGURE 7.32

Question: 87

Given the following conditions:

- The plant experiences a reactor trip and SI from 100% power.
- **ONLY** one train of SI has actuated.
- Four Containment Fan Cooler fans are running in fast on one train.
- Two Containment Fan Cooler fans are running in slow on the other train.

Which of the following is the Containment Fan Cooler fan alignment following operator action in response to this situation?

a. Four fans running in slow

b. Four fans running in fast

c. Eight fans running in fast

d. Eight fans running in slow

Answer:

a. Four fans running in slow

QUESTION NUMBER: 87
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 022A3.01

Ability to monitor automatic operation of the CCS, including: Initiation of safeguards mode of operation

K/A IMPORTANCE: ***RO*** 4.1 ***SRO*** 4.3

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: CCS-R2

PREDICT the response(s) of the Containment Cooling Subsystems to the following signals.
a. SI

REFERENCES: EOP Guide-1
SD-169

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.1 041

JUSTIFICATION:

a. **CORRECT** The automatic response of the system is to provide only one fan running in slow per air handling unit.

b. Plausible since only 4 fans are to be running, but should be running in slow speed.

c. Plausible since one train has 4 fans running in fast and a train has failed to actuate, but the correct train actuation contains the 2 fans running in slow speed.

d. Plausible since one train has 4 fans running and a train has failed to actuate, but the correct train actuation contains the 2 fans running in slow speed.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Integration of system knowledge and procedural requirements

REFERENCES SUPPLIED:

4.1.3 Emergency Operations (continued)

In the event of a LOCA, the fan coolers receive an automatic start signal through ESS Load Block 2. One fan per unit will start on low speed. Time delay relays maintain the start signal and allow the fans to coastdown during the shift from high to low speeds. The failure to start on Safety Injection alarm is also temporarily blocked. See Table 6.4 for the time delay relays. With a low speed start and a LOCA, the post accident discharge nozzle dampers open. The post-accident discharge duct is provided with high velocity nozzles to diffuse air to a minimum distance of 40 feet. These nozzles are directed to selected areas of heat release, to achieve thorough mixing of containment atmosphere. The dampers will fail to the safe position even if there is a system malfunction due to the fact that instrument air is isolated on containment isolation. The starting fan is determined by the lead fan selector switch. If any lead fan fails to start, its alternate fan may be started after receiving the ESS manual load permissive (Load Block 9). If one safety train of coolers is lost due to failure of a service water train or a diesel generator, the system will operate at 50% capacity. The remaining fans in the operating train should not be started.

In the event the Control Room must be evacuated, the system can be controlled from the ACP. AH-2 and AH-3 coolers will operate both manually and automatically as described for normal and emergency operation as long as ARP-4A is operable. These two coolers will become inoperable if ARP-4 is inoperable. AH-1 and AH-4 controls bypass ARP-4B on a transfer to ACP control. Each fan can be manually started in high speed to continue normal operation. Additionally, on a LOSP, the "A" fan in each cooler will be automatically started in high speed by ESS Load Block 2, and the "B" fan can be manually started following an ESS manual load permissive. Following a LOCA, the "A" fan in each cooler can be started manually in low speed or the "B" fan can be started following an ESS manual load permissive. As previously stated, only one fan per cooler should be operated during a LOCA. Post-accident discharge nozzle dampers remain closed on a transfer to the ACP, unless instrument air is lost or the transfer panel fuse is pulled.

4.2 Containment Fan Coil Units (AH-37A,B; AH-38A,B; AH-3A,B; AH-39A,B)

The prerequisites for operation of the Containment Fan Coil Units are:

1. The Normal Service Water System is in operation.

2. The Instrument Air System is in operation.

3. Electrical power is available.

Control of the Containment Fan Coil Units is maintained by six control switches, three alarms, and twelve damper status lights. All controls, displays, and alarms for this system are on the MCB. See Figure 7.7 for panel layout.

Instructions	Response Not Obtained
15. Verify AFW Pumps Running:	
a. Verify both MDAFW pumps - RUNNING	
b. <u>IF</u> necessary to control SG level, <u>THEN</u> verify TDAFW pump - RUNNING	
16. Check Main Steam Isolation:	
a. Main steam isolation - ACTUATED	a. Check main steam isolation actuation criteria by observing any of the following: o Steam line pressure - LESS THAN 601 PSIG o CNMT pressure - GREATER THAN 3.0 PSIG o Manual closure of all MSIVs AND bypass valves is desired. GO TO Step 16c.
b. GO TO Step 16d.	
c. Main steam isolation - REQUIRED	c. GO TO Step 17.
d. Verify main steam isolation - ACTUATED (Refer to OMM-004, "POST TRIP/SAFEGUARDS REVIEW", Attachment 8.)	
17. Verify Both EDGs - RUNNING	
18. Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED	

4.1.2 Normal Operation - Containment Average Temperature Above 118°F

During this mode of operation, both Train A and Train B are in operation. Therefore, both service water trains must be in operation. The two fan cooler units located at Elevation 286'. (AH-3 and AH-4) will operate with both fans of each unit running at full speed. Each of the two vertical concrete air shafts is served by one of these two fan coolers. The other two fan cooler units located at Elevation 236'. (AH-1 and AH-2) will be manually energized to operate with one fan per unit operating at full speed. If the containment average temperature continues to rise, all fans will be manually energized to operate at full speed and the nozzle dampers will remain closed. The following sequence of operation is important to prevent over-pressurization of the system. Assuming AH-2 and AH-3 are operating normally, start one fan in AH-1, stop one fan in AH-2, and then start both fans in AH-4. When the containment average temperature drops to 118°F or below, the system can be returned to normal by stopping one fan in AH-1, stopping both fans in AH-4, and then by starting both fans in AH-2. If AH-1 and AH-4 were operating normally, the above sequence would be similar, with AH-1 corresponding to AH-2 and AH-4 corresponding to AH-3. The dampers will automatically assume the proper position.

4.1.3 Emergency Operations

During plant emergencies, the Containment Fan Coolers will start automatically and dampers will assume the proper position. The system has two automatic start signals for two types of emergency operation, a Loss of Off-Site Power (LOSP) and a Loss of Coolant Accident (LOCA).

On a LOSP, the fan cooler units receive an automatic start signal through ESS Load Block 2. One fan per unit will start on high speed and discharge to the concrete air shaft. The setting of the lead fan selector switch for each unit will determine which fan, in each unit, will start. If one diesel generator or one service water train fails, the system will be operating at 50 percent capacity. To bring the system to 100 percent capacity, the operator must wait until he gets an ESS manual load permissive (Load Block 9). He can then manually start the remaining two fans in the operating train if the diesel generator can take the load.

Question: 88

Given the following conditions:

- A recovery from an SGTR on the 1B SG is being performed using the backfill method.
- ERFIS in **NOT** available.
- **NO** RCPs are running.
- RCS pressure channels read:
  PI-402 = 600 psig
  PI-403 = 620 psig
  PI-402A = 650 psig
- Thot channels read:
  TI-413 = 420 °F
  TI-423 = 480 °F
  TI-433 = 415 °F
- The five hottest ICCM TCs read:
  490 °F
  486 °F
  459 °F
  430 °F
  425 °F

Which of the following identifies the amount of subcooling present?

a. 8 °F

b. 18 °F

c. 30 °F

d. 40 °F

QUESTION NUMBER: 88
TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: 038EK1.01

Knowledge of the operational implications of the following concepts as they apply to the SGTR: Use of steam tables

K/A IMPORTANCE: ***RO*** 3.1 ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** 8/10 ***55.43(b) SRO***

OBJECTIVE: EOP-3.19

Given a set of conditions during EOP implementation, DETERMINE the correct response or required action based upon the EOP User's Guide general information
a. Determining an RCS subcooling value

REFERENCES: EOP Users Guide
LP-EOP-3.19

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.19 047

JUSTIFICATION:

a. **CORRECT** With PI-402A available it should be used along with the highest incore thermocouple. Using these indications, the amount of subcooling is 8 °F.

b. Plausible since this amount of subcooling would be determined if the lowest pressure and highest Thot were used, but these are the incorrect indications to use.

c. Plausible since this amount of subcooling would be determined if the lowest pressure and highest incore thermocouple were used, but this is the incorrect pressure to use.

d. Plausible since this amount of subcooling would be determined if PI-402A and the average incore thermocouple were used, but this is the incorrect temperature to use.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 4

Application of procedural requirements and use of table - high difficulty due to knowledge requirement and potential for error in application of table

REFERENCES SUPPLIED: Steam Tables

6.0 GENERAL INFORMATION

6.1 Background and Basis for EOP Network

During the verification and validation of the EOP network, and during Operator simulator training, many questions are frequently asked concerning the EOP network. The background and basis for the SHNPP EOP network is found in detail in the background documents of the WOG ERGs and the EOP Step Deviation Documents. The following sections contain clarification of certain procedural requirements that are frequently questioned by the operators.

6.2 RCS Subcooling

The ERFIS plant computer functions as the plant "subcooling monitor". RCS subcooling will normally be obtained from the top level Safety Parameter Display System (SPDS) screen. If for some reason the subcooling monitor is not available, the operators will manually determine subcooling using one of the following (Reference 2.2.2.2):

- o Graph provided on the CSFSTs
- o "Subcooling Margin Calc. Program" - Version 1.0
- o Steam Tables

Subcooling values are generally presented in the following format:

10°F [42°F] - C
20°F [50°F] - M

The top set of values is normally used when the subcooling monitor is available (designated by C). The bottom set of numbers is used only when the subcooling monitor is not available (designated by M for manual). The subcooling values used in the procedure were determined based on specific instrument inaccuracies. Should it be necessary to manually determine subcooling, the following conventions apply:

1. Primary temperature is obtained using one of the following based on availability of the indications (listed in order of preference):

    - o Core exit TC reading on SPDS (ERFIS point TRC9300). This reading is the average of the five hottest core exit TCs and is the input used for the Subcooling Monitor.

    - o Highest core exit TC reading from the Inadequate Core Cooling Monitor (ICCM).

6.2 RCS Subcooling (continued)

- o Highest active loop wide range T-hot (TI-413, 423, 433). An active loop is defined as one that has forced or natural circulation flow. If any RCPs are running, all loops will be active (backflow is available in loops where RCPs are not running). A classic example of a non-active loop would be a loop that has a SGTR since it is isolated and natural circulation flow in this loop would not be available.

2. Primary pressure is obtained using one of the following based on the range and availability of RCS and PRZ pressure indication:

- o If ERFIS is available, then use the RCS pressure reading on SPDS, or ERFIS point PRC9455. If PRZ pressure is above 1700 PSIG, this reading is the average of the three PRZ pressure channels (PT-457, PT-456, and PT-455). If PRZ pressure is below 1700 PSIG, this reading is the average of the two RCS wide range pressure channels (PT-402 and PT-403).

- o If PRZ pressure is greater than 1700 PSIG and CNMT conditions are normal, then use the lowest PRZ pressure indication (PI-457, PI-456, or PI-455.1).

- o If PRZ pressure is off scale low or adverse CNMT conditions exist, then use the lowest of the two RCS wide-range pressure indications PI-402.1 or PI-403. Only PT-402 and PT-403 are used since these transmitters are located outside containment.

- o When RCS pressure is less than 700 PSIG, PI-402A should be used. PI-402A receives input from qualified instrument PT-402 and its narrow range scale provides a more precise indication of pressure.

6.3 Resetting SI, Phase A, Phase B, and FW Isolation

In most events, these signals will be reset in PATH-1 after actuation of safeguards equipment has been verified. However, if the operator performs a manual actuation at some other time during the recovery, the operator may reset these signals whenever it is appropriate or required to operate equipment. For example, if the procedure directs the user to obtain SG activity samples and the sample valves are shut, the operator may reset SI and open the valves, prior to being directed to. There are no explicit requirements that must be met prior to resetting SI; however, some RAB ventilation will realign when SI is reset and the ventilation portion of SI verification attachment of OMM-004 should be completed or verified using the plant computer prior to resetting SI.

(b) For primary pressure indication use

1) RCS pressure on SPDS

a) Above 1700 psig this is the average of the three PRZ pressure channels (PI-455.1, 456, and 457).

b) Below 1700 pisg the the average of the the two wide range pressure channels.

2) IF ERFIS is <u>not</u> available and PRZ pressure is > 1770 psig with normal CNMT conditions, use the lowest PZR pressure indication from PI-457, 456, 455.1

3) If ERFIS is <u>not</u> available and pressure is < 1700 psig (off scale low) or adverse conditions exist use, the lowest RCS wide-range pressure (PI-402 or 403)

(c) When RCS pressure less than 700 psig, PI-402A should be used in <u>all</u> cases

3. Reset SI

a. The operator may reset SI whenever he feels it appropriate or required to operate equipment

(1) There are no explicit requirements that must be met prior to resetting SI

b. Some RAB ventilation will realign - applicable portion of OMM-004 should be completed or verified using the plant computer prior to SI reset

4. Any time the sequencer is activated

a. The SLBs should be monitored for proper loading

(1) Provides immediate attention to major equipment not checked in the EOPs (i.e., E-6 fans, WC-2 chiller)

b. The operator should allow the sequencer to complete all load blocks prior to attempting to start any large electrical loads

(1) Includes loads that sequencer may have failed to start

Question: 89

Given the following conditions:

- ALB-13-6-2, RPI NON-URGENT ALARM, alarms.
- The General Warning LED for Control Rod H2 is flashing.
- The Data B Failure 1, 2, 3 LEDs are flashing.
- The position LED for Control Rod H2 at Step 48 is LIT.

Which of the following describes the **MINIMUM** and **MAXIMUM** known positions of Control Rod H2?

	MINIMUM POSITION	**MAXIMUM POSITION**
a.	38 Steps	52 Steps
b.	44 Steps	52 Steps
c.	38 Steps	58 Steps
d.	44 Steps	58 Steps

Answer:

a.	38 Steps	52 Steps

QUESTION NUMBER: 89
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/1

K/A: 014A2.02

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

K/A IMPORTANCE: ***RO*** 3.1 ***SRO*** 3.6

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: RODCS-3.1

DESCRIBE how individual rod position is determined and displayed by the Digital Rod Position Indication System, including the following
b. Accuracy of displayed position for any mode of operation and indications of full and half accuracy

REFERENCES:
ALB-013
SD-104
LP-RODCS-3.1

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number RODCS-3.1 016

JUSTIFICATION:

a. **CORRECT** With a Data B failure, the accuracy of DRPI is +4, -10.

b. Plausible since the the maximum position is correct, but the lower end of indication should be -10 instead of -4.

c. Plausible since the the minimum position is correct, but the upper end of indication should be +4 instead of +10.

d. Plausible since this would be the accuracy if a Data A failure had occurred, but failure is a Data B failure.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 4

Application of given conditions to system knowledge - high difficulty due to requirement for recall of system knowledge

REFERENCES SUPPLIED:

4.2.2 Central Control Unit and Control Board Display (continued)

The rods are arranged in banks on the control bank display with labels to identify rods by core location. The central control unit adds the rod position from Data Cabinet A to the position from Data Cabinet B to obtain the full accuracy rod position. The DRPIS displays rod position with an accuracy of ±4 steps (±2.5 inches) when both A and B data are used (with the exception of rod movement in the middle region of the shutdown detector).

If a failure eliminates the data from one of two coil sets of a control rod position detector, the system indicates that rod's position with half accuracy. The failed data is blocked by the central control unit, while the data from the other data cabinet is displayed along with a general warning alarm. At half accuracy, every other LED illuminates (i.e., every twelve steps) on the display as the rod is moved. The system accuracy decreases to +10, -4 steps with data A failure, or -10, +4 steps for a data B failure. If a failure occurs in both A and B data, the system alerts the operator with a rod bottom light, a general warning light, an "Urgent Failure" alarm, and a "Rod Deviation" alarm.

4.2.3 Digital Rod Position Indication System Alarms

Table 6.6 lists the DRPI System alarms and causes.

4.2.4 Limiting Conditions for Operations

Technical Specification 3.1.3.2 states that while operating in Modes 1 and 2, the DRPI system and the Demand Position Indication system shall be operable and capable of determining the shutdown and control rod positions within ±12 steps.

Technical Specification 3.1.3.3 states that while operating in Modes 3, 4, and 5 with the reactor trip breakers closed, that one DRPI shall be operable and capable of determining the rod position within ±12 steps for each shutdown or control rod not fully inserted.

ALARM

RPI NON-URGENT ALARM

AUTOMATIC ACTIONS

None Applicable

CAUSE

1. A or B data failure.
2. Central Control or Rod Deviation card removed.
3. Rod Deviation Cards differ in output.
4. Maintenance or testing in progress.
5. Alarm circuit malfunction.

OBSERVATIONS

1. DRPI Panel LEDs illuminated as follows:
   a. Data A failure 1,2,3 (Flashing).
   b. Data B failure 1,2,3 (Flashing).
   c. General warning for affected rod(s) (Flashing).

ACTIONS

1. If authorized maintenance or testing is not in progress, refer to AOP-001, Malfunction of Reactor Control System.
2. Refer to Technical Specifications 3.1.3.2 and 3.1.3.3.
3. Prepare a WR/JO if necessary.

DEVICE/SETPOINTS

1. RPI System Circuitry/Malfunction

POSSIBLE PLANT EFFECTS

1. Half accuracy operation of rod indication.
2. Restricted operation.
3. Plant shutdown.
4. LCO

(2) If any equipment has failed to auto start, a manual start should be attempted when the component status is checked in Path-1

(a) This includes cases, where the sequencer itself fails to function

(3) Prevents potentially overloading diesel generator and results in more reliable electrical power distribution

5. Stable pressure/temperature

a. Both RCS and SG pressure or temperature are checked frequently for STABLE or INCREASING conditions

(1) This does not necessarily imply constant

(2) The variable may be decreasing slowly due to an operator-controlled cooldown and still be considered stable

(3) If the operator can basically control the rate and magnitude of temperature or pressure change, the temperature or pressure should be considered "stable"

6. SI realignment

a. The attachment to EPP-008 is provided as a guide to the operator to aid in realigning plant systems after an SI

(1) This attachment assumes the SI was spurious

(2) The operator must evaluate recommended realignment based on actual plant conditions and reference appropriate system operating procedure for any applicable precautions and limitations

(3) The reactor trip breakers are not closed in EPP-008 but rather in FP-004 or GP-007.

(a) Until the Rx trip breakers are closed, automatic SI actuation (T.S. 3.3.2) is inoperable (note in EPP-008)

b. Systems may become inoperable during implementation of the EOPs.

(1) The status of Technical Specifications components and systems must be evaluated when exiting the EOPs.

(3) *Power is distributed through two line fuses and radio frequency interference filters to*

(a) *Low-voltage DC power supply assembly*

(b) *Step-down transformer T-1*

1) *Transforms 120-V AC, 60 Hz to 6-V AC 60 Hz for coil excitation*

2) *Mounted at the base of the cabinet*

d. *Beneath the power supply assembly is a panel containing power supply fuses and test points for +15- V DC, -15- V DC, and ground*

e. *The printed circuit cards for each cabinet are contained in a 5-tier card rack*

(1) *The left most card in the top rack is the data I/O card*

(2) *The remaining occupied card slots contain detector/encoder cards, one for every rod position detector*

f. Detector/encoder cards

(1) Two detector/encoder cards for each rod position detector (Data A and Data B)

(2) With 52 control rods, there are 52 detector/encoder cards in each data cabinet

(3) Each card provides the following functions

(a) Receives input from associated rod position detector

1) 21 coil lines and common for control banks

2) 10 coil lines and common for shutdown banks

3) 6-volt sample line

(b) Determines highest coil penetrated

1) Difference detectors determine voltage difference between adjacent coils

a) Operational amplifier with gain of 5 connected as a difference amplifier

b) Penetrated coil—1.15-V AC

RODCS-3.1 016

The general warning LED is lit for control Rod H2 and the position LEDs at Steps 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144, 156, 168, 180, 186, 192, 204, and 216 are lit. To what accuracy can Rod H2 position be determined?

A. H2 position indication is inoperable

B. ± 6 steps

C. ± 12 steps

✓D. +10, -4 steps

Question: 90

Which of the following describes the effect a Containment Phase A isolation will have on RCP seal leakoff?

a. No. 1 seal leakoff will discharge to the PRT via a relief valve

b. No. 1 seal leakoff will discharge to the RCDT via a relief valve

c. All No. 1 seal leakoff will be directed through the No. 2 seal and then to the PRT

d. All No. 1 seal leakoff will be directed through the No. 2 seal and then to the RCDT

Answer:

a. No. 1 seal leakoff will discharge to the PRT via a relief valve

QUESTION NUMBER: 90
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 003K6.04

Knowledge of the effect of a loss or malfunction on the following will have on the RCPS: Containment isolation valves affecting RCP operation

K/A IMPORTANCE: ***RO*** 2.8 ***SRO*** 3.1

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: CVCS-A8

DESCRIBE how the following conditions affect CVCS components
c. Containment Phase A isolation (T) signal

REFERENCES: OMM-004
SD-107

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number CVCS-R8 003

JUSTIFICATION:

a. **CORRECT** A Phase A signal causes the seal return isolation to close and a relief valve will lift to direct seal leakoff to the PRT.

b. Plausible since the seal return isolation closes, but relief valve directs leakoff to PRT instead of RCDT.

c. Plausible since a portion of #1 seal leakoff goes to #2 seal, but #1 seal leakoff will still be available though directed to the PRT through a relief.

d. Plausible since a portion of #1 seal leakoff goes to #2 seal, but #1 seal leakoff will still be available though directed to the PRT through a relief.

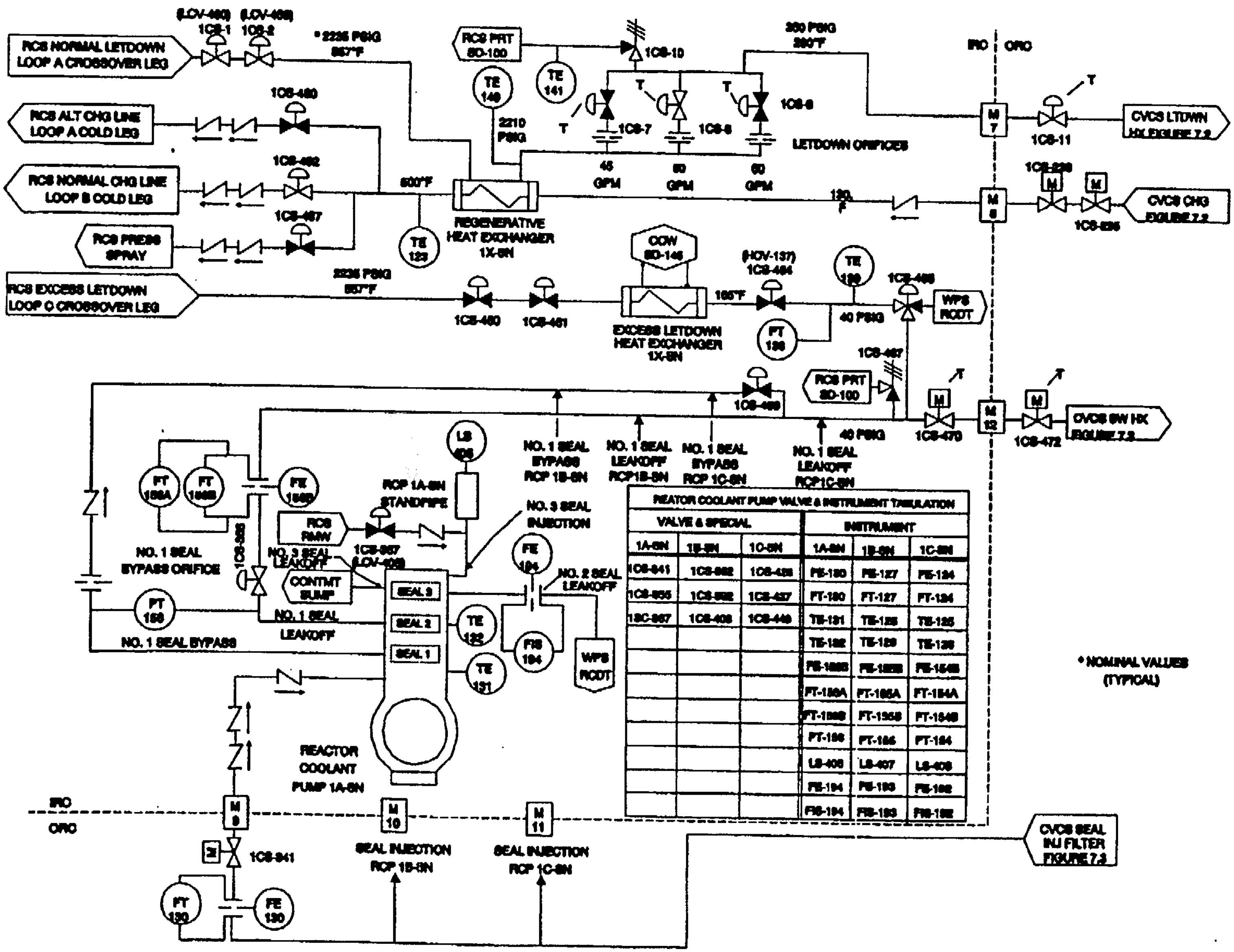
DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operation

REFERENCES SUPPLIED:

Containment Isolation Phase A Verification

TRAIN - A Components		REQ POS	POS CK	TRAIN - B Components		REQ POS	POS CK
MLB 1A-SA				MLB 1B-SB			
4-1	N2 TO PRT ISOL SHUT 1RC-141	LIT		4-1	N2 TO PRT ISOL SHUT 1RC-144	LIT	
4-2	RCP SEAL RTN SHUT 1CS-470	LIT		4-2	RCP SEAL RTN SHUT 1CS-472	LIT	
4-3	RCDT SHUT 1ED-121	LIT		4-3	RCDT PMP ISOL SHUT 1ED-125	LIT	
4-4	RCDT VENT ISOL SHUT 1ED-164	LIT		4-4	RCDT VENT ISOL SHUT 1ED-161	LIT	
5-4	CNMT SUMP VALVE SHUT 1ED-94	LIT		5-4	CNMT SUMP VALVE SHUT 1ED-95	LIT	
8-4	ACCUM SMPL SHUT 1SP-85	LIT		8-4	ACCUMS SHUT 1SP-78/81/84	LIT	
9-4	LOOP 2/3 SMPL SHUT 1SP-949	LIT		9-4	LOOP 2/3 SMPL SHUT 1SP-948	LIT	
10-4	PZR STM/LIQ SHUT 1SP-60/41	LIT		10-4	PZR STM/LIQ SHUT 1SP-59/40	LIT	
MLB 2A-SA				MLB 2B-SB			
				2-4	LTDN ISOL VLV SHUT 1CS-11	LIT	
4-3	CSS VLV SHUT 1CT-47	LIT		4-3	CSS VLV SHUT 1CT-95	LIT	
				4-4	TO RCDT & HX SHUT 1CC-176	LIT	
				5-4	FROM RCDT & HX SHUT 1CC-202	LIT	



REATOR COOLANT PUMP VALVE & INSTRUMENT TABULATION					
VALVE & SPECIAL			INSTRUMENT		
1A-SN	1B-SN	1C-SN	1A-SN	1B-SN	1C-SN
1CS-841	[illegible]	[illegible]	FE-130	FE-127	FE-124
1CS-855	[illegible]	1CS-427	FT-130	FT-127	FT-124
1SC-867	1CS-408	1CS-449	TE-131	[illegible]	[illegible]
			TE-132	[illegible]	[illegible]
			[illegible]	[illegible]	FE-154B
			FT-156A	FT-155A	FT-154A
			FT-156B	FT-155B	FT-154B
			PT-156	FT-155	FT-154
			LS-406	LS-407	LS-408
			FE-194	FE-193	FE-192
			FIS-194	FIS-193	FIS-192

Figure 7.1

Question: 91

During the performance of PATH-1, the crew must determine if "RCS temperature is stable at or trending to 557 °F."

Which of the following describes the temperature to be used when RCPs are running AND when RCPs are off?

	RCPs ON	**RCPs OFF**
a.	T-avg	Cold Leg Temps
b.	T-avg	Hot Leg Temps
c.	Incore TCs	Cold Leg Temps
d.	Incore TCs	Hot Leg Temps

Answer:

a.	T-avg	Cold Leg Temps

QUESTION NUMBER: 91

TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: 007EA1.03

Ability to operate and monitor the following as they apply to a reactor trip: RCS pressure and temperature

K/A IMPORTANCE: ***RO*** 4.2 ***SRO*** 4.1

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: EOP-3.1

DEMONSTRATE the below-assumed operator knowledge from the SHNPP Step Deviation Documents and WOG ERGs that support performance of EOP actions
e. Temperatures to use for RCS trends

REFERENCES: EOP Guide-1
LP-EOP-3.1

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.1 047

JUSTIFICATION:

a. **CORRECT** With RCPs operating T-avg is the temperature used and with RCPs off T-cold is the temperature used.

b. Plausible since T-avg is used with RCPs running, but T-cold is used with RCPs off.

c. Plausible since T-cold is used with RCPs off and incore TCs indicate the highest temperature with RCPs on, but T-avg is used with RCPs on.

d. Plausible since incore TCs indicate the highest temperature with RCPs on, but T-avg is used with RCPs on and T-cold with RCPs off.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural requirements

REFERENCES SUPPLIED:

2) T_{hot} following faulted SG isolation to limit repressurization

(6) PRZ PORV tailpipe response

(a) Leaking PORV will cause tailpipe temperature to increase to T_{sat} for the PRT (until rupture disk relieves)

(b) Note that temperatures will always follow conditions in CNMT

(7) Parameters to use for diagnostics

(a) Differentiate between LOCA, MSLB, and SGTR

(b) All cause similar effects on RCS

(c) Radiation levels are one key difference

(8) Meaning of abnormal radiation for SGTR

(a) Refer to User's Guide

(b) Based upon previous established levels (including leaks)

(c) N-16 effects will cause level decrease

(d) May be considered abnormal from upward trend (before or after trip)

(9) Causes of abnormal PRT conditions

(a) Several possible sources

1) PRZ PORV or safety

2) CVCS letdown or seal return

3) Reactor vessel head vent

c. Selected EOP step basis

(1) Immediate action steps

(a) Verify proper alignment and condition of ESF systems

(b) Reactor trip—heat addition

(c) Turbine trip—prevent uncontrolled cooldown

(d) Power supplies—ESF operability

(e) Safety injection—ESF operation

Instructions	Response Not Obtained

NOTE: IF no RCPs running, THEN wide range cold leg temperature should be used to monitor RCS temperature.

34. Monitor RCS Temperature:

Instructions	Response Not Obtained
a. Temperature - STABLE AT OR TRENDING TO 557°F	a. GO TO Step 34c.
b. GO TO Step 35.	
c. Temperature - LESS THAN 557°F AND DECREASING	c. Transfer steam dump to steam pressure mode. (Refer to OP-126, "MAIN STEAM, EXTRACTION STEAM AND STEAM DUMP SYSTEM", Section 5.3.) GO TO Step 35.
d. Stop dumping steam.	
e. Any SG level - GREATER THAN 10% [40%]	e. Maintain feed flow greater than 222.5 KPPH until level greater than 10% [40%] in at least one intact SG. GO TO Step 34g.
f. Control feed flow to limit cooldown.	
g. Temperature - STABLE OR INCREASING	g. IF cooldown continues AND is NOT due to safety injection, THEN shut MSIVs AND bypass valves.

(2) Other transitions depend on event

(a) FRP-S.1—ATWS

(b) EPP-001—Complete loss of AC power

(c) EPP-004—Reactor trip without SI

(d) FRP-H.1—Loss of heat sink

(e) Entry Point C—Loss of primary or secondary coolant

(f) EPP-014—Faulted SG

(g) PATH-2—SGTR

(h) EPP-008—Inadvertent SI or small break LOCA

(i) EPP-013—LOCA outside CNMT

(3) If no transition is made, repeat diagnostics

3. Procedure overview

a. Review the procedure discussing operator-required knowledge and basis for steps

b. Required operator knowledge to implement EOPs

(1) Verification of reactor/turbine trip

- Refer to PATH-1 guide

(2) Conditions requiring SI actuations

(a) AOP-16 actions

(b) Automatic setpoints

(3) RCP trip criteria

(a) Foldout A applies until PATH-1 is exited

(b) Actions must be taken as soon as criteria is recognized

(4) Valves to verify for FWIS/MSLIS

- Refer to OMM-004

(5) Temperatures to use for RCS trends

(a) RCPS on—T_{avg}

(b) Without RCPs

1) T_{cold} while controlling cooldown

Question: 92

Given the following conditions:

- A reactor trip occurred due to a loss of offsite power.
- The plant is being cooled down on RHR per EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS.
- RVLIS upper range indicates greater than 100%.
- Three CRDM fans have been running during the entire cooldown.
- RCS cold leg temperatures are 190 °F.
- Steam generator pressures are 50 psig.

Steam should be dumped from all SGs to ensure ...

a. boron concentration is equalized throughout the RCS prior to taking a sample to verify cold shutdown boron conditions.

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

c. RCS and SG temperatures are equalized prior to any subsequent RCP restart.

d. RCS temperatures do **NOT** increase during the required 29-hour vessel soak period.

Answer:

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

QUESTION NUMBER: 92

TIER/GROUP: ***RO*** 1/2 ***SRO*** 1/2

K/A: WE09EK2.2

Knowledge of the interrelations between the (Natural Circulation Operations) and the facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and the proper operation of these systems.

K/A IMPORTANCE: ***RO*** 3.6 ***SRO*** 3.9

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: EOP-3.8-2

DEMONSTRATE the below-assumed operator knowledge from the SHNPP Step Deviation Document and the WOG ERGs that support performance of EOP actions: Determining that upper head and SG U-tube temperatures are below 200 °F

REFERENCES: EPP-005
LP-EOP-3.8

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98RO-53

JUSTIFICATION:

a. Plausible since this action would have been performed in this procedure, but must be completed prior to depressurizing the RCS below 1900 psig.

b. **CORRECT** SG pressure above 0 psig indicates that the SGs are above 200 °F. Depressurizing the RCS under this condition will result in additional void formation in the SG u-tubes.

c. Plausible since RCP operation throughout NC Cooldown is desirable, but will not be performed at this point in the procedure.

d. Plausible since a soak period is addressed, but only if continued operation of CRDM fans had not been maintained.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of plant conditions using tables to determine if procedural requirements are met

REFERENCES SUPPLIED: Steam Tables

Instructions	Response Not Obtained

NOTE: If CRDM fans could NOT be run during the RHR cooldown, approximately 29 HOURS are required for the head to cool to a temperature at which RCS depressurization will NOT cause voiding. (With two CRDM fans running, extra time for head cooling should NOT be required.)

Instructions	Response Not Obtained
32. Depressurize RCS:	
a. Check entire RCS - LESS THAN 200°F	a. RETURN TO Step 30.
b. Consult plant operations staff concerning the following: o Appropriate procedure actions for RCS depressurization o Long term plant status	

- END -

f. Continue cooldown

(1) Prior to 200°F

(a) Open breaker for standby reactor makeup water pump

(b) Place clearance on standby reactor makeup water pump

(c) Reset high flux at SD alarm per GP-007

(2) Do not depressurize RCS before entire RCS is less than 200°F to prevent void formation in RCS

(a) Head

(b) SG U-tubes

(3) Cool down inactive portion of RCS

(a) Upper head still has very little flow—use at least two CRDM fans

(b) Dump steam from all SGs to cool U-tubes

(4) If CRDM fans not running and upper head is water solid, will take 29 hours for head to cool below 200°F

(5) If two CRDM fans running, no extra time should be required

Objective 2e

(6) Check entire RCS less than 200°F

(a) Head should be same as RCS with two CRDM fans running

(b) Without CRDM fans requires previous length of waiting

(c) SG U-tubes should be equal to RCS if SGs are no longer steaming

(7) Consult plant staff for RCS depressurization

4. Flow path review

a. Entry conditions

(1) From EOP network when event is mitigated and natural circulation verified

(a) EPP-002

(b) EPP-004

Question: 93

Given the following conditions:

- A Loss of Off-Site Power has occurred.
- ALB-17-5-5, CONDENSATE STORAGE TANK LOW MINIMUM LEVEL, alarms (65%).

Which of the following describes the significance of this alarm?

a. CST level is nearing the level where it will be inadequate to maintain the required suction pressure to the TDAFW pump

b. Manual swap to the backup source Emergency Service Water System should be initiated

c. Normal Condenser Makeup System must be manually isolated to prevent drain down of the CST

d. CST level is nearing the level where it will be inadequate to maintain hot standby for 12 hours

Answer:

d. CST level is nearing the level where it will be inadequate to maintain hot standby for 12 hours

QUESTION NUMBER: 93
TIER/GROUP: ***RO*** 2/1 ***SRO*** 2/1

K/A: 061A1.04

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: AFW source tank level

K/A IMPORTANCE: ***RO*** 3.9 ***SRO*** 3.9

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: AFS-R1

IDENTIFY the system parameter sensed by each of the following sensors and DESCRIBE the indications, alarms, and/or automatic actions associated with each developed signal
f. CST level

REFERENCES: ALB-017
TS Basis 3.7.1.3

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AFS-R1 005

JUSTIFICATION:

a. Plausible since the low-low suction pressure condition will trip the TDAFW pump, but this value is below the given alarm.

b. Plausible since this will be required if a low-low suction pressure condition trips the TDAFW pump, but this value is below the given alarm.

c. Plausible since the design of the CST is to ensure that water is available to the AFW pumps, but the level at which the condenser makeup is located is above this alarm.

d. **CORRECT** The CST must be above the low minimum level to ensure adequate supply of water to the TDAFW pump during a loss of offsite power to allow maintaining hot standby for 12 hours.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of system and procedural requirements

REFERENCES SUPPLIED:

ALARM

CONDENSATE STORAGE TANK LOW MINIMUM LEVEL

AUTO ACTIONS

None

CAUSES

1. Aux. Feedwater System in operation

2. Malfunction of automatic level control system

3. Demineralized water make-up isolated or out of service

4. Instrument or alarm circuit malfunction

5. Leak in system

OBSERVATIONS

1. LI-9010A1 SA and LI-9010B1 SB, TANK LEVEL (CST)

2. Aux. Feedwater pumps control switch light indications

3. ALB-017- 6-5, CONDENSATE STORAGE TANK HI-HI/LO-LO LEVEL alarm (Level less than 70%)

4. AFW flow chart recorder, FR-AF-2050

ACTIONS

1. Dispatch an operator to:

   a. Verify that the CST level control make-up system is operable. Manually operate the level control valve as necessary as per OP-134, Condensate System.

   b. Verify condensate transfer pump has tripped, if in operation.

   c. R Walk down system to ensure there are no leaks. Check sumps for increasing levels. Check CST enclosure (Reference 5).

   d. Ensure demineralized water system is in operation.

2. Refer to Tech. Specs.

3. Prepare a WR/JO if necessary.

AUXILIARY FEEDWATER SYSTEM

operation. The AFW System provides decay heat removal immediately following a station blackout event, and is required to mitigate the Loss of Normal Feedwater and Feedwater Line break accidents analyzed in FSAR Chapter 15. The pump performance requirements are based upon a 4% degradation of the vendor certified performance curves. Pump operation at this level has been demonstrated by calculation to deliver sufficient AFW flow to satisfy the accident analysis acceptance criteria.

With regard to the periodic AFW valve position verification of Surveillance Requirement 4.7.1.2.1 Sub-paragraph a.3, this requirement does not include in its scope the AFW flow control valves inline from the AFW motor-driven pump discharge header to each steam generator when they are equipped with an auto-open feature. The auto-open logic feature is designed to automatically open these valves upon receipt of an Engineered Safety Features System AFW start signal. As a consequence, valves with an auto-open feature do not have a "correct position" which must be verified. The valves may be in any position, in any MODE of operation thereby allowing full use of the AFW System for activities such as to adjust steam generator water levels prior to and during plant start-up, as an alternate feedwater system during hot standby, for cooldown operations, and to establish and maintain wet layup conditions in the steam generators.

3/4.7.1.3 CONDENSATE STORAGE TANK

The OPERABILITY of the condensate storage tank with the minimum water volume ensures that sufficient water is available to maintain the RCS at HOT STANDBY conditions for 12 hours with steam discharge to the atmosphere concurrent with total loss-of-offsite power. The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics, and the value has also been adjusted in a manner similar to that for the RWST and BAT, as discussed on page B 3/4 1-3.

3/4.7.1.4 SPECIFIC ACTIVITY

The limitations on Secondary Coolant System specific activity ensure that the resultant offsite radiation dose will be limited to a small fraction of 10 CFR Part 100 dose guideline values in the event of a steam line rupture. This dose also includes the effects of a coincident 1 gpm reactor-to-secondary tube leak in the steam generator of the affected steam line. These values are consistent with the assumptions used in the safety analyses.

3/4.7.1.5 MAIN STEAM LINE ISOLATION VALVES

The OPERABILITY of the main steam line isolation valves ensures that no more than one steam generator will blow down in the event of a steam line rupture. This restriction is required to: (1) minimize the positive reactivity effects of the Reactor Coolant System cooldown associated with the blowdown, and (2) limit the pressure rise within containment in the event the steam line rupture occurs within containment. The OPERABILITY of the main steam isolation valves within the closure times of the Surveillance Requirements are consistent with the assumptions used in the safety analyses.

3/4.7.2 STEAM GENERATOR PRESSURE/TEMPERATURE LIMITATION

The limitation on steam generator pressure and temperature ensures that the pressure-induced stresses in the steam generators do not exceed the maximum allowable fracture toughness stress limits. The limitations of 70°F and 200 psig are based on a steam generator RT_{NDT} of 60°F and are sufficient to prevent brittle fracture.

Question: 94

Given the following conditions:

- RCS temperature is 300 °F.
- The Low Temperature Overpressure Protection system (LTOP) is armed.
- PT-441, RCS Wide Range Pressure, has failed low.

Which of the following describes the effect on LTOP?

a. **ONLY** PRZ PORV PCV-445A is available for LTOP

b. Both PRZ PORVs are available for LTOP

c. Neither PRZ PORV is available for LTOP

d. **ONLY** PRZ PORV PCV-444B is available for LTOP

Answer:

a. **ONLY** PRZ PORV PCV-445A is available for LTOP

QUESTION NUMBER: 94
TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 010K6.01

Knowledge of the effect of a loss or malfunction of the Pressure detection systems

K/A IMPORTANCE: ***RO*** 2.7 ***SRO*** 3.1

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: PZRPC-3.0-9

Provided a figure of the LTOPS control logic, DESCRIBE the operation of the Low Temperature Over Pressure (LTOP) Protection System

REFERENCES: SD-100.03

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. **CORRECT** PT-441 is the pressure input for PORV 444B. With no pressure input, 444B will not function to relieve a high pressure.

b. Plausible since a single failure does not typically disable a protective feature, but PT-441 failing will disable 444B.

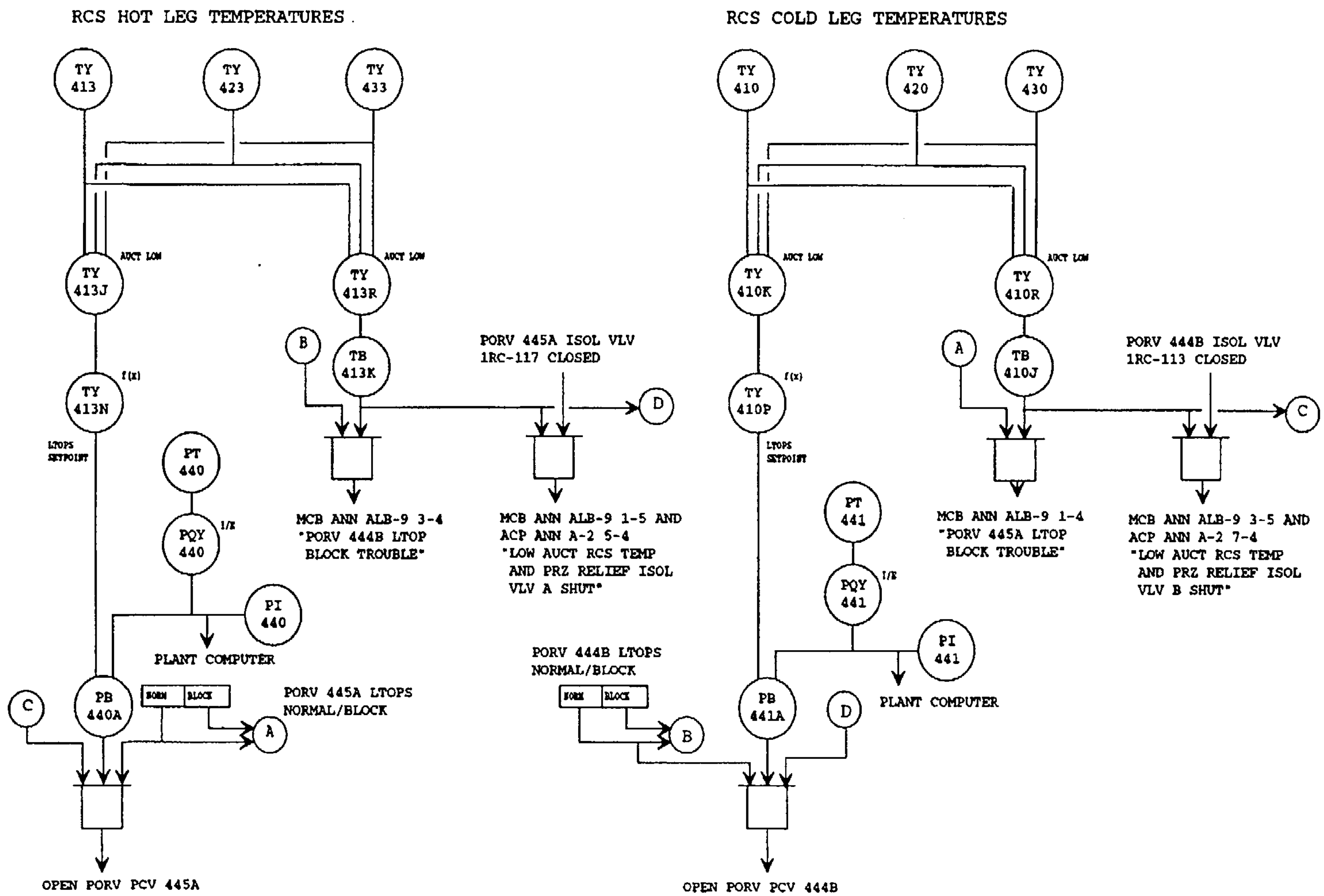
c. Plausible since a single failure does not typically disable a protective feature, but PT-441 failing will disable 444B.

d. Plausible since a failure of PT-440 would result in this condition, but PT-441 has failed.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 2

Application of given conditions to drawing to determine outcome

REFERENCES SUPPLIED: SD-100.03, Figure 7.16



Low Temperature Over Pressure Protection Control Logic

Figure 7.16
Sheet 1 of 1

Question: 95

Given the following conditions:

- Reactor power is at 70%.
- Rod Control is in AUTO.
- Bank 'D' control rods are at 195 steps.
- Loop 1 Tavg is 576 °F.
- Loop 2 Tavg is 574 °F.
- Loop 3 Tavg is 572 °F.

Which of the following failures will cause control rods to step out?

a. Loop 1 Thot fails high

b. Loop 3 Thot fails low

c. Loop 2 Tcold fails high

d. Loop 2 Tcold fails low

Answer:

d. Loop 2 Tcold fails low

QUESTION NUMBER: 95

TIER/GROUP: ***RO*** 2/2 ***SRO*** 2/2

K/A: 016K3.01

Knowledge of the effect that a loss or malfunction of the NNIS will have on the following: RCS

K/A IMPORTANCE: ***RO*** 3.4 ***SRO*** 3.6

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: RODCS-3.0

PREDICT rod behavior in automatic rod control by describing the role of each of the following in the development of the rod speed and direction signals
a. Loop Tavg channels

REFERENCES: SD-104
LP-RODCS-3.0

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number RODCS-3.0 033

JUSTIFICATION:

a. Plausible since this would cause average Tavg to increase, but rod control uses median Tavg not average Tavg.

b. Plausible since this would cause average Tavg to decrease, but rod control uses median Tavg not average Tavg.

c. Plausible since this would change the median Tavg used, but loop 1 Tavg being the new median Tavg would cause rods to step inward.

d. **CORRECT** Rod control uses median Tavg as an input. With loop 2 Tcold failing low, the median Tavg will now be loop 3 which is 2 °F below the previous Tavg, so rods will step out.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of component failure to determine effect on plant response

REFERENCES SUPPLIED:

4.1.4.2 Automatic Rod Control (continued)

The Tavg channel (Tavg-Tref) functions to provide fine control during steady state operations. When power is essentially constant, the power mismatch channel provides no input. Under this condition the summing unit just compares Tref to Tavg and generates a corresponding error signal. If this error signal exceeds the prescribed dead band (±1.5°F) rod motion will be initiated.

The Median Tavg Selector normally receives an input from each loop Tavg. The selected median loop Tavg signal is then supplied to the automatic rod control program as well as to other control systems. A Tavg loop can be selected out from PIC cabinet #8 by installing a jumper. Failure of a single loop, either high or low, will have no affect on the median Tavg.

Turbine load and nuclear power also provide inputs to this channel. This provides for a fast response to a change in load (by means of the turbine load feed-forward signal) as well as control stability (by means of the nuclear power feedback signal in cases where the moderator coefficient is zero or slightly negative). Turbine load and nuclear power are compared in a rate comparator (impulse-lag unit) with the resultant deviation modified in accordance with the rate of change of the deviation. The impulse-lag unit is designed to speed up system response to a power mismatch. Since the Tavg channel provides fine control during steady-state operation, the power mismatch channel should not produce a steady-state error signal. This is provided for by the derivative action in the impulse-lag unit, which causes the output of this unit to go to zero during steady-state operation although the nuclear power and turbine load signals may not match exactly.

A non-linear gain unit, placed at the output of the impulse-lag unit, converts the power mismatch signal to a temperature error in addition to varying the effect of this channel, with larger load changes having a larger effect.

The low and high gains are 0.3°F and 1.5°F per percent of power mismatch, respectively. The low gain is used when the percent of power mismatch is one (1) percent or less. The high gain is used above one (1) percent. Increasing the gain for high mismatches further increases the initial output of the channel thereby initiating rod motion more quickly.

Since reactivity changes at low power levels have a smaller effect on thermal power levels than reactivity changes at high power levels, a variable-gain unit is provided at the output of the non-linear gain unit. This variable gain unit imposes a high gain on the power mismatch error signal at low power levels; an intermediate gain at intermediate power levels; and a low gain at high power levels. This variable gain enables the mismatch channel to provide adequate control at low power levels, as well as stable operation at high power levels.

The gains employed in the variable gain unit are 2.0 from 0-50%, inversely proportional to turbine power from 50-100%, and 1.0 at 100%. A first stage turbine pressure signal provides turbine power level information to govern the switching of gains.

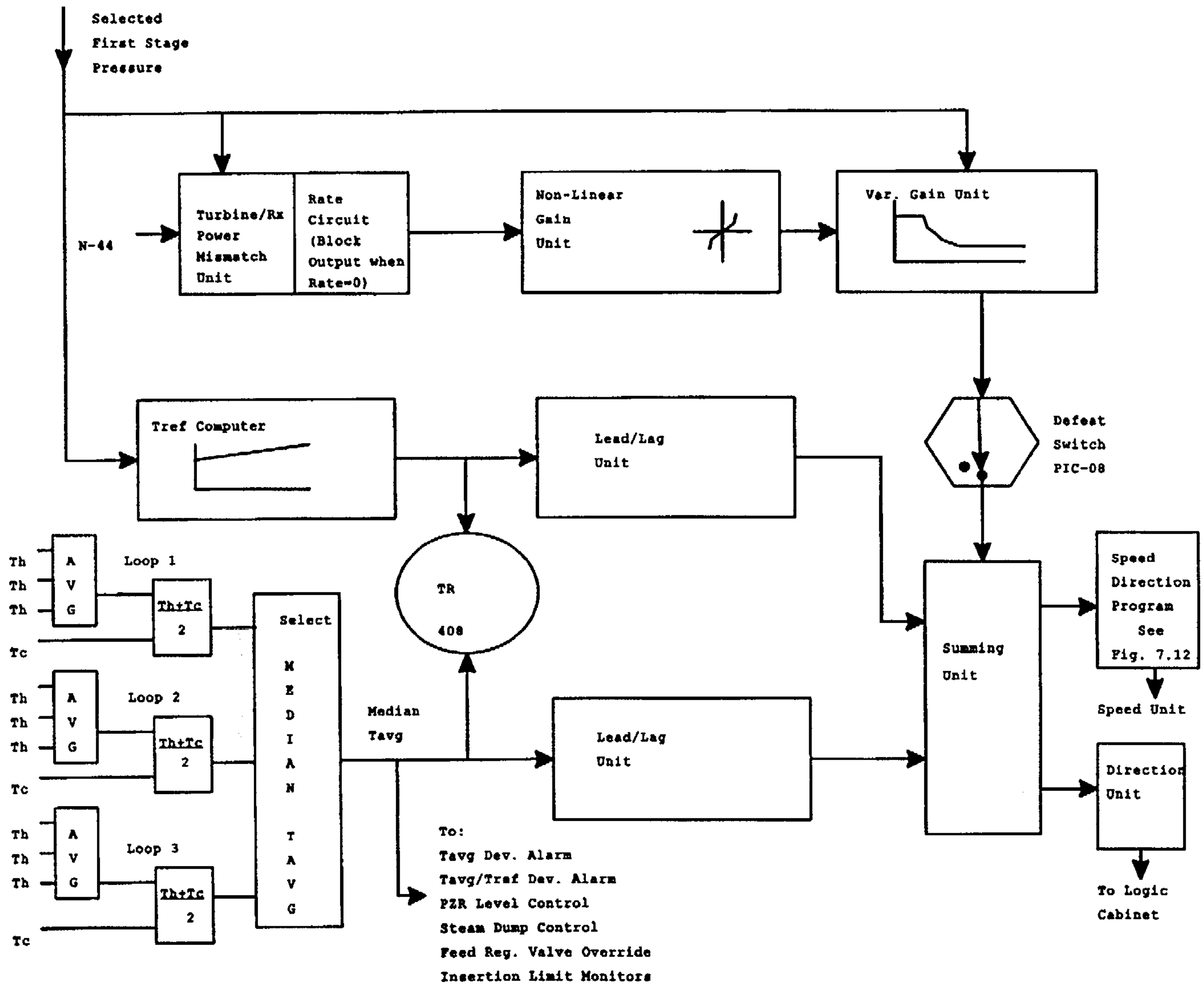


Figure 7.11
Automatic Rod Control Block Diagram

b) Loop B—578°F

c) Loop C—576°F

2) Loop C is median value and will be used for control

(2) Main turbine first-stage pressure input

(a) Used to develop T-ref

1) First-stage (impulse) pressure preferred indication of secondary load

2) PT-446 or PT-447 may be selected with a switch on the MCB

3) Pressure signal is converted to a reference temperature (T-ref) signal

4) The automatic control system will attempt to adjust control banks to maintain actual T-avg near T-ref

5) T-ref increases as turbine load increases

a) Reduces decrease in steam pressure

b) Reduces change in cold leg temperature which affects Nuclear Instrumentation (NI) readings

(b) First-stage pressure also supplies secondary load signal to power mismatch circuit

(3) Reactor power input

(a) Supplied only by NI-44

(b) Supplies reactor power signal to power mismatch circuit

d. Error signal development

(1) Temperature mismatch circuit

(a) Feedback control circuit that compares median-select T-avg with signal-conditioned T-ref

(b) Generates error signal based on magnitude of deviation

(2) Power rate mismatch circuit

(a) One of few feed-forward control processes in the plant

(b) Compares rate of change of the difference between turbine power and reactor power to anticipate a developing temperature mismatch

(c) Error signal is summed with the T-avg—T-ref error signal for improved plant stability

(3) Temperature mismatch and power rate mismatch error signals are combined (summed) to produce a total error signal that is used to determine rod speed and direction

e. Temperature mismatch circuits

(1) Median-select T-avg

(a) $(T_c + T_h)/2$ from each loop

(b) Median-select temperature sent to summer

(c) Filtered by lead/lag module which prevents oscillations

(d) Further response conditioned

(2) T-ref

(a) Input—turbine impulse pressure (selectable from PT-446 or PT-447)

(b) T-ref calculator—generates temperature signal proportional to turbine power

(c) T-ref signal sent to summer through lead-lag circuits

(d) T-ref is high and low limited

1) lo limit=557

2) hi limit=580.8

(3) Signal summator—Compares lagged T-ref and median-selected, lagged T-avg

(4) Indications

(a) Recorder TR-408

1) T-avg

RODCS-3.0 033
What indication of RCS temperature is used by the automatic Rod Control System?

A. Lowest T_{hot}

B. Highest T_{avg}

✓C. Median T_{avg}

D. Average T_{avg}

SUPPLIED REFERENCE MATERIALS FOR SHNPP NRC SENIOR REACTOR OPERATOR EXAMINATION

REFERENCE NUMBER	REFERENCE TITLE
AOP-001, Attachment 2	Affected And Symmetric Thermocouple Locations
AOP-037, Attachment 3	Affected ALB Determination
AOP-018, Attachment 1	Reactor Coolant Pump Trip Limits
AOP-018, Attachment 2	Specific Symptoms of Seal Malfunctions
AP-617, Attachment 1	Immediate Notification Requirements
EPP-012, Table 1	Containment Spray Requirements
FRP-H.1, Attachment 1	Guidance On Restoration of Feed Flow
FRP-I.3, Attachment 1	Instructions for Determining Venting Time
FRP-I.3, Figure 2	Hydrogen Flow Rate Versus RCS Pressure
OP-125, Attachment 8	Pressure Factor Determination
OP-141, Attachment 5	Cooling Tower Cold Weather Operation
PLP-114, Figure 1	Minimum Decay Time Vs. CCW Temperature
SD-100.03, Figure 7.16	Low Temperature Over Pressure Protection Control Logic
Technical Specification 3.8.1.1	AC Sources, Operating
Curve F-10-1	Rod Insertion Limits
Curve F-10-2	Axial Flux Difference Limits as a Function of Rated Thermal Power
Curve H-X-15	P/S Leak Rate Using Monitor
NA	Steam Tables

Affected And Symmetric Thermocouple Locations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A								T							
B					T	R		R		R T					
C							R	T	R		R	T			
D			T	R	T	R				R		R			
E			R	T	R		T	T		T	R	T		T	
F		R	T	R	T	R		R	T	R	T	R	T	R	
G	T	T	R			T	R	T	R				R		T
H		R	T		T	R		T	T	R	T		T	R	T
J		T	R				R		R	T		T	R		
K		R	T	R	T	R		R T		R	T	R		R	
L					R	T		T			R	T	R	T	
M			T	R		R			T	R	T	R			
N				T	R	T	R	T	R	T					
P						R	T	R T		R					
R							T								

R - Control Rod

T - Thermocouple

Affected Thermocouples

Affected And Symmetric Thermocouple Locations

NOTE: B10 E07 K08 P08 H08 have no symmetric locations

GRID	I		II		III		IV	
TRAIN	A	B	A	B	A	B	A	B
	A08				H15			
		G01		G15			R07	
S L	B05			E14		L14		
Y O		C08	H13				N08	H03
M C		D03	C12				N04	M03
M A	E04	D05		E12	M11	L12		
E T			H11	E08		L08		H05
T I		F05	F11	E10	K11		K05	L06
R O		F03	F13			N10	N06	K03
I N	G06		F09			J10		
C S		G08			H09			
	G02						J02	P07
					M09	J12		

1. Determine thermocouple location(s) adjacent to the misaligned rod using the core grid map (Sheet 1), and circle the locations(s) in the Table above. These are the affected thermocouple(s).

2. Record values for all <u>operable</u> affected and symmetric thermocouples using the RVLIS Console. Symmetric thermocouples are those in the same row.

   Affected TC #1 ______ Symmetric TC(s) ____________________

   Affected TC #2 ______ Symmetric TC(s) ____________________

   Affected TC #3 ______ Symmetric TC(s) ____________________

   Affected TC #4 ______ Symmetric TC(s) ____________________

3. Determine the average of symmetric thermocouples above, for each affected thermocouple.

Affected ALB Determination

POWER SUPPLIES	NUMBER OF AFFECTED WINDOWS	AFFECTED ALBs
System 1		
125 VDC 1A and 1C	306	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
System 2		
125 VDC 2A#1 and 2D#3	240	13, 14 (49 of 52), 15 (2 of 22), 16, 17, 19, 20 (37 of 39), 21 (24 of 37), 22 (15 of 48), 24 (2 of 10), 25 (2 of 10), 26 (1 of 14)
125 VDC 2C#1 and 2D#1	160	14 (3 of 52), 15 (20 of 22), 18 (10 of 24), 22 (30 of 48), 23 (8 of 97), 26 (13 of 14), 27, 28, 29, 30 (17 of 31), 24 (8 of 10), 25 (8 of 10)
125 VDC 2E#1 and 2D#2	135	18 (14 of 24), 20 (2 of 39), 21 (13 of 37), 22 (3 of 48), 23 (89 of 97), 30 (14 of 31)
System 1		
24 VDC or 12 VDC 1A#1	97	1, 2, 3, 4
24 VDC or 12 VDC 1A#2	108	5, 6, 7, 8
24 VDC or 12 VDC 1C#1	101	9, 10, 11, 12
System 2		
24 VDC or 12 VDC 2A#1	145	13, 14, 15, 20
24 VDC or 12 VDC 2A#2	84	17, 21, 30
24 VDC or 12 VDC 2C#1	121	23, 25, 26
24 VDC or 12 VDC 2C#2	91	22, 27, 28, 29
24 VDC or 12 VDC 2E#1	94	16, 18, 19, 24

NOTE:

- When ( ) follow the ALB number, the first number indicates the affected windows, and the second number indicates the total number of windows for that ALB.
- Total number of annunciators is 841 in Modes 1-4 and 592 in Modes 5-6.
- A given ALB has 3 power supplies. For multiple power supply failures, care must be taken to not count an ALB twice.

Affected ALB Determination

General Description of Systems Associated with ALBs:

ALB-1	Containment Spray & Accumulator System
ALB-2	Emergency Service Normal Service Water System
ALB-3	Misc. Systems
ALB-4	RHR/RWST System
ALB-5	Component Cooling Water System
ALB-6	Chemical Volume Control System
ALB-7	Chemical Volume Control System
ALB-8	RCP System
ALB-9	Pressurizer System
ALB-10	Reactor Coolant System
ALB-11	Reactor First Out System
ALB-12	Reactor First Out System
ALB-13	Nuclear Instrumentation System and Rod Control System
ALB-14	Steam Generator System
ALB-15	Various Protective Panels Trouble Alarm
ALB-16	Feedwater System
ALB-17	Auxiliary Feedwater System
ALB-18	Turbine First Out System
ALB-19	Heater Drain Pump & Condensate System
ALB-20	MSR & Turbine System
ALB-21	LP/HP Heaters & Circulating Water System
ALB-22	Generator Exciter, Startup & Unit Transformer
ALB-24	Diesel Generator - A System
ALB-25	Diesel Generator - B System
ALB-26	Control Panels Trouble Alarm System
ALB-27	HVAC System (DG & Containment)
ALB-28	HVAC System (Containment)
ALB-29	HVAC System (Containment)
ALB-30	HVAC System (Control Room)

Reactor Coolant Pump Trip Limits

NOTE: False indications such as step changes or spikes on both the upper and lower thrust bearings are signs that the instrumentation transient may not be valid.

Validation of the temperatures should be performed by observing positive indications of any of the following:

- Simultaneous temperature increases in upper and lower thrust bearing and upper guide bearing (may indicate loss of CCW cooling or oil viscosity problems common to the upper reservoir).
- Vibration levels increasing along with increasing bearing temperatures.
- High or Low RCP oil level alarms along with increasing bearing temperatures.

R 1. **Any of the following Motor Bearing temperatures exceeding 190°F** (Ref: FSAR Section 5.4.1):

	ERFIS Points		
	RCP A	RCP B	RCP C
Mtr Upper Thrust Brg Temp	TRC0417A	TRC0427A	TRC0437A
Mtr Lower Thrust Brg Temp	TRC0417B	TRC0427B	TRC0437B
Mtr Upper Radial Brg Temp	TRC0418A	TRC0428A	TRC0438A
Mtr Lower Radial Brg Temp	TRC0419	TRC0429	TRC0439

R 2. **Any of the following Pump temperatures exceeding 230°F** (Ref: FSAR Section 5.4.1):

	ERFIS Points		
	RCP A	RCP B	RCP C
Pump Radial Brg Temp	TRC0131	TRC0128	TRC0125
Seal Water Inlet Temp	TRC0132	TRC0129	TRC0126

3. **RCP Stator Winding temperature exceeding 300°F**:

	ERFIS Points		
	RCP A	RCP B	RCP C
Mtr Stator Windg Temp	TRC0418B	TRC0428B	TRC0438B

Reactor Coolant Pump Trip Limits (Cont.)

NOTE: ALB-5-1-2B, RCP THERM BAR HDR LOW FLOW, indicates loss of CCW to all RCP thermal barriers

4. **Loss of RCP seal injection when:**

   a. CCW flow is lost to associated RCP Thermal Barrier HX.

   b. RCS temperature is greater than or equal to 400°F AND CCW HX outlet temperature is greater than 105°F.

   c. RCS temperature is less than 400°F AND CCW HX outlet temperature is greater than 120°F.

R 5. **RCP vibration in excess of the following** (Ref: FSAR Section 5.4.1):

- 20 mils shaft
- 15 mils shaft and increasing greater than 1 mil/hr.
- 5 mils frame
- FOR A and C RCPs ONLY: 3 mils frame and increasing greater than 0.2 mil/hr.
- FOR B RCP ONLY: 3.5 mils frame and increasing greater than 0.2 mil/hr.

6. **RCP Motor current fluctuations of 40 amps peak-to-peak:**

	ERFIS Points		
	RCP A	RCP B	RCP C
Motor Current	IRC0160	IRC0161	IRC0162

7. **Loss of CCW to an RCP or RCP Motor when:**

R
- An RCP has operated for 10 minutes without CCW flow to either motor oil cooler (Ref: FSAR Section 9.2.2)
- Isolation of CCW to an RCP is necessary to stop excessive CCW System leakage

Specific Symptoms of Seal Malfunctions

Seal Malfunction	Symptoms
#1 Seal Failed	Any of the following exist for the affected RCP: • Both #1 and #2 seal leakoff high flow alarms in • Total #1 seal flow greater than or equal to 8 gpm (See note 1,3) • Total #1 seal flow greater than 6.5 gpm with either the RCP seal water inlet or radial bearing temperature steadily increasing (See notes 1 and 2) • Total #1 seal flow less than 0.8 gpm with either the RCP seal water inlet or radial bearing temperature steadily increasing (See notes 1 and 2))
#1 Seal Degraded	All the following exist for the affected RCP: • #1 seal leakoff flow greater than 6.5 gpm • Total #1 seal flow less than 8 gpm (See note 1) • RCP seal water inlet temperature stable (See note 2) • RCP radial bearing temperature stable (See note 2)
#1 Seal Blocked	#1 seal leakoff flow less than 0.8 gpm (3) (Assumes normal operating pressure and #2 seal leakoff flow is zero or negligible. At low RCS pressures, seal parameters are given in OP-100, Reactor Coolant System.)
#2 Seal Failed	High #2 seal leakoff flow condition with a corresponding reduction in #1 seal leakoff flow. #3 seal leakoff should remain fairly constant.
#3 Seal Failed	Frequent (more often than every 14 hours) need for filling the standpipe. May also detect an increase in CNMT sump level.

Notes	
1	Total #1 seal flow is defined as the sum of #1 and #2 seal leakoff flows. When calculating total #1 seal flow and #1 seal leakoff flow is greater than 6.5 gpm, #2 seal leakoff flow should be considered negligible until it can be read locally unless #2 high leakoff flow alarm is in, then assume total seal flow is greater than 8 gpm.
2	RCP seal water inlet and RCP radial bearing temperatures are indicative of a #1 seal failure. Normal 100% power values for these temperatures are 140°F to 150°F. An increase in #1 seal leakoff flow will result in an increase in these temperatures but the increase should taper off and stabilize well below 230°F. "Steadily increasing" - An increase at a constant or increasing rate that will result in exceeding 230°F. "Stable" - A slow increase in temperature or an increase in temperature but at a decreasing rate and well below 230°F. Under these conditions, additional time is available to evaluate the trend and contact Engineering. In the absence of additional guidance, if temperature has increased to greater than 190°F and is still increasing, it should be considered "steadily increasing".
3	Validate reading using diverse indications.

IMMEDIATE NOTIFICATION REQUIREMENTS

The following tables are divided into sections based upon the time allowed for reporting the respective events as follows:

- I One Hour Notifications
- II Four Hour Notifications
- III Twenty-four Hour Notifications

NOTE: The events listed in this attachment may be concurrent with conditions that result in a declared emergency. In the case of a declared emergency, the notification made under the Emergency Plan and implementing procedures satisfies the notifications required by this procedure. Written reports will be based on §50.73 and Technical Specifications regardless of whether the initial notification is made under the Emergency Plan or this procedure.

I. ONE HOUR NOTIFICATIONS

I.A. OPERATIONAL EVENTS

1. Technical Specification Deviations or Shutdowns
2. Degraded or Unanalyzed Conditions
3. Natural Phenomena and External Conditions
4. Safety Injection
5. Loss of Emergency Response Capability
6. Threat to Safety of Plant or Personnel by Internal Events
7. Accidental Criticality in Fuel Handling Building

I.B. RADIOLOGICAL EVENTS

1. Radioactive Shipments
2. Loss or Theft of Licensed Material/Radiological Sabotage
3. Exposure to Individuals or Releases

I.C. SECURITY THREAT

1. Adversary Threat
2. Security Program Vulnerabilities
3. International Atomic Energy Agency (IAEA) Representative

I.D. FITNESS FOR DUTY

1. FFD - NRC Employee

IMMEDIATE NOTIFICATION REQUIREMENTS

II. FOUR HOUR NOTIFICATIONS

II.A. OPERATIONAL EVENTS

1. Degraded Conditions Found in the Plant while Shutdown
2. Unplanned Actuation of any ESF
3. Loss of a Safety Function
4. Off-Site Notification Has Been or Will Be Made

II.B. RELEASES/CONTAMINATION

1. Airborne Release
2. Liquid Release
3. Transport of Contaminated Individuals

III. TWENTY-FOUR HOUR NOTIFICATIONS

III.A. EXPOSURE TO INDIVIDUALS OR RELEASES

1. Radiological Exposure/Release
2. Other Releases

III.B. VIOLATION OF OPERATING LICENSE CONDITIONS

III.C. FITNESS FOR DUTY PROGRAM EVENTS

IMMEDIATE NOTIFICATION REQUIREMENTS

I. ONE HOUR NOTIFICATIONS

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
I.A.1	TECHNICAL SPECIFICATION DEVIATIONS OR SHUTDOWNS (See Note 4)		
	Initiation of any nuclear plant shutdown (from Modes 1 or 2) required by Technical Specifications shall be a one hour notification; initiation of any nuclear plant cooldown required by Technical Specifications shall be reported as an LER only. (See Notes 5 & 6)	§50.72(b)(1)(i)(A) §50.36(c)(2)	LER required by §50.73 (a)(2)(i)(A) and (a)(2)(i)(B) (See Note 7)
	Deviation from the plant Technical Specifications authorized pursuant to §50.54(X).	§50.72(b)(1)(i)(B)	LER required by §50.73 (a)(2)(i)(C)
	Any event resulting in violation of Technical Specification Safety Limits defined by Specifications 2.1.1 and 2.1.2, or results in a Reactor Protection System Limiting Safety System Setting less conservative than the Allowable Value of Specification 2.2, Table 2.2-1 for multiple channels of a single trip function. (See Note 9)	§50.36(c)(1)(i)(A) §50.36(c)(1)(ii)(A)	LER required by §50.36 (c)(8) 14-day special report required by T.S. 6.7.1
I.A.2	DEGRADED OR UNANALYZED CONDITIONS (See Note 4)		
	Any event or condition during operation that results in the condition of the plant, including its principal safety barriers, being seriously degraded, or results in the plant being: a) In an unanalyzed condition that significantly compromises safety (See Notes 8 & 9), or b) In a condition that is outside the design basis of the plant, or c) In a condition not covered by the plant's operating and emergency procedures. The unavailability of a principal safety barrier (e.g., loss of containment due to improper use of an airlock) shall be reported regardless of the cause or the duration of the event, even if such reporting is done after the condition is corrected.	§50.72(b)(1)(ii)	LER required by §50.73 (a)(2)(ii)
I.A.3	NATURAL PHENOMENA AND EXTERNAL CONDITIONS (See Note 4)		
	Natural phenomena or other external conditions that pose an actual threat to the safety of the plant or significantly hampers site personnel in the performance of duties necessary to continue to operate in a safe manner (including orderly plant shutdown and maintenance of shutdown conditions).	§50.72(b)(1)(iii)	LER required by §50.73 (a)(2)(iii) Note: If subsequent evaluation indicates that the phenomenon did not pose an actual threat or significantly hamper site personnel, a LER is not required.

IMMEDIATE NOTIFICATION REQUIREMENTS

I. ONE HOUR NOTIFICATIONS (continued)

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
I.A.4	SAFETY INJECTION (See Note 4)		
	Any event that results or should have resulted in Emergency Core Cooling System (ECCS) discharge into the reactor coolant system as a result of a valid signal. (See Note 10)	§50.72(b)(1)(iv)	LER required by §50.73 (a)(2)(iv); a T.S. Special Report may be required, see Attachment 2
	Safety Injection actuation by spurious/invalid signals is covered by II.A.2. Inadvertent accumulator injections are covered by II.A.2.		
I.A.5	LOSS OF EMERGENCY RESPONSE CAPABILITY (See Note 4)		
	Any event that results in a major loss of assessment capability, offsite response capability, or communications capability (e.g., significant portion of Control Room indication, Emergency Notification System, or offsite notification system).	§50.72(b)(1)(v)	None

This includes loss of any of the following:

a) All dedicated FTS-2000 phone links to the NRC, as determined by the Emergency Planning Organization.

b) Offsite siren capability as follows:

   i) Greater than 16 of the 81 sirens (20% of system) reported as out of service, or

   ii) All sirens in a single county out of service (See Note 13).

   The Customer Service Center or on-call ERO SEC or EOM will notify the Control Room of a siren problem by telephone.

c) Selective Signaling System phones from the Control Room, ACP, or EOF to local, county, and state warning points. Reporting is required only if these communication links cannot be compensated for by other readily available off-site communication systems.

d) National Weather Service primary and back-up NOAA Weather Radio transmitters at Fayetteville or primary and back-up NOAA Weather Radio transmitters at Durham. The National Weather Service will contact the Control Room if either of these two conditions exists.

IMMEDIATE NOTIFICATION REQUIREMENTS

I. ONE HOUR NOTIFICATIONS (continued)

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
I.A.6	THREAT TO SAFETY OF PLANT OR PERSONNEL BY INTERNAL EVENTS (See Note 4)		
	Threats to plant/personnel safety shall be declared an emergency in accordance with PEP-110; immediate reporting is not required.	§50.72(b)(1)(vi)	LER required by §50.73 (a)(2)(x)
I.A.7	ACCIDENTAL CRITICALITY IN FUEL HANDLING BUILDING (See Note 4)		
	Accidental criticality of special nuclear material.	§70.52(a)	None
I.B.1	RADIOACTIVE SHIPMENTS (See Note 1)		
	Removable contamination from a received package containing radioactive material in excess of the limits specified in §71.87(i)	§20.1906(d)(1) §71.87(i)	NRC Notification Also Required per §20.1906(d)(1)
	Radiation levels from a received package of radioactive material in excess of the limits specified in §71.47.	§20.1906(d)(2) §71.47	NRC Notification Also Required per §20.1906(d)(2)
I.B.2	LOSS OR THEFT OF LICENSED MATERIAL/ RADIOLOGICAL SABOTAGE (See Note 2)		
	Any loss or theft or attempted theft of:		
	a) Licensed material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in Appendix C to §20.1000-§20.2401 under such circumstances that it appears that an exposure could result to persons in unrestricted areas,	§20.2201(a)(1)(i) §20.2201(d) §70.52(b)	30 Day Written Report also required per §20.2201(b)
	b) Any Special Nuclear Material or spent fuel,	§73.71(a) (loss/theft only) §74.11 §150.16(b)	30 Day Written Report also required per §73.71(a) 15 Day Written Report may also be required per §150
	c) Greater than 10 curies of tritium at any one time or 100 curies in one calendar year, or	§30.55(c)	15 Day Written Report also required
	d) More than 15 pounds of uranium or thorium at any one time or more than 150 pounds in one calendar year.	§40.64(c) §150.17(c)	15 Day Written Report also required
	Recovery of or accounting for loss of any shipment of Special Nuclear Material or spent fuel	§73.71(a)	

IMMEDIATE NOTIFICATION REQUIREMENTS

I. ONE HOUR NOTIFICATIONS (continued)

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
I.B.3	EXPOSURE TO INDIVIDUALS OR RELEASES (See Note 4)		
	Any event involving by-product, source or Special Nuclear Material that may have caused or threatens to cause:		
	a) An individual to receive: 1) A total effective dose equivalent of ≥25 Rem 2) An eye dose equivalent of ≥75 Rem 3) A shallow-dose equivalent to the skin or extremities of ≥250 Rad 4) An intake of 5 ALI in 24 hours	§20.2202(a)(1)	LER required by §50.73(a)(2)(viii), (a)(2)(ix) and §20.2203
	b) Release of radioactive material in excess of Technical Specification Instantaneous Limits shall be declared an emergency in accordance with PEP-110. (See Note 3)	§20.2202(a)(2) §50.72(b)(2)(iv)	LER required by §50.73(a)(2)(viii), (a)(2)(ix) and §20.2203
I.C.1	ADVERSARY (SECURITY) THREAT (See Note 2)		
	When specified by Security based on applicable Security Plan Procedure.	§73.71(b) §73 App. G	30 Day Written Report also Required per §73.71(d)
I.C.2	SECURITY PROGRAM VULNERABILITIES (See Note 2)		
	When specified by Security based on applicable Security Plan Procedure.	§73.71(b) §73 App. G	30 Day Written Report also Required per §73.71(d)
I.C.3	INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA) REPRESENTATIVE (See Note 11)		
	Individual claiming to be an IAEA representative who is not accompanied by an NRC employee and has no prior confirmation of credentials in writing.	§75.7	None
I.D.1	FITNESS FOR DUTY - NRC EMPLOYEE (See Note 12)		
	Notification of NRC employee's unfitness for duty.	§26.27(d)	None

IMMEDIATE NOTIFICATION REQUIREMENTS

I. ONE HOUR NOTIFICATIONS (continued)

NOTES:

1. The involved H.P. Supervisor shall immediately notify the final delivery carrier. Follow-up NRC notification shall be made by Regulatory Affairs per §20.1906(d)(1).

2. Security threats or theft of licensed material shall be reported to site Security personnel. After initial notification or after submission of 30 day report, additional information shall be reported to NRC as it is available and within 30 days of discovering additional information. Per §73.71(a)(5) and §73.71(b)(2), significant supplemental information which becomes available after the initial telephonic notification or after the submission of the written report must be telephonically reported to the NRC Operations Center and also submitted in a revised written report. (Written reports will be submitted on USNRC Form 366 and will be provided a number unique to Safeguards Events. These reports will not be a part of the AEOD tracking program for LERs.)

3. The reporting requirements of PEP-110 shall take precedence over the less restrictive times for reporting requirements of §20.2202 and §50.72(b)(2) for releases.

4. Per §50.72(c), during the course of events reported under §50.72(a) and §50.72(b), also immediately report:
   a) Further degradation in the level of safety or worsening conditions;
   b) Results of assessments/evaluations of plant conditions;
   c) Effectiveness of corrective actions or protective measures taken, and
   d) Information related to plant behavior which is not understood.

5. Per §50.36(c)(2), only a 30 day written notification is required when a Technical Specification LCO and action statements are not met but action other than a plant mode change is required. Such conditions may still require notification under I.A.2, II.A.1 or II.A.3.

6. Per §50.73(a)(2)(i)(B), only a LER is required when it is discovered that the plant had been in a condition prohibited by Technical Specifications, but the condition was undiscovered and does not now exist. Such conditions may still be considered as requiring notification under I.A.2, II.A.1, or II.A.3.

7. LER required only if Specification 3.0.3 is applicable or if plant shutdown/cooldown is completed (the time permitted for a change in mode or other conditions specified in the Technical Specification has elapsed).

8. Reportability under this paragraph for unanalyzed conditions is based on nonconformance to the assumptions and requirements of the FSAR. If the condition is covered by an action statement in Technical Specifications (other than 3.0.3), the condition is not unanalyzed and should not be reported. Conditions which result in Engineered Safety Features actuating at setpoints less conservative than the allowable value of Specification 3.3.2, Table 3.3-4, for multiple channels of a single ESF function, shall be reported under this paragraph.

9. Determination that an RPS or ESF actuation would actuate at setpoints less conservative than the allowable value in Technical Specifications shall be based on actual testing of the actuation circuit or instrumentation (performance of daily calorimetric), except when gross discrepancies are discovered.

10. Valid signals are those signals that are initiated in response to actual plant conditions or parameters satisfying the requirements for ECCS discharge into the RCS, unless it is part of a preplanned test. This includes intentional manual initiation.

11. Notification is to Director, Office of Nuclear Reactor Regulation (per §75.6 and §75.7).

12. Per §26.27(d), the appropriate Regional Administrator must be notified immediately by telephone. During other than normal working hours, the NRC Operations Center must be notified.

IMMEDIATE NOTIFICATION REQUIREMENTS

I. ONE HOUR NOTIFICATIONS (continued)

NOTES:

13. The following Warning Sirens will not operate when power is lost to the identified transformers. The Control Room staff is to use this table to determine reportability.

TRANSFRMR	SIREN	COUNTY
1078K	17	Chatham
1447K	20	Chatham
1598K	1	Chatham
1774K	3	Chatham
A250AF	8	Chatham
BQ63AF	6A	Chatham
C180	11	Chatham
CB36AC	53	Chatham
CC090	16	Chatham
CD97AC	24	Chatham
CR13AF	6	Chatham
CS05AF	7	Chatham
CZ64AF	5	Chatham
D697AC	14	Chatham
EMC	9	Chatham
EMC	12	Chatham
L780AF	Z	Chatham
M556AC	49	Chatham
M580AC	27	Chatham
N218AF	54	Chatham
N279BH	55	Chatham
X392AC	41	Chatham
G918BH	Q	Chatham
X595AC	15	Chatham
Z090AC	44	Chatham
Z278AC	52	Chatham
Z561AC	10	Chatham

TRANSFRMR	SIREN	COUNTY
Z885AC	13	Chatham
J047BH	70	Harnett
J445	U	Harnett
G754	60	Harnett
L424BH	57	Harnett
M049	56	Harnett
M086	59	Harnett
P268	69	Harnett
EMC	42	Lee
EMC	45	Lee
EMC	46	Lee
EMC	48	Lee
EMC	58	Lee
V959AC	39 *	Lee
921	28	Wake
12688	40	Wake
1099K	31	Wake
1187K	26	Wake
1394K	21	Wake
2324K	4	Wake
584K	22	Wake
689K	V	Wake
7162K	D	Wake
8371K	72	Wake
951K	19	Wake
APEX CITY	29	Wake
APEX CITY	30	Wake

TRANSFRMR	SIREN	COUNTY
B185	25	Wake
B872BH	38	Wake
B924BH	A	Wake
K684BH	67A	Wake
X462AC	67	Wake
J681BH	63	Wake
J702BH	66	Wake
L166BH	62	Wake
L869BH	48A	Wake
M408	65	Wake
N909	71	Wake
N991	51	Wake
S087BH	32	Wake
S275BH	C	Wake
S551	34	Wake
S716BH	37	Wake
SOLAR	E01	Wake
SOLAR	E02	Wake
SOLAR	E03	Wake
SOLAR	E04	Wake
SOLAR	E05	Wake
SOLAR	E06	Wake
SOLAR	E07	Wake
SOLAR	E08	Wake
SOLAR	E09	Wake
SOLAR	E10	Wake
U343BH	36	Wake

* Note: If power is lost to Siren 39 and the Electric Membership Corporation cannot be contacted, it should be conservatively assumed that power has been lost to all sirens in Lee County.

IMMEDIATE NOTIFICATION REQUIREMENTS

II. FOUR HOUR NOTIFICATIONS

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
II.A.1	DEGRADED CONDITIONS FOUND IN THE PLANT WHILE SHUTDOWN (See Note 3)		
	Any condition found while the reactor is shutdown, that had it been found while the reactor was in operation, would have resulted in the nuclear power plant including its principal safety barriers being seriously degraded or being in an unanalyzed condition that significantly compromises plant safety. The unavailability of a principal safety barrier shall be reported regardless of the cause or duration of the event.	§50.72(b)(2)(i)	LER required by §50.73(a)(1) and (a)(2)(ii)
II.A.2	UNPLANNED ACTUATION OF ANY ESF (See Notes 1 & 3)		
	Any event or condition that results in manual or automatic actuation of any ESF (Table 3.3-3) including the RPS (Table 2.2-1) except when: a) The actuation results from and is part of a pre-planned sequence during testing or reactor operation; or b) The actuation is invalid and: 1) Occurs while the system is properly removed from service; or 2) Occurs after the safety function has been already completed; or 3) Involves only the following specific ESFs or their equivalent systems: (i) Control Room Emergency Ventilation System; or (ii) Containment Ventilation System; or (iii) Reactor Auxiliary Building Ventilation System; or (iv) Fuel Handling Building Ventilation System Valid ESF actuations are those actuations that result from "valid signals" or from intentional manual initiation, unless it is part of a preplanned test. Valid signals are those signals that are initiated in response to actual plant conditions or parameters satisfying the requirements for ESF initiation. Invalid actuations are by definition those that do not meet the criteria for being valid. Thus, invalid actuations include actuations that are not the result of valid signals and are not intentional manual actuations. Invalid actuations include instances where instrument drift, spurious signals, human error, or other invalid signals caused actuation of the ESF (for example, jarring a cabinet, an error in use of jumpers or lifted leads, an error in actuation of switches or controls, equipment failure, or radio frequency interference).	§50.72(b)(2)(ii) §50.36(c)(1)(ii)(A)	LER required by §50.73(a)(2)(iv) or §50.36(c)(7). A T.S. Special Report may be required, see Attachment 2.

IMMEDIATE NOTIFICATION REQUIREMENTS

II. FOUR HOUR NOTIFICATIONS (continued)

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
II.A.3	LOSS OF A SAFETY FUNCTION (See Notes 2 & 3)		
	Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: a) Shut down the reactor and maintain it in a safe shutdown condition, b) Remove residual heat, c) Control the release of radioactive material, or d) Mitigate the consequences of an accident. These events may include one or more procedural errors, equipment failures, and/or discovery of design, analysis, fabrication, construction, and/or procedural inadequacies. However, individual component failures need not be reported if redundant equipment in the same system was operable and available to perform the required safety function, except as specified in the next paragraph. These events would also include cases where one train is disabled and a second train fails a surveillance test. This category includes events with multiple failures of redundant components and events with a single failure when it is determined that the redundant components may be reasonably expected to fail because of the same failure mechanisms.	§50.72(b)(2)(iii)	LER required by §50.73(a)(2)(v), (a)(2)(vi), (a)(2)(vii)
II.A.4	OFF-SITE NOTIFICATION HAS BEEN OR WILL BE MADE (See Note 3)		
	Any event or situation related to the health and safety of the public or on-site personnel, or protection of the environment, for which a news release is planned or notification to other government agencies has been or will be made.	§50.72(b)(2)(vi)	None
II.B.1	AIRBORNE RELEASE (See Notes 3 & 4)		
	Any airborne radioactive release that, when averaged over a period of 1 hour, results in concentrations in an unrestricted area that exceed 20 times the applicable concentration specified in Appendix B to § Part 20, table 2, column 1.	§50.72(b)(2)(iv)(A)	LER required by §50.73(a)(2)(viii)(A)
II.B.2	LIQUID RELEASE (See Notes 3 & 4)		
	Any liquid effluent release that, when averaged over a time of 1 hour, exceeds 20 times the applicable concentration specified in Appendix B to § Part 20, table 2, column 2, at the point of entry into the receiving waters (i.e., unrestricted area) for all radionuclides except tritium and dissolved noble gases.	§50.72(b)(2)(iv)(B)	LER required by §50.73(a)(2)(viii)(B)

IMMEDIATE NOTIFICATION REQUIREMENTS

II. FOUR HOUR NOTIFICATIONS (continued)

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
II.B.3	TRANSPORT OF CONTAMINATED INDIVIDUALS (See Note 3)		
	Any event requiring the transport of a radioactively contaminated person to an offsite medical facility for treatment.	§50.72(b)(2)(v)	None

NOTES:

1. Refer to the following T.S. Surveillance Requirements following any safety injection actuation: 4.4.5.3.c.1, 4.4.5.3.c.3, 4.4.5.3.c.4, 4.4.6.2.2.d, and 4.5.2.g.1.
2. Reportability under this paragraph is based on nonconformance to the assumptions and requirements of the FSAR which nonconservatively impact the ability of the structure or system to perform its safety function. The requirement is applied to each individual system, regardless of the availability of other systems to perform the same safety function and regardless of the duration of the unavailability. For example, the unplanned loss of both trains of RHR Cooling is reportable even if the event was momentary, and even if the steam generators were available as a heat sink.
3. Per §50.72(c), during the course of events reported under §50.72(a) and §50.72(b), also immediately report:
   a) Further degradation in the level of safety or worsening conditions;
   b) Results of assessments/evaluations of plant conditions;
   c) Effectiveness of corrective actions or protective measures taken, and
   d) Information related to plant behavior which is not understood.
4. These immediate notifications also satisfy the requirements of §20.2202. Reporting this via an LER also satisfies the requirements of §20.2203(a)(3).

IMMEDIATE NOTIFICATION REQUIREMENTS

III. TWENTY-FOUR HOUR NOTIFICATIONS

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
III.A.1	RADIOLOGICAL EXPOSURE/RELEASE		
	Any event involving licensed material possessed by the licensee that may have caused or threatens to cause an individual to receive, in a period of 24 hours:	§20.2202(b)	30 Day Written Report Also Required per §20.2203.
	a) A total effective dose equivalent > 5 Rem; or		
	b) An eye dose equivalent > 15 Rem; or		
	c) A shallow-dose equivalent to the skin or extremities > 50 Rem; or		
	d) An intake of > 1 ALI.		
III.A.2	OTHER RELEASES		
	Any Unusual or Important Environmental Events	Env. Prot. Plan Section 4.1, PLP-500	30 Day Written Report also required
III. B	VIOLATION OF OPERATING LICENSE CONDITIONS		
	1) Any event resulting in the plant operating in a manner which violates the SHNPP Facility Operating License, Section 2.C:	OL Section 2.G	LER required per OL Section 2.G
	a) Reactor Core Thermal Power Level exceeds 2775 Mwt (Note 2)	OL Section 2.C.1	
	2) A failure to comply with the following administrative requirements (See Note 1):		LER required per OL Section 2.G
	a) Deviation from the requirements of the Environmental Protection Plan;	OL Section 2.C.2	
	b) Failure to comply with anti-trust conditions of Appendix C to OL;	OL Section 2.C.3	
	c) Failure to comply with new fuel storage requirements.	OL Section 2.C.10	

IMMEDIATE NOTIFICATION REQUIREMENTS

III. TWENTY-FOUR HOUR NOTIFICATIONS (continued)

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
III.C	FITNESS FOR DUTY PROGRAM EVENTS (See Note 3)		
	1. Sale, use, or possession of illegal drugs within the protected area.	§26.73(a)(1)	None
	2. Any acts by any person licensed under §55, or by any supervisory personnel assigned to perform duties within the scope of §26	§26.73(a)(2)	None
	a) Involving the sale, use, or possession of a controlled substance,		
	b) Resulting in a confirmed positive test on such persons,		
	c) Involving use of alcohol within the protected area, or		
	d) Resulting in a determination of unfitness for scheduled work due to the consumption of alcohol.		
	3. False positive error on a blind performance test specimen when error is determined to be administrative.	App. A to Part 26 B.2.8(e)(5)	None

NOTES:

1. Identification of these conditions shall be reported to site management, who will make the determination of reportability.
2. Average thermal power level for any eight-hour period exceeding 2775 MWt. Instantaneous thermal power level exceeding 2830 MWt (102%) or average thermal power levels equivalent to 2830 MWt (102%) for a 15-minute period, 2803 MWt (101%) for a 30-minute period, 2789 MWt (100.5%) for a 60-minute period, shall be used for determination of reportability (Reference 2.10).
3. The "supervisory personnel" refers to any person who directly supervises personnel subject to the requirements of §26; "illegal drugs" and "controlled substances" are considered to refer to the same group of substances.

Instructions	Response Not Obtained
12. Determine CNMT Spray Requirements:	
a. Spray pump suction - ALIGNED TO RWST	a. GO TO Step 14.
b. Determine required number of CNMT spray pumps from Table 1:	

TABLE 1: CONTAINMENT SPRAY REQUIREMENTS			
RWST LEVEL	CONTAINMENT PRESSURE	MINIMUM # OF FAN COOLER UNITS RUNNING	REQUIRED # OF CNMT SPRAY PUMPS
GREATER THAN 23.4%	GREATER THAN 45 PSIG	N/A	2
	BETWEEN 10 PSIG AND 45 PSIG	0	2
		2	1
		4	0
	LESS THAN 10 PSIG	N/A	0
BETWEEN 3% AND 23.4%	GREATER THAN 45 PSIG	N/A	2
	BETWEEN 10 PSIG AND 45 PSIG	2	1
		3	0
	LESS THAN 10 PSIG	N/A	0
LESS THAN 3%	N/A	N/A	0

c. Verify spray pumps - REQUIRED NUMBER RUNNING

d. Reset CNMT spray signal.

e. Align CNMT spray pump(s) stopped in Step 12c for standby operation:

- o Shut CNMT spray pump discharge valve(s):

  1CT-50 (A CT Pump)
  1CT-88 (B CT Pump)

- o Shut CNMT spray chemical addition valve(s):

  1CT-12 (A CT Pump)
  1CT-11 (B CT Pump)

GUIDANCE ON RESTORATION OF FEED FLOW

NOTE:
- A hot, dry SG is one where the corresponding RCS hot leg temperature is greater than 550°F AND wide range level is less than 10% [35%].
- Feed flow should be restored to hot, dry SGs one at a time.
- After RCS bleed and feed has been initiated it is preferred, but NOT required, that feed flow be restored to one SG at a time.

Before RCS bleed and feed:

1. Feed at least one intact SG, whose wide range level is greater than 10% [35%], at maximum rate.
2. Feed flow should NOT be established to a hot, dry SG until the corresponding RCS hot leg temperature has decreased to less than 550°F.

After RCS bleed and feed:

1. IF core exit TCs are stable OR decreasing, THEN feed one intact SG at 50 KPPH. WHEN wide range level increases to greater than 10% [35%], THEN feed flow may be increased to maximum rate.
2. IF core exit TCs are increasing, THEN feed one intact SG at maximum rate until SG narrow range level is greater than 10% [40%]. Do NOT reduce feed flow if core exit TCs become stable OR decreasing.
3. Feed flow should NOT be established to another hot, dry SG until the corresponding RCS hot leg temperature has decreased to less than 550°F.
4. WHEN all RCS hot leg temperatures are less than 550°F, THEN check the SG being fed (active SG) for symptoms indicating a faulted OR ruptured condition.
5. IF the active SG is faulted OR ruptured, THEN perform the following:
   a. Establish feed flow to another intact SG.
   b. IF an intact SG does NOT exist, THEN a decision should be made to use the best available SG, which may be the currently active SG.
   c. WHEN the heat load has been transferred to a backup SG, THEN isolate the faulted OR ruptured SG to prevent further radiation releases.

INSTRUCTIONS FOR DETERMINING VENTING TIME

1. Determine CNMT Volume at STP 'A':

$$A = (2.266 \times 10^6\ FT^3) \times \frac{492°R}{(\text{CNMT temperature } °F + 460°R)}$$

A = ________ (FT^3)

2. Determine Maximum Hydrogen volume that can be vented 'B':

$$B = \frac{(3.0\% - \text{CNMT Hydrogen Concentration}) \times \text{'A'}}{100\%}$$

B = ________ (FT^3)

3. Determine Hydrogen flow rate as a function of RCS pressure 'C':

   a. Check RCS pressure and mark on Figure 2.

   b. Using Figure 2, read hydrogen flow rate 'C'.

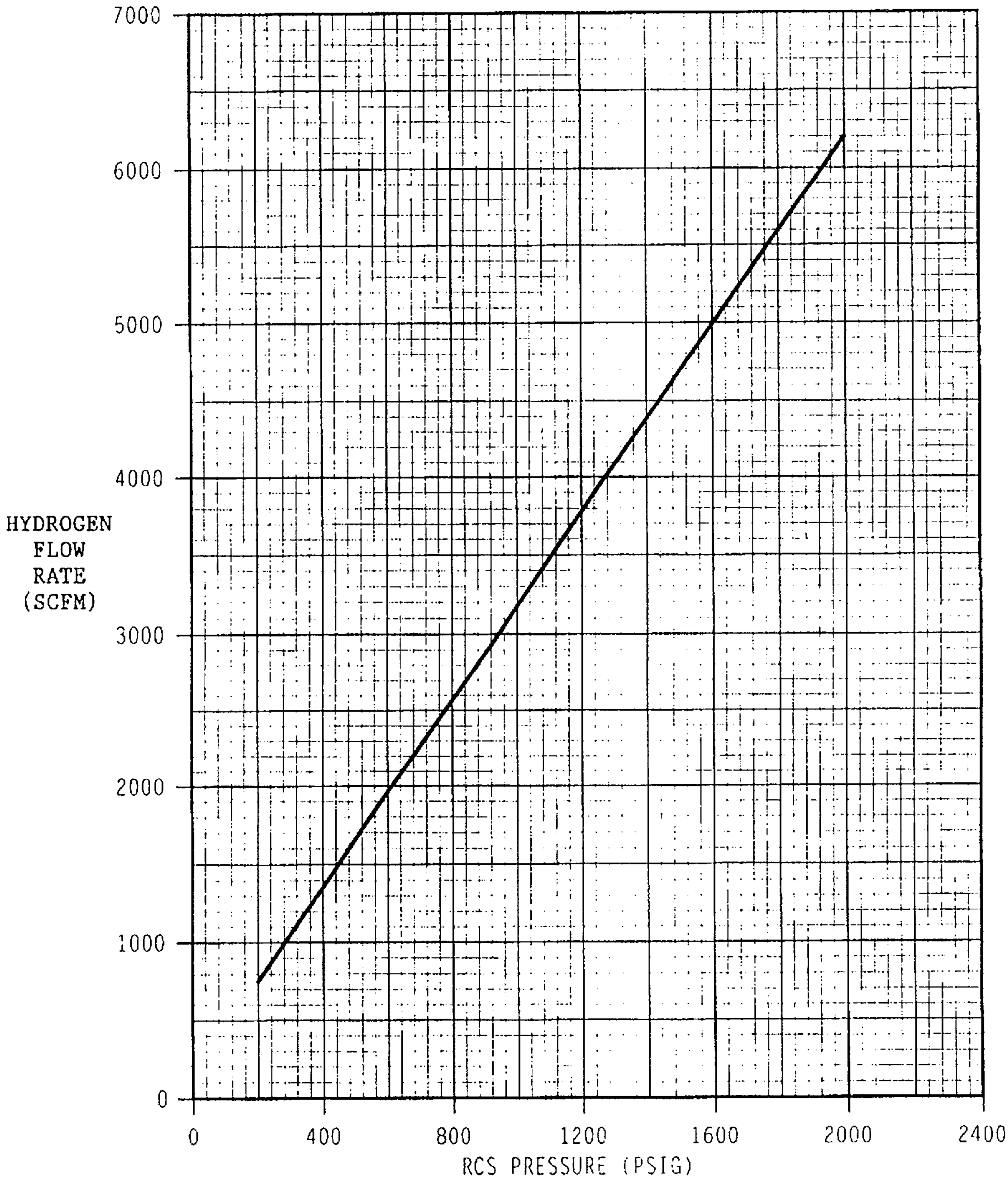
C = ________ (FT^3/MIN)

4. Calculate maximum venting time 'D':

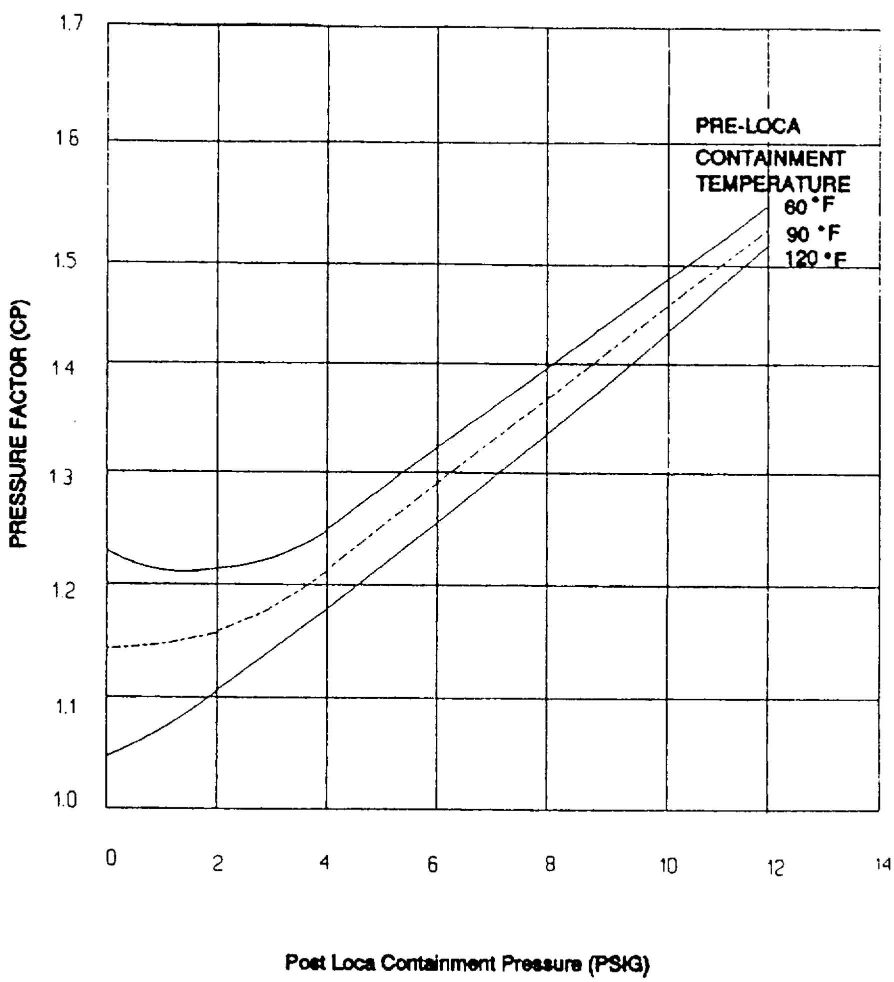
$$\text{Maximum venting time} = \frac{B}{C} = \_\_\_\_\_\_\_\_$$

D = ________ (MINUTES)

FIGURE 2: HYDROGEN FLOW RATE VERSUS RCS PRESSURE



Pressure Factor Determination

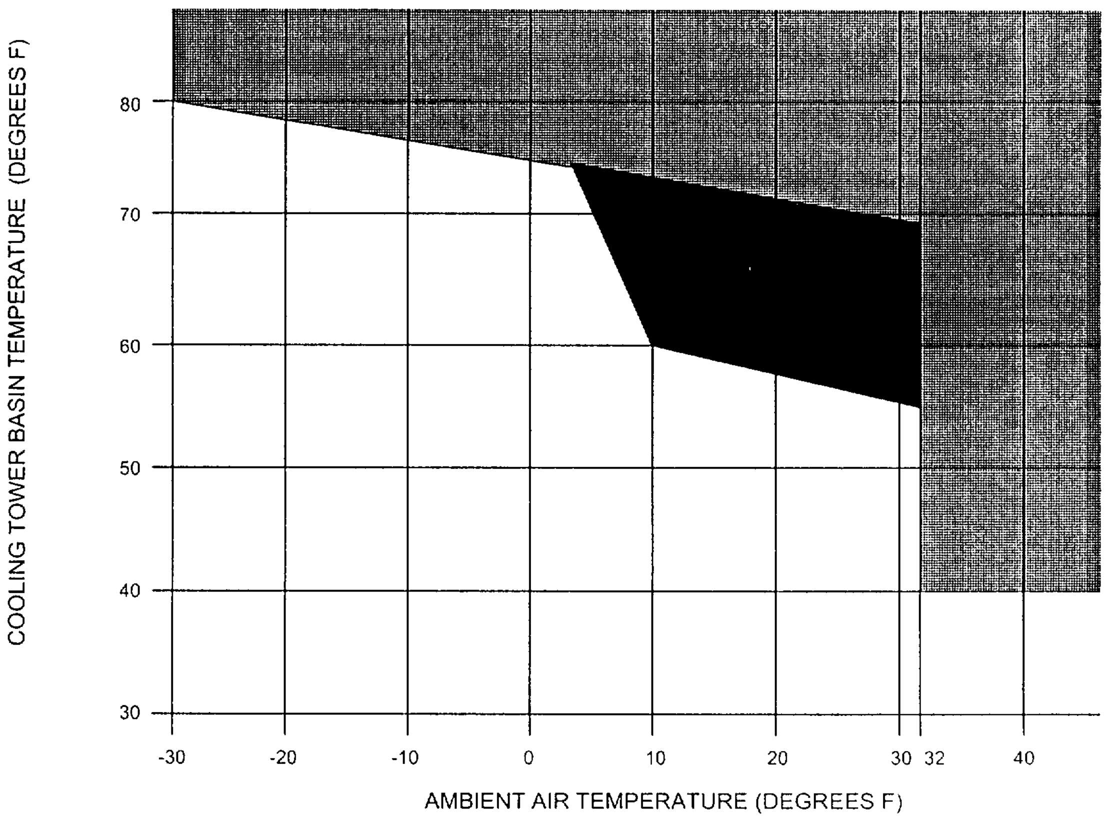


Reference Power X CP = Required Power

'A' Recombiner 41.28 KW X ______ = ____________

'B' Recombiner 40.24 KW X ______ = ____________

Cooling Tower Cold Weather Operation



NORMAL OPERATION - COOLING TOWER DEICING GATE VALVES OPEN

AS IS - COOLING TOWER DEICING GATE VALVES REMAIN AS IS

HALF OPEN - COOLING TOWER DEICING GATE VALVES HALF OPEN

Refueling Operations

1.0 OPERATIONAL REQUIREMENTS - DECAY TIME

1.1 The reactor shall be subcritical for a minimum period of time as determined by Figure 1.

APPLICABILITY: During movement of irradiated fuel in the reactor vessel.

ACTION:

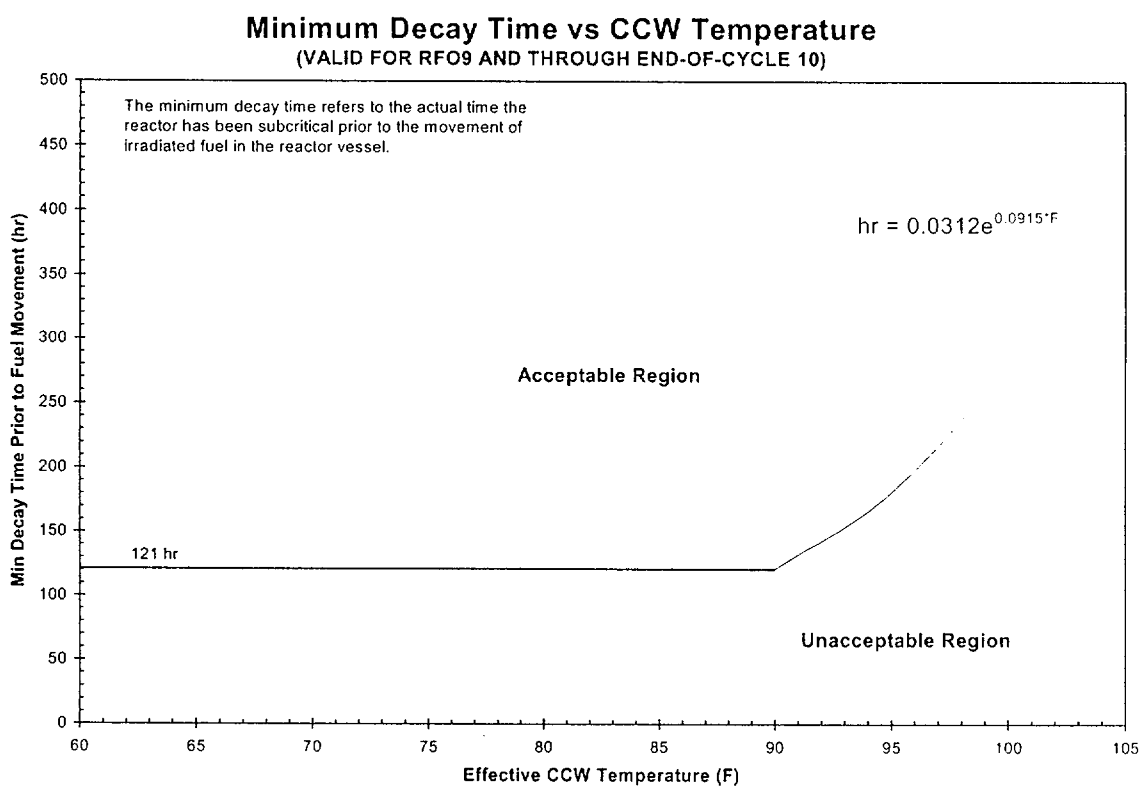
With the reactor subcritical for a time less than determined by Figure 1, suspend all operations involving movement of irradiated fuel in the reactor vessel. Fuel movement in the reactor vessel may continue provided the minimum decay time is in the acceptable region as shown on Figure 1.

2.0 SURVEILLANCE REQUIREMENTS

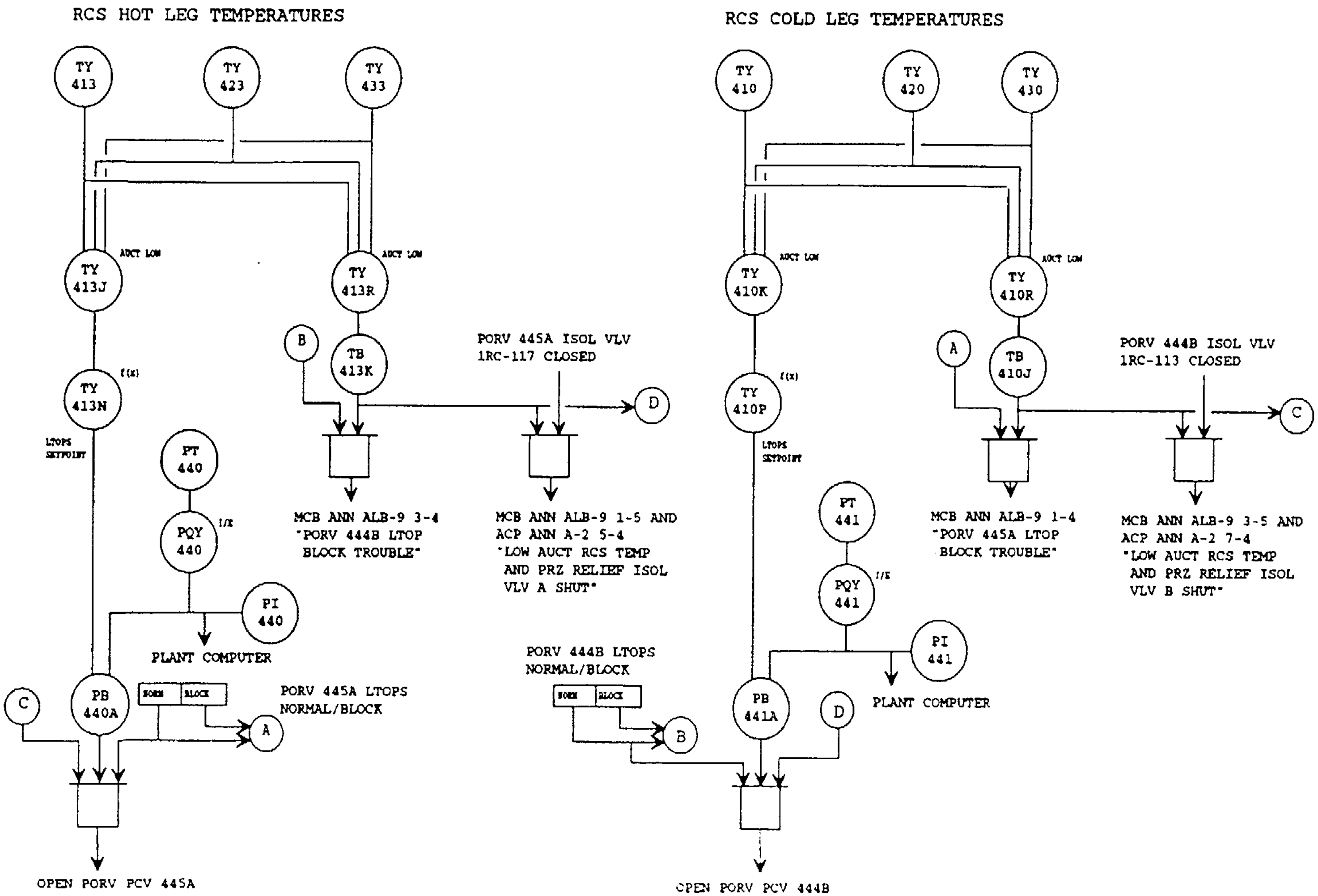
2.1 The reactor shall be determined to have been subcritical for a minimum period of time as determined by Figure 1 by verification of the date and time of subcriticality prior to movement of irradiated fuel in the reactor vessel.

2.2 CCW temperature shall be monitored every 12 hours during the movement of fuel in the reactor vessel to ensure the temperature used to determine decay time is not exceeded.

Figure 1



NOTE: Effective CCW Temperature refers to actual CCW heat exchanger outlet temperature plus 5F.



Low Temperature Over Pressure Protection Control Logic

Figure 7.16
Sheet 1 of 1

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Two separate and independent diesel generators, each with:

1. A separate day tank containing a minimum of 1457 gallons of fuel, which is equivalent to a minimum indicated level of 40%**.

2. A separate main fuel oil storage tank containing a minimum of 100,000 gallons of fuel, and

3. A separate fuel oil transfer pump.

c. Automatic Load Sequencers for Train A and Train B.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one offsite circuit of 3.8.1.1.a inoperable:

1. Perform Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and

2. Restore the offsite circuit 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; and

3. Verify required feature(s) powered from the OPERABLE offsite A.C. source are OPERABLE. If required feature(s) powered from the OPERABLE offsite circuit are discovered to be inoperable at any time while in this condition, restore the required feature(s) to OPERABLE status within 24 hours from discovery of inoperable required feature(s) or declare the redundant required feature(s) powered from the inoperable A.C. source as inoperable.

**Minimum indicated level with a fuel oil specific gravity of 0.83 and the level instrumentation calibrated to a reference specific gravity of 0.876.

ACTION (Continued):

b. With one diesel generator of 3.8.1.1.b inoperable:

1. Perform Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and

*2. Within 24 hours, determine the OPERABLE diesel generator is not inoperable due to a common cause failure or perform Surveillance Requirement 4.8.1.1.2.a.4#; and

3. Restore the diesel generator 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; and

4. Verify required feature(s) powered from the OPERABLE diesel generator are OPERABLE. If required feature(s) powered from the OPERABLE diesel generator are discovered to be inoperable at any time while in this condition, restore the required feature(s) to OPERABLE status within 4 hours from discovery of inoperable required feature(s) or declare the redundant required feature(s) powered from the inoperable A.C. source as inoperable.

c. With one offsite circuit and one diesel generator of 3.8.1.1 inoperable:

NOTE: Enter applicable Condition(s) and Required Action(s) of LCO 3/4.8.3, ONSITE POWER DISTRIBUTION - OPERATING, when this condition is entered with no A.C. power to one train.

1. Restore one of the inoperable A.C. sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

2. Following restoration of one A.C. source (offsite circuit or diesel generator), restore the remaining inoperable A.C. source to OPERABLE status pursuant to requirements of either ACTION a or b, based on the time of initial loss of the remaining A.C. source.

*This ACTION is required to be completed regardless of when the inoperable EDG is restored to OPERABILITY.

#Activities that normally support testing pursuant to 4.8.1.1.2.a.4, which would render the diesel inoperable (e.g., air roll), shall not be performed for testing required by this ACTION statement.

ACTION (Continued):

d. With two of the required offsite A.C. sources inoperable:

1. Restore one offsite circuit to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and

2. Verify required feature(s) are OPERABLE. If required feature(s) are discovered to be inoperable at any time while in this condition, restore the required feature(s) to OPERABLE status within 12 hours from discovery of inoperable required feature(s) or declare the redundant required feature(s) inoperable.

3. Following restoration of one offsite A.C. source, restore the remaining offsite A.C. source in accordance with the provisions of ACTION a with the time requirement of that ACTION based on the time of initial loss of the remaining inoperable A.C. source.

e. With two of the required diesel generators inoperable:

1. Perform Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and

#2. Restore one of the diesel generators to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

3. Following restoration of one diesel generator, restore the remaining diesel generator in accordance with the provisions of ACTION b with the time requirement of that ACTION based on the time of initial loss of the remaining inoperable diesel generator.

f. With three or more of the required A.C. sources inoperable:

1. Immediately enter Technical Specification 3.0.3.

2. Following restoration of one or more A.C. sources, restore the remaining inoperable A.C. sources in accordance with the provisions of ACTION a,b,c,d and/or e as applicable with the time requirement of that ACTION based on the time of initial loss of the remaining inoperable A.C. sources.

g. With contiguous events of either an offsite or onsite A.C. source becoming inoperable and resulting in failure to meet the LCO:

1. Within 6 days, restore all A.C. sources required by 3.8.1.1 or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

#Activities that normally support testing pursuant to 4.8.1.1.2.a.4, which would render the diesel inoperable (e.g., air roll), shall not be performed for testing required by this ACTION statement.

LIMITING CONDITION FOR OPERATION

ACTION (Continued):

h. With one automatic load sequencer inoperable:

1. Restore the automatic load sequencer to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignment and power availability, and

b. Demonstrated OPERABLE at least once per 18 months by manually transferring the onsite Class 1E power supply from the unit auxiliary transformer to the startup auxiliary transformer.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the day tank,

2. Verifying the fuel level in the main fuel oil storage tank,

3. Verifying the fuel oil transfer pump can be started and transfers fuel from the storage system to the day tank,

4. Verifying the diesel generator can start** and accelerate ## to synchronous speed (450 rpm) with generator voltage and frequency 6900 ± 690 volts and 60 ± 1.2 Hz,

5. Verifying the diesel generator is synchronized, gradually loaded** to an indicated 6200-6400 kW*** and operates for at least 60 minutes,

6. Verifying the pressure in at least one air start receiver to be greater than or equal to 190 psig, and

7. Verifying the diesel generator is aligned to provide standby power to the associated emergency buses.

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable, regarding loading recommendations.

***This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

The voltage and frequency conditions shall be met within 10 seconds or gradual acceleration to no-load conditions per vendor recommendations will be an acceptable alternative.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

b. Check for and remove accumulated water:

1. From the day tank, at least once per 31 days and after each operation of the diesel where the period of operation was greater than 1 hour, and

2. From the main fuel oil storage tank, at least once per 31 days.

c. By sampling new fuel oil in accordance with ASTM-D4057-81 prior to addition to storage tanks and:

1. By verifying, in accordance with the tests specified in ASTM-D975-81 prior to addition to the storage tanks, that the sample has:

a) An API Gravity of within 0.3 degrees at 60°F, or a specific gravity of within 0.0016 at 60°F, when compared to the supplier's certificate, or an absolute specific gravity at 60°F of greater than or equal to 0.83 but less than or equal to 0.89, or an API gravity of greater than or equal to 26 degrees but less than or equal to 38 degrees.

b) A kinematic viscosity at 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes, if the gravity was not determined by comparison with the supplier's certification;

c) A flash point equal to or greater than 125°F; and

d) A clear and bright appearance with proper color when tested in accordance with ASTM-D4176-82.

2. By verifying within 30 days of obtaining the sample that the other properties specified in Table 1 of ASTM-D975-81 are met when tested in accordance with ASTM-D975-81 except that the analysis for sulfur may be performed in accordance with ASTM-D1552-79 or ASTM-D2622-82.

d. At least once every 31 days by obtaining a sample of fuel oil from the storage tank, in accordance with ASTM-D2276-78, and verifying that total particulate contamination is less than 10 mg/liter when checked in accordance with ASTM-D2276-78, Method A.

e. At least once per 184 days, on a STAGGERED TEST BASIS, the diesel generators shall be started** and accelerated to at least 450 rpm in less than or equal to 10 seconds. The generator voltage and frequency shall be 6900 ± 690 volts and 60 ± 1.2 Hz in less than or equal to 10 seconds after the start signal.

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

The generator shall be manually synchronized to its appropriate emergency bus, loaded to an indicated 6200-6400*** kW, and operate for at least 60 minutes. The diesel generator shall be started for this test by using one of the following signals on a rotating basis:

1. Simulated loss of offsite power by itself, and

2. A Safety Injection test signal by itself.

This test, if it is performed so that it coincides with the testing required by Surveillance Requirement 4.8.1.1.2.a.4, may also serve to concurrently meet those requirements as well.

f. At least once per 18 months during shutdown by:

1. DELETED

2. Verifying that, on rejection of a load of greater than or equal to 1078 kW, the voltage and frequency are maintained with 6900 ± 690 volts and 60 ± 6.75 Hz, with frequency stabilizing to 60 ± 1.2 Hz within 10 seconds without any safety-related load tripping out or operating in a degraded condition.

3. Verifying that the load sequencing timer is OPERABLE with the interval between each load block within 10% of its design interval.

4. Simulating a loss of offsite power by itself, and:

***This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

a) Verifying de-energization of the emergency buses and load shedding from the emergency buses.

b) Verifying the diesel starts** on the auto-start signal, energizing the emergency buses with permanently connected loads in less than or equal to 10 seconds, energizing the auto-connected shutdown loads through the load sequencer, and operating for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization of these loads, the steady-state voltage and frequency shall be maintained at 6900 ± 690 volts and 60 ± 1.2 Hz.

5. Verifying that on a safety injection test signal (without loss of power) the diesel generator starts** on the auto-start signal and operates on standby for greater than or equal to 5 minutes.

6. Simulating a loss of offsite power in conjunction with a safety injection test signal, and

a) Verifying de-energization of the emergency buses and load shedding from the emergency buses.

b) Verifying the diesel starts** on the auto-start signal, energizing the emergency buses with permanently connected loads in less than or equal to 10 seconds, energizing the auto-connected emergency (accident) loads through the sequencing timers, and operating for greater than or equal to 5 minutes and maintaining the steady-state voltage and frequency at 6900 ± 690 volts and 60 ± 1.2 Hz.

c) DELETED

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

A.C. SOURCES

OPERATING

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

7. Verifying the diesel generator operates** for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to 6800-7000 kW*** and, during the remaining 22 hours of this test, the diesel generator shall be loaded to an indicated 6200-6400 kW***.

8. DELETED

9. Verifying the diesel generator's capability to:

   a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power,
   b) Transfer its loads to the offsite power source, and
   c) Proceed through its shutdown sequence.

10. DELETED

11. Verifying the generator capability to reject a load of between 6200 and 6400 kW without tripping. The generator voltage shall not exceed 110% of the generator voltage at the start of the test during and following the load rejection;

12. Verifying that, with the diesel generator operating in a test mode and connected to its bus, a simulated Safety Injection signal overrides the test mode by: (1) returning the diesel generator to standby operation and (2) automatically energizing the emergency loads with offsite power.

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

***This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

13. Verifying that all diesel generator trips, except engine overspeed, loss of generator potential transformer circuits, generator differential, and emergency bus differential are automatically bypassed on a simulated or actual loss of offsite power signal in conjunction with a safety injection signal.

14. Verifying that within 5 minutes of shutting down the EDG, after the EDG has operated for at least 2 hours at an indicated load of 6200-6400 kw, the EDG starts and accelerates to 6900 ± 690 volts and 60 ± 1.2 hz in 10 seconds or less.

g. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting** both diesel generators simultaneously, during shutdown, and verifying that both diesel generators accelerate to at least 450 rpm in less than or equal to 10 seconds.

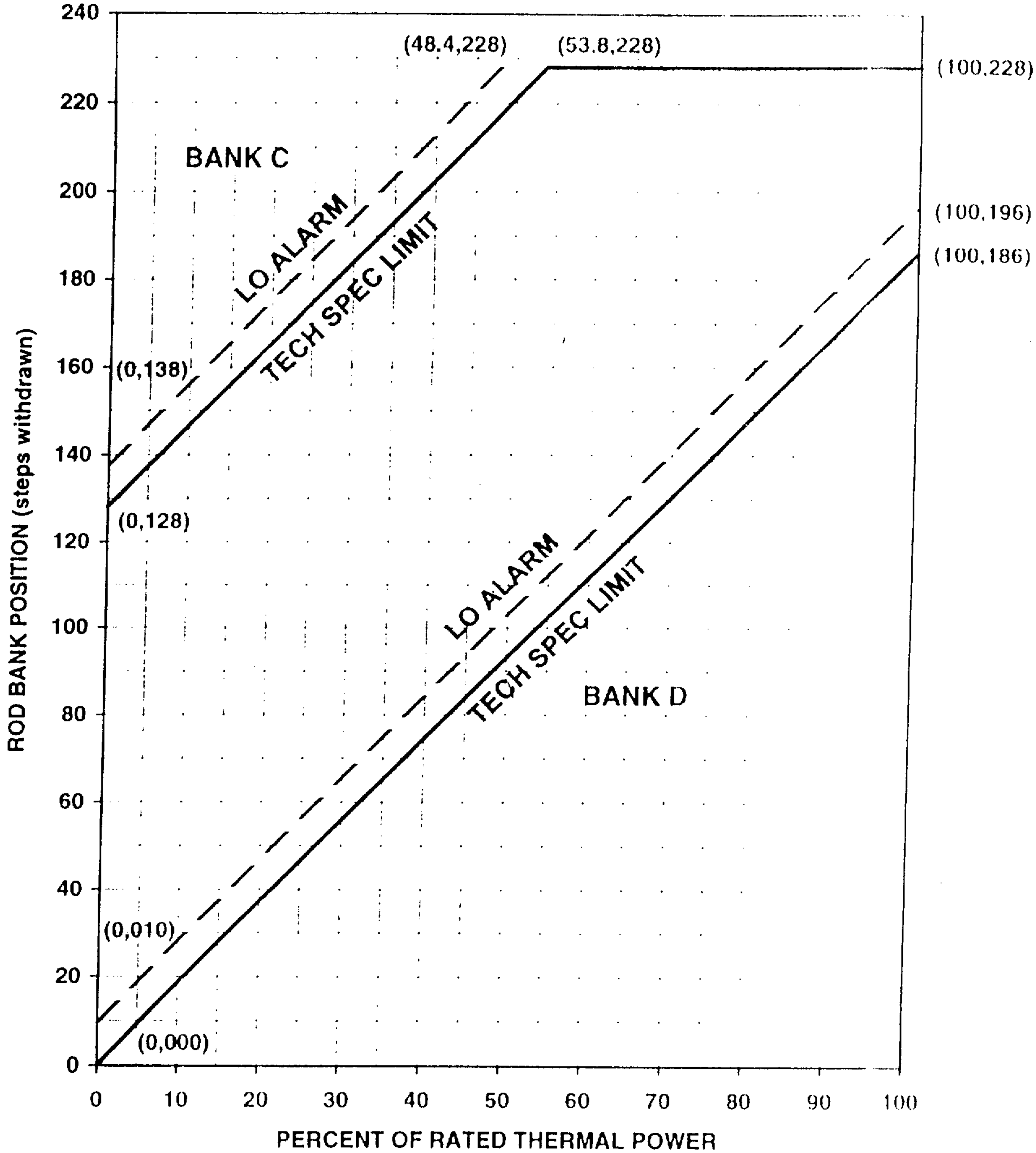
h. At least once per 10 years by:

1) Draining each main fuel oil storage tank, removing the accumulated sediment, and cleaning the tank using a sodium hypochlorite solution or other appropriate cleaning solution, and

2) Performing a pressure test, of those isolable portions of the diesel fuel oil piping system designed to Section III, subsection ND of the ASME Code, at a test pressure equal to 110% of the system design pressure.

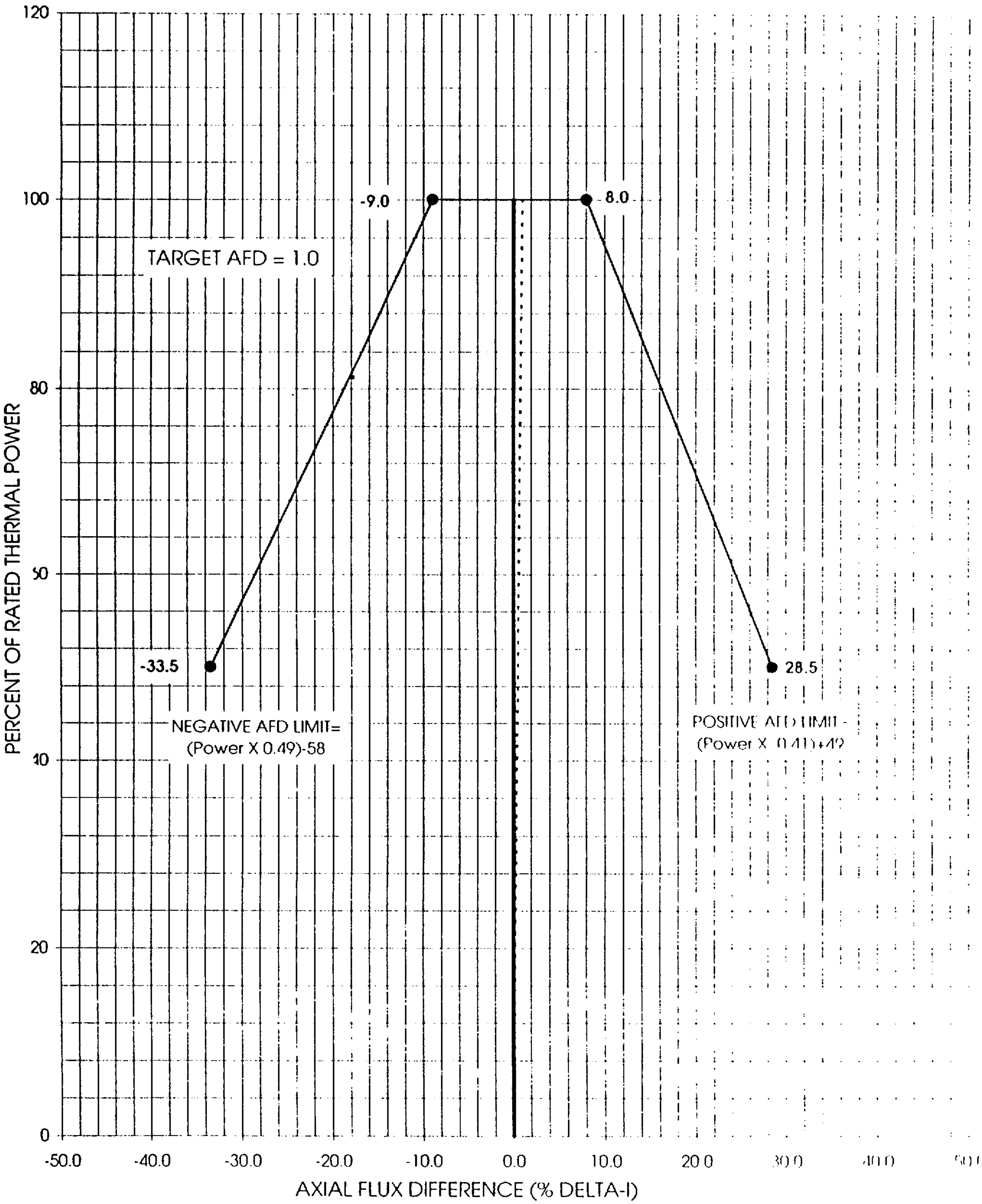
**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

HARRIS UNIT 1 CYCLE 10
ROD INSERTION LIMITS



CURVE NO.	F-10-1	REV NO.	0
ORIGINATOR	Andrew Howe	DATE	4/17/00
SUPERVISOR	[signature]	DATE	4-22-00
SUPERINTENDENT - SHIFT OPERATIONS	[signature]	DATE	4 23 00

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER



Curve No.	F-10-2	Rev. No.	2
Originator	Andrea E. Goss. Dinf	Date	6/14/00
Supervisor	Andrew Howe for D. Bagsa	Date	6-14-00
Superintendent-Shift Operations	[illegible]	Date	6-14-00

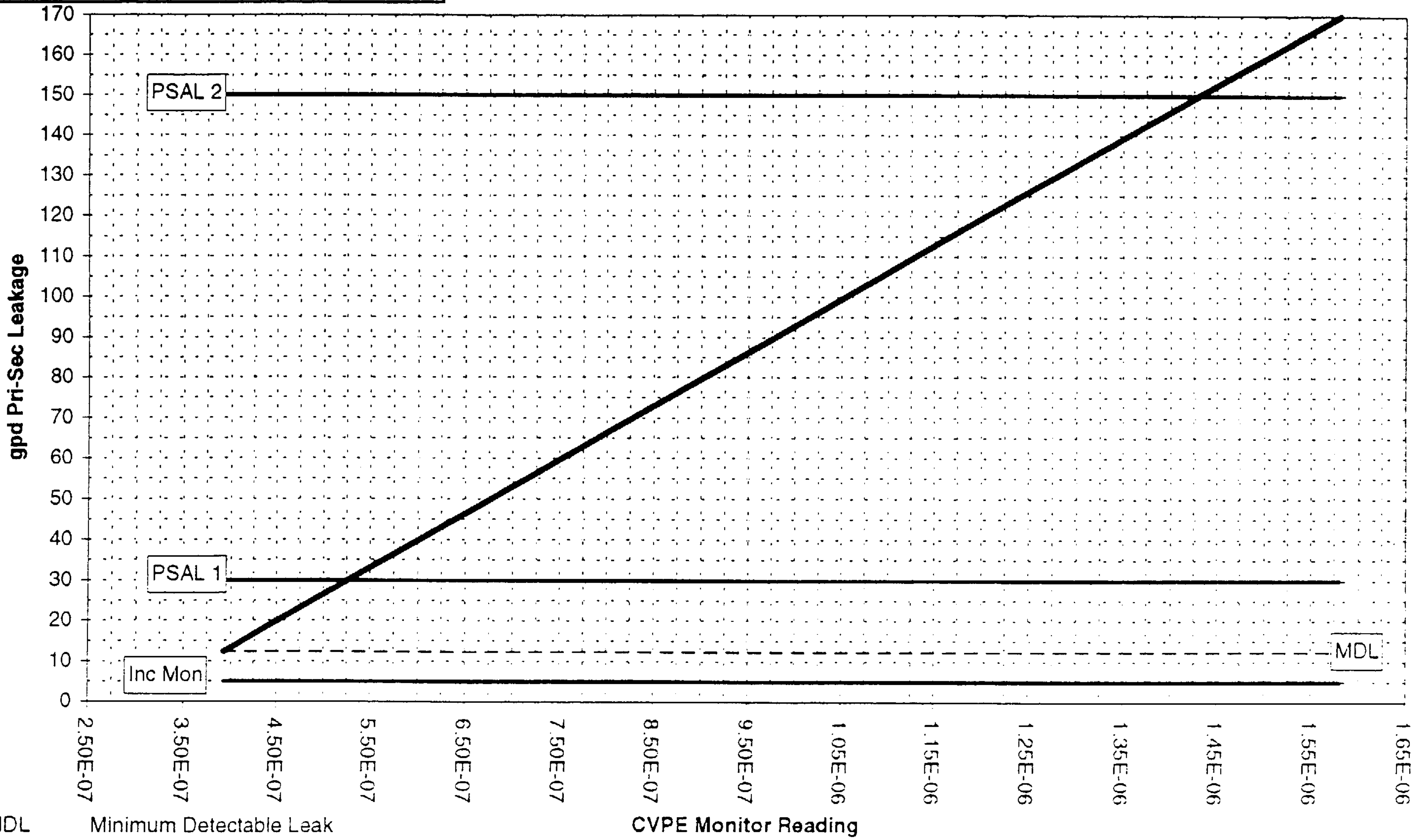
Curve 4-X-15	Rev No. 1
Originator Don Edwards	Date 4/14/00
Supervisor Terry Thompson	Date 4/14/00
Superintendent- Shift Operations	Date 4-15-00

P/S Leak Rate Using Monitor
(Based on Xe-133 Monitor Equivalent)

Total CVPE dilution flow is 155 scfm

CVPE Alert = 29.6 gpd

CVPE Alarm = 148.69 gpd



MDL Minimum Detectable Leak

Inc Mon Increased Monitoring

PSAL Primary to Secondary Action Level

Note: Dilution flow is equal to Total Motivating Air flo + Nitrogen flow + Air In Leakage flow

SUPPLIED REFERENCE MATERIALS FOR SHNPP NRC REACTOR OPERATOR EXAMINATION

REFERENCE NUMBER	REFERENCE TITLE
AOP-001, Attachment 2	Affected And Symmetric Thermocouple Locations
AOP-018, Attachment 1	Reactor Coolant Pump Trip Limits
AOP-018, Attachment 2	Specific Symptoms of Seal Malfunctions
AOP-036, Attachment 6	SG Wide Range Level Band Vs. SG Pressure
AOP-037, Attachment 3	Affected ALB Determination
OP-125, Attachment 8	Pressure Factor Determination
OP-141, Attachment 5	Cooling Tower Cold Weather Operation
SD-100.03, Figure 7.16	Low Temperature Over Pressure Protection Control Logic
Curve F-10-1	Rod Insertion Limits
Curve F-10-2	Axial Flux Difference Limits as a Function of Rated Thermal Power
NA	Steam Tables

Attachment 2
Sheet 1 of 2

Affected And Symmetric Thermocouple Locations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A								T							
B					T	R		R		R T					
C							R	T	R		R	T			
D			T	R	T	R				R		R			
E			R	T	R		T	T		T	R	T		T	
F		R	T	R	T	R		R	T	R	T	R	T	R	
G	T	T	R			T	R	T	R				R		T
H		R	T		T	R		T	T	R	T		T	R	T
J		T	R				R		R	T		T	R		
K		R	T	R	T	R		R T		R	T	R		R	
L					R	T		T			R	T	R	T	
M			T	R		R			T	R	T	R			
N				T	R	T	R	T	R	T					
P						R	T	R T		R					
R							T								

R - Control Rod

T - Thermocouple

Affected Thermocouples

Affected And Symmetric Thermocouple Locations

NOTE:B10 E07 K08 P08 H08 have no symmetric locations

GRID		I		II		III		IV	
TRAIN		A	B	A	B	A	B	A	B
		A08				H15			
			G01		G15			R07	
S	L	B05			E14		L14		
Y	O		C08	H13				N08	H03
M	C		D03	C12				N04	M03
M	A	E04	D05		E12	M11	L12		
E	T			H11	E08		L08		H05
T	I		F05	F11	E10	K11		K05	L06
R	O		F03	F13			N10	N06	K03
I	N	G06		F09			J10		
C	S		G08			H09			
		G02						J02	P07
						M09	J12		

1. Determine thermocouple location(s) adjacent to the misaligned rod using the core grid map (Sheet 1), and circle the locations(s) in the Table above. These are the affected thermocouple(s).

2. Record values for all operable affected and symmetric thermocouples using the RVLIS Console. Symmetric thermocouples are those in the same row.

   Affected TC #1 ______ Symmetric TC(s) ____________________

   Affected TC #2 ______ Symmetric TC(s) ____________________

   Affected TC #3 ______ Symmetric TC(s) ____________________

   Affected TC #4 ______ Symmetric TC(s) ____________________

3. Determine the average of symmetric thermocouples above, for each affected thermocouple.

Reactor Coolant Pump Trip Limits

NOTE: False indications such as step changes or spikes on both the upper and lower thrust bearings are signs that the instrumentation transient may not be valid.

Validation of the temperatures should be performed by observing positive indications of any of the following:

- Simultaneous temperature increases in upper and lower thrust bearing and upper guide bearing (may indicate loss of CCW cooling or oil viscosity problems common to the upper reservoir).
- Vibration levels increasing along with increasing bearing temperatures.
- High or Low RCP oil level alarms along with increasing bearing temperatures.

R 1. **Any of the following Motor Bearing temperatures exceeding 190°F** (Ref: FSAR Section 5.4.1):

	ERFIS Points		
	RCP A	RCP B	RCP C
Mtr Upper Thrust Brg Temp	TRC0417A	TRC0427A	TRC0437A
Mtr Lower Thrust Brg Temp	TRC0417B	TRC0427B	TRC0437B
Mtr Upper Radial Brg Temp	TRC0418A	TRC0428A	TRC0438A
Mtr Lower Radial Brg Temp	TRC0419	TRC0429	TRC0439

R 2. **Any of the following Pump temperatures exceeding 230°F** (Ref: FSAR Section 5.4.1):

	ERFIS Points		
	RCP A	RCP B	RCP C
Pump Radial Brg Temp	TRC0131	TRC0128	TRC0125
Seal Water Inlet Temp	TRC0132	TRC0129	TRC0126

3. **RCP Stator Winding temperature exceeding 300°F**:

	ERFIS Points		
	RCP A	RCP B	RCP C
Mtr Stator Windg Temp	TRC0418B	TRC0428B	TRC0438B

Reactor Coolant Pump Trip Limits (Cont.)

NOTE: ALB-5-1-2B, RCP THERM BAR HDR LOW FLOW, indicates loss of CCW to all RCP thermal barriers

4. **Loss of RCP seal injection when:**

   a. CCW flow is lost to associated RCP Thermal Barrier HX.

   b. RCS temperature is greater than or equal to 400°F AND CCW HX outlet temperature is greater than 105°F.

   c. RCS temperature is less than 400°F AND CCW HX outlet temperature is greater than 120°F.

R 5. **RCP vibration in excess of the following** (Ref: FSAR Section 5.4.1):

   - 20 mils shaft
   - 15 mils shaft and increasing greater than 1 mil/hr.
   - 5 mils frame
   - FOR A and C RCPs ONLY: 3 mils frame and increasing greater than 0.2 mil/hr.
   - FOR B RCP ONLY: 3.5 mils frame and increasing greater than 0.2 mil/hr.

6. **RCP Motor current fluctuations of 40 amps peak-to-peak:**

	ERFIS Points		
	RCP A	RCP B	RCP C
Motor Current	IRC0160	IRC0161	IRC0162

7. **Loss of CCW to an RCP or RCP Motor when:**

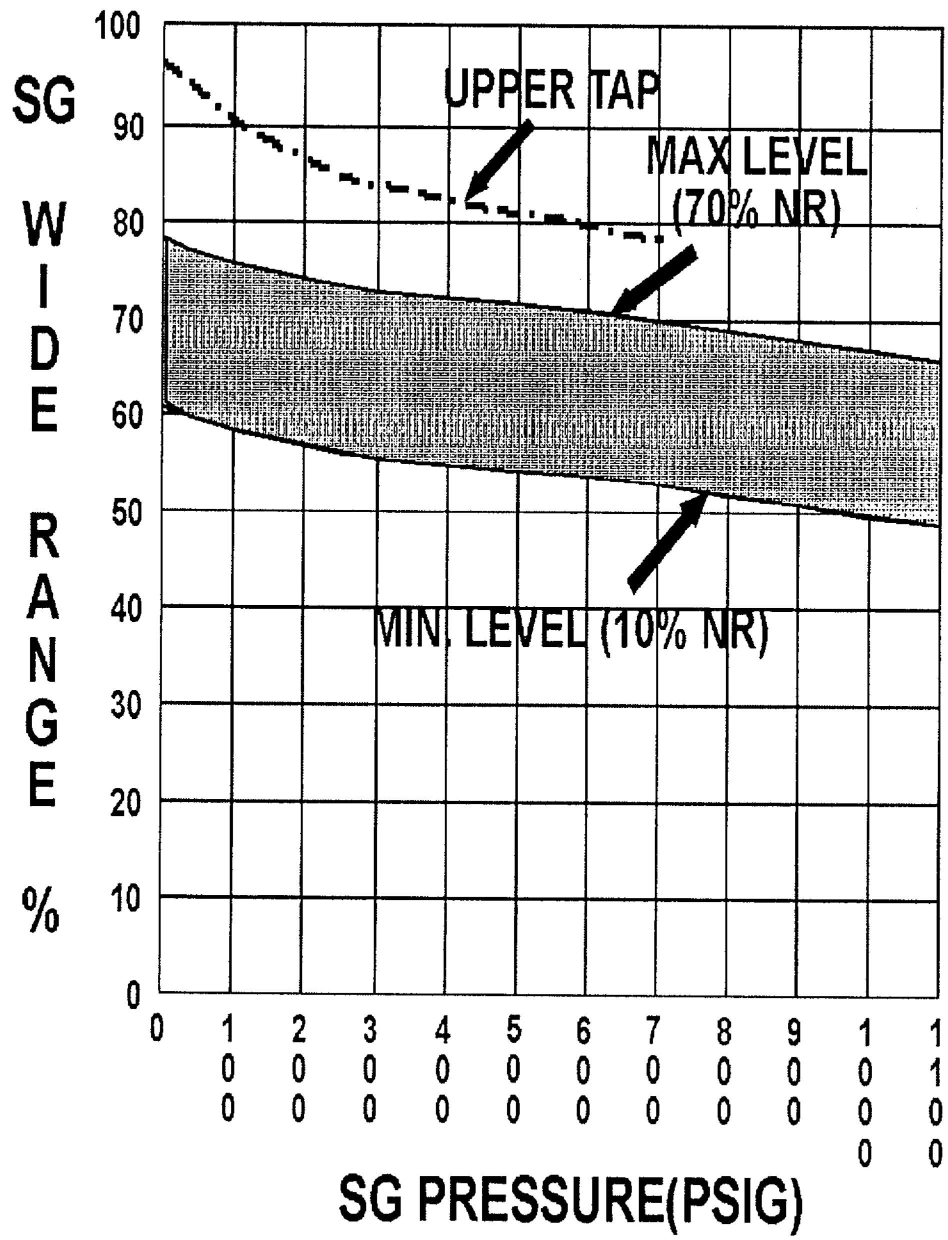
R
   - An RCP has operated for 10 minutes without CCW flow to either motor oil cooler (Ref: FSAR Section 9.2.2)
   - Isolation of CCW to an RCP is necessary to stop excessive CCW System leakage

Specific Symptoms of Seal Malfunctions

Seal Malfunction	Symptoms
#1 Seal Failed	Any of the following exist for the affected RCP: • Both #1 and #2 seal leakoff high flow alarms in • Total #1 seal flow greater than or equal to 8 gpm (See note 1,3) • Total #1 seal flow greater than 6.5 gpm with either the RCP seal water inlet or radial bearing temperature steadily increasing (See notes 1 and 2) • Total #1 seal flow less than 0.8 gpm with either the RCP seal water inlet or radial bearing temperature steadily increasing (See notes 1 and 2))
#1 Seal Degraded	All the following exist for the affected RCP: • #1 seal leakoff flow greater than 6.5 gpm • Total #1 seal flow less than 8 gpm (See note 1) • RCP seal water inlet temperature stable (See note 2) • RCP radial bearing temperature stable (See note 2)
#1 Seal Blocked	#1 seal leakoff flow less than 0.8 gpm (3) (Assumes normal operating pressure and #2 seal leakoff flow is zero or negligible. At low RCS pressures, seal parameters are given in OP-100, Reactor Coolant System.)
#2 Seal Failed	High #2 seal leakoff flow condition with a corresponding reduction in #1 seal leakoff flow. #3 seal leakoff should remain fairly constant.
#3 Seal Failed	Frequent (more often than every 14 hours) need for filling the standpipe. May also detect an increase in CNMT sump level.

Notes	
1	Total #1 seal flow is defined as the sum of #1 and #2 seal leakoff flows. When calculating total #1 seal flow and #1 seal leakoff flow is greater than 6.5 gpm, #2 seal leakoff flow should be considered negligible until it can be read locally unless #2 high leakoff flow alarm is in, then assume total seal flow is greater than 8 gpm.
2	RCP seal water inlet and RCP radial bearing temperatures are indicative of a #1 seal failure. Normal 100% power values for these temperatures are 140°F to 150°F. An increase in #1 seal leakoff flow will result in an increase in these temperatures but the increase should taper off and stabilize well below 230°F. "Steadily increasing" - An increase at a constant or increasing rate that will result in exceeding 230°F. "Stable" - A slow increase in temperature or an increase in temperature but at a decreasing rate and well below 230°F. Under these conditions, additional time is available to evaluate the trend and contact Engineering. In the absence of additional guidance, if temperature has increased to greater than 190°F and is still increasing, it should be considered "steadily increasing".
3	Validate reading using diverse indications.

SG Wide Range Level Band vs. SG Pressure



Affected ALB Determination

POWER SUPPLIES	NUMBER OF AFFECTED WINDOWS	AFFECTED ALBs
System 1		
125 VDC 1A and 1C	306	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
System 2		
125 VDC 2A#1 and 2D#3	240	13, 14 (49 of 52), 15 (2 of 22), 16, 17, 19, 20 (37 of 39), 21 (24 of 37), 22 (15 of 48), 24 (2 of 10), 25 (2 of 10), 26 (1 of 14)
125 VDC 2C#1 and 2D#1	160	14 (3 of 52), 15 (20 of 22), 18 (10 of 24), 22 (30 of 48), 23 (8 of 97), 26 (13 of 14), 27, 28, 29, 30 (17 of 31), 24 (8 of 10), 25 (8 of 10)
125 VDC 2E#1 and 2D#2	135	18 (14 of 24), 20 (2 of 39), 21 (13 of 37), 22 (3 of 48), 23 (89 of 97), 30 (14 of 31)
System 1		
24 VDC or 12 VDC 1A#1	97	1, 2, 3, 4
24 VDC or 12 VDC 1A#2	108	5, 6, 7, 8
24 VDC or 12 VDC 1C#1	101	9, 10, 11, 12
System 2		
24 VDC or 12 VDC 2A#1	145	13, 14, 15, 20
24 VDC or 12 VDC 2A#2	84	17, 21, 30
24 VDC or 12 VDC 2C#1	121	23, 25, 26
24 VDC or 12 VDC 2C#2	91	22, 27, 28, 29
24 VDC or 12 VDC 2E#1	94	16, 18, 19, 24

NOTE:

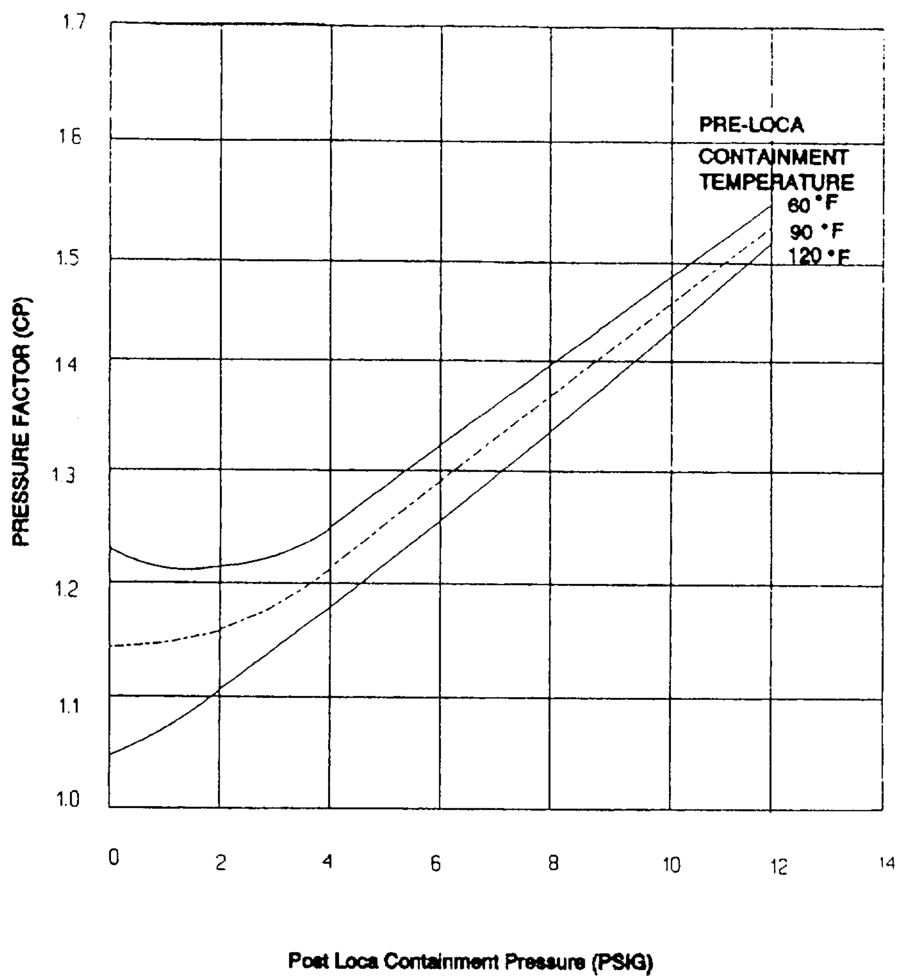
- When ( ) follow the ALB number, the first number indicates the affected windows, and the second number indicates the total number of windows for that ALB.
- Total number of annunciators is 841 in Modes 1-4 and 592 in Modes 5-6.
- A given ALB has 3 power supplies. For multiple power supply failures, care must be taken to not count an ALB twice.

Affected ALB Determination

General Description of Systems Associated with ALBs:

ALB-1	Containment Spray & Accumulator System
ALB-2	Emergency Service Normal Service Water System
ALB-3	Misc. Systems
ALB-4	RHR/RWST System
ALB-5	Component Cooling Water System
ALB-6	Chemical Volume Control System
ALB-7	Chemical Volume Control System
ALB-8	RCP System
ALB-9	Pressurizer System
ALB-10	Reactor Coolant System
ALB-11	Reactor First Out System
ALB-12	Reactor First Out System
ALB-13	Nuclear Instrumentation System and Rod Control System
ALB-14	Steam Generator System
ALB-15	Various Protective Panels Trouble Alarm
ALB-16	Feedwater System
ALB-17	Auxiliary Feedwater System
ALB-18	Turbine First Out System
ALB-19	Heater Drain Pump & Condensate System
ALB-20	MSR & Turbine System
ALB-21	LP/HP Heaters & Circulating Water System
ALB-22	Generator Exciter, Startup & Unit Transformer
ALB-24	Diesel Generator - A System
ALB-25	Diesel Generator - B System
ALB-26	Control Panels Trouble Alarm System
ALB-27	HVAC System (DG & Containment)
ALB-28	HVAC System (Containment)
ALB-29	HVAC System (Containment)
ALB-30	HVAC System (Control Room)

Pressure Factor Determination

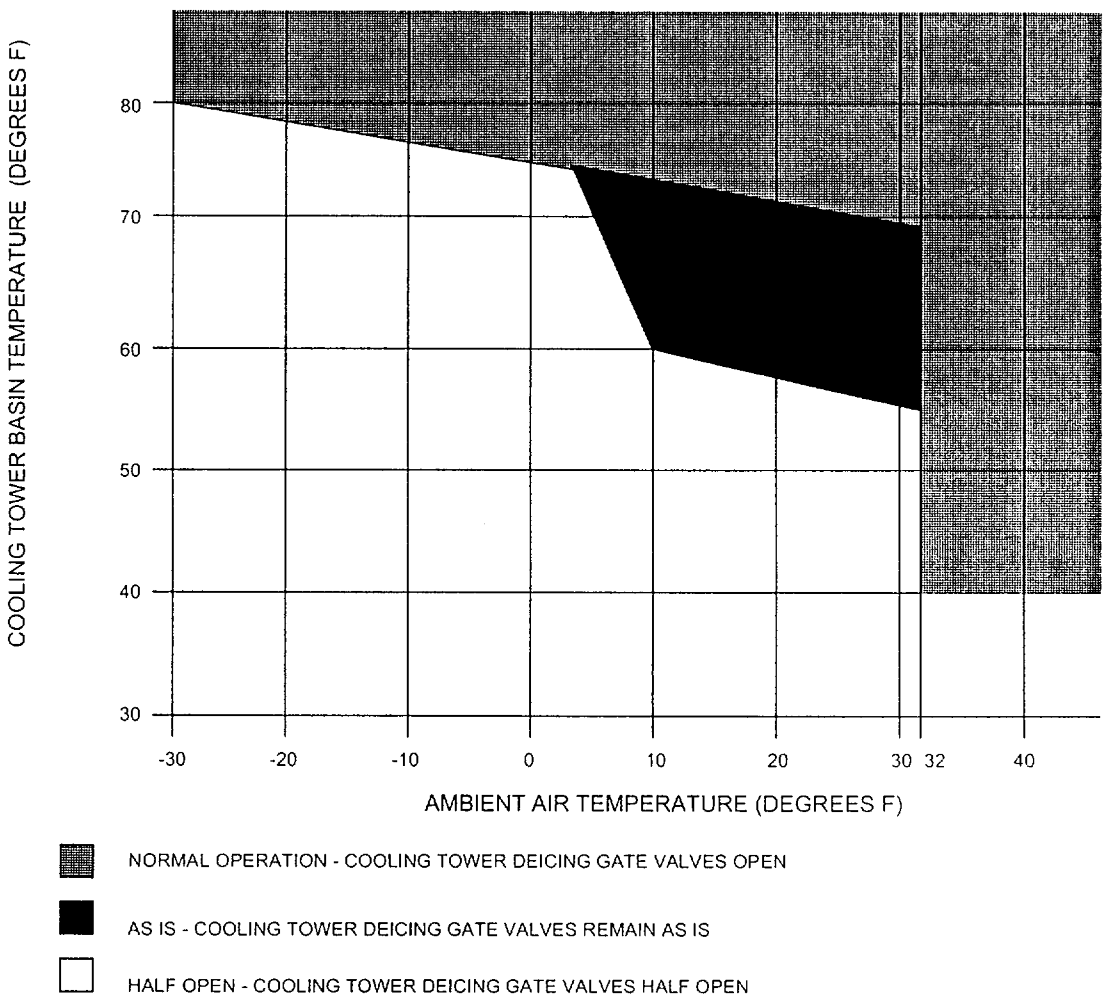


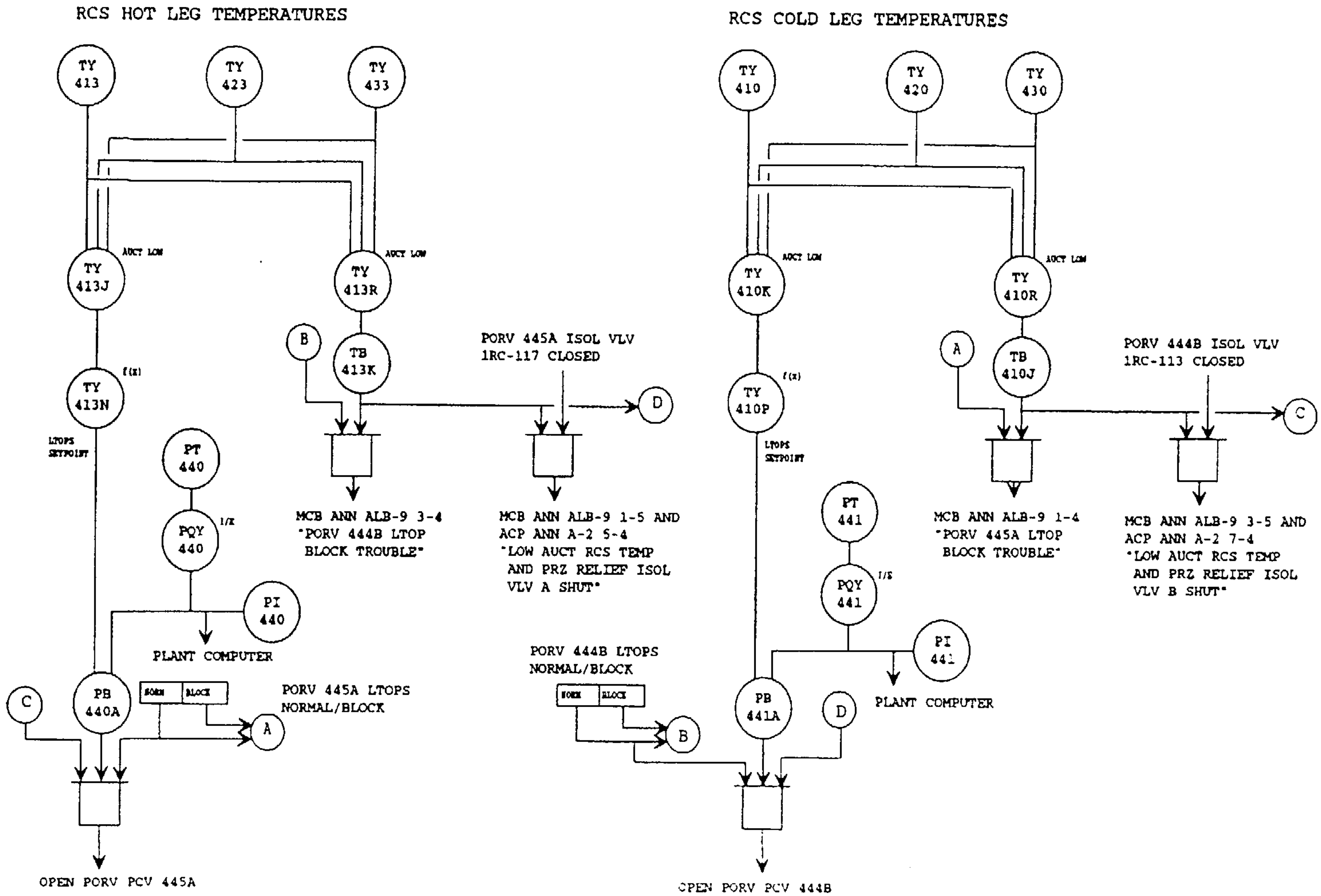
Reference Power X CP = Required Power

'A' Recombiner 41.28 KW X ______ = ____________

'B' Recombiner 40.24 KW X ______ = ____________

Cooling Tower Cold Weather Operation

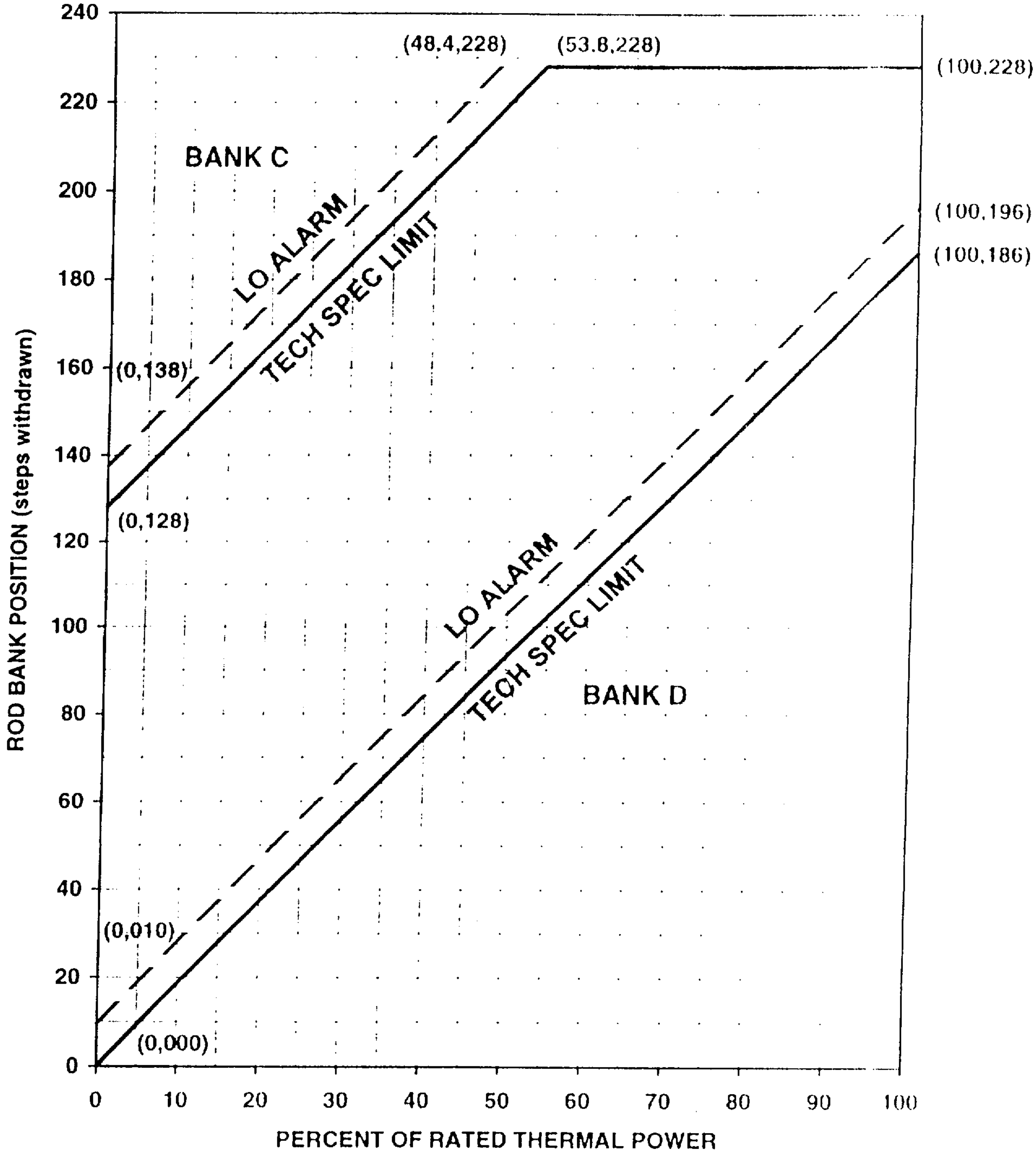




Low Temperature Over Pressure Protection Control Logic

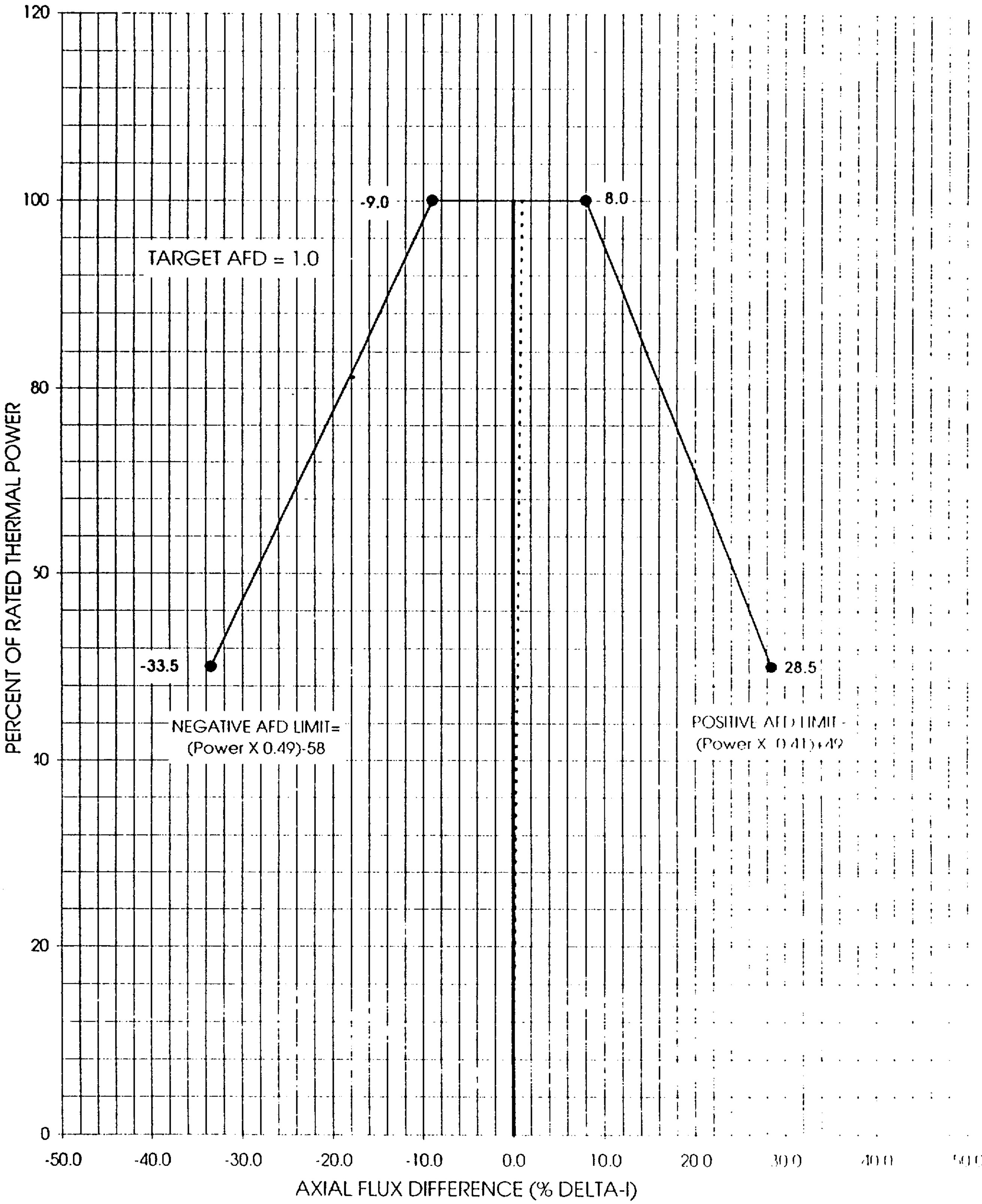
Figure 7.16
Sheet 1 of 1

HARRIS UNIT 1 CYCLE 10
ROD INSERTION LIMITS



CURVE NO.	F-10-1	REV NO.	0
ORIGINATOR	Andrew Howe	DATE	4/17/00
SUPERVISOR	[signature]	DATE	4-22-00
SUPERINTENDENT - SHIFT OPERATIONS	[signature]	DATE	4-23-00

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER



Curve No.	F-10-2	Rev. No.	2
Originator	Andrea E. Ross - [illegible]	Date	6/14/00
Supervisor	Andrew Howe for D. Bakosa	Date	6-14-00
Superintendent-Shift Operations	[illegible]	Date	6-14-00

Question: 16

Given the following conditions:

- While performing an OP valve lineup, two valves are found under clearance.
- One of the valves is in the position required by the OP valve lineup.
- The other valve is **NOT** in the position required by the OP valve lineup.

Which of the following describes the action to take for each valve?

a.
- CORRECT POSITION - initial as being in the correct position, using the clearance number as a reference
- WRONG POSITION - enter the clearance number in the initials space

b.
- CORRECT POSITION - circle the component number on the checklist **AND** leave the initial space blank
- WRONG POSITION - make a note in the comment section **AND** leave the initial space blank

c.
- CORRECT POSITION - enter the clearance number in the initials space
- WRONG POSITION - circle the component number on the checklist **AND** leave the initial space blank

d.
- CORRECT POSITION - initial as being in the correct position, using the clearance number as a reference
- WRONG POSITION - make a note in the comment section **AND** leave the initial space blank

Answer:

a.
- CORRECT POSITION - initial as being in the correct position, using the clearance number as a reference
- WRONG POSITION - enter the clearance number in the initials space

QUESTION NUMBER: 16

TIER/GROUP: ***RO*** 3 ***SRO***

K/A: 2.1.29

Knowledge of how to conduct and verify valve lineups.

K/A IMPORTANCE: ***RO*** 3.4 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: PP-3.11-R4

EXPLAIN what actions are required if an operator discovers a valve out of position or one with an improperly installed locking device

REFERENCES: OMM-001

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number PP-3.11-R4 001

JUSTIFICATION:

a. **CORRECT** A valve found under clearance while performing a checklist should be initialed if in the correct position, using the clearance number as a reference, and have the clearance number in the initials space if not in correct position.

b. Plausible since component number is circles when performing a clearance if the label is missing, but not correct actions for valves under clearance.

c. Plausible since these actions could be taken while performing a lineup, but not correct actions for valves under clearance.

d. Plausible since actions for valve in required position are correct, but wrong position requires clearance number in initials space.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural requirements

REFERENCES SUPPLIED:

5.2.2 Electrical and Valve Lineup Checklist (continued)

7. Operational Equipment status checks are normally performed by operations personnel. Operations personnel normally perform checks of fire protection system and equipment. When the operator has verified status of an item, the operator initials the space provided for the item.

8. If valve or breaker tags or labels are found missing, the person performing the lineup shall circle the component number. As time permits, initiate a deficiency tag per AP-038 to identify the discrepancy. The Unit SCO is responsible to assure replacement of tags or labels. Valves and breakers without tags shall only be operated after properly identifying the component and informing the Unit SCO that the tag is missing.

9. If the item is under clearance, but in the required position for the checklist, it may be documented as being in the correct position using the clearance as the reference. If the item is not in the required position, enter the clearance number, with concurrence of the Unit SCO, in the initials space. The Unit SCO will resolve conflicts arising from equipment status checks.

R 10. Procedures, Operations Work Procedures (OWPs), Operations Surveillance Tests (OSTs), and so forth on vital or sensitive plant equipment require independent verification. Perform Independent Verification per PLP-702. (Reference 2.6.0.0.4 and 2.4.0.0.5)

11. The Control Room Status File and off normal components shall be audited monthly (except during refueling outages) for accuracy and the need for the off-normal conditions. The audit shall be documented on Attachment 3. The off normal computer tracking system can generate a report of all components off normal as well as those that have been off normal for greater than 91 days.

   a. All off normal components and Operating Procedure lineups, other than the normal valve and electrical lineups, in the file shall be field verified to check component status and determine if the lineup is still valid and required.

   b. Any Attachments/components no longer valid or required should be completed and forwarded to the Unit SCO for review. Any off normal components or Operating Procedure off-normal lineups which do not match existing field conditions or have been in effect for greater than 91 days shall be listed on or attached to Attachment 3 to be reviewed by the Superintendent - Shift Operations.

   c. In addition to the requirements of Step 5.2.2.0.11.b, if a caution tag was not installed on a component and it has been off normal for greater than 91 days, a Condition Report shall be verified generated to have the Responsible Engineer evaluate the system impact if the off normal condition is to remain in effect. The AR Number should be added to the Off Normal database reason to prevent duplication of work. (Reference Response to Notice of Violation C, NRC Inspection Report No. 50-400/96-11)

   d. When the monthly audit is completed forward the completed Attachment 3 to the Superintendent - Shift Operations for review.

PP-3.11-R4 001

While performing a checklist, a valve is found under clearance and not in the required position. The person performing the lineup should, with the concurrence of the SSO, _________.

✓A. enter the clearance number in the initials space.

B. circle the component number on the checklist.

C. make a note in the comment section.

D. initial the checklist because clearance restoration will restore the valve.

Question: 17

A leak in the Instrument Air system has occurred.

Which of the following describes an automatic response **AND** the pressure at which the response will occur?

a. The Standby Air Compressor starts at 105 psig

b. The in-service Air Dryer is bypassed at 90 psig

c. 1SA-506 opens to supply Instrument Air from Service Air at 90 psig

d. The FW preheater bypass valves shut at 66 psig

Answer:

d. The FW preheater bypass valves shut at 66 psig

QUESTION NUMBER: 17
TIER/GROUP: ***RO*** 2/2 ***SRO***

K/A: 079K1.01

Knowledge of the physical connections and/or cause-effect relationships between the SAS and the following systems: IAS

K/A IMPORTANCE: ***RO*** 3.0 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 4 ***55.43(b) SRO***

OBJECTIVE: ISA-R9

STATE the purpose and DESCRIBE the operation of the following major ISA System valves:
a. Service air/instrument air cross-tie bypass valve (1IA-650)
b. Service air header isolation valve (1SA-506)
c. ISA containment isolation valves (IA-819, ISA-80)

REFERENCES: AOP-017

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number ISA-R9 002

JUSTIFICATION:

a. Plausible since the standby compressors start, but starting pressures are 101 psig, 96 psig, and 95 psig for the different compressors.

b. Plausible since an automatic action occurs at 90 psig, but the dryers do not automatically bypass.

c. Plausible since this valve operates at 90 psig, but the valve closes instead of opens.

***d.* CORRECT** The preheater bypass valves will auto close if IA pressure decreases to 66 psig.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operations

REFERENCES SUPPLIED:

LOSS OF INSTRUMENT AIR

1.0 SYMPTOMS

1. Low Instrument Air and Service Air Pressure indication
2. ALB-02-8-1, INSTRUMENT AIR LOW PRESSURE alarm
3. ALB-02-8-2, AIR DRYER A/B TROUBLE alarm
4. ALB-02-8-3A, AIR COMPR C TROUBLE alarm
5. ALB-02-8-3B, AIR COMPR A/B TROUBLE alarm
6. ALB-02-8-4, SERVICE AIR LOW PRESS alarm
7. ALB-02-8-5, COMPUTER ALARM AIR SYSTEMS alarm
8. ALB-28-2-1, CONTAINMENT VAC RELIEF A AIR ACCUM LOW PRESS alarm
9. ALB-28-3-1, CONTAINMENT VAC RELIEF B AIR ACCUM LOW PRESS alarm

2.0 AUTOMATIC ACTIONS

NOTE: For Action 1 below, MCB pressure indication may be 7 psig below the given setpoint before action occurs due to Air Dryer DP.

1. Standby Air Compressors start (Air Compressor 1C starts at 101 psig, Air Compressor 1A starts at 96 psig and Air Compressor 1B starts at 95 psig).
2. Service Air System isolates (1SA-506 shuts at 90 psig instrument air pressure).
3. FW Preheater Bypass Valves auto shut (instrument air pressure decreases to 66 psig):
   - 1AF-64
   - 1AF-102
   - 1AF-81
4. FW Flow Control Valves auto shut (instrument air pressure decreases to 60 psig on the control air supply to the valves):
   - 1FW-133
   - 1FW-249
   - 1FW-191

3. 0 OPERATOR ACTIONS

3.1 Immediate Actions

None

Question: 18

Given the following conditions:

- Essential Services Chilled Water System (ESCWS) 'A' Train is in service.
- A reactor trip and safety injection occurs.

Which of the following describes the expected ESCWS alignment?

a.
- Both ESCW chillers running
- ESCWS trains split with 'A' Train supplying the non-safety ESCWS loop

b.
- Both ESCW chillers running
- ESCWS trains split with the non-safety ESCWS loop isolated

c.
- **ONLY** 'A' Train ESCWS chiller running
- ESCWS trains cross-connected with the non-safety ESCWS loop isolated

d.
- **ONLY** 'A' Train ESCWS chiller running
- ESCWS trains cross-connected with the 'A' Train supplying the non-safety ESCWS loop

Answer:

b.
- Both ESCW chillers running
- ESCWS trains split with the non-safety ESCWS loop isolated

QUESTION NUMBER: 18
TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 013A3.02

Ability to monitor automatic operation of the Operation of actuated equipment

K/A IMPORTANCE: ***RO*** 4.1 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: ESCWS-3.0-7

PREDICT system response to hypothetical plant conditions:
Safety injection signal

REFERENCES: OP-148

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.26-R2 001

JUSTIFICATION:

a. Plausible since both ESWCS chillers start on SI, but non-safety loop isolates from both safety headers.

b. **CORRECT** On a safety injection signal the two ESWCS chillers start and the non-safety loop isolates. Safety loops are normally not cross-connected.

c. Plausible since non-safety loop isolates from both safety headers on SI, but safety loops are not cross-connected and are supplied by individual chillers.

d. Plausible since given conditions have non-safety loop being supplied by this train, but both chillers start on SI and safety headers are not cross-connected.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operations

REFERENCES SUPPLIED:

4.0 PRECAUTIONS AND LIMITATIONS

1. R Failure of the operating train during normal operation is annunciated in the control room on AEP-1. The operator must manually switch operation to the idle train and its associated air handling equipment. (Reference 2.3.0.01)

2. Chiller interlocks prevent chiller startup if chilled water flow is not established.

3. If the chiller has been shut down with the L.O. heater deenergized for longer than six hours, then do not start the chiller until the heater has been in service for twelve hours.

4. Upon receipt of a Safety Injection Signal, both chillers commence operation. The train should not be secured until the components cooled by that train of ESCW are also secured. In addition the non-safety portion of ESCWS is isolated. This includes:

   a. Service air to expansion tank.

   b. NNS air handling units

   c. Demineralized water to expansion tank

5. During emergency operation, make-up water to ESCWS is from emergency service water through 1SW-1171, SW Emer M/U to WC2-1A Chiller Isol Vlv for Train A and 1SW-1204, SW Emer M/U to WC2-1B Chiller Isol Vlv for Train B. These valves must be operated from AEP-1 when expansion tank low-low water level alarms are received.

6. The oil level on the Compressor motor prior to startup should be between the white marks on the sight gage (one on each end of the motor).

7. R The oil level on the standby chiller Compressor prior to startup should be greater than halfway up in the lower sight glass. Oil level is allowed to be higher than top of upper sightglass provided that "Main Compr High Oil Level" alarm is not present. If "Main Compr High Oil Level" alarm is present, refer to Section 8.13 for actions to check compressor oil level. If the "Main Compr High Oil Level" alarm clears while checking the compressor oil level, the standby compressor oil level is considered acceptable and does not need to be drained. (References 2.6.0.04 and 2.6.0.09)

8. The inboard and outboard oil level reservoir bowls on chilled water pump should be at least half full prior to startup.

9. R During normal operations, only one ESW header will be in service. Therefore, only operate the Essential Services Chiller that will have service water flow to it. (Reference 2.6.0.01)

10. Observe Technical Specification 3.7.13.

AOP-3.26-R2 001

Which of the following is NOT an automatic action associated with AOP-026, Loss of Essential Service Chilled Water System?

A. Both ESCW chillers start on the SI sequencer.

B. Both ESCW chillers start on the UV sequencer.

C. Nonsafety ESCW loop isolates on an SI signal.

✓D. Nonsafety ESCW loop isolates on a UV signal.

Question: 19

Given the following conditions:

- An SGTR has occurred.
- A transition has been made from PATH-2 to EPP-020, SGTR with Loss of Reactor Coolant: Sub-Cooled Recovery.
- After several steps have been completed in EPP-020, it becomes apparent that the wrong procedure is being implemented.

Which of the following actions should be taken?

a. Return to the point in PATH-2 where the transition was made to EPP-20

b. Return to the top left entry in PATH-2

c. Return to the point in PATH-1 where the transition was made to PATH-2

d. Return to the top left entry in PATH-1

Answer:

d. Return to the top left entry in PATH-1

QUESTION NUMBER: 19
TIER/GROUP: ***RO*** 3 ***SRO***

K/A: 2.4.16

Knowledge of EOP implementation hierarchy and coordination with other support procedures.

K/A IMPORTANCE: ***RO*** 3.0 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: EOP-3.19

DESCRIBE Control Room usage of the EOP network as it relates to the following
e. Rediagnosis

REFERENCES: EOP Users Guide

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.19 023

JUSTIFICATION:

a. Plausible since this is the transition last made to the incorrect procedure, but the top left entry point in PATH-1 should be entered.

b. Plausible since this is the entry condition for the last known correct procedure, but the top left entry point in PATH-1 should be entered.

c. Plausible since this is the transition last made to the last known correct procedure, but the top left entry point in PATH-1 should be entered.

d. **CORRECT** Whenever it is determined that the wrong EOP is being implemented, entry should be made to the top left entry of PATH-1 to allow proper diagnosis.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural requirements

REFERENCES SUPPLIED:

5.1.5 <u>Rediagnosis</u>

Should the operator determine or suspect that he is in an incorrect PATH or EPP, he should rediagnose the event by re-entering at the top left of PATH-1 and be directed to the correct PATH or EPP. During this rediagnosis, complete reactuation and reverification of the Engineered Safety Features is allowed but not required. Reactuation of necessary safety features and performance of action steps during rediagnosis is guided by the requirements of the applicable foldout and operator judgment based on the symptoms. Some action steps previously performed may be repeated during rediagnosis as deemed appropriate by the operator.

5.1.6 <u>Direct Entry into EPP-001</u>

Direct entry into EPP-001, "LOSS OF AC POWER TO 1A-SA AND 1B-SB BUSES", is expected to be a rare occurrence. However, once in EPP-001, special considerations come into effect. Because none of the electrically powered safeguards equipment used to restore Critical Safety Functions is operable, <u>none</u> of the FRP's can be implemented. A CAUTION at the beginning of EPP-001 states that:

> "CSF Status Trees should be monitored for information only. Function Restoration Procedures should <u>NOT</u> be implemented unless directed by this procedure."

Once in EPP-001, the operator is directed to restore power to the emergency buses through manipulations at the MCB. If power can be restored to one of the emergency buses in this manner, the operator is directed to return to the procedure and step that were in effect prior to entry into EPP-001. Since power is available to safeguards equipment and no actions have been taken to lockout safeguards equipment, the operator is also directed to implement FRPs as required.

If power can <u>not</u> be restored at the MCB, the operator performs the required actions to minimize degradation of the plant. This includes defeating the Emergency Safeguards sequencer so emergency loads can be manually loaded once power is restored. The operator is not allowed to transition to any other procedure until some form of power is restored to the AC emergency buses. Even then, permission is not granted to implement FRPs until some initial status checks and actions are performed by the operator.

EOP-3.19 023

During an SGTR accident, the SCO has made a transition from Path-2 to EPP-20, SGTR with Loss of Reactor Coolant: Sub-cooled Recovery. After doing several steps, he feels he is in the wrong procedure. What action should be taken?

A. Return to the exit point in PATH-2.

B. Return to the top left entry in PATH-2.

C. Return to the exit point in PATH-1.

✓D. Return to the top left entry in PATH

Question: 20

During the review of a clearance request to support preventative maintenance work activities, it is determined that there is an existing Standard Clearance.

Which of the following would be the appropriate course of action?

a. The work can be performed under the Standard Clearance, and the technician signing on is responsible for ensuring adequate clearance boundary

b. The work can be performed under the Standard Clearance, and Clearance Preparer is responsible for ensuring adequate clearance boundary

c. The work can be performed using the Standard Clearance to create a new clearance if the Clearance Preparer and Verifier confirm the accuracy of the Standard Clearance

d. The work **CANNOT** be performed using the Standard Clearance since Standard Clearance use is limited to support corrective maintenance work activities only

Answer:

c. The work can be performed using the Standard Clearance to create a new clearance if the Clearance Preparer and Verifier confirm the accuracy of the Standard Clearance

QUESTION NUMBER: 20
TIER/GROUP: ***RO*** 3 ***SRO***

K/A: 2.2.13

Knowledge of tagging and clearance procedures.

K/A IMPORTANCE: ***RO*** 3.6 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: PP-2.4-5

EXPLAIN the following requirements regarding Work Coordination Center operation and given associated situations EVALUATE whether or not proper procedure is being followed
- Standard clearance practices

REFERENCES: OPS-NGGC-1301

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number PP-3.4 003

JUSTIFICATION:

a. Plausible since new clearance would be identical to standard clearance, but it must be a new clearance with accuracy confirmed by preparer and verifier.

b. Plausible since new clearance would be identical to standard clearance, but it must be a new clearance with accuracy confirmed by preparer and verifier.

c. **CORRECT** A standard clearance is a model used to create a clearance to support preventative maintenance work which must have the clearance preparer and verifier confirm the accuracy before use.

d. Plausible since standard clearances are limited to creating new clearances for specific maintenance work activities, but corrective maintenance cannot use a standard clearance.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural requirements

REFERENCES SUPPLIED:

3.14 Requestor

The individual who initiates a clearance or a boundary change request.

3.15 Rollback

The process of changing a clearance status to a previous status.

3.16 Standard Clearances

A clearance model used to create a clearance to support preventive maintenance work activities. The model can be used repetitively to create clearances for the same regularly scheduled preventive maintenance work activity on the same piece of equipment. Clearance models are not used to create clearances to support corrective maintenance work activities. A clearance model can be derived from a historical clearance or independently developed and must be approved for use by an individual knowledgeable with the clearance process.

3.17 Station/Line Clearances

Station/Line Clearances are administered by System Operations. NGGM-IA-0003, Transmission Interface Agreement for Operation, Maintenance, and Engineering Activities at Nuclear Plants, should be used to identify responsibility boundaries between Nuclear Plant Operations and System Operations.

3.18 Supplement Sheet

An attachment to an Operations Clearance that is used to track work activities and other related clearances.

3.19 Tag Hanger

An individual that is qualified to hang and remove clearances.

3.20 Tag Verifier

An individual that is qualified to verify components are positioned correctly and clearance tags are installed and removed according to this procedure.

3.21 Work Control Center (WCC)

An office located away from the Control Room where assigned personnel prepare, coordinate and track Operations Clearances and perform other administrative functions related to coordination of plant activities.

9.2.2 Operations Clearances Preparation and Restoration

11. A Clearance Preparer can use a standard clearance to create a new clearance to support preventive maintenance work activities. The Clearance Preparer and verifier must confirm the accuracy of the standard clearance by reviewing the tag sheet, supplement sheet, and special instructions. If the standard clearance is accurate for the preventive maintenance activity, then it is not necessary to include reference materials (prints, OP lineup sheets) in the clearance package. If the standard clearance is not accurate for the preventive maintenance activity, then it must be revised, noted in special instructions and reapproved before it can be used to create a new clearance.

9.2.3 Personal Clearances Preparation and Restoration

1. The preparer shall review the scope of the maintenance and any related reference materials (CWDs, procedures, flow diagrams, and so forth) to determine the necessary clearance boundary.

2. The preparer will complete the next available entry on the Clearance Log (Attachment 1) with the following information:

    - The next sequential clearance number
    - The system number
    - The component description
    - The reason for the clearance (include the work item number or procedure)

3. The preparer will then complete the Clearance Form (Attachment 7) by providing the following information:

    - The clearance number
    - Equipment to be cleared
    - Work Item number or Procedure to be performed
    - Clearance tag numbers
    - Order to be hung (the sequence the clearance tags are to be hung, if the sequence is not applicable, record N/A)
    - Equipment Description
    - Component clearance position
    - Ground tags as needed

PP-3.4 003
During the review of a clearance request it is determined that there is an existing applicable Master Clearance. Which of the following would be the appropriate course of action?

✓A. The work can be performed under the Master Clearance, the technician signing on is responsible for ensuring adequate clearance boundary

B. The work can be performed under the Master Clearance, the Master Clearance holder is respondsible for ensuring adequate clearance boundary

C. The work can only be performed under the Master Clearance if there is no "crossing of disiplines". (ie. Mechanical work can only be performed under a Mechanical Clearance and Electrical work only under an Electrical Clearance)

D. The work can not be performed under the Master Clearance. A seperate clearance must be in effect for each job in progress.

Question: 36

Given the following conditions:

- EPP-008, SI Termination, is being performed following an inadvertent SI.
- One CSIP has been secured.
- The normal CSIP miniflow isolation valves will **NOT** open.

Which of the following actions should be taken?

a. Maintain BIT flow until the miniflow isolation valves are manually opened

b. Direct an NLO to open the valves locally and continue to the next step once the directions have been provided

c. Initiate and maintain at least 30 GPM RCP seal injection flow until the miniflow isolation valves are open

d. Initiate and maintain at least 60 GPM CSIP flow until the miniflow isolation valves are open

Answer:

d. Initiate and maintain at least 60 GPM CSIP flow until the miniflow isolation valves are open

QUESTION NUMBER: 36
TIER/GROUP: ***RO*** 1/2 ***SRO***

K/A: WE02EA1.1

Ability to operate and / or monitor the following as they apply to the (SI Termination) Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

K/A IMPORTANCE: ***RO*** 4.0 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: EOP-3.1

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis
j. SI termination sequence

REFERENCES: EPP-008

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.1 018

JUSTIFICATION:

a. Plausible since this would maintain pump protection, but would not meet the goal of terminating SI.

b. Plausible since this is a standard response when implementing EOPs, but specific instructions require that pump protection be maintained.

c. Plausible since this would maintain some minimum pump flow, but flow would be inadequate to provide pump protection.

d. **CORRECT** Minimum pump flow for pump protection must be maintained. If flow cannot be established through the miniflow, a minimum value of normal charging flow must be maintained.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analyis of actions required to protect equipment based on plant conditions

REFERENCES SUPPLIED:

Instructions	Response Not Obtained
NOTE: Additional foldout item, "SI REINITIATION CRITERIA" applies.	
4. Check Miniflow Status:	
a. Check CSIP suction - ALIGNED TO RWST	a. Initiate charging AND maintain at least 60 GPM flow through CSIP. Do NOT shut charging flow control valve in Step 6. GO TO Step 5.
b. Open normal miniflow isolation valves: 1CS-182 1CS-196 1CS-210 1CS-214	b. Initiate charging AND maintain at least 60 GPM flow through CSIP until normal miniflow valves opened. Do NOT shut charging flow control valve in Step 6.
5. Isolate High Head SI Flow:	
a. Shut BIT outlet valves: 1SI-3 1SI-4	a. Locally shut OR isolate valves.
b. Verify cold leg AND hot leg injection valves - SHUT 1SI-52 1SI-86 1SI-107	b. Locally shut valves.

Question: 37

Given the following conditions:

- The plant is operating at 100% power.
- The Steam Dump System is in the T-AVG Mode.
- A transient results in a rapid loss of load to 45%.

Which of the following describes the **INITIAL** response of the listed valves to this event?

	CONDENSER DUMPS	**ATMOSPHERIC DUMPS**	**INTERCEPT VALVES**
a.	Open	Open	Remain Open
b.	Open	Open	Close
c.	Open	Remain Closed	Remain Open
d.	Remain Closed	Open	Close

Answer:

a.	Open	Open	Remain Open

QUESTION NUMBER: 37
TIER/GROUP: ***RO*** 2/3 ***SRO***

K/A: 041K4.14

Knowledge of SDS design feature(s) and/or interlock(s) which provide for the following: Operation of loss-of-load bistable taps upon turbine load loss

K/A IMPORTANCE: ***RO*** 2.5 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.15

IDENTIFY the expected response of the steam dump system to a given load rejection or a turbine trip per AOP-015

REFERENCES: AOP-015

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.15 003

JUSTIFICATION:

a. **CORRECT** While operating in T-AVG mode, a load rejection of at least 40% will cause both the condenser dumps and atmospheric dumps to actuate. Intercept valves will only close if a complete loss of load occurs while above 22%.

b. Plausible since condenser and atmospheric dumps will both operate, but intercept valves will remain open since a complete loss of load has not occurred.

c. Plausible since condenser will operate and intercept valves will remain open, but atmospheric dumps operate on a loss of load greater than 40%.

d. Plausible since atmospheric dumps operate on a loss of load greater than 40%, but condenser dumps operate on loss of load greater than 10%.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comprehension of the effects of changing plant conditions on system operations

REFERENCES SUPPLIED:

SECONDARY LOAD REJECTION

1.0 SYMPTOMS

1. Step decrease in unit export load or steam flow
2. Steam Dump actuation
3. SG PORVs opening
4. Control rod insertion if Rod Control is in automatic
5. MSR relief valves opening
6. Both Generator output breakers indicate open
7. Governor valve and intercept valve closure
8. ALB 20-2-2, TURBINE RUNBACK OPERATIVE alarm
9. RUNBACK OPER light on DEH control panel
10. ALB 22-6-1B, GENERATOR BKR 52-7 TRIP alarm
11. ALB 22-6-1A, GENERATOR BKR 52-9 TRIP alarm
12. ALB 10-6-4B, RCS TREF/TAVG HIGH-LOW alarm

2.0 AUTOMATIC ACTIONS

1. Steam Dump valves operate:
   a. In T-AVG mode, upon a rapid loss of load greater than 10% (40% load for atmospheric dumps)
   b. In T-AVG mode, if Turbine trips (both groups of condenser dumps control at no-load Tavg)
   c. In steam pressure mode, when steam pressure exceeds controller setpoint (nominally 1092 psig)
2. SG PORVs start to open when main steam pressure exceeds controller setpoint (nominally 1106 psig).
3. Governor and intercept valves shut if load drop anticipator senses a complete loss of load above 22% power.

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

AOP-3.15 003
Upon a rapid loss of load greater than________, the condenser steam dump valves will operate if in T-AVG Mode.

✓A. 10 percent

B. 22 percent

C. 40 percent

D. 50 percent

Question: 38

Given the following conditions:

- The plant is operating at 100% power.
- Charging flow is 150 gpm.
- Letdown flow is 45 gpm.
- Seal injection flow is 10 gpm to each RCP.
- RCP #1 Seal Return is 3 gpm from each RCP.
- Pressurizer level is stable.

Which of the following describes the RCS leak rate **AND** the required action based on the leak rate?

	LEAK RATE	**REQUIRED ACTION**
a.	126 gpm	Perform a plant shutdown per GP-006
b.	126 gpm	Manually trip the reactor and initiate safety injection
c.	135 gpm	Perform a plant shutdown per GP-006
d.	135 gpm	Manually trip the reactor and initiate safety injection

Answer:

b.	126 gpm	Manually trip the reactor and initiate safety injection

2.0 AUTOMATIC ACTIONS

1. Reactor trip will occur if PRZ pressure drops below 1960 psig (rate compensated).
2. SI will actuate from either of the following:
   - PRZ pressure signal of 1850 psig
   - CNMT pressure signal of 3 psig
3. CNMT ventilation isolation will actuate on 2/4 high radiation level signal from CNMT ventilation isolation monitors (REM-3561A,B,C,D).
4. CNMT normal purge and supply will isolate on a high radiation level signal from RM 3502A, RCS leak detection radiation monitor (Ref: FSAR Section 12.3.4).
5. Letdown will isolate on low PRZ level (17%).
6. RWST valves to charging pumps will open on low-low VCT level (5%) and VCT outlet valves will shut after RWST valves open.
7. RCP thermal barrier flow control valve (1CC-252) will close on a high flow (174 gpm) signal from the RCP thermal barrier heat exchangers.

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

3.2 Follow-up Actions

R NOTE: RCS leakage in excess of Tech Spec limits may require initiation of the Emergency Plan.

1. IF RHR is in operation, THEN Go To AOP-020, Loss of RCS Inventory or Residual Heat Removal While Shutdown.
2. Refer to PEP-110, Emergency Classification and Protective Action Recommendations, and enter the EAL Network at entry point X.
3. R IF at anytime, RCS leakage is determined to be greater than automatic OR manual VCT makeup capability, THEN perform the following:
   a. Trip the reactor.
   b. Manually initiate safety injection (Ref: CAP 91H0993).
   c. Go To EOP Path-1.
4. Verify Reactor Makeup Control System operates to maintain VCT level.

QUESTION NUMBER: 38
TIER/GROUP: ***RO*** 1/2 ***SRO***

K/A: 009EA2.25

Ability to determine or interpret the following as they apply to a small break LOCA: Reactor Trip setpoints

K/A IMPORTANCE: ***RO*** 3.9 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 3/10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.16

Given a set of plant conditions, PERFORM an RCS flow balance calculation and DETERMINE if a reactor trip and Safety Injection are required.

REFERENCES: AOP-016

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.16 013

JUSTIFICATION:

a. Plausible since leakage rate is calculated correctly, but trip and SI is required since leakage rate exceeds makeup capabilities.

b. **CORRECT** Leak rate is determined by adding charging and seal injection and subtracting letdown and seal return (150 + 30) - (45 + 9) = 126 gpm. A reactor trip and SI would be required since this leakage exceeds the capabilities of makeup.

c. Plausible since leakage rate calculated would account for all but seal return, but seal return must be included and trip and SI is required.

d. Plausible since leakage rate calculated would account for all but seal return and trip and SI is required, but seal return must be included.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of calculation based on plant parameters

REFERENCES SUPPLIED:

3.2 Follow-up Actions (continued)

5. Maintain PRZ level:

- Verify charging flow.
- IF necessary, THEN isolate letdown.

6. Isolate Sampling System:

a. Notify Chemistry to stop any primary sampling activities.

b. Shut the following:

- 1SP-945, RCS Loop B Hot Leg Smpl Isol
- 1SP-944, RCS Loop C Hot Leg Smpl Isol

c. Verify the following are shut:

- 1SP-40, Pressurizer Liquid Sample Isol
- 1SP-41, Pressurizer Liquid Sample Isol
- 1SP-59, Pressurizer Stm Space Sample Isol
- 1SP-60, Pressurizer Stm Space Sample Isol

7. Determine leak rate as follows:

a. Perform an RCS flow balance calculation as follows:

(1) Control charging flow using FK-122A.1 to stabilize PZR level.

(2) Operate letdown orifice valves, 1CS-7, 1CS-8, and 1CS-9 as necessary to maintain charging flow on scale.

(3) Calculate leak rate as follows:

(______ + ______) - (______ + ______) = ________

(Charging Flow	+ Total Seal Inj Flow)	- (LTDN Flow	+ Total Seal Return Flow)	= RCS Leakage (GPM)

b. IF CNMT sump in-leakage has increased, THEN refer to alarm response procedure ALB-1-6-1 to estimate leak rate.

AOP-3.16 013

The plant is operating at 100 percent power. The following conditions exist:

Charging flow	115 gpm
Letdown flow	0 gpm
Seal injection flow	10 gpm to each RCP
RCP #1 Seal Return	5 gpm from each RCP
Pressurizer level	Stable

What action should the operating crew take with regard to continued plant operation?

A. Operation may continue at full power indefinitely

B. A plant shutdown must be performed per GP-006

C. A manual reactor trip must be initiated

✓D. A manual reactor trip and SI must be initiated

Question: 39

Given the following conditions:

- A fire has occurred in cable spread Room A - RAB 286 which requires a plant shutdown.
- 'A' SG pressure is 950 psig.
- 'A' SG wide range level is 70%.
- 'A' SG narrow range level is unavailable.
- AFW flow is being supplied to 'A' SG.

Which of the following actions should be taken?

a. Decrease AFW flow to lower 'A' SG wide range level to < 67%

b. Decrease AFW flow to lower 'A' SG wide range level to < 50%

c. Increase AFW flow to raise 'A' SG wide range level to > 50%

d. Increase AFW flow to raise 'A' SG wide range level to > 67%

Answer:

a. Decrease AFW flow to lower 'A' SG wide range level to < 67%

QUESTION NUMBER: 39
TIER/GROUP: ***RO*** 1/1 ***SRO***

K/A: 0672.1.25

Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data (Plant Fire on Site).

K/A IMPORTANCE: ***RO*** 2.8 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.36-R7

Given a set of plant conditions and a copy of AOP-036, Safe Shutdown Following a Major Fire, EVALUATE the conditions and DETERMINE the appropriate response

REFERENCES: AOP-036

SOURCE: ***New*** ☒ ***Significantly Modified*** ☐ ***Direct*** ☐

Bank Number NA

JUSTIFICATION:

a. **CORRECT** Current SG level is above the maximum allowed level and must be reduced.

b. Plausible since this is the intersection of the minimum level curve and pressure line, but lowering level below this value would provide inadequate level.

c. Plausible since this is the intersection of the minimum level curve and pressure line, but level is currently above this level and increasing flow would increase it further.

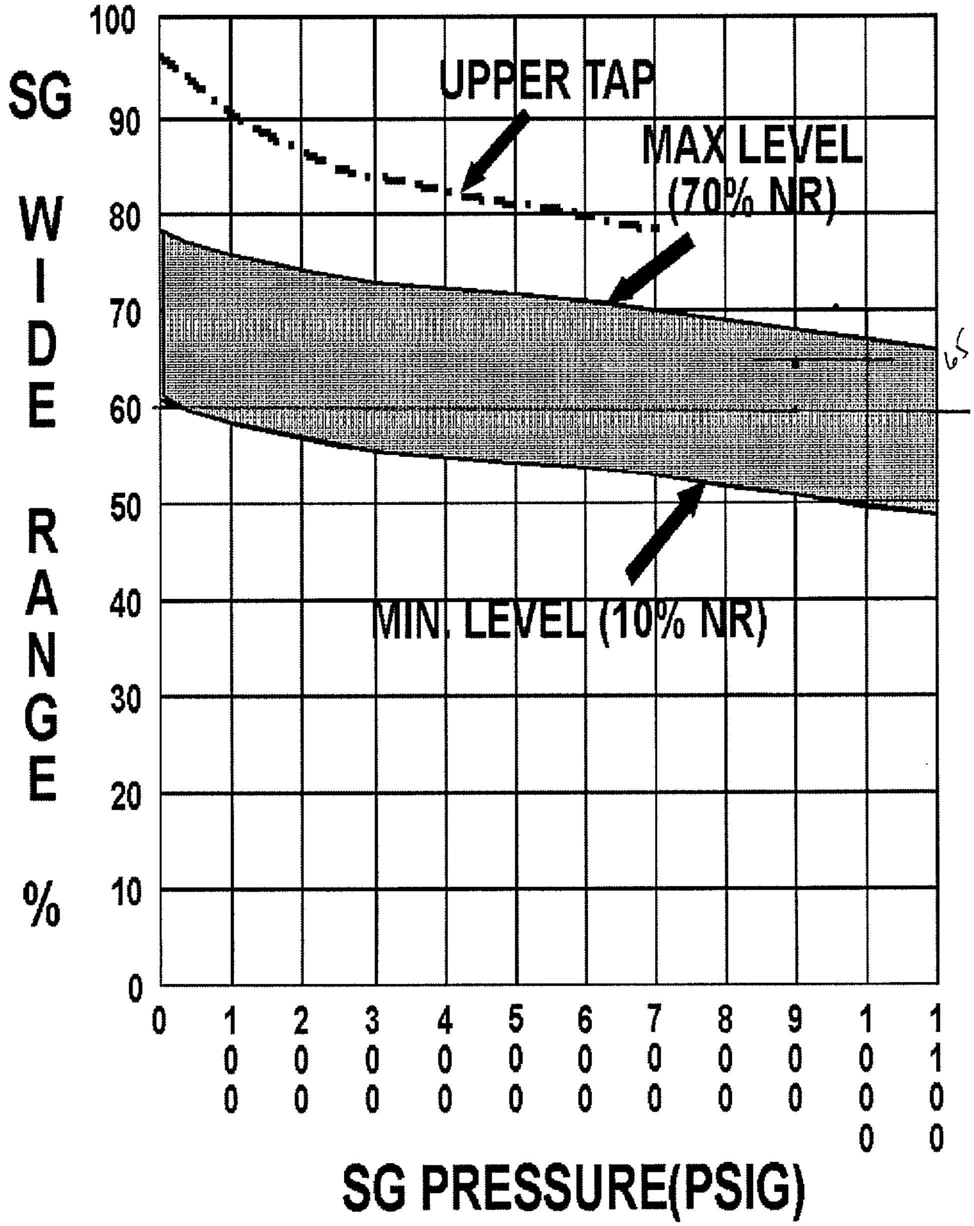
d. Plausible since this is the intersection of the maximum level curve and pressure line, but level is currently above this level and increasing flow would increase it further.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 2

Application of given data to curve to determine required actions

REFERENCES SUPPLIED: AOP-036, Attachment 6

SG Wide Range Level Band vs. SG Pressure



Question: 40

You are the on-shift control operator and you are assigned to perform an Operations Surveillance Test (OST).

Which of the following must be performed by someone other than you?

a. Sign off step completion for actions that you direct the AOs to perform

b. Complete the prerequisites section before the test starts

c. Sign the test verifying that **ALL** prerequisites have been met and that the Unit SCO has given permission for the test to begin

d. Sign the test as completed with **NO** exceptions and submit to Document Records

Answer:

d. Sign the test as completed with **NO** exceptions and submit to Document Records

QUESTION NUMBER: 40
TIER/GROUP: ***RO*** 3 ***SRO***

K/A: 2.2.12

Knowledge of surveillance procedures.

K/A IMPORTANCE: ***RO*** 3.0 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: PP-3.3

DISCUSS the role played by a Control Operator in the execution of an Operations Test and who must authorize performance of these tests

REFERENCES: OMM-007

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number PP-3.3 015

JUSTIFICATION:

a. Plausible since someone else is actually performing the steps, but it is permissible for the person directing the action to sign the step off.

b. Plausible since some prerequisites are often performed by other groups, but those prerequisites that can be completed by operations may be performed the the control operator.

c. Plausible since the Unit-SCO permission is required, but this can be signed off as stating that permission has been received.

d. **CORRECT** The Unit-SCO or S-SO is required to review and sign off all surveillance tests for completeness and accuracy.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of administrative procedural requirements

REFERENCES SUPPLIED:

5.3.1 <u>Procedure Administration</u> (continued)

c. Prerequisites that require verification of instrumentation free of deficiencies that affect instrument indication, are to ensure that before starting a test the instrument is available and capable of providing reliable data for performance of the test. In cases where the purpose of the test is to check instrumentation (such as channel checks in the Daily Surveillance Log) the instruments should not be considered when evaluating the Prerequisite condition.

9. After reviewing the Prerequisites the Unit SCO permission shall be obtained and documented as follows:

   a. If all Prerequisites have been met, the person performing the Prerequisites may sign the authorization block indicating that permission has been obtained.

   b. If any Prerequisite has not been performed, the Unit SCO or Superintendent - Shift Operations must sign the authorization block authorizing performance of the test and acknowledging that the Prerequisites not met have appropriate entries made as to why the Prerequisites are not met and that the test may still be performed without completion of the Prerequisites.

10. Unless stated in the procedure, each step in Section 7.0 shall be performed in numerical order.

11. Each procedure Step shall be initialed by the person performing the Step or, if the Step is directing actions of others, by the person responsible for the overall completion of the test.

12. Initialing of Steps performed by other people is typically done after receiving confirmation from the person completing the step that the step is complete. In cases where support activities are directed to be performed and continuation of the test is not immediately dependent on the support activity, the step can be signed based on directing the activity to be performed (For example, if Maintenance is directed to remove a test gauge in Step 4 but the gauge will not be verified removed until Step 8, Step 4 can be signed because Step 8 will ensure that the action has been completed).

13. When Steps are being performed that check the installation or removal of test equipment, the subsequent procedure steps may be completed provided the subsequent steps do not rely on the installation or removal of test equipment. The test cannot be considered completed until system configuration is restored, including removal of equipment installed for testing.

14. Independent verification shall be performed as required by PLP-702, Independent Verification. It is permissible to continue with the test after directing that independent verification be performed. However, a component shall not be declared operable prior to performance of the independent verification.

15. The last Step in Section 7.0 should be to complete the applicable portions of the Certifications and Review page.

5.3.1 Procedure Administration (continued)

16. The Unit SCO (S-SO for CASE I and II tests) will review all surveillance tests completed during the shift. The review is for completeness and accuracy. The review shall be indicated by signing and dating in the proper space.

17. For testing where an entire procedure is not required (such as, retests, post-maintenance testing, increased test frequency testing, and so forth) the Unit SCO shall determine pages required to properly document completion of a procedure (for example, cover page or current change form, pages with initialed steps and attachments.) These pages shall be transmitted to document services for retention. The pages used shall be listed in the comments section of the procedure.

18. Refer to AP-100 for guidance on marking Steps N/A.

19. The use of notes shall not be used in lieu of procedural changes to document the performance of a step or section in a manner other than described by the procedure. If a procedure is incorrect then the procedure shall be changed to correct the problem before continuing with the procedure.

20. For tests completed in their entirety, all pages shall be used to properly document completion of the test with the exception of tests that have work sheets and scratch sheets for manual execution of the test and the test is normally performed on a computer and so forth. Tests that contain such work sheets or forms should not have those forms turned in if they are to be left blank.

21. The following attachments are presented here as examples and are not required for all procedures, but if they are used, they should follow the format as described. Other formats may be used with the approval of the Procedure Coordinator as long as the formats are in compliance with AP-005.

    a. Calibration Data Attachment - The calibration due dates shall be recorded and verified before performing the test.

    b. Performance Data Attachment - Performance Data shall be data recorded during the performance to ensure operability of the equipment with the exception of vibration and Inservice Inspection Valve Data.

    c. Vibration Data Attachment - This attachment shall be used to record the vibration data. This attachment includes the vibration amplitudes as necessary for Inservice Inspection requirements.

    d. Valve Test Data Attachment - The Inservice Testing requirements for valves are recorded on this attachment. The attachment normally consists of two tests, a Full Stroke Test and a Fail Safe Test.

        (1) The Full Stroke Test verifies the ability of the valve to go through a complete cycle without any indication of binding. The verification of travel shall usually be observing the stem indicator or indicating lights.

PP-3.3 015
You are the on-shift control operator and you are assigned to perform an Operations Surveillance Test (OST). Which of the OST related tasks below cannot be performed by you as control operator?

A. Read purpose and precaution and ensure that you understand the procedure's intent.

B. Complete the prerequisites section to ensure a proper lineup exists before the test starts.

✓C. Sign the test verifying that the prerequisites have been met and that the test procedure may begin.

D. Collect the necessary special tools and equipment specified for the test.

Question: 56

What are the normal and alternate power supplies to PIC-17?

	Normal	Alternate
a.	UPS Instrument Bus IDP-1A-S1	Appendix R Inverter
b.	UPS Instrument Bus IDP-1A-S1	UPP-1
c.	Appendix R Inverter	UPS Instrument Bus IDP-1A-S1
d.	Appendix R Inverter	UPP-1

Answer:

a.	UPS Instrument Bus IDP-1A-S1	Appendix R Inverter

QUESTION NUMBER: 56
TIER/GROUP: ***RO*** 2/2 ***SRO***

K/A: 062K2.01

Knowledge of bus power supplies to the Major system loads

K/A IMPORTANCE: ***RO*** 3.3 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: AOP-3.4-A2

IDENTIFY the normal and alternate power supplies for PIC-17, PIC-18, and PIC-19

REFERENCES: OP-156.02
LP-AOP-3.4

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AOP-3.4-A2 004

JUSTIFICATION:

a. **CORRECT** PIC-17 normal power supply is Instrument Buses IDP-1A-SI and alternate power supply is from MCC 1A31-SA through Appendix R Transformer.

b. Plausible since PIC-17 normal supply is listed correctly, but alternate supply is Appendix R Transformer.

c. Plausible since both supply PIC-17, but are listed in reverse order.

d. Plausible since Appendix R Transformer is alternate supply and UPP-1 is supply to PIC-19.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operations

REFERENCES SUPPLIED:

5.7.2 Procedural Steps (continued)

NOTE:
- The PIC Primary Power Supply is the Upper Power Supply and the PIC Secondary Power Supply is the Lower Power Supply in the Center Bay of each PIC.
- If any of the PIC power supplies have two breakers and must be switched OFF, the DC OUTPUT breaker is operated first and then the AC INPUT breaker operated.

2. At the appropriate PIC, verify Primary and Secondary Power Supplies OFF.

	Instrument Bus	Process Instrument Cabinet
a.	IDP-1A-SI	PIC Cab 1
b.	IDP-1B-SII	PIC Cab 2 & Cab 10
c.	IDP-1A-SIII	PIC Cab 3, Cab 9 & Cab 13
d.	IDP-1B-SIV	PIC Cab 4 & Cab 14

3. At the appropriate PIC, verify circuit breakers 3 and 4 are open. (Located on the back side of the PIC)

	Instrument Bus	Process Instrument Cabinet
a.	IDP-1A-SI	PIC Cab 1
b.	IDP-1B-SII	PIC Cab 2 & Cab 10
c.	IDP-1A-SIII	PIC Cab 3, Cab 9 & Cab 13
d.	IDP-1B-SIV	PIC Cab 4 & Cab 14

NOTE: The Secondary Power Supply should **NOT** be de-energized for PIC 17 and PIC 18 in the following Step. These PICs have Secondary Power Supplies from the Appendix R Inverters and should continue to function.

4. At the appropriate PIC, verify the Primary Power Supply (Upper Power Supply) OFF.

	Instrument Bus	Process Instrument Cabinet
a.	IDP-1A-SI	PIC Cab 17
b.	IDP-1B-SII	PIC Cab 18

5. At the appropriate 480V Emergency MCC, place the respective 7.5 KVA Inverter Breaker in the ON position:

	Inverter	Breaker
a.	Channel I	1A21-SA-3BR
b.	Channel II	1B21-SB-1CL
c.	Channel III	1A31-SA-6AL
d.	Channel IV	1B31-SB-3CR

c. Located in cable spread rooms

d. Control functions (not all-inclusive)

(1) HVAC

(2) Accumulator discharge valves

(3) Remainder of slave relays

(4) Electrical distribution

4. Appendix R transformers

a. Provides power to two PICs

AO Objective 1e

(1) PIC-17 (SA)

(2) PIC-18 (SB)

b. Located in RAB-286

c. Provides instrument power distribution independent of 305 level

d. PIC-19

- Nonsafety (not powered from Appendix R inverters)

AO Objective 2, Figure 7.15

5. Power supplies

a. PIC-17

(1) Normally powered from 7.5 KVA UPS Instrument Bus 1DP-1A-SI

(2) Backup powered from MCC 1A31-SA (RAB-286) through Appendix R Transformer (RAB-286) and PP-1A312-SA (RAB-286)

Figure 7.16

b. PIC-18

(1) Normally powered from 7.5 KVA UPS Instrument Bus 1DP-1B-SII

(2) Backup powered from MCC 1B31-SB (RAB-286) through Appendix R transformer (RAB-286) and PP-1B312-SB (RAB-286)

c. PIC-19

(1) UPP-1 Ckt 29

Question: 57

Given the following conditions:

- A rapid shutdown is required per GP-006.
- It is estimated that 1300 gallons of boric acid will be required to complete the shutdown, but the actual required volume has **NOT** yet been calculated.

The actual required volume must be calculated prior to ...

a. commencing the boration.

b. borating > 500 gallons.

c. borating > 650 gallons.

d. reducing turbine load.

Answer:

b. borating > 500 gallons.

QUESTION NUMBER: 57
TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 0042.4.49

Ability to perform without reference to procedures those actions that require immediate operation of system components and controls (Chemical and Volume Control System).

K/A IMPORTANCE: ***RO*** 4.0 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: PMS-R8

IDENTIFY lessons learned from related industry events

REFERENCES: OP-107

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number PMS-R8 001

JUSTIFICATION:

a. Plausible since the calculation would be performed before borating during a normal down power transient.

***b.* CORRECT** On a rapid shutdown, boration should be commenced before performing the actual calculation provided that the calculation is completed before 500 gallons of boric acid or 1/2 of the estimated required boric acid is added, whichever is more limiting.

c. Plausible since the calculation must be completed before 1/2 of the required boric acid is added unless the total estimated boration is > 1000 gallons, then it must be calculated before 500 gallons are added.

d. Plausible since the boration, and thus the calculation, would be performed before lowering load during a normal down power transient.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural requirements

REFERENCES SUPPLIED:

8.21 Rapid Addition of Boric Acid to RCS

8.21.1 Initial Conditions

1. Plant conditions (other than those requiring entry into AOP-002) are such that rapid RCS Boration is required.

2. The amount of Boric Acid addition has been estimated.

3. Charging and letdown are in service.

8.21.2 Procedural Steps

NOTE: If performing a rapid shutdown of the plant per GP-006, the following calculation does not have to be completed before boration begins, but should be completed before half of the estimated (or before 500 gallons whichever is less) boron addition has been dispensed.

1. Determine the volume of boric acid necessary to achieve the required RCS boron concentration and enter the amount on Attachment 18.

2. Verify the backup Boric Acid Transfer Pump control switch is in STOP.

3. Start the Boric Acid Transfer Pump aligned for Auto Make-up (switch in AUTO) by placing the control switch to START.

4. If using 1CS-278 SB, EMERGENCY BORIC ACID ADDITION for Boric Acid addition perform the following: (This Step is N/A if using 1CS-283 and 1CS-156 for Boric Acid addition)

    a. Record the initial BAT level for backup calculation of Boric Acid addition on Attachment 18.

    b. Open 1CS-278 SB, EMERGENCY BORIC ACID ADDITION and record the time on Attachment 18.

    c. Record the Boric Acid flowrate from FI-110 on Attachment 18.

    d. On Attachment 18, calculate the amount of time in minutes it will take to deliver the required amount of Boric Acid.

    e. Control charging and letdown to maintain normal PRZ and VCT levels.

    f. Independently verify the calculation performed in Step 8.21.2.0.4.d above.

    g. Calculate the final BAT level for the required amount of Boric Acid being added.

    h. Independently verify the calculation performed in Step 8.21.2.0.4.g above.

    i. Shut 1CS-278 SB after the calculated amount of time has elapsed.

PMS-R8 001

As RO, a rapid shutdown is required per GP-006. The SCO directs you to perform a rapid addition of boric acid to the RCS. What guidance is provided in OP-107?

A. When the rod insertion alarm actuates, initiate emergency boration per AOP-002.

B. Calculate the amount of boration, then initiate boric acid flow using 1CS-278.

C. Calculate the amount of boration, then initiate boric acid flow using 1CS-283.

✓D. Commence the boration immediately and complete the calculation before half of the estimated boration is added.

Question: 58

Given the following conditions:

- The AutoLog is **NOT** functioning.
- The Reactor Operator is maintaining a manual log.

The following log entries have been made:

- 0956 B-SB CSIP trip
- 1005 Started A-SA CSIP per AOP-018
- 1011 Established normal letdown

At 1030, the Reactor Operator realizes he forgot to make a 0957 entry that letdown had been isolated.

Which of the following entries would be a proper entry in accordance with OMM-016, Operator Logs?

a. *1030 Isolated normal letdown

b. L.E. 1030 Isolated normal letdown

c. *0957 Isolated normal letdown

d. L.E. 0957 Isolated normal letdown

Answer:

d. L.E. 0957 Isolated normal letdown

QUESTION NUMBER: 58
TIER/GROUP: ***RO*** 3 ***SRO***

K/A: 2.1.18

Ability to make accurate, clear and concise logs, records, status boards, and reports.

K/A IMPORTANCE: ***RO*** 2.9 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 10 ***55.43(b) SRO***

OBJECTIVE: PP-3.10-R4

STATE the following requirements as they apply to a CO's narrative log
- How to make entries which are not in chronological order

REFERENCES: OMM-016

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number PP-3.10-R4 001

JUSTIFICATION:

a. Plausible since the autolog entry time is automatically entered, but each entry must identify when the actual event occurred.

b. Plausible since this would place the entries in the correct order, but late entries are made by annotating the correct time and checking the late entry box.

c. The autolog entry is time stamped when the entry is made so each entry must identify when the actual event occurred. If a late entry is made, the late entry box must be checked.

d. **CORRECT** When making a late entry, the letters "LE" followed by the actual time of the event are to be entered.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of administrative procedural requirements

REFERENCES SUPPLIED:

Backup Hard Copy Narrative Logs

1. In the event of a computer system extended failure (beyond shift turnover) where computerized log entries are not possible, then manual narrative logs are to be maintained as follows:

   a. Hard copy narrative log entries should be made in black ink only.

   b. Time entries are to be made using the 24- hour clock format.

   c. The initial entry in the log upon assuming the watch should be made.

   d. At the end of each shift, the off-going operator signs the log signifying that the entries are an accurate record of the events that occurred on their watch.

   e. If it becomes necessary to make a log entry out of chronological order, the log entry MUST be noted with the actual time of the event and marked "L.E."

   f. Corrections to hard copy logs shall be made as follows:

      (1) Draw a single line through the incorrect entry.

      (2) Initial and date the line out.

      (3) Record the correction adjacent to the original entry.

2. Once the computer system has been recovered, all backup hard copy log entries should be entered into the AutoLog database.

   a. If the person entering the data into the database is other than the person who made the hard copy entries, each entry into the database must be annotated to identify the individual who made the associated hard copy entry.

   b. The applicable backup hard copy logs must be retained and be subject to the same document control requirements as the computer generated narrative logs.

   c. If the backup hard copy log entries are not entered into the Auto Log database then the original backup hard copy logs will be retained in the Main Control Room for 30 days and then transmitted to the vault for permanent storage as a QA record.

Question: 59

Both Condensate Pumps, both Condensate Booster Pumps (CBPs), and the 'A' Main Feed Pump (MFP) are running.

Which of the following will cause an automatic start of the 'B' MFP?

a. 'A' MFP trips on low lube oil pressure

b. 'A' MFP trips on low discharge pressure

c. A' MFP trips on low flow

d. 'A' MFP control switch is taken to the STOP position

Answer:

a. 'A' MFP trips on low lube oil pressure

QUESTION NUMBER: 59
TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 059A2.07

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

K/A IMPORTANCE: ***RO*** 3.0 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: CFW-A2

STATE the two conditions which will cause an automatic start of an idle MFP

REFERENCES: SD-134

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number CFW-A2 002

JUSTIFICATION:

a. **CORRECT** With only one MFW pump running the other pump will autostart if the running pump trips on low lube oil pressure at 9 psig or an 86 lockout of the running pump motor breaker.

b. Plausible since the pump will autostart on a trip of the running pump, but only on low lube oil pressure at 9 psig or an 86 lockout of the running pump motor breaker.

c. Plausible since other pumps in the condensate and feedwater system trip on low flow, but a feedwater pump will auto start only on low lube oil pressure at 9 psig or an 86 lockout of the running pump motor breaker.

d. Plausible since the pump will autostart on a trip of the running pump, but only on low lube oil pressure at 9 psig or an 86 lockout of the running pump motor breaker.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operations

REFERENCES SUPPLIED:

4.6.4 Feed Pumps (continued)

The electric lube oil pumps will start when either condensate pump is running. A lube oil pressure switch will cycle to maintain 11-17 psig lube oil pressure. When the MFP is started, the attached lube oil pump will generate >17 psig and cause the electric pump to cycle off. With no condensate pumps running the electric lube oil pump will run for 20 minutes after MFP shutdown to allow for rotor coastdown.

The main feed pumps are equipped with an auto start feature. If only one pump is running, the other pump will automatically start if the start permissive relay is energized and the running pump generates the start signal by any of the following:

- Low lube oil pressure trip at 9 psig
- Pump motor lockout relay operation (86)

5.0 INTERFACE SYSTEMS

A number of systems are required for the proper long term operation of the feed and condensate system. Additionally, the condensate system supports the operation of several important plant systems. The importance of any specific system interface varies and is discussed in the following paragraphs. In many cases, the plant can be operated for limited periods without adverse effect with a given system interface inoperative. Refer to the indicated System Description for a complete discussion of the interface system.

5.1 Systems Required for Support

5.1.1 Power Supplies (SD-156)

6.9 KV AC power is required for operation of the main system pumps and 480 volt AC power is required for the various auxiliary pumps. System valves require 480 volt AC, 120 volt AC, or 125 volt DC power for proper operation.

5.1.2 Service Water (SD-139)

Service water is the cooling medium for the oil coolers serving the condensate, condensate booster, and feed pumps. The pumps cannot be operated for prolonged periods of time without adequate cooling of their respective oil systems.

5.1.3 Feedwater Heaters, Vents, and Drains (SD-136)

Feedwater is heated by the feedwater heaters. The proper functioning of this system is essential for efficient plant operation. Various plant high pressure drains are returned to the shell side of heater set number

Question: 60

Given the following conditions:

- The plant was at 100% power when a Main Steam Line break occurred outside containment.
- 'A' SG is indicating 400 psig.
- Containment pressure is -0.27 inches water gauge.

Which of the following Containment Ventilation fans will be operating?

a. Containment Pre-entry Purge Exhaust

b. Containment Pre-entry Purge Make-up

c. Normal Containment Purge Make-up

d. Airborne Radioactivity Removal

Answer:

d. Airborne Radioactivity Removal

QUESTION NUMBER: 60
TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 022K4.03

Knowledge of CCS design feature(s) and/or interlock(s) which provide for Automatic containment isolation

K/A IMPORTANCE: ***RO*** 3.6 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: CVS-R1

EXPLAIN the operation of the containment ventilation system as a result of the following conditions
d. Containment phase B isolation signal occurs

REFERENCES:
OMM-004
SD-168
LP-CVS-3.0

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number CVS-R1 002

JUSTIFICATION:

a. Plausible if it is not recognized that a low steam line pressure will cause an SI which will cause a CVI signal, resulting in a trip of this fan if it was previously operating.

b. Plausible if it is not recognized that a low steam line pressure will cause an SI which will cause a CVI signal, resulting in a trip of this fan if it was previously operating.

c. Plausible if it is not recognized that a low steam line pressure will cause an SI which will cause a CVI signal, resulting in a trip of this fan if it was previously operating.

d. **CORRECT** Fan is normally operating at power and does not receive a trip signal from Containment Ventilation Isolation.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Integration of system knowledge and plant status based upon initial conditions

REFERENCES SUPPLIED:

Containment Ventilation Isolation Verification

TRAIN - A Components	REQ POS	POS CK	TRAIN - B Components	REQ POS	POS CK
MAIN CONTROL BOARD					
1CB-2 SA VACUUM RELIEF	SHUT		1CB-6 SB VACUUM RELIEF	SHUT	
CB-D51 SA VACUUM RELIEF	SHUT		CB-D52 SB VACUUM RELIEF	SHUT	
1CP-9 SA NORMAL PURGE INLET	SHUT		1CP-6 SB NORMAL PURGE INLET	SHUT	
1CP-5 SA NORMAL PURGE DISCH	SHUT		1CP-3 SB NORMAL PURGE DISCH	SHUT	
1CP-10 SA PRE-ENTRY PURGE INLET	SHUT		1CP-7 SB PRE-ENTRY PURGE INLET	SHUT	
1CP-4 SA PRE-ENTRY PURGE DISCH	SHUT		1CP-1 SB PRE-ENTRY PURGE DISCH	SHUT	
ACTUATED BY EITHER TRAIN A OR B	E-5A CNMT PRE-ENTRY PURGE EXHAUST FAN			STOP	
	E-5B CNMT PRE-ENTRY PURGE EXHAUST FAN			STOP	
	AH-82 A NORMAL PURGE SUPPLY FAN			STOP	
	AH-82 B NORMAL PURGE SUPPLY FAN			STOP	

Comment No. Description

________ ______________________________

________ ______________________________

________ ______________________________

________ ______________________________

Signature: ________________________ Time __________

Date __________

4.5 Containment Pre-entry Purge Exhaust System (continued)

3. The CP-D2-1 Control Switch (CS-2718) is not in the shut position.

4. Locked closed valves are opened.

5. Electric power is available.

6. Instrument air is available to pneumatically operated valves and dampers.

The Containment Pre-entry Purge Exhaust System has six control switches and four alarms on the MCB, Section 1D2. There is also one Control Switch on ARP-4A(SA)R2.

The control switches are used for manual operation of the system. Two of the MCB Control Switches (CS-2694, CS-2749) operate the exhaust fans. Each of these control switches has four indicating lights: white, amber, green, and red. The white and amber lights are not used. The green light indicates the fan is stopped, and the red light indicates it is operating. If no lights are on, control power is unavailable. Two of the MCB Control Switches (CS-2691SA, CS-2692SB) operate the system isolation valves. These control switches are the same as used to operate the containment pre-entry purge make-up isolation valves (Section 4.4). Each switch has red and green indicating lights to show the status of its respective valve. The red light indicates the valve is open, and the green light indicates the valve is closed. If both lights are on, the valve is in midstroke. If no lights are on, electric power is unavailable. The last two MCB Control Switches (CS-2718, CS-2724) operate the system dampers. CS-2718 has red and green indicating lights to show the status of CP-D2-1. CS-2724 has two sets of red and green indicating lights, one for the status of CP-D8-1 and one for CP-D9-1 and CP-D10-1. Status indication is the same as for the valve indicating lights. The ARP Control Switch (CS-2691.1SA) provides a permissive for 1CP-4 (2CP-B7SA-1). No indicating lights are available.

The system has four alarms on ALB-28. Alarms are given for:

1. Low fan discharge flow (ALB-28, 3-3),

2. High filtration train humidity (ALB-28, 4-5),

3. High differential pressure across the medium efficiency filter, the HEPA filter, or the entire filtration train (ALB-28, 4-2), and

4. Charcoal filter trouble due to detector failure, pre-high temperature, or high temperature (ALB-28, 4-4).

The system is not required to operate during accident conditions. The system is normally operated in preparation for a refueling outage or other extended work. One fan is operated with the other fan on standby. Both fans cannot be operated simultaneously. The fan is started manually from the control switch. During system start-up, the low flow signal is temporarily blocked until the fan reaches full speed. The fan will automatically stop if any one of the following occurs:

(2) Outside containment tap is piped to outside of the RAB

3. Instrumentation and controls

a. Indications

Mock-up

(1) Valve/damper position on control switch

b. Controls

(1) Shut-auto-open control switches on MCB Panel 1D2

(2) Each switch controls one valve and one damper

(3) Auto-open on high-high containment—outside ΔP (<-2.25 inches wg.)

(4) Auto-close when ΔP drops below -0.25 inches wg.

(5) Auto-close on containment ventilation isolation signal

(6) Fails closed on loss of power (electric or pneumatic)

c. Alarm on containment air high vacuum ALB-028 5-1 (-1.0 inch wg.)

d. Alarm on low accumulator air pressure on valve operators ALB-028 2-1 and 3-1 (72.5 psig)

H. Containment ventilation isolation

1. Generated on

a. High radiation on 2/4 Containment Isolation System radiation monitors (2000 mR/hr) (1 CR 3561 A, B, C, and D)

b. Any SI signal

c. Manual Phase A or Phase B containment isolation actuation

2. Closes all CVS containment isolation valves

3. Trips the following fans

a. NCPMU (AH-82s)

b. CPPE (E-5s)

c. CPPMU (AH-81s)C(via interlock with CPPE fans)

Question: 76

Given the following conditions:

- The plant is at 80% power.
- A dropped rod in Group 2 of Control Bank 'D' has occurred.
- A recovery of the dropped rod has begun.
- The ROD CONTROL URGENT ALARM (ALB-013-7-1) has just alarmed.

The power cabinet causing the urgent alarm is …

a. 1AC.

b. 2AC

c. 1BD.

d. 2BD.

~~Answer:~~

QUESTION NUMBER: 76
TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 001A2.03

Ability to (a) predict the impacts of the following malfunction or operations on the CRDS- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences: Effect of stuck or misaligned rod

K/A IMPORTANCE: ***RO*** 3.5 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: RODCS-3.0-R5

DESCRIBE the major function of power cabinet components including the following:
c. Cause and results of power cabinet Urgent and Nonurgent Alarms

REFERENCES: AOP-001

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 018

JUSTIFICATION:

a.		Plausible since other group of rods, Group 1, causes alarm, but group must be powered from same power cabinet.
b.		Plausible since alarm caused by other group, and this is other banks, but group must be powered from same power cabinet.
c.	CORRECT	The other group of rods in the bank do not move when directed due to the lift coil disconnect switches being open and cause the urgent failure.
d.		Plausible since this is the group of rods which are being moved and other rods in the group have the disconnect switch open, but caused by other group in same bank.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operation

REFERENCES SUPPLIED:

Table 6.1

Power Cabinet Control

Power Cabinet	Group	Rod Banks
1AC	1	CBA CBC SDA
1BD	1	CBB CBD SDB
2AC	2	CBA CBC SDA
2BD	2	CBB CBD SDB
SC	1	SDC

3.2 Follow-up Actions (continued)

d. Record the step counter reading of the affected group:

Bank______ Group______ Steps______

e. Direct the operator to locally read the Pulse to Analog (P/A) converter reading for the affected bank:

Bank______ P/A Reading______

f. Manually zero the step counter for the affected group.

R g. IF the control rod has been misaligned for more than one hour, THEN reduce power to less than 90% prior to any rod withdrawal (Ref: SOER 84-2 Recommendation 1).

R h. Reduce turbine load by a sufficient amount to ensure that reactor power will remain below 90% as the rod is withdrawn or as recommended by Reactor Engineering (Ref: SOER 84-2 Recommendation 1).

R i. Adjust turbine load during subsequent rod withdrawal to maintain programmed Tavg (Ref: SOER 84-2 Recommendation 1).

R j. Limit power ramp rate during rod withdrawal to 5% per minute (Ref: SOER 84-2 Recommendation 1).

k. IF the control rod has been dropped for more than one hour, THEN consult Reactor Engineering prior to performing Step 3.2.7.l (Ref: SOER 84-2 Recommendation 1).

NOTE: When rod withdrawal is started, a Rod Control Urgent alarm will be received and the movement for the other group of rods in the affected bank will be locked out. Computer alarm Rod Dev/Seq NIS PWR Range Tilts may be received during rod withdrawal due to a Rod-To-Bank Deviation or Bank Sequence Error.

l. Place the Rod Motion lever to WITHDRAW.

m. Monitor the following for the dropped rod to verify rod withdrawal:

- Step counter
- DRPI

n. When the step counter reaches the position recorded in Step 3.2.7.d., THEN stop rod withdrawal.

Question: 77

Given the following conditions:

- A plant cooldown is being performed per GP-007.
- RCPs 'A' and 'C' are running.
- RCS temperature is 170 °F.
- RCS pressure is 180 psig.
- VCT pressure is 30 psig.

Which of the following describes when the operating RCPs are to be stopped?

	A' RCP	C' RCP
a.	When the RCS is < 160 °F	Immediately
b.	Immediately	Immediately
c.	When the RCS is < 160 psig	Immediately
d.	When the RCS is < 160 °F	When the RCS is < 160 °F

Answer:

b.	Immediately	Immediately

QUESTION NUMBER: 77
TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 003A1.09

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCPS controls including: Seal flow and D/P

K/A IMPORTANCE: ***RO*** 2.8 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 5 ***55.43(b) SRO***

OBJECTIVE: RCS-R3

Given a set of plant conditions, APPLY the Precautions and Limitations of OP-100

REFERENCES:

ALB-008
OP-100
SD-100.01
GP-007

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since one RCP is normally maintained in service until the RCS is below 160 degreesF, but minimum seal differential pressure is not available so the RCPs must be immediately stopped.

b. **CORRECT** RCPs must be stopped when seal differential pressure drops below 200 psid.

c. Plausible since one RCP is normally maintained in service until the RCS is below 160 degreesF, not 160 psig, but minimum seal differential pressure is not available so the RCPs must be immediately stopped.

d. Plausible since RCPs are normally maintained in service until the RCS is below 160 degreesF, but minimum seal differential pressure is not available so the RCPs must be immediately stopped.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Comparision and prioritization of different conditions requiring operator actions

REFERENCES SUPPLIED:

5.0 START-UP

5.1 Reactor Coolant Pump Start-up

5.1.1 Initial Conditions

1. The RCS is filled and vented per GP-001 OR initial pump start per GP-001.

2. Attachment 1 is complete.

3. Attachment 2 is complete.

4. № 1 Seal Leakoff Flow is in the normal operating range of Attachment 3. (Reference 2.5.0.01)

5. Reactor power is less than 25%. (Reference 2.3.0.02)
R

6. If starting RCPs for RCS fill and vent per GP-001, RCS pressure is greater than 325 psig. (Reference 2.3.0.01)
R

7. № 1 Seal ΔP is greater than 200 psid. (Reference 2.3.0.01)
R

8. Seal injection flow is 8 - 13 gpm. (Reference 2.3.0.01)
R

9. VCT temperature is between 60 and 130°F.

10. VCT pressure is greater than 15 psig.

11. No RCP related annunciators are in alarm which could adversely affect RCP operation. (Reference ERFIS GD AOP-018, Locked Rotor Monitor)

5.1.2 Procedure Steps

CAUTION

Only one RCP is to be started at any one time. If the motor is allowed to coast to a stop between starts, two successive starts are permitted. A third start may be made when the winding and the core have cooled by running for 20 minutes, or by standing idle for 45 minutes.

---

1. Verify the following before pump start:

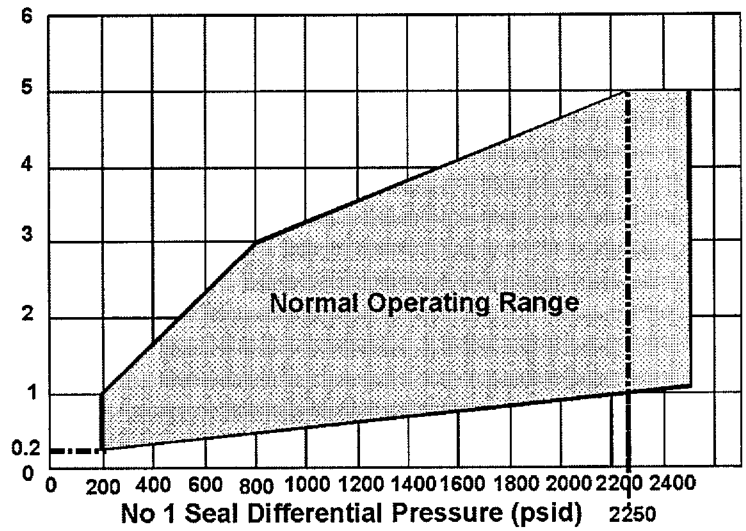
   a. If jogging RCPs per GP-001, RCS Pressure is greater than 325 psig. (Reference 2.3.0.01)
   R

   b. № 1 Seal ΔP is greater than 200 psid.

NOTE: VCT Outlet Temp TE-116 should be used for seal injection water temperature.

   c. Seal Injection flow is between 8 and 13 gpm at a temperature between 60 and 130°F. (Reference 2.3.0.01)
   R

Nº 1 Seal Performance Parameters



Drawing Reference VM-MRF, Section 4 Product Update S-009, Mar 1988

Plant Startup/Shutdown	Normal Range	Minimum	Maximum	Notes
FLOW (GPM)	N/A	0.2	N/A	a, b, c, d
Δ P	N/A	200	N/A	a, b, c

Continuous Operation	Normal Range	Minimum	Maximum	Notes
FLOW (GPM)	1.0 TO 5.0	0.8	6.5	a, d, e, f
Δ P	2250	2150	2300	N/A

NOTES

a. Inform Responsible Engineer (RCP) to evaluate the operating and troubleshooting guidelines in the RCP Technical manual for leak rates outside the specified values. (Reference 2.5.0.01)

b. Minimum RCP startup requirements are 0.2 gpm at a ΔP of 200 psi. If 0.2 gpm at 200 psi is not met then inform Responsible Engineer (RCP) and refer to Section 8.13 for guidance.

c. For start-up at ΔPs greater than 200 psi, the minimum Nº 1 seal leakoff is determined from the Nº 1 Seal Normal Operating Range, curve. For example, at a ΔP of 1000 psi the minimum seal leakrate is 0.5 gpm.

d. High flow alarm setpoint is 6.5 gpm per PCR-2249.

e. If the Nº 1 Seal leakoffs are outside the Normal Operating Range (1.0 - 5.0 gpm) but within the Normal Operating Limits (0.8 - 6.5 gpm) continue pump operation. Ensure that seal injection flow exceeds Nº 1 Seal leakoff for the affected RCP. Closely monitor pump and seal parameters and contact Responsible Engineer (RCP) for further instructions. Westinghouse may need to be consulted.

f. For Nº 1 Seal leakoffs outside the Normal Operating Limits (0.8 - 6.5 gpm), for Continuous Operation go to AOP-018.

4.0 PRECAUTIONS AND LIMITATIONS (continued)

22. Whenever the RCS is water solid, the RHR Pump Suction
R Valves 1RH-1, 1RH-2, 1RH-39, and 1RH-40 should remain open to insure that there is a flow path from the RCS to the RHR Suction Reliefs. (References 2.3.0.05 and 2.6.0.03)

23. When the #1 RCP Seal differential pressure is below 200 psid or when the VCT pressure is below 15 psig, the Reactor Coolant Pumps must not be operated.

24. Xenon free shutdown margin should be achieved prior to securing
R RCPs. (References 2.6.0.013 and 2.7.0.011)

25. When making a determination of RCS temperature, use all available temperature detectors to prevent reaching saturation conditions in the RCS when reducing RCS pressure.

- Wide range T_{hot}
- Wide range T_{cold}
- Core thermocouples
- RHR HX inlet & outlet temperatures

26. If all RCPs have been stopped for more than 5 minutes, and
R the reactor coolant temperature is greater than the charging and seal injection water temperature, do not restart a RCP until a steam bubble has been formed in the Pressurizer. This will minimize the pressure transient when the first pump is started and the cold water previously injected by the charging pumps is circulated through the warmer reactor coolant components. (Reference 2.6.0.03)

27. If the RCPs are secured and RHR is cooling down the RCS, the
R temperature in the RCS loops may not be equivalent throughout the system. A RCP restart should not be attempted unless a bubble is in the pressurizer. This will minimize the pressure transient when the first pump is started and the cold water previously injected by the charging pumps is circulated through the warmer reactor coolant components. (Reference 2.6.0.03)

28. The greatest improvement in reducing the risk of pressurized
R thermal shock is by procedurally verifying that all required evolutions for which RCP's would be needed are complete prior to securing the final RCP. (Reference 2.6.0.010)

29. Attempting to increase RCS boron concentration with no RCP's in
R operation can result in pockets of reduced boron concentration. PLP-629 provides guidance concerning suspected boron pockets. (Reference 2.6.0.013 and 2.7.0.011)

30. If the hot legs or cold legs temperature is greater than or equal to 140°F, the S-2 and S-4 fans need to be in service.

31. During MODE 5 operations with VCT pressure higher than RCS
R pressure gas evolution can occur. Low temperature, high pressure in the VCT allows a larger amount of gas to dissolve into the fluid. When transferred to the RCS into a lower pressure or higher temperature (relative to the VCT), nitrogen will come out of solution and accumulate in the high points (SG U-tubes, Reactor Vessel Head area). (Reference 2.7.0.06)

ALARM

RCP-A SEAL #1 LOW ΔP

AUTOMATIC ACTIONS

None

CAUSE

1. No. 1 seal failure
2. Low RCS pressure
3. Instrumentation or alarm circuit malfunction

OBSERVATIONS

1. No. 1 seal differential pressure PI-156A1

ACTIONS

NOTE: An RCP should not be operated with seal ΔP less than 200 psid or No. 1 seal leakoff less than 0.2 gpm.

1. For failed seal, go to AOP-018, Reactor Coolant Pump Abnormal Conditions.
2. If RCS pressure is low, increase RCS pressure.
3. R If alarm is in conjunction with high bearing water temperatures or high No. 1 seal flow, check RCP vibrations. If vibration readings are high, RCP must be shutdown to check for mechanical problems (Reference 4).
4. Prepare a WR/JO, if necessary.

DEVICE/SETPOINTS

RCP 1A-SN SEAL DIFF PRESS LOW	PS-156	212 psid

POSSIBLE PLANT EFFECTS

1. Wear/overheating of RCP seals
2. RCP trip
3. Plant shutdown or trip
4. LCO

4.7 Reactor Coolant Pump Operation

Certain conditions must be met prior to starting an RCP. These include:

- RCS pressure greater than 325 psig, to provide adequate NPSH.
- No. 1 seal Delta P greater than 200 psid.
- Seal injection flow greater than 6 gpm at a temperature between 60°F and 130°F.
- No. 1 seal leakoff flow between 0.2 gpm and 1.0 gpm.
- RCP standpipe at normal operating level.
- Volume Control Tank pressure greater than 15 psig, to ensure some flow up past the #2 seal.
- RCP oil levels at normal operating level.
- CCW flow to thermal barrier, upper oil cooler and lower oil cooler is within specifications.

Only one RCP is started at any one time. Two successive starts are permitted, provided the motor is allowed to coast to a stop between starts. A third start may be made when the winding and the core have cooled by running for a period of 20 minutes, or by standing idle for a period of 45 minutes.

4.8 RCP Oil Lift System

To initiate start-up of the RCPs, the oil lift system must be operated to reduce starting torque. The pressure of the oil "lifts" the thrust bearing shoes away from the thrust runner and provides an oil film for the bearing (Figure 7.13). A permissive interlock in the RCP starting circuit will not allow the RCP motor to be started until the oil lift pressure reaches a preset value (600 psig) as sensed by pressure switches PS-417, PS-427 and PS-437 on RCP 1A, 1B and 1C, respectively. The maximum oil lift system pressure is limited to 1200 psig by a relief valve.

Administrative procedures require the lift pumps to operate for two minutes prior to starting the RCP. After the RCP has been in operation for one minute, the lift pump may be stopped. The lift pump is not required for normal RCP operation or for stopping the RCP.

A viscosity pump at the outer periphery of the thrust bearing runner (ported area through the bearing runner) circulates oil through an external oil-to-water heat exchanger (oil cooler) to cool the upper bearing and provides oil to the bearing pads. The lower radial bearing is located below the motor rotor core and is fed by the viscosity pump.

4.9 RCP Vibration Monitors

The RCP vibration monitors YT-419, YT-429 and YT-439 are used for main control room indication and will alarm on the MCB to alert the operator. These monitors provide sensing of shaft and frame vibrations and may be used for in-place pump balancing. The RCP breaker will trip open on a locked rotor as sensed by the locked rotor monitors.

4.0 PRECAUTIONS AND LIMITATIONS (continued)

15. The RCS must be filled and all major air pockets vented before starting a RCP.

16. An RCP should not be operated continuously until the RCS has been thoroughly vented.

17. R RCS pressure must be greater than 325 psig to start an RCP during fill and vent operations. However, the minimum loop pressure for subsequent RCP operation is controlled by the minimum ΔP (200 psid) across the № 1 Seal. (Reference 2.3.0.01)

18. RCP № 1 Seal Bypass Valve should remain shut unless RCP RADIAL BRG TEMP <u>OR</u> RCP SEAL WTR INLET TEMP approaches the alarm level of 220°F. If the following conditions are met, the bypass valve should then be opened: (Reference 2.5.0.01)

    a. Seal injection flow to each RCP is between 8 - 13 gpm.

    b. № 1 Seal leakoff from any pump is less than 1 gpm.

    c. RCS pressure is less than 1000 psig.

19. During RCS fill and vent, the № 1 Seal bypass valve should be opened briefly to vent the lines. The bypass valve should not be opened until RCS pressure is at least 100 psig and the № 1 Seal leakoff line is opened. After venting the lines, the № 1 Seal bypass valve should be closed and remain closed unless the conditions described in 18 above occur.

20. R Whenever RCS temperature is greater than 160°F, at least one RCP must be in operation. (Reference 2.6.0.01)

21. RCP seal flow has a normal operating range of 8 - 13 gpm per pump. However, at no time should the total to all three RCPs exceed 31 gpm with RCS pressure at 2215 - 2255 psig. This is the maximum controlled leakage allowed by Tech Spec 3.4.6.2e. If plant conditions dictate, seal flow to each RCP may be reduced to a minimum of 6 gpm.

22. RCPs shall not be started with one or more of the RCS cold leg temperatures less than or equal to 325°F unless the secondary water temperature is less than 50°F above each of the RCS cold leg temperatures. (Reference 2.2.0.02)

23. When starting an RCP while the plant is solid, pressure surges large enough to lift an LTOP relief should be anticipated. Prompt action will be required to prevent LTOP actuation.

24. When RCS pressure is being maintained by the low pressure letdown control valve, changes to the RHR flow rate by throttling valves or starting and stopping the RHR pumps will result in changes in RCS pressure.

Question: 78

Which of the following conditions would be considered a loss of Containment Integrity?

a. Failure of the inner door on the emergency air lock to seal with the plant in Mode 6 during core alterations

b. Failure of 1SP-948, RCS Sample, to open when given an OPEN signal with the plant in Mode 3

c. Equipment hatch **NOT** closed and sealed with the plant in Mode 5

d. Locking device on 1SA-80, Service Air Supply, is discovered missing with the plant in Mode 4

Answer:

d. Locking device on 1SA-80, Service Air Supply, is discovered missing with the plant in Mode 4

QUESTION NUMBER: 78
TIER/GROUP: ***RO*** 1/1 ***SRO***

K/A: 069AA2.01

Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Loss of containment integrity

K/A IMPORTANCE: ***RO*** 3.7 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 9/10 ***55.43(b) SRO***

OBJECTIVE: AOP-3.23

IDENTIFY symptoms that require entry into AOP-023, Loss of Containment Integrity

REFERENCES: AOP-023
PLP-106

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.23 005

JUSTIFICATION:

a. Plausible since the doors provide containment integrity, but only one door is required to be operable and closed.

b. Plausible since automatic valves are required to be capable of operating when required, but only in the closed direction.

c. Plausible since this would be a violation of containment integrity in any other Mode, but in Mode 5 this is acceptable.

d. **CORRECT** Containment integrity is considered to be lost if a manual valve or blind flange is not in the proper position as required by plant conditions. Manual valves must be locked closed to be considered operable.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison and application of different conditions to technical specification requirements

REFERENCES SUPPLIED:

LOSS OF CONTAINMENT INTEGRITY

1.0 SYMPTOMS

1. Failure of both doors for the containment personnel air lock to seal when in Modes 1 through 4.

2. Failure of both doors for the emergency containment air lock to seal when in Modes 1 through 4.

3. Failure of a containment isolation valve to shut when given a shut signal.

4. A manual or blind flange not in proper position as required by plant conditions.

5. Equipment hatch not closed and sealed when in Modes 1 through 4.

6. Visual indication of structural damage to the containment vessel or liner.

7. ALB-30-10-5, COMPUTER ALARM MISC, for FPP8010 HI N_2 FLOW TO ELEC PENET.

2.0 AUTOMATIC ACTIONS

None

3.0 OPERATOR ACTIONS

3.1 Immediate Actions

None

3.2 Follow-up Actions

NOTE: Loss of containment integrity may require initiation of the SHNPP Emergency Plan.

1. Refer to PEP-110, Emergency Classification and Protective Action Recommendations, and enter the EAL Network at entry point X.

2. Refer to the following Tech Specs:

- 3.6.1.1 Containment Integrity
- 3.6.1.2 Containment Leakage
- 3.6.1.3 Containment Air Locks
- 3.6.1.4 Internal Pressure
- 3.6.1.6 Containment Vessel Structure Integrity
- 3.6.1.7 Containment Ventilation System
- 3.6.3 Containment Isolation Valves
- 3.6.5 Vacuum Relief System

Containment Isolation Valves

PENETRATION NO.	VALVE NO. CP&L (EBASCO)	FUNCTION	MAXIMUM ISOLATION TIME (SEC)	APPLICABLE NOTES	REDUNDANT VALVE(S)
8.	REMOTE MANUAL VALVES (continued)				
26	1SW-91 (SW-B45)	SERVICE WATER TO FAN COOLER AH-2	N/A	1, 6	NONE
27	1SW-225 (SW-B52)	SERVICE WATER TO FAN COOLER AH-1	N/A	1, 6	NONE
28	1SW-227 (SW-B51)	SERVICE WATER TO FAN COOLER AH-4	N/A	1, 6	NONE
29	1SW-97 (SW-B47)	SERVICE WATER FROM FAN COOLER AH-3	N/A	1, 6	NONE
30	1SW-109 (SW-B49)	SERVICE WATER FROM FAN COOLER AH-2	N/A	1, 6	NONE
31	1SW-98 (SW-B48)	SERVICE WATER FROM FAN COOLER AH-1	N/A	1, 6	NONE
32	1SW-110 (SW-B50)	SERVICE WATER FROM FAN COOLER AH-4	N/A	1, 6	NONE
47	1SI-300 (SI-V571)	CONTAINMENT SUMP TO RHR PUMP A	N/A	1, 8	NONE
48	1SI-301 (SI-V570)	CONTAINMENT SUMP TO RHR PUMP B	N/A	1, 8	NONE
49	1CT-105 (CT-V6)	CONTAINMENT SUMP TO CT PUMP A	N/A	1, 8	NONE
50	1CT-102 (CT-V7)	CONTAINMENT SUMP TO CT PUMP B	N/A	1, 8	NONE
63	1CM-2 (CM-B5)	HYDROGEN PURGE EXHAUST	N/A	7	1CM-4
9.	MANUAL VALVES				
NOTE:	Manual valves must be locked closed to be considered OPERABLE, except as provided in Note 3.				
34	1LT-6 (LT-V2)	ILRT ROTOMETER (LOCKED CLOSED)	N/A	N/A	NONE

Containment Isolation Valves

PENETRATION NO.	VALVE NO. CP&L (EBASCO)	FUNCTION	MAXIMUM ISOLATION TIME (SEC)	APPLICABLE NOTES	REDUNDANT VALVE(S)
9.	MANUAL VALVES (continued)				
41	1SA-80 (SA-V14)	SERVICE AIR SUPPLY (LOCKED CLOSED)	N/A	3	1SA-82
42	1ED-119 (WL-D651)	RCDT PUMP DISCH BYPASS (LOCKED CLOSED)	N/A	3	1ED-125
44	1SF-145 (SF-D164)	REFUELING CAVITY CLEANUP (LOCKED CLOSED)	N/A	N/A	1SF-144
44	1SF-144 (SF-D165)	REFUELING CAVITY CLEANUP (LOCKED CLOSED)	N/A	N/A	1SF-145
45	1SF-118 (SF-D25)	REFUELING CAVITY CLEANUP (LOCKED CLOSED)	N/A	N/A	1SF-119
45	1SF-119 (SF-D26)	REFUELING CAVITY CLEANUP (LOCKED CLOSED)	N/A	N/A	1SF-118
51	1BD-270 (BD-V183)	SG 1A 1BD-11 BYPASS CIV (LOCKED CLOSED)	N/A	1, 3, 6	NONE
52	1BD-272 (BD-V184)	SG 1B 1BD-30 BYPASS CIV (LOCKED CLOSED)	N/A	1, 3, 6	NONE
53	1BD-274 (BD-V185)	SG 1C 1BD-49 BYPASS CIV (LOCKED CLOSED)	N/A	1, 3, 6	NONE
61	1CM-5 (CM-B6)	H_2 PURGE MAKEUP (LOCKED CLOSED)	N/A	3	1CM-7
62	1LT-10 (LT-V4)	ILRT (LOCKED CLOSED)	N/A	N/A	NONE
63	1CM-4 (CM-B4)	H_2 PURGE EXHAUST (LOCKED CLOSED)	N/A	3	1CM-2
79	1FP-355 (FP-V44)	FIRE WATER STANDPIPE SUPPLY (LOCKED CLOSED)	N/A	3	1FP-357
90	1DW-63 (DW-V120)	DEMIN WATER SUPPLY (LOCKED CLOSED)	N/A	3	1DW-65

AOP-3.23 005
Which one of the following is a symptom of AOP-023, Loss of Containment Integrity?

A. Failure of the inner door on the emergency air lock to seal when in Mode 4.

B. Failure of CS-341, CVCS seal water to RCP A, to open when given a ""open"" signal
when in Mode 4.

C. Equipment hatch not closed and sealed when the plant is in Mode 5.

✓D. A manual valve not in proper position as required by plant conditions.

Question: 79

Given the following conditions:

- A LOCA has occurred inside Containment.
- Containment pressure is 5.5 psig.
- RCS Wide Range Pressure indications are:

(BLACK BEZELED INSTRUMENTS)
PI-440 = 1060 psig
PI-441 = 1040 psig
(YELLOW BEZELED INSTRUMENTS)
PI-402 = 980 psig
PI-403 = failed low
PI-402A = 700 psig

RCS pressure should be reported as ...

a. 700 psig.

b. 980 psig.

c. 1040 psig.

d. 1060 psig.

Answer:

b. 980 psig.

QUESTION NUMBER: 79
TIER/GROUP: ***RO*** 3 ***SRO***

K/A: 2.4.3

Ability to identify post-accident instrumentation.

K/A IMPORTANCE: ***RO*** 3.5 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 6 ***55.43(b) SRO***

OBJECTIVE: EOP-3.19

DESCRIBE Control Room usage of EPPs, foldouts, and FRPs as it relates to the following:
g. Use of RCS wide-range pressure indication

REFERENCES: EOP Users Guide

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number EOP-3.19 034

JUSTIFICATION:

a. Plausible since yellow bezeled instruments are qualified for post-accident monitoring. The lowest qualified instrument following an accident should be used unless the narrow range instrument PI-402A is on scale with RCS pressure below 700 psig.

b. **CORRECT** Yellow bezeled instruments are qualified for post-accident monitoring. The lowest qualified instrument following an accident should be used unless the narrow range instrument PI-402A is on scale with RCS pressure below 700 psig.

c. Plausible since this is the lowest black bezeled instrument, but yellow bezeled instruments should be used due to post-accident conditions.

d. Plausible since this is the highest black bezeled instrument, but yellow bezeled instruments should be used due to post-accident conditions.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of plant conditions to determine required actions

REFERENCES SUPPLIED:

6.2 RCS Subcooling (continued)

- o Highest active loop wide range T-hot (TI-413, 423, 433). An active loop is defined as one that has forced or natural circulation flow. If any RCPs are running, all loops will be active (backflow is available in loops where RCPs are not running). A classic example of a non-active loop would be a loop that has a SGTR since it is isolated and natural circulation flow in this loop would not be available.

2. Primary pressure is obtained using one of the following based on the range and availability of RCS and PRZ pressure indication:

   - o If ERFIS is available, then use the RCS pressure reading on SPDS, or ERFIS point PRC9455. If PRZ pressure is above 1700 PSIG, this reading is the average of the three PRZ pressure channels (PT-457, PT-456, and PT-455). If PRZ pressure is below 1700 PSIG, this reading is the average of the two RCS wide range pressure channels (PT-402 and PT-403).

   - o If PRZ pressure is greater than 1700 PSIG and CNMT conditions are normal, then use the lowest PRZ pressure indication (PI-457, PI-456, or PI-455.1).

   - o If PRZ pressure is off scale low or adverse CNMT conditions exist, then use the lowest of the two RCS wide-range pressure indications PI-402.1 or PI-403. Only PT-402 and PT-403 are used since these transmitters are located outside containment.

   - o When RCS pressure is less than 700 PSIG, PI-402A should be used. PI-402A receives input from qualified instrument PT-402 and its narrow range scale provides a more precise indication of pressure.

6.3 Resetting SI, Phase A, Phase B, and FW Isolation

In most events, these signals will be reset in PATH-1 after actuation of safeguards equipment has been verified. However, if the operator performs a manual actuation at some other time during the recovery, the operator may reset these signals whenever it is appropriate or required to operate equipment. For example, if the procedure directs the user to obtain SG activity samples and the sample valves are shut, the operator may reset SI and open the valves, prior to being directed to. There are no explicit requirements that must be met prior to resetting SI; however, some RAB ventilation will realign when SI is reset and the ventilation portion of SI verification attachment of OMM-004 should be completed or verified using the plant computer prior to resetting SI.

6.8 Use of RCS Wide Range Pressure Indication

Since PT-440 and PT-441 are not environmentally qualified and can include large instrument errors during adverse conditions, they are not used for EOP setpoints. When PRZ pressure channels are off scale low OR adverse CNMT conditions exist, then only use PT-402 and PT-403 to determine RCS pressure. This simplifies the usage of pressure instruments. EOP setpoints for RCS pressure do not include an adverse CNMT value based on the following:

- PT-402 and PT-403 are located outside containment.
- Prevents confusion as to which setpoint applies.
- The probability of a failure of both PT-402 and PT-403 coincident with an event that causes adverse CNMT conditions is extremely remote.

6.9 Dump Steam at Maximum Rate

It is possible to cause a main steam line isolation on decreasing rate (100 PSI) of change of pressure if steam dumps are opened too rapidly. This is undesirable because the required cooldown would have to be completed using the SG PORVs with their smaller steam dump capacity. The operator should fully open the dumps but not so fast as to cause a main steam line isolation on rate.
If the operator is already dumping steam using the SG PORVs, generation of a main steam line isolation signal is unlikely and not an immediate concern. The operator should open the SG PORVs as quickly as possible to initiate the cooldown.

When the operator is doing a rapid cooldown, he should block the low steam line pressure SI when appropriate to prevent a main steam line isolation. Generally, when "maximum rate" is used there are no explicit limits on the rate. However, in EPP-001 when dumping steam at maximum rate, the operator should maintain narrow range level in at least one SG.

6.14 Plant Instrumentation and Plant Computer

The operator must be aware of the importance of instruments with yellow bezels (Post Accident Monitoring Instrumentation) when using EOPs in post accident conditions. The requirements for Post Accident Monitoring Instrumentation can be found in Reg. Guide 1.97 and FSAR Section 7.5.1.8. In general, yellow bezeled instruments have been specifically qualified to be used in post accident conditions. The operator should continue to monitor all plant instrumentation and frequently compare redundant instrument channels or ranges. If a difference develops between comparable yellow bezeled meters and black bezeled meters the operator should preferentially rely on the yellow bezeled meter and report the difference to plant management.

The ERFIS plant computer should be used to assist in monitoring the plant's status. When directed to check a trended parameter, the operator should use the computer CRTs as the primary indication and the recorder panels in the back of the control room as a backup. Trend arrows on the SPDS top-level-display should <u>not</u> be used to evaluate parameter trends. When directed to verify the status of components in response to ESFAS signals, the operator should use the SAFEGUARDS function of the plant computer as the primary method. If the computer is not available, the operator should refer to the appropriate attachment of OMM-004, "POST TRIP/SAFEGUARDS REVIEW" for a list of affected components and required status. If offsite power is lost, the ERFIS battery can support ERFIS operations for approximately 30 minutes.

EOP-3.19 034
While monitoring RCS pressure following an accident, the RO reports a difference between a black bezeled and a yellow bezeled pressure indicator. How should RCS pressure be monitored considering this difference?

✓A. Use only the yellow bezeled instrument.

B. Use only the black bezeled instrument.

C. Use the average of the two instruments.

D. Use the most limiting pressure for the diagnostic step.

Question: 80

Given the following conditions:

- A reactor trip and safety injection has occurred.
- A transition has been made to FRP-H.1, Response to Loss of Secondary Heat Sink.
- The Condensate Storage Tank (CST) has emptied due to a rupture.

Which of the following will result in the Emergency Service Water System (ESW) supplying suction to the Auxiliary Feedwater (AFW) Pump?

a. Manual operator action when the CST drops below 10% level

b. Automatic alignment when the CST drops below 10% level

c. Manual operator action when AFW suction pressure drops below 14 psig

d. Automatic alignment when AFW suction pressure drops below 14 psig

Answer:

a. Manual operator action when the CST drops below 10% level

QUESTION NUMBER: 80
TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 061K1.07

Knowledge of the physical connections and/or cause-effect relationships between the AFW and the following systems: Emergency water source

K/A IMPORTANCE: ***RO*** 3.6 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 8 ***55.43(b) SRO***

OBJECTIVE: ESW-3.0-A6

DESCRIBE the ESW flow path for operation of the following components
b. AFW pumps

REFERENCES: FRP-H.1
OP-137

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number ESW-A3 001

JUSTIFICATION:

a. **CORRECT** A foldout page item requires manually alignment of the ESW to AFW suction sources when CST level drops below 10%.

b. Plausible since this is the CST level where action is required, but manual alignment is required.

c. Plausible since this is slightly above the low-low suction pressure trip of the AFW pumps, but CST level is the monitored parameter.

d. Plausible since this is slightly above the low-low suction pressure trip of the AFW pumps, but CST level is the monitored parameter and manual alignment is required.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural requirements

REFERENCES SUPPLIED:

FOLDOUT

- <u>RCS BLEED AND FEED INITIATION CRITERIA</u>

  <u>IF</u> any of the following occurs, <u>THEN</u> immediately perform Steps 12 through 21 for RCS bleed and feed.

  - SG wide range level - ANY TWO LESS THAN 10% [35%]

  - PRZ pressure - GREATER THAN OR EQUAL TO 2335 PSIG DUE TO LOSS OF SECONDARY HEAT SINK

  - RCS temperature <u>AND</u> pressure - INCREASING DUE TO LOSS OF SECONDARY HEAT SINK

- <u>COLD LEG RECIRCULATION SWITCHOVER CRITERIA</u>

  <u>IF</u> RWST level decreases to less than 23.4% (2/4 Low-Low alarm), <u>THEN</u> GO TO EPP-010, "TRANSFER TO COLD LEG RECIRCULATION", Step 1.

- <u>AFW SUPPLY SWITCHOVER CRITERIA</u>

  <u>IF</u> CST level decreases to less than 10%, <u>THEN</u> switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

- <u>RHR RESTART CRITERIA</u>

  <u>IF</u> RCS pressure decreases to less than 190 PSIG, <u>THEN</u> restart RHR pumps to supply water to the RCS.

8.0 INFREQUENT OPERATIONS

8.1 Using Emergency Service Water System as a Backup Source of Water to Auxiliary Feedwater System

8.1.1 Initial Conditions

1. Condensate storage tank unavailable or level less than 10%.
R (Reference 2.3.0.02)

2. Service Water System in operation per OP-139.

8.1.2 Procedural Steps

CAUTION

- The Emergency Service Water System serves as a backup source of water to the Auxiliary Feedwater System if the Condensate Storage Tank volume is exhausted or unavailable. Since the Emergency Service Water System uses raw reservoir water, it is only used in extreme emergencies.

- Isolating Service Water to the Containment Fan Coolers will make the Coolers inoperable, therefore only one Train of ESW should be aligned to the suction of the AFW pumps unless a determination has been made on the desirability of making both Trains of Containment Fan Coolers inoperable.

---

1. To supply AFW pump 1A-SA from ESW Header A:

   a. Declare A Train Containment Fan Coolers inoperable.

   b. Verify A Train Containment Fan Coolers are secured per OP-169.

   c. SHUT 1SW-92 SA, CNMT FAN COOLER AH-3 INLET.

   d. SHUT 1SW-97 SA, CNMT FAN COOLER AH-3 OUTLET.

   e. SHUT 1SW-91 SA, CNMT FAN COOLER AH-2 INLET.

   f. SHUT 1SW-109 SA, CNMT FAN COOLER AH-2 OUTLET.

   g. SHUT 1SW-122, AFW pump 1A-SA SW Drain Isolation.

   h. OPEN 1SW-121SA, SW HEADER A TO AUX FW MOTOR PMP A-SA.

   i. OPEN 1SW-123SA, SW HEADER A TO AUX FW MOTOR PMP A-SA.

   j. Monitor AFW system parameters to ensure proper operation.

2. To supply AFW pump 1B-SB from ESW Header B:

   a. Declare B Train Containment Fan Coolers inoperable.

   b. Verify B Train Containment Fan Coolers are secured per OP-169.

   c. SHUT 1SW-227 SB, CNMT FAN COOLER AH-4 INLET.

ESW-A3 001

Which one of the following statements concerning the ESW flow path is **CORRECT**?

A. ESW suction to AFWS will automatically align when CST level falls to < 10 percent level.

B. A & B trains of ESW are normally aligned to the BTRS chillers.

C. Both A & B trains of ESW are normally aligned to each CSIP oil cooler.

✓D. ESW must be manually aligned to supply the air compressors by operating valves in the TB and RAB.

Question: 96

Given the following conditions:

- A reactor trip has occurred due to a SG low-low level trip.
- RCS temperature has stabilized at no-load Tavg.

Which of the following describes the expected condition of the Feedwater System when directed to check the status?

	Main Feed Pumps	**Main Feed Reg Valves**	**Feed Isolation Valves**
a.	Tripped	Closed	Closed
b.	Tripped	Closed	Open
c.	Running	Open	Closed
d.	Running	Closed	Closed

Answer:

d.	Running	Closed	Closed

QUESTION NUMBER: 96

TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 059A4.12

Ability to manually operate and monitor in the control room: Initiation of automatic feedwater isolation

K/A IMPORTANCE: ***RO*** 3.4 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: CFW-A6

STATE and EXPLAIN the response of major CFW System valves to the following signals/conditions
b. Reactor trip (P-4) coincident with low Tavg (< 564°F)

REFERENCES:
SD-103
SD-134
EPP-004
108D831, Sh 13

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number CFW-A6 002

JUSTIFICATION:

a. Plausible since this would occur on a SG high-high level, but not on a SG low-low level.

b. Plausible since this would occur on a SG high-high level in addition to the FWIV closing, but not on a SG low-low level.

c. Plausible since only a single valve closes on the reactor trip with low Tavg and the FWIVs close on low flow, but the Feed regulating valve also closes.

d. **CORRECT** On a reactor trip coincident with low Tavg, the MFW regulating valves are closed and the MFW pumps continue to operate. The FWIVs close on low flow.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of given conditions to determine plant response

REFERENCES SUPPLIED:

Instructions	Response Not Obtained
4. Check RCP Status:	
a. Check RCPs - AT LEAST ONE RUNNING	a. Transfer steam dump to steam pressure mode. (Refer to OP-126, "MAIN STEAM, EXTRACTION STEAM AND STEAM DUMP SYSTEM", Section 5.3.) Verify operation of condenser steam dumps OR SG PORVs to establish natural circulation.
5. Check Feed System Status:	
a. RCS Temperature - LESS THAN 564°F	a. <u>WHEN</u> RCS temperature less than 564°F, <u>THEN</u> do Steps 5b AND c. Continue with Step 6.
b. Verify feed reg valves - SHUT	
c. Establish feed reg bypass flow:	c. Establish AFW flow to SGs.
1) Verify feed reg bypass valves - IN MANUAL	
2) Slowly open each feed reg bypass valve AND feed SGs to establish level between 10% and 50%.	

3.4 Major Valves

The following section give a brief description of the major valves in the condensate and feedwater system. A more complete and detailed description is available in the vendor technical manuals listed in Section 8.2.

3.4.1 Feedwater Control Valves

The main feedwater control valves FCV-478, FCV-488, and FCV-498 are located at the north end of the Turbine Building on Elevation 261' along column line 43. They are 12" with 16" schedule 120 ends. The valves use stacked discs trim to control the system flow. A smaller bypass valve (Section 3.4.2) is provided.

The valve bodies are manufactured by Copes-Vulcan and are pneumatically opened and closed. The valves' trim and actuators are manufactured by Control Components Inc. (CCI). Three solenoid valves in series control the air signal from the positioner to the actuator. On loss of instrument air or electrical power, the feedwater control valves will fail shut. The motive force to shut each valve is provided by air accumulators for each valve. The solenoid valves receive 125 VDC from ARP-1A(SA), ARP-1B(SB), and ARP-9. The two safety grade solenoid valves on each valve will shut the valve on a feedwater isolation signal and low RCS Tavg coincident with a reactor trip from solid state protection (Train A or Train B). The control grade solenoid valve on each valve will shut the valve on SG low pressure or low level for preheater bubble collapse protection. The feedwater control valves are controlled from main control board 1B1 by auto/manual control stations.

The feedwater control valves are built to ASME Section III, Class 3 requirements and are seismically qualified, but not environmentally qualified. The feedwater control valves are not installed in safety grade piping, but they are important to safety because they act as a backup to the main feed isolation valves during a steam line rupture (FSAR 15.1.5.1.c).

3.4.2 Feedwater Bypass Control Valves

The feedwater control valve bypass valves FCV-479, FCV-489, and FCV-499 are located beside their respective main feed control valves (Section 3.4.1). The bypass valves are Masoneilan 3" cage type globe valves with a balanced tight shutoff plug. The bypass valves have a linear flow characteristic in the 0-20% power range so that steam generator level can be easily controlled at low flow rates.

4.3.4 Main Feedwater Isolation (MFIS) (Figure 7.24)

Main feedwater isolation consists of closure of the main feedwater valves, the feedwater isolation valves, the feedwater bypass valves, and tripping of the main feedwater pumps and the turbine. The MFIS is derived from an SI signal or a two out of four Hi-Hi steam generator signal (P-14). Reset of the bypass valves and main feedwater isolation valves is accomplished by the Train A and Train B reset switches on the MCB. Closure of only the main feedwater valves will automatically occur when the reactor is tripped (P-4) and a two-out-of-three low T_{avg} signal occurs.

4.3.5 Containment Isolation ØA (T) (Figure 7.30)

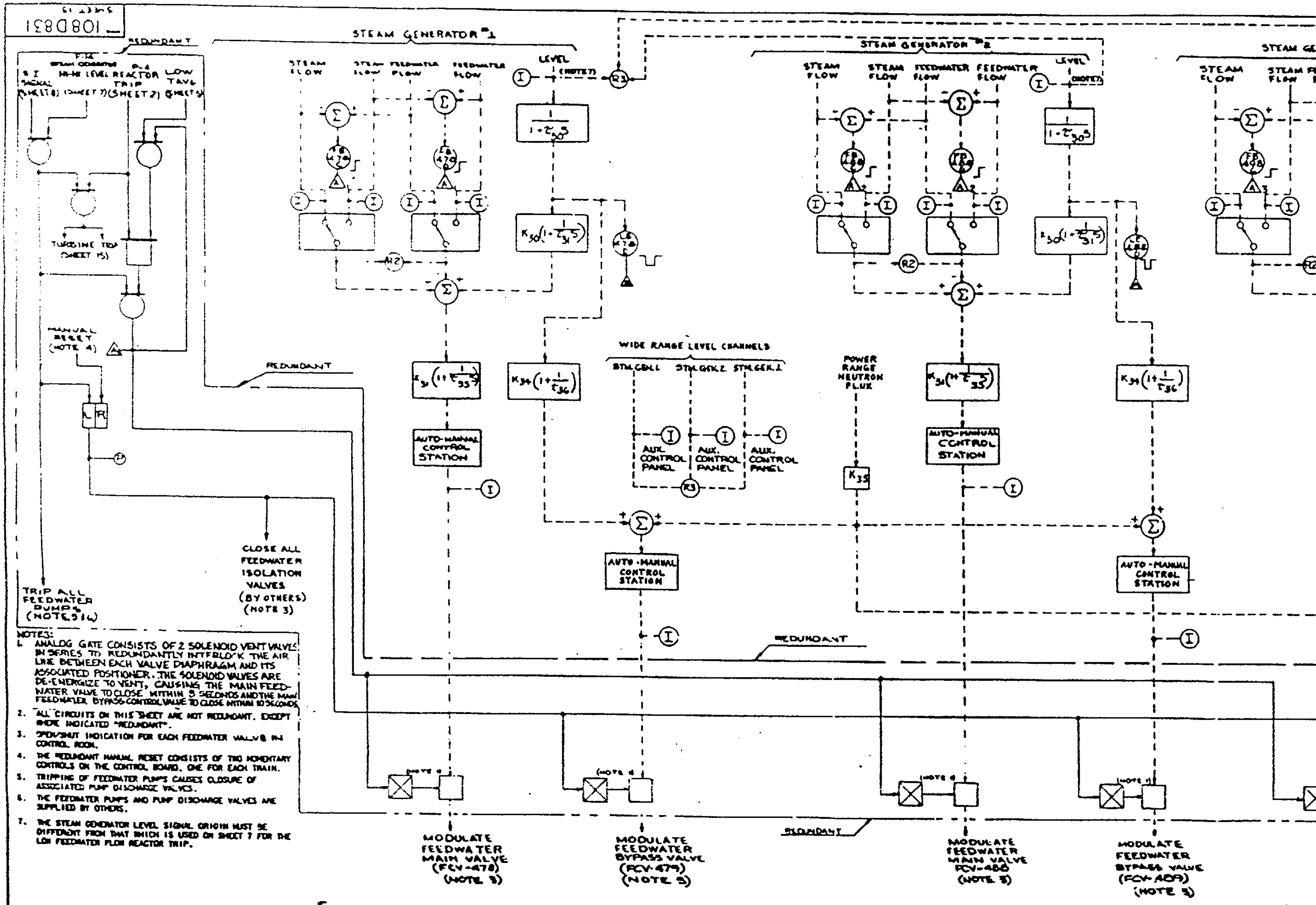
Containment isolation ØA results from either a safety injection signal (Figure 7.27) or from manual actuation of either of two MCB switches. Reset of the T signal is accomplished by actuation of the Train A and Train B Containment Isolation ØA Reset MCB switches. See SD-114 for more discussion.

4.3.6 Containment Ventilation Isolation (CVIS) (Figure 7.30)

Containment ventilation isolation results from a ØA containment isolation signal, safety injection signal (Figure 7.27), from a Manual Containment spray actuation signal (Figure 7.31), or a high radiation signal from the Radiation Monitoring System containment radioactivity detectors (RM-1CR-3561A, B, C, & D). The CVIS signal can be reset by the Train A and Train B Containment Ventilation Isolation Reset switches on the MCB. See SD-114 for more discussion. (See Section 4.6)

4.3.7 Containment Spray (CSAS) (Figure 7.31)

Containment Spray results from either a two out of four, Hi-3 containment pressure, or simultaneous manual actuation of either group of two MCB switches. The CSAS signal can be reset by the Train A and Train B Containment Spray Reset switches on the MCB. It is noted that the manual spray actuation controls also initiate Containment Ventilation Isolation and Containment Isolation Phase B. Reference SD-112.



NOTES:

1. ANALOG GATE CONSISTS OF 2 SOLENOID VENT VALVES IN SERIES TO REDUNDANTLY INTERLOCK THE AIR LINE BETWEEN EACH VALVE DIAPHRAGM AND ITS ASSOCIATED POSITIONER. THE SOLENOID VALVES ARE DE-ENERGIZE TO VENT, CAUSING THE MAIN FEEDWATER VALVE TO CLOSE WITHIN 5 SECONDS AND THE MAIN FEEDWATER BYPASS CONTROL VALVE TO CLOSE WITHIN 10 SECONDS.
2. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT, EXCEPT WHERE INDICATED "REDUNDANT".
3. OPEN/SHUT INDICATION FOR EACH FEEDWATER VALVE IN CONTROL ROOM.
4. THE REDUNDANT MANUAL RESET CONSISTS OF TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
5. TRIPPING OF FEEDWATER PUMPS CAUSES CLOSURE OF ASSOCIATED PUMP DISCHARGE VALVES.
6. THE FEEDWATER PUMPS AND PUMP DISCHARGE VALVES ARE SUPPLIED BY OTHERS.
7. THE STEAM GENERATOR LEVEL SIGNAL ORIGIN MUST BE DIFFERENT FROM THAT WHICH IS USED ON SHEET 7 FOR THE LOW FEEDWATER FLOW REACTOR TRIP.

CAROLINA POWER AND LIGHT COMPANY
PLANT: SHEARON HARRIS NUCLEAR POWER PLANT
UNIT: 1 ITEM-05
STATUS: APPROVED
CERTIFICATION LTR. NO. CQL 0518
AUTHORITY: A. T. PARKER
TECH. LTR. NO. SP/SA-44750

WESTINGHOUSE PROPRIETARY DATA

11 10 9 8 7 6 5 4 3

CFW-A6 002

The Reactor Trip Breaker and Reactor Trip Bypass Breaker open signal (P-4), coincident with a low-low Tavg signal, causes which of the following valve(s) to automatically shut?

✓A. Main Feed Regulating Valves only

B. Main Feed Regulating Bypass Valves only

C. Both Main Feed Regulating Valves and Main Feed Regulating Bypass Valves

D. Main Feed Regulating Valves, Main Feed Regulating Bypass Valves and Preheater Bypass Valves

Question: 97

Which of the following air compressors would be available during a Loss of Off-Site Power?

a. A and B **ONLY**

b. A and C **ONLY**

c. B and C **ONLY**

d. A, B and C

Answer:

a. A and B **ONLY**

QUESTION NUMBER: 97
TIER/GROUP: ***RO*** 2/3 ***SRO***

K/A: 078K2.01

Knowledge of bus power supplies to the following: Instrument air compressor

K/A IMPORTANCE: ***RO*** 2.7 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: ISA-R7

EXPLAIN the ISA System response to the following conditions
b. Loss of off-site power

REFERENCES: SD-151
LP-ISA-18.1

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number ISA-R7 001

JUSTIFICATION:

a. CORRECT Air compressor 1A is powered by MCC 1A1, 1B by MCC 1B1, and 1C by Aux Bus 1E3. During a loss of offsite power, the EDGs will supply power to 1A and 1B, but 1C will not have power.

b. Plausible since 1A will be available, but 1B will also be available instead of 1C.

c. Plausible since 1B will be available, but 1A will also be available instead of 1C.

d. Plausible since 1A and 1B will be available, but 1C will not be available.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of system design and operations

REFERENCES SUPPLIED:

3.0 COMPONENTS

3.1 Air Compressors

The two 50% capacity CAS air compressors are made by Atlas-Copco. They are oil free, air-cooled, two-stage, rotary screw air compressors designed to prevent oil from entering the air header. Each compressor is rated at 682 scfm at a discharge pressure of 125 psig. The compressors are driven by 200 horsepower motors, with an 8 horse power cooling fan. The air compressors are powered from:

Air Compressor 1A - MCC 1A1 Compt 1C

Air Compressor 1B - MCC 1B1 Compt 3C

The breakers are located in the 286' Elevation of the RAB underneath the Control Room. The compressors are controlled from local control panels in the 261' Elevation of the Turbine Building.

Downstream of each of the 50% capacity CAS air compressors is a R.P. Adams water-cooled aftercooler. The aftercooler has a design pressure of 75 psi on the shellside (water) and a 125-psi design pressure on the tubeside (air). The aftercoolers are built to ASME Pressure Vessel Code Section VIII and are stamped with a "U" by the manufacturer. Both of the aftercoolers are made of 90-10 copper nickel and have design temperatures of 400°F.

The 1C air compressor is also made by Atlas Copco. It is an oil free, air cooled, two-stage rotary screw 1500 scfm air compressor designed to prevent oil from entering the air header. Air compressor 1C has an air cooled intercooler and aftercooler built in with a fan powered off the compressor drive. This fan draws cooling air in the top of the compressor box across the motor, compressor, fan, coolers, and then out the top of the compressor box. Air compressor 1C is powered from Auxiliary Bus 1E3 Compt. 4C.

1C air compressor is located next to the 1B air compressors at the south end corner, 261' Elevation Turbine Building.

3.2 Air Dryers

Air dryers 1A and 1B are Kemp Model 7060 and are rated to dry at least 684 scfm. The air dryers are built to ASME Pressure Vessel Code Section VIII and are stamped with a "U" by the manufacturer. The 1A Air Dryer is powered from MCC 1A24 Compt 5AL. The 1B Air Dryer is powered from MCC 1B24 Compt 1ER.

Compressed Air System Electrical Lineup Checklist

(1): These components are operated per Sections 5.2, 7.1, or 7.2.

(2): This switches is operated per Sections 5.1 or 7.3.

COMPONENT NUMBER	COMPONENT DESCRIPTION	POSITION	CHECK
	PP-1D344 (TB 261)		
1D344-11	Compressed Air System Control Pnl	ON	______
	MCC-1A24 (RAB 261)		
1A24-5AL	Air Dryer 1A-NNS	ON	______
	MCC-1B24 (RAB 261)		
1B24-1ER	Air Dryer 1B-NNS	ON	______
	480 Volt Bus 1A1 (RAB 286)		
1A1-1C	Air Compressor 1A-NNS	RACKED IN/CLOSED	______
	480 Volt Bus 1B1 (RAB 286)		
1B1-3C	Air Compressor 1B-NNS	RACKED IN/CLOSED	______
	480 Volt Bus 1E3 (TB 286)		
1E3-4C	Air Compressor 1C-NNS	RACKED IN/CLOSED	______
	480 Volt Bus 1E31 (TB 286)		
1E31-9CL	Air Dryer 1C Htr Control Pnl	ON	______
DISCONNECT SWITCH	Air Dryer 1C-NNS 100 Amp Disconnect Switch (Lower left of dryer skid)	OFF/ON (1)	______
SWITCH	Air Dryer 1A-NNS Control Switch (Upper left of dryer skid)	OFF/ON (1)	______
SWITCH	Moisture Analyzer Mode Switch (Lower center of dryer skid)	Time Control	______
SWITCH	Air Dryer 1B-NNS Control Switch (Upper left of dryer skid)	OFF/ON (1)	______
SWITCH	Moisture Analyzer Mode Switch (Lower center of dryer skid)	Time Control	______
SWITCH	Air Compressor 1C-NNS UNLOAD/NORMAL Switch (Upper left of panel)	UNLOAD (2)	______

c. Aftercooler water level sightglass on air-side outlet

d. Reflash annunciator LEDs

(1) High water temperature

(2) High discharge air temperature

(3) High discharge air pressure

(4) Low oil pressure

(5) Control power failure

(6) 480-V breaker trouble

e. Total run time indicator on compressor control panel

f. Loading time indicator

g. Voltage on indicator (if power on)

h. LOCAL power panel with disconnect switch located at RAC

Obj. 5

11. Local controls for RAC

a. RESET-START switch

b. STOP switch—10-second time delay

c. UNLOAD/NORMAL switch—for warm-up and cool-down

12. RAC operation

a. RAC is the lead compressor

b. Loads and unloads automatically

c. If unloaded for 15 minutes, the RAC will shut down and the AUTO operation lamp will be illuminated

Mock-up

Obj. 10.a., c.

13. MCB alarms

a. "Rotary Air Compressor Trouble," ALB-002 Window 8-3A (Refer to APP-ALB-002 to discuss operator actions)—alarms on RAC trips

(1) High air temperature

(2) Low oil pressure

(3) Motor breaker protective trip

Question: 98

Given the following conditions:

- The plant is operating at 40% power.
- AOP-005, Radiation Monitoring System, has been entered.
- A high (red) alarm on REM-1WC-3544, WPB CCW HX Inlet Monitor, has just been received.

As a result of the high radiation alarm, which of the following will automatically occur?

a. 1CC-252, RCP Thermal Barrier Flow Control Valve, CLOSES

b. 3WC-4, WPB CCW Surge Tank Overflow Valve, CLOSES

c. 1CC-304, CCW to Gross Failed Fuel Detector, OPENS

d. 3WC-7, WPB CCW Surge Tank Drain Valve, OPENS

Answer:

b. 3WC-4, WPB CCW Surge Tank Overflow Valve, CLOSES

QUESTION NUMBER: 98
TIER/GROUP: ***RO*** 2/2 ***SRO***

K/A: 073K1.01

Knowledge of the physical connections and/or cause-effect relationships between the PRM system and the following systems: Those systems served by PRMs

K/A IMPORTANCE: ***RO*** 3.6 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 10/11 ***55.43(b) SRO***

OBJECTIVE: AOP-3.5-2

RECOGNIZE automatic actions that are associated with AOP-005, Radiation Monitoring System

REFERENCES: AOP-005

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AOP-005 004

JUSTIFICATION:

a. Plausible since this valve does automatically close if RCS leakage to the CCW thermal barrier HX is occurring, but closes on high flow.

b. **CORRECT** A high rad alarm on this monitor will cause the surge tank overflow to isolate to prevent the release of radioactivity.

c. Plausible since it would be desirable to monitor for high RCS activity, but valve does not receive automatic open signal from this monitor.

d. Plausible since this valve does have an automatic action associated with the surge tank, but the valve closes on a low level.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system operations and interlocks

REFERENCES SUPPLIED:

RADIATION MONITORING SYSTEM

1.0 SYMPTOMS

1. Increasing radiation level on radiation monitors
2. ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE alarm
3. ALB-10-3-4, WPB EFFLUENT RAD MONITOR TROUBLE alarm
4. ALB-10-5-4, RAB/TB STACK ACCIDENT RAD MONITOR TROUBLE alarm
5. Notification to the Control Room of increasing radiation levels or alarms

2.0 AUTOMATIC ACTIONS

1. High alarm on the following Containment monitors initiates Containment Ventilation Isolation on 2/4 logic:
   - RM-1CR-3561A-SA
   - RM-1CR-3561B-SB
   - RM-1CR-3561C-SA
   - RM-1CR-3561D-SB
2. High alarm on REM-1LT-3502A-SA, CNMT RCS Leak Detection monitor, isolates Normal Containment Purge
3. High alarm on REM-1LT-3502B, CNMT Pre-Entry Purge monitor, isolates Containment Pre-entry Purge
4. High alarm on any of the following FHB Spent Fuel Pool Area monitors initiates FHB Emergency Exhaust mode of operation:
   - RM-1FR-3564A-SA
   - RM-1FR-3564B-SB
   - RM-1FR-3565A-SA
   - RM-1FR-3565B-SB
   - RM-1FR-3566A-SA
   - RM-1FR-3566B-SB
   - RM-1FR-3567A-SA
   - RM-1FR-3567B-SB
5. High alarm on REM-1WV-3546, WPB Stack 5 PIG monitor, shuts 3WG -229, WG DECAY TANKS E & F TO PLANT VENT VLV
6. High alarm on REM-1WC-3544, WPB CCW HX Inlet monitor, shuts 3WC -4, WPB CCW Surge Tank Overflow valve

Question: 99

Given the following conditions:

- The plant has tripped from 100% power due to a trip of 'B' RCP.
- 'A' and 'C' RCPs are running.

Which of the following is the expected RVLIS Dynamic Head indication?

a. 36%

b. 41%

c. 63%

d. 100%

Answer:

c. 63%

QUESTION NUMBER: 99
TIER/GROUP: ***RO*** 2/2 ***SRO***

K/A: 002K6.03

Knowledge of the effect or a loss or malfunction on the Reactor vessel level indication

K/A IMPORTANCE: ***RO*** 3.1 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: ICCM-R2

LIST the expected indications for a liquid filled vessel during all RCP combinations

REFERENCES: SD-106

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number ICCM-R2 001

JUSTIFICATION:

a. Plausible since this is an expected RVLIS dynamic head indication, but only if no RCPs are running.

b. Plausible since this is an expected RVLIS dynamic head indication, but only if 1 RCPs is running.

c. **CORRECT** With 2 RCPs running and no voids, RVLIS dynamic reading should be approximately 63%.

d. Plausible since this is an expected RVLIS dynamic head indication, but only if 3 RCPs are running.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of system design and operation

REFERENCES SUPPLIED:

TABLE 6.1

Normal RVLIS Readings (%)

RCP's Operating (Train A/Train B)

	0	1	2	3
Upper Range	110/110	109/109	107/107	61/61
Full Range	110/110	120/120	120/120	120/120
Dynamic Head	36/36	41/41	63/63	100*/100*

NOTE: RVLIS accuracy is ±6% level

* Values for 0% reactor power. This reading is 110% level at 100% reactor power.

ICCM-R2 001

The plant has experienced an automatic trip from 100 percent power due to the loss of 6.9-kV Auxiliary Bus 1A. Only the "B" RCP is running. Assuming zero void fraction conditions, the RVLIS dynamic range indication should be ____ percent.

A. 110

B. 100

C. 63

✓D. 41

Question: 100

Given the following conditions:

- A reactor shutdown is in progress.
- Intermediate Range Channel N-35 compensating voltage is set too low.
- Intermediate Range Channel N-36 compensating voltage is set correctly.

Which of the following describes the effect of N-35 being undercompensated?

a.
- Source Range Channel N-31 will automatically re-energize prematurely
- Source Range Channel N-32 will automatically re-energize at the correct power level

b.
- Both Source Range Channels N-31 and N-32 will automatically re-energize prematurely

c.
- Source Range Channel N-31 must be manually re-energized
- Source Range Channel N-32 will automatically re-energize at the correct power level

d.
- Both Source Range Channels N-31 and N-32 must be manually re-energized

Answer:

d.
- Both Source Range Channels N-31 and N-32 must be manually re-energized

QUESTION NUMBER: 100

TIER/GROUP: ***RO*** 2/1 ***SRO***

K/A: 015K6.02

Knowledge of the effect of a loss or malfunction on the following will have on the NIS: Discriminator/compensation circuits

K/A IMPORTANCE: ***RO*** 2.6 ***SRO***

10CFR55 CONTENT: ***55.41(b) RO*** 7 ***55.43(b) SRO***

OBJECTIVE: NIS-R4

PREDICT an intermediate-range channel's response to both under-compensated and overcompensated conditions

REFERENCES: OP-105
108D831, Sh 3

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number NIS-R4 001

JUSTIFICATION:

a. Plausible since the train related compensating voltage is set incorrectly, but it would remain above P-6 resulting in both SR channels remaining off.

b. Plausible since compensating voltage is set incorrectly, but IR channel would remain above P-6, causing both SR channels to remain deenergized.

c. Plausible since the train related compensating voltage is set too low, but either IR channel remaining above P-6 results in both SR channels remaining off.

d. **CORRECT** With one IR channel not dropping below P-6 due to being undercompensated, neither SR channel will automatically energize.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of component failure to determine plant response

REFERENCES SUPPLIED:

6.0 NORMAL OPERATION

NR-45 is normally selected to record the highest Power Range channel on one pen. The other pen may be selected to an Intermediate Range channel or a ΔF channel.

7.0 SHUTDOWN

7.1 Normal Plant Shutdown (Mode 1 to Mode 3)

7.1.1 Initial Conditions

1. The Plant is in Mode 1 and a shutdown is in progress.

7.1.2 Procedure Steps

CAUTION

Both Intermediate Range channels must be below the P-6 reset of 5 x 10^{-11} amps for Source Range high voltage to automatically re-energize. If one Intermediate Range channel fails to drop below the P-6 reset when core conditions indicate that the channel should have, the Source Range high voltage will have to be manually energized.

---

1. When Intermediate Range Power is less than 5 x 10^{-11} amps on both channels, check the following:

   a. At the Source Range Drawers, both Source Range Detectors are energized.

   b. ALB-13-2-3, SOURCE RANGE LOSS OF DETECTOR VOLTAGE, not lit.

   c. At the Bypass Permissive Light Panel, the following lights are de-energized:

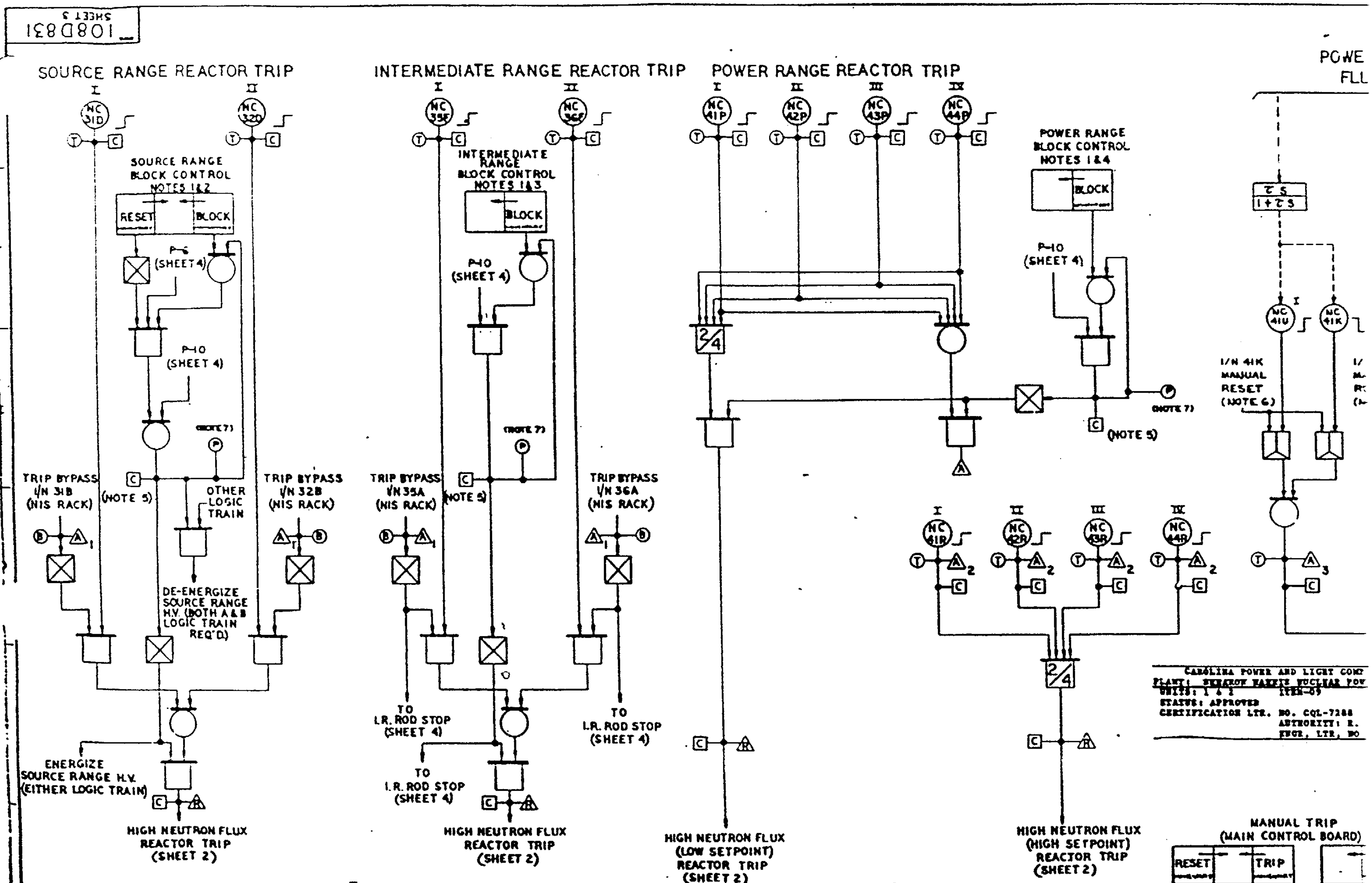
      - SOURCE RANGE TRAIN A TRIP BLOCKED HI VOLT OFF (Window 1-2)
      - SOURCE RANGE TRAIN B TRIP BLOCKED HI VOLT OFF (Window 2-2)
      - IR PWR > P-6 SOURCE RANGE BLOCK PERMISSIVE (Window 1-5)

2. If the Source Range high voltage fails to re-energize automatically due to Intermediate Range detector under compensation, perform the following to energize the Source Range detector high voltage:

   a. Take the following switches to RESET:

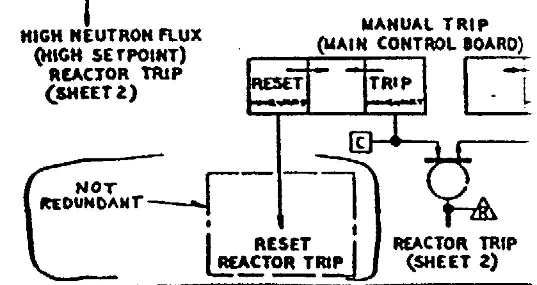
      - SOURCE RANGE TRAIN A TRIP BLOCK
      - SOURCE RANGE TRAIN B TRIP BLOCK

   b. Check that Source Range detector high voltage is energized as described in Step 1 of this section.



NOTES:

1. THE REDUNDANT MANUAL BLOCK CONTROLS CONSIST OF TWO CONTROLS ON THE CONTROL BOARD FOR EACH RANGE, ONE FOR EACH TRAIN.
2. I/N 33A IS IN LOGIC TRAIN A.
   I/N 33B IS IN LOGIC TRAIN B.
3. I/N 38A IS IN LOGIC TRAIN A.
   I/N 38B IS IN LOGIC TRAIN B.
4. I/N 47A IS IN LOGIC TRAIN A.
   I/N 47B IS IN LOGIC TRAIN B.
5. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.
6. MANUAL RESET CONTROLS CONSIST OF FOUR MOMENTARY CONTROLS IN THE CONTROL ROOM, ONE CONTROL FOR EACH INSTRUMENT CHANNEL.
7. TWO PERMISSIVE STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.



NIS-R4 001

Which one of the following statements describes the potential negative consequences if Intermediate-Range Channel N-35's compensation voltage is set too low (i.e., undercompensated)?

A. N-35 could cause an unplanned trip during a power reduction.

B. N-35 trip could clear too early during a power reduction proving that the channel was inoperable following the repair.

C. N-35 P-6 bistable could clear too soon allowing the Source Range to re-energize and "burn-up" due to high flux levels.

✓D. N-35 P-6 bistable could stay energized preventing the Source Range from reenergizing automatically.

Question: 16

Given the following conditions:

- A reactor shutdown is being performed.
- Source Range Channel N-31 is known to be failed high due to a detector problem.

Which of the following SR channel N-31 configurations will permit a continued normal shutdown when the Intermediate Range NIs drop below the P-6 reset point?

	INSTRUMENT POWER FUSES	**CONTROL POWER FUSES**	**LEVEL TRIP SWITCH POSITION**
a.	Removed	Installed	Bypass
b.	Installed	Removed	Bypass
c.	Removed	Installed	Normal
d.	Installed	Removed	Normal

Answer:

a.	Removed	Installed	Bypass

QUESTION NUMBER: 16
TIER/GROUP: ***RO*** ***SRO*** 1/2

K/A: 032AA2.01

Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: Normal/abnormal power supply operation

K/A IMPORTANCE: ***RO*** ***SRO*** 2.9

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: NIS-3.0-10

ASSESS MCB and NI drawer indications to determine if (and at what power level) a reactor trip will occur during a power transient

REFERENCES: OP-105

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98SRO-44

JUSTIFICATION:

a. **CORRECT** Placing the Level Trip Bypass switch in BYPASS will prevent a reactor trip input to SSPS provided power is available to the relay from control power.

b. Plausible since bypass function is maintained via fused connection, but by control power instead of instrument power.

c. Plausible since bypass function is maintained via control power fuses, but switch must be in bypass position.

d. Plausible since bypass function is maintained via fused connection, but by control power instead of instrument power.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of plant response based on improper actions taken

REFERENCES SUPPLIED:

8.2 <u>Inadvertent Source Range Detector Energization at Power</u>
R (Reference 2.6.0.01)

8.2.1 <u>Initial Conditions</u>

1. Reactor operating in the power range and either Source Range detector energizes.

8.2.2 <u>Procedural Steps</u>

<u>NOTE</u>: Normally the affected Source Range channel will be de-energized by the removal of instrument power fuses. However, above the P-6 setpoint, control power fuses can be removed if required for troubleshooting or repair.

<u>CAUTION</u>

Removal of control power fuses will disable the level trip bypass function of the affected Source Range channel. If power is reduced below P-6 with the control power fuses removed, a Reactor trip signal will be generated by the affected Source Range channel.

---

1. Promptly de-energize the affected Source Range channel by removing the 118V 5A INST POWER fuses.

<u>NOTE</u>: The affected channel should only be re-energized after consultation with maintenance and Reactor Engineering to prevent damage to the affected detector.

2. During the next shutdown, perform the following:

   a. Immediately after Source Range detector high voltage is unblocked, record signals from both Source Range detectors on NR-45.

   b. Observe the decay of neutron count rate on both channels.

   c. If any erratic indications, such as disagreement between signal decay or excessive noise, are observed, initiate corrective action.

   d. If one or both Source Range channels are found inoperable, refer to Tech Spec 3.3.1.

3.0 PREREQUISITES

1. AC Electrical Distribution is available per OP-156.02.

4.0 PRECAUTIONS AND LIMITATIONS

1. No more than one redundant protection channel may be placed in bypass at a time.

2. In the event that high voltage is applied to Source Range detectors at power, the affected channels should be de-energized promptly. A reactor shutdown is not required.

3. Intermediate Range meter level must be less than or equal to 5×10^{-11} amps before resetting the Source Range Train A(B) Trip Block switches to avoid a reactor trip.

4. Verify a minimum of 1 decade overlap between the Source and Intermediate Range channels before blocking the Source Range Reactor Trip Signals.

5. Verify a minimum of 1 decade overlap between the Intermediate Range and Power Range channels before blocking the Intermediate Range and Low Range Power Range Reactor Trip Signals.

6. Removal of more than one Power Range channel from service when less than P-6, will de-energize the Source Range detectors by activating P-10.

7. A 30 to 45 minute warm-up time, with all drawers closed, is required for stabilization of circuit parameters before attempting to complete any alignment or adjustment procedure.

8. Lock all potentiometers containing locking nuts after an adjustment is made. If necessary, recheck and repeat the adjustment procedure before proceeding to the next adjustment.

9. Do not remove control power fuses while Intermediate or Source Range drawer assemblies are in the BYPASS mode. If control power fuses are removed, the bypass function will be removed and a Reactor Trip signal may be initiated.

10. If the Source Range detectors are in service with Reactor Trip Breakers shut or critical activities are in progress that could be adversely affected by a Source Range detector spike, DO NOT ALLOW any switchyard disconnects to be operated without evaluation of the effects on the Source Range instrumentation. (Reference 2.5.0.02)

11. Technical Specifications require four Power Range channels in Modes 1 and 2, two Intermediate Range channels in Modes 1 (<P-10) and 2, and two Source Range channels in Modes 2 (<P-6), 3, 4, 5, and 6. If any NIS channel is declared inoperable, refer to Tech Spec 3.3.1.

12. Technical Specifications require two source range channels, each with continuous visual indication in the Main Control Room and one with audible indication in Containment and in the Main Control Room, for Refueling operations per Tech Spec 3.9.2.

Question: 17

Given the following conditions:

- FRP-S.1, Response to Nuclear Power Generation/ATWS, is being implemented.
- An SI actuation has occurred.
- The Foldout page is applicable.

Which of the following actions should be taken?

a. Continue with FRP-S.1 while verifying proper operation of safeguard equipment

b. Continue with FRP-S.1 until the reactor is tripped or made subcritical, then immediately exit to PATH-1

c. Transition to PATH-1 and verify all automatic actions required for an SI have occurred, then return to FRP-S.1 only when directed by PATH-1

d. Reset SI and FW isolation as soon as possible to restore feed flow to the steam generators, then continue with FRP-S.1

Answer:

a. Continue with FRP-S.1 while verifying proper operation of safeguard equipment

QUESTION NUMBER: 17
TIER/GROUP: ***RO*** ***SRO*** 1/1

K/A: 0292.4.16

Knowledge of EOP implementation hierarchy and coordination with other support procedures (ATWS).

K/A IMPORTANCE: ***RO*** ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.15

DESCRIBE the purpose of the following EOPs including type of event for which they were designed and the major actions performed
- FRP-S.1

REFERENCES: FRP-S.1
EOP Users Guide

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.15 021

JUSTIFICATION:

a. **CORRECT** If a safety injection occurs while implementing FRP-S.1, proper operation of SI equipment is verified while continuing with FRP-S.1.

b. Plausible since PATH-1 provides instructions for a response to safety injection, but FRP-S.1 must be performed until completion.

c. Plausible since PATH-1 provides instructions for a response to safety injection, but FRP-S.1 must be performed until completion.

d. Plausible since a safety injection will result in a loss of MFW, but AFW flow is capable of providing minimum required flow.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural requirements

REFERENCES SUPPLIED:

FOLDOUT

- <u>SI VERIFICATION</u>

  <u>IF</u> SI actuation occurs, <u>THEN</u> verify proper operation of safeguards equipment while continuing with this procedure.

- <u>AFW SUPPLY SWITCHOVER CRITERIA</u>

  <u>IF</u> CST level decreases to less than 10%, <u>THEN</u> switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

6.25 Safeguards Verification During FRP Implementation

During implementation of FRP-S.1, it is possible for automatic initiation of SI to occur after subcriticality is attained. By the rules of usage for FRPs (see Section 5.2.3) the operator is required to complete FRP-S.1 prior to exiting the procedure. Upon exiting FRP-S.1, the rules of usage also require implementation of other RED or MAGENTA FRPs. To ensure verification of safeguards equipment is accomplished in a timely manner and is not bypassed, FRP-S.1 includes instructions in a FOLDOUT item to perform the verification. The item is not applicable until the immediate actions of FRP-S.1 are performed. This ensures its instructions do not conflict with the mitigation of an ATWS. The verification should consist of implementation of PATH-1 action blocks 7 through 20. As with any SI actuation, the sequencer should be monitored as described in Section 6.4.

The FOLDOUT item instructions provide flexibility by allowing the verification to be done while continuing with the procedure. The verification may be done concurrently with the implementation of FRP-S.1, or the implementation of FRP-S.1 may be temporarily suspended while the verification is completed.

During implementation of FRP-H.1, SI may be manually actuated as part of the initiation of "bleed and feed". After all steps to initiate "bleed and feed" have been completed, a step in the procedure verifies the actuation of safeguards equipment. Verification is delayed to ensure it does not delay or conflict with initiation of "bleed and feed".

6.26 Restoration of RCP Cooling and RCP Restart

During implementation of EOPs, RCPs may be stopped for any of following reasons:

- Satisfying the conditions of the "RCP TRIP CRITERIA"
- Specific instructions within the EOPs
- Implementation of AOP-018 (See Section 5.1.2.)
- Loss of power to the associated buses

Since forced circulation is desired (but not required) to enhance recovery actions, many EOPs include instructions to restart an RCP. Specific instructions for aligning cooling, verifying support conditions, and restarting an RCP during accident conditions are included in OP-100. The EOPs refer to the appropriate OP-100 section(s) whenever restoration of RCP cooling and/or RCP restart is desired.

Question: 18

Given the following conditions:

- The plant is operating at 100% power.
- While investigating an alarm condition at 0600, the S-SO determines that EDG 1B-SB is inoperable.
- Engineering reports at 1030 that a test deficiency on RHR Pump 1A-SA causes the pump to be declared inoperable.

When is the **LATEST** time that RHR Pump 1A-SA must be returned to service before TS 3.0.3 must be entered?

a. 1030

b. 1130

c. 1430

d. 1630

Answer:

c. 1430

QUESTION NUMBER: 18
TIER/GROUP: ***RO*** ***SRO*** 2/2

K/A: 0622.1.12

Ability to apply technical specifications for a system (AC Electrical Distribution).

K/A IMPORTANCE: ***RO*** ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: ADEL-2.7-1

APPLY Tech Specs as follows:
b. Given electrical Tech Specs and a situation, INTERPRET Tech Specs to DETERMINE applicability of Tech Spec LCO action statements

REFERENCES: TS 3.8.1.1

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since the RHR pump receives emergency power from the inoperable EDG and might be considered to be immediately inoperable, but 4 hours are permitted under these conditions.

b. Plausible since TS 3.0.3 provides 1 hour to make preparations to commence shutdown, but this 1 hour is after entry is made into 3.0.3.

c. CORRECT With one EDG inoperable and if a required feature powered from the opposite EDG is declared inoperable, 4 hours are permitted before the feature powered from the inoperable EDG must be declared inoperable.

d. Plausible since hot standby conditions are required within 6 hours if the inoperable EDG is not restored to service within a certain time frame, but this condition renders both RHR pumps inoperable after 4 hours.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Application of conditions to Tech Specs to determine proper actions

REFERENCES SUPPLIED: Tech Spec 3.8.1.1

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Two separate and independent diesel generators, each with:

 1. A separate day tank containing a minimum of 1457 gallons of fuel, which is equivalent to a minimum indicated level of 40%**,

 2. A separate main fuel oil storage tank containing a minimum of 100,000 gallons of fuel, and

 3. A separate fuel oil transfer pump.

c. Automatic Load Sequencers for Train A and Train B.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one offsite circuit of 3.8.1.1.a inoperable:

 1. Perform Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and

 2. Restore the offsite circuit 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; and

 3. Verify required feature(s) powered from the OPERABLE offsite A.C. source are OPERABLE. If required feature(s) powered from the OPERABLE offsite circuit are discovered to be inoperable at any time while in this condition, restore the required feature(s) to OPERABLE status within 24 hours from discovery of inoperable required feature(s) or declare the redundant required feature(s) powered from the inoperable A.C. source as inoperable.

**Minimum indicated level with a fuel oil specific gravity of 0.83 and the level instrumentation calibrated to a reference specific gravity of 0.876.

ACTION (Continued):

b. With one diesel generator of 3.8.1.1.b inoperable:

1. Perform Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and

*2. Within 24 hours, determine the OPERABLE diesel generator is not inoperable due to a common cause failure or perform Surveillance Requirement 4.8.1.1.2.a.4#; and

3. Restore the diesel generator 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; and

4. Verify required feature(s) powered from the OPERABLE diesel generator are OPERABLE. If required feature(s) powered from the OPERABLE diesel generator are discovered to be inoperable at any time while in this condition, restore the required feature(s) to OPERABLE status within 4 hours from discovery of inoperable required feature(s) or declare the redundant required feature(s) powered from the inoperable A.C. source as inoperable.

c. With one offsite circuit and one diesel generator of 3.8.1.1 inoperable:

NOTE: Enter applicable Condition(s) and Required Action(s) of LCO 3/4.8.3, ONSITE POWER DISTRIBUTION - OPERATING, when this condition is entered with no A.C. power to one train.

1. Restore one of the inoperable A.C. sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

2. Following restoration of one A.C. source (offsite circuit or diesel generator), restore the remaining inoperable A.C. source to OPERABLE status pursuant to requirements of either ACTION a or b, based on the time of initial loss of the remaining A.C. source.

*This ACTION is required to be completed regardless of when the inoperable EDG is restored to OPERABILITY.

#Activities that normally support testing pursuant to 4.8.1.1.2.a.4, which would render the diesel inoperable (e.g., air roll), shall not be performed for testing required by this ACTION statement.

ACTION (Continued):

d. With two of the required offsite A.C. sources inoperable:

1. Restore one offsite circuit to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and

2. Verify required feature(s) are OPERABLE. If required feature(s) are discovered to be inoperable at any time while in this condition, restore the required feature(s) to OPERABLE status within 12 hours from discovery of inoperable required feature(s) or declare the redundant required feature(s) inoperable.

3. Following restoration of one offsite A.C. source, restore the remaining offsite A.C. source in accordance with the provisions of ACTION a with the time requirement of that ACTION based on the time of initial loss of the remaining inoperable A.C. source.

e. With two of the required diesel generators inoperable:

1. Perform Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and

#2. Restore one of the diesel generators to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

3. Following restoration of one diesel generator, restore the remaining diesel generator in accordance with the provisions of ACTION b with the time requirement of that ACTION based on the time of initial loss of the remaining inoperable diesel generator.

f. With three or more of the required A.C. sources inoperable:

1. Immediately enter Technical Specification 3.0.3.

2. Following restoration of one or more A.C. sources, restore the remaining inoperable A.C. sources in accordance with the provisions of ACTION a,b,c,d and/or e as applicable with the time requirement of that ACTION based on the time of initial loss of the remaining inoperable A.C. sources.

g. With contiguous events of either an offsite or onsite A.C. source becoming inoperable and resulting in failure to meet the LCO:

1. Within 6 days, restore all A.C. sources required by 3.8.1.1 or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

#Activities that normally support testing pursuant to 4.8.1.1.2.a.4, which would render the diesel inoperable (e.g., air roll), shall not be performed for testing required by this ACTION statement.

LIMITING CONDITION FOR OPERATION

ACTION (Continued):

h. With one automatic load sequencer inoperable:

1. Restore the automatic load sequencer to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignment and power availability, and

b. Demonstrated OPERABLE at least once per 18 months by manually transferring the onsite Class 1E power supply from the unit auxiliary transformer to the startup auxiliary transformer.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the day tank,

2. Verifying the fuel level in the main fuel oil storage tank,

3. Verifying the fuel oil transfer pump can be started and transfers fuel from the storage system to the day tank,

4. Verifying the diesel generator can start** and accelerate ## to synchronous speed (450 rpm) with generator voltage and frequency 6900 ± 690 volts and 60 ± 1.2 Hz,

5. Verifying the diesel generator is synchronized, gradually loaded** to an indicated 6200-6400 kW*** and operates for at least 60 minutes,

6. Verifying the pressure in at least one air start receiver to be greater than or equal to 190 psig, and

7. Verifying the diesel generator is aligned to provide standby power to the associated emergency buses.

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable, regarding loading recommendations.

***This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

The voltage and frequency conditions shall be met within 10 seconds or gradual acceleration to no-load conditions per vendor recommendations will be an acceptable alternative.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

b. Check for and remove accumulated water:

1. From the day tank, at least once per 31 days and after each operation of the diesel where the period of operation was greater than 1 hour, and

2. From the main fuel oil storage tank, at least once per 31 days.

c. By sampling new fuel oil in accordance with ASTM-D4057-81 prior to addition to storage tanks and:

1. By verifying, in accordance with the tests specified in ASTM-D975-81 prior to addition to the storage tanks, that the sample has:

a) An API Gravity of within 0.3 degrees at 60°F, or a specific gravity of within 0.0016 at 60°F, when compared to the supplier's certificate, or an absolute specific gravity at 60°F of greater than or equal to 0.83 but less than or equal to 0.89, or an API gravity of greater than or equal to 26 degrees but less than or equal to 38 degrees.

b) A kinematic viscosity at 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes, if the gravity was not determined by comparison with the supplier's certification;

c) A flash point equal to or greater than 125°F; and

d) A clear and bright appearance with proper color when tested in accordance with ASTM-D4176-82.

2. By verifying within 30 days of obtaining the sample that the other properties specified in Table 1 of ASTM-D975-81 are met when tested in accordance with ASTM-D975-81 except that the analysis for sulfur may be performed in accordance with ASTM-D1552-79 or ASTM-D2622-82.

d. At least once every 31 days by obtaining a sample of fuel oil from the storage tank, in accordance with ASTM-D2276-78, and verifying that total particulate contamination is less than 10 mg/liter when checked in accordance with ASTM-D2276-78, Method A.

e. At least once per 184 days, on a STAGGERED TEST BASIS, the diesel generators shall be started** and accelerated to at least 450 rpm in less than or equal to 10 seconds. The generator voltage and frequency shall be 6900 ± 690 volts and 60 ± 1.2 Hz in less than or equal to 10 seconds after the start signal.

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

The generator shall be manually synchronized to its appropriate emergency bus, loaded to an indicated 6200-6400*** kW, and operate for at least 60 minutes. The diesel generator shall be started for this test by using one of the following signals on a rotating basis:

1. Simulated loss of offsite power by itself, and

2. A Safety Injection test signal by itself.

This test, if it is performed so that it coincides with the testing required by Surveillance Requirement 4.8.1.1.2.a.4, may also serve to concurrently meet those requirements as well.

f. At least once per 18 months during shutdown by:

1. DELETED

2. Verifying that, on rejection of a load of greater than or equal to 1078 kW, the voltage and frequency are maintained with 6900 ± 690 volts and 60 ± 6.75 Hz, with frequency stabilizing to 60 ± 1.2 Hz within 10 seconds without any safety-related load tripping out or operating in a degraded condition.

3. Verifying that the load sequencing timer is OPERABLE with the interval between each load block within 10% of its design interval.

4. Simulating a loss of offsite power by itself, and:

***This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

a) Verifying de-energization of the emergency buses and load shedding from the emergency buses.

b) Verifying the diesel starts** on the auto-start signal, energizing the emergency buses with permanently connected loads in less than or equal to 10 seconds, energizing the auto-connected shutdown loads through the load sequencer, and operating for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization of these loads, the steady-state voltage and frequency shall be maintained at 6900 ± 690 volts and 60 ± 1.2 Hz.

5. Verifying that on a safety injection test signal (without loss of power) the diesel generator starts** on the auto-start signal and operates on standby for greater than or equal to 5 minutes.

6. Simulating a loss of offsite power in conjunction with a safety injection test signal, and

a) Verifying de-energization of the emergency buses and load shedding from the emergency buses.

b) Verifying the diesel starts** on the auto-start signal, energizing the emergency buses with permanently connected loads in less than or equal to 10 seconds, energizing the auto-connected emergency (accident) loads through the sequencing timers, and operating for greater than or equal to 5 minutes and maintaining the steady-state voltage and frequency at 6900 ± 690 volts and 60 ± 1.2 Hz.

c) DELETED

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

A.C. SOURCES

OPERATING

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

7. Verifying the diesel generator operates** for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to 6800-7000 kW*** and, during the remaining 22 hours of this test, the diesel generator shall be loaded to an indicated 6200-6400 kW***.

8. DELETED

9. Verifying the diesel generator's capability to:

   a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power,
   b) Transfer its loads to the offsite power source, and
   c) Proceed through its shutdown sequence.

10. DELETED

11. Verifying the generator capability to reject a load of between 6200 and 6400 kW without tripping. The generator voltage shall not exceed 110% of the generator voltage at the start of the test during and following the load rejection;

12. Verifying that, with the diesel generator operating in a test mode and connected to its bus, a simulated Safety Injection signal overrides the test mode by: (1) returning the diesel generator to standby operation and (2) automatically energizing the emergency loads with offsite power.

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

***This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

13. Verifying that all diesel generator trips, except engine overspeed, loss of generator potential transformer circuits, generator differential, and emergency bus differential are automatically bypassed on a simulated or actual loss of offsite power signal in conjunction with a safety injection signal.

14. Verifying that within 5 minutes of shutting down the EDG, after the EDG has operated for at least 2 hours at an indicated load of 6200-6400 kw, the EDG starts and accelerates to 6900 ± 690 volts and 60 ± 1.2 hz in 10 seconds or less.

g. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting** both diesel generators simultaneously, during shutdown, and verifying that both diesel generators accelerate to at least 450 rpm in less than or equal to 10 seconds.

h. At least once per 10 years by:

1) Draining each main fuel oil storage tank, removing the accumulated sediment, and cleaning the tank using a sodium hypochlorite solution or other appropriate cleaning solution, and

2) Performing a pressure test, of those isolable portions of the diesel fuel oil piping system designed to Section III, subsection ND of the ASME Code, at a test pressure equal to 110% of the system design pressure.

**This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

Question: 19

Given the following conditions:

- 1CS-235, Charging Line Isolation, was closed to establish a clearance boundary for maintenance on 1CS-238.
- 1CS-235 had to be manually torqued shut.
- 1CS-235 is a Limitorque SMB-00/SB-00 motor-operated valve.

Prior to declaring 1CS-235 operable after the clearance is removed, the valve must be ...

a. verified to have the torque switch calibrated correctly.

b. stroked with the control switch.

c. monitored for seat leakage.

d. manually stroked full open.

Answer:

b. stroked with the control switch.

QUESTION NUMBER: 19
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.2.21

Knowledge of pre- and post-maintenance operability requirements.

K/A IMPORTANCE: ***RO*** ***SRO*** 3.5

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 2

OBJECTIVE: PP-2.4-1

IDENTIFY the primary functions and explain the responsibilities of the Work Coordination Center

REFERENCES: OMM-014

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number B00 028

JUSTIFICATION:

a. The Unit-SCO ensures all pertinent information, including retest requirements, is entered in the Remarks section of the EIR when equipment fails surveillance.

b. **CORRECT** Plausible since PMTR may include the required retest requirements, but the Unit-SCO must ensure that all necessary retest requirements for operability are annotated on the EIR.

c. Plausible since the required work to repair the pump may require additional retest requirements, but the Unit SCO must ensure that all necessary retest requirements for operability are annotated on the EIR.

d. Plausible since the required work to repair the pump may require additional retest requirements, but the Unit SCO must ensure that all necessary retest requirements for operability are annotated on the EIR.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of administrative procedural requirements

REFERENCES SUPPLIED:

5.1.1 Standard Practices (continued)

10. The Tag Hanger or individual directing the removal of the Operations Clearance should have as a minimum the Clearance Tag Sheet, or a copy, present during installation and removal of tags.

11. When boundary valves leak by their seat and a complete draining cannot be accomplished, the Unit SCO and the Clearance Holder should determine when conditions are safe to perform the required maintenance.

12. If the Clearance involved draining a portion of a system, instructions for a fill and vent should be included in the Special Instructions. OMM-001, Refilling and Venting Systems After Draining section, should be referenced. For filling and venting of an entire train or system, the applicable Operating Procedure should be referenced for instructions.

13. If the component that was drained has a heater associated with the drained portion, the fill and vent must be performed prior to energizing the heater.

14. If applicable, specific Sections of procedures can also be specified to assist in removing the Operations Clearance in the correct order and/or verifying appropriate plant conditions exist before returning the equipment to service. If only a portion of a procedure is to be performed, the applicable steps should be clearly identified and the partial procedure performance accomplished per PRO-NGGC-0200. The Unit SCO shall be fully cognizant of the procedure Steps to be performed and verify that plant conditions are appropriate.

15. All Limitorque SMB-00/SB-00 motor operated valves, if manually operated, are required to be stroked electrically from the control switch to be declared operable. All of the applicable SMB-00/SB-00 valves are listed on Attachment 7. (Reference 2.4.0.08)

16. When draining non-contaminated systems inside the RAB, measures must be taken to prevent these systems from being drained to the Radioactive Floor Drain or Equipment Drains Systems. The "Special Instructions" section of the clearance should specify the required drain routing, including any special equipment requirements, to ensure that non-contaminated systems are drained to the Secondary Waste System, or the HVAC Condensate Drains System. These non-contaminated systems include, but are not limited to NSW, ESW, CCW, ESCW, NESCW, FP, PW, FW, AFW, and DW. (Ref. 2.1.0.013)

17. While a system is breached, if a significant increase in pressure occurs in the system (such as a pump start or system heatup), the system should be periodically checked for an increase in leakage.

18. Clearance boundary isolation valves for work on acid (excluding boric acid) or caustic systems should be capable of performing adequate isolation. A review of AMMS is required to verify that no outstanding deficiencies exist that affect a boundary valve's ability to adequately isolate the system. (Reference 2.4.0.03)

Question: 20

Given the following conditions:

- AOP-036, Safe Shutdown Following a Major Fire, is being implemented.
- A safety injection occurs concurrently with a loss of off-site power.
- 1A-SA EDG starts and loads.
- 1B-SB EDG fails to start.

Which of the following actions should be taken?

a. Continue with AOP-036 while referencing EOP-PATH 1

b. Follow EOP-PATH 1 and continue with AOP-036 when directed to perform a plant cooldown

c. Continue with AOP-036 while referencing EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses

d. Follow EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses, and continue with AOP-036 when directed to perform a plant cooldown

Answer:

b. Follow EOP-PATH 1 and continue with AOP-036 when directed to perform a plant cooldown

QUESTION NUMBER: 20
TIER/GROUP: ***RO*** ***SRO*** 1/1

K/A: 0672.4.27

Knowledge of fire in the plant procedure (Plant Fire On Site).

K/A IMPORTANCE: ***RO*** ***SRO*** 3.5

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: AOP-3.36-R2

In the event of a reactor trip/safety injection during a major fire, DETERMINE which procedures should be used

REFERENCES: AOP-036

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number AOP-3.36-R2 002

JUSTIFICATION:

a. Plausible since AOP-036 assumes minimal equipment available based on fire location, but actions must be taken PATH-1 in response to the safety injection.

b. **CORRECT** If a reactor trip or safety injection occurs, refer to PATH-1 and when directed to perform a plant cooldown continue with AOP-036.

c. Plausible since AOP-036 assumes minimal equipment available based on fire location, but actions must be taken PATH-1 in response to the safety injection.

d. Plausible since AOP-036 assumes minimal equipment available based on fire location, but actions must be taken PATH-1 in response to the safety injection.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural requirements

REFERENCES SUPPLIED:

SAFE SHUTDOWN FOLLOWING A FIRE

1.0 SYMPTOMS

1. A required plant shutdown following a fire in any plant fire area, as indicated by fire panel alarms, that may inhibit normal shutdown procedures.

2.0 AUTOMATIC ACTIONS

None

3.0 OPERATOR ACTIONS

3.1 Immediate Action

None

3.2 Follow-Up Actions

NOTE: If safe and efficient operation of the plant will not be compromised, procedure steps may be performed simultaneously or out of sequence at the discretion of the Unit SCO.

1. Check that a plant shutdown is required due to a fire in the plant.

NOTE: The plant is designed to provide the capability to achieve hot and cold shutdown conditions assuming a postulated fire in an area containing equipment required to shutdown the plant.

2. Refer to the applicable Fire Pre-Plan and determine what safety related equipment may be affected by the fire.

3. If a normal plant shutdown can be achieved with at least one train of equipment using normal plant procedures, Go To procedure and step in effect.

4. A fire may require initiation of the Emergency Plan.
R Refer to PEP-110 and evaluate EAL Network using EAL entry point X. (Ref: DIN 842960398)

5. IF a reactor trip or safety injection occurs, Refer to EOP-PATH-1 and when directed to perform plant cooldown, continue with this procedure.

6. General guidelines for affected systems.

   a. Monitor for spurious valve and/or pump operation which may result in equipment damage (for example, CSIP suction valves), and be particularly alert for inconsistent operation and indication of equipment.

   b. Start alternate equipment per applicable operating procedures.

   c. Shift support systems trains (for example, ESW, CCW, and Chilled Water) as required.

Question: 36

Given the following conditions:

- A Loss of All AC Power has occurred.
- EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses, directs that SI be actuated and immediately reset.

Actuating SI and immediately resetting it is performed to ensure the ...

a. EDG will be capable of tripping on any trip signal when started.

b. SI valves will **NOT** automatically realign when power is restored.

c. CCW pumps do **NOT** automatically start when power is restored.

d. DC battery capacity is conserved until power is restored.

Answer:

b. SI valves will **NOT** automatically realign when power is restored.

QUESTION NUMBER: 36
TIER/GROUP: ***RO*** ***SRO*** 1/3

K/A: 056AA2.47

Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Proper operation of the ED/G load sequencer

K/A IMPORTANCE: ***RO*** ***SRO*** 3.9

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.7-7

Given a step, caution, or note from EOP-001, EOP-002, or EOP-003, STATE its purpose

REFERENCES: EPP-001

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since resetting SI will activate all EDG trips, including non-emergency trips, but resetting SI is performed to ensure SI valves will not automatically realign upon AC power restoration.

b. **CORRECT** Resetting SI ensures SI valves will not automatically realign upon AC power restoration.

c. Plausible since CCW pump autostarts on low pressure are disabled, but they are disabled by opening the control power knife switches.

d. Plausible since this is one goal during the implementation of EPP-001, but it is met by shedding DC loads locally, not by resetting SI.

DIFFICULTY:
Comprehensive/Analysis [ ] ***Knowledge/Recall*** [X] ***Rating*** 3

Knowledge of procedural requirements and basis

REFERENCES SUPPLIED:

Instructions	Response Not Obtained

NOTE:

- o Foldout applies.
- o Resetting SI ensures SI valves will NOT automatically realign upon AC power restoration.
- o To prevent overheating their components, the inverter and MCB panel doors should be opened within 30 minutes following a loss of all AC power.
- o After the sequencer is de-energized, the torque switch and overload protection for limitorque valves will remain bypassed.

8. Align Equipment For Extended Power Loss:

Instructions	Response Not Obtained
a. Check SI - ACTUATED	a. Actuate SI.
b. Reset SI.	
c. Locally open panel doors: o S-1 Inverter o S-2 Inverter o S-3 Inverter o S-4 Inverter o Main Control Board (rear doors - key #94)	
d. Locally de-energize control power to the emergency safeguards sequencers: DP-1A-SA CKT #8 DP-1B-SB CKT #8	
e. Locally open control power knife switch for each CCW pump breaker: 1A-SA CUB 8 (CCW PUMP A) 1A-SA CUB 3 (CCW PUMP C) 1B-SB CUB 8 (CCW PUMP B) 1B-SB CUB 2 (CCW PUMP C)	

Question: 37

The plant is in Mode 4. The following RCS leak rates are noted:

• Primary to secondary – SG 'A'	0.08 gpm
• Primary to secondary – SG 'B'	0.11 gpm
• Primary to secondary – SG 'C'	0.07 gpm
• Leakage by PRZ Safeties to PRT	5.40 gpm
• Leakage from RCS to RCDT	4.00 gpm
• Total leakage from RCS	10.30 gpm

Which of the following RCS Technical Specification leakage limits is being exceeded for this Mode?

a. Pressure Boundary Leakage

b. Unidentified Leakage

c. Primary to Secondary Leakage

d. Identified Leakage

Answer:

c. Primary to Secondary Leakage

QUESTION NUMBER: 37
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.1.33

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

K/A IMPORTANCE: ***RO*** ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 3-Feb

OBJECTIVE: RCS-3.0-10

DEMONSTRATE knowledge of the Technical Specifica-tions associated with the Reactor Coolant System: b) RECOGNIZE the LCO limits associated with action statements of one hour or less

REFERENCES: TS 1.17
TS 3.4.6.2

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number 98RO-90

JUSTIFICATION:

a. Plausible since if any of the leakage passed the safety valves is considered to be pressure boundary leakage the limit for pressure boundary leakage of 0 would be exceeded, but this is not pressure boundary leakage.

b. Plausible since limit of 1 gpm would be exceeded if any other given leakage is considered to be unidentified in addition to the actual unidentified leakage of 0.64 gpm.

c. **CORRECT** SG 'B' leakage exceeds individual SG limit of 150 gpd (158.4 gpd) although the total SG leakage is within limits.

d. Plausible since total leakage from RCS is 10.3 gpm which exceeds identified leakage limit of 10 gpm, but identified leakage is actually 9.66 gpm which includes leakage to SGs, PRT, and RCDT.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of calculated value to technical specification requirements

REFERENCES SUPPLIED:

$\bar{E}$ - AVERAGE DISINTEGRATION ENERGY

1.12 $\bar{E}$ shall be the average, weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling, of the sum of the average beta and gamma energies per disintegration (MeV/d) for isotopes, with half-lives greater than 15 minutes, making up at least 95% of the total non-iodine activity in the coolant.

ENGINEERED SAFETY FEATURES RESPONSE TIME

1.13 The ENGINEERED SAFETY FEATURES (ESF) RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF Actuation Setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays where applicable.

EXCLUSION AREA BOUNDARY

1.14 The EXCLUSION AREA BOUNDARY shall be that line beyond which the land is not controlled by the licensee to limit access.

FREQUENCY NOTATION

1.15 The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.1.

GASEOUS RADWASTE TREATMENT SYSTEM

1.16 A GASEOUS RADWASTE TREATMENT SYSTEM is any system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system off-gases from the primary system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

IDENTIFIED LEAKAGE

1.17 IDENTIFIED LEAKAGE shall be:

a. Leakage (except CONTROLLED LEAKAGE) into closed systems, such as pump seal or valve packing leaks that are captured and conducted to a sump or collecting tank, or

b. Leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of Leakage Detection Systems or not to be PRESSURE BOUNDARY LEAKAGE, or

c. Reactor Coolant System leakage through a steam generator to the Secondary Coolant System.

LIMITING CONDITION FOR OPERATION

3.4.6.2 Reactor Coolant System leakage shall be limited to:

a. No PRESSURE BOUNDARY LEAKAGE,

b. 1 gpm UNIDENTIFIED LEAKAGE,

c. 1 gpm total reactor-to-secondary leakage through all steam generators and 150 gallons per day through any one steam generator,

d. 10 gpm IDENTIFIED LEAKAGE from the Reactor Coolant System,

e. 31 gpm CONTROLLED LEAKAGE at a Reactor Coolant System pressure of 2235 ± 20 psig, and

f. The maximum allowable leakage of any Reactor Coolant System Pressure Isolation Valve shall be as specified in Table 3.4-1 at a pressure of 2235 ± 20 psig.*

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

ACTION:

a. With any PRESSURE BOUNDARY LEAKAGE, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With any Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE and leakage from Reactor Coolant System Pressure Isolation Valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With any Reactor Coolant System Pressure Isolation Valve leakage greater than the limit specified in Table 3.4-1, isolate the high pressure portion of the affected system from the low pressure portion within 4 hours by use of at least two closed manual or deactivated automatic valves, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

*Test pressures less than 2235 psig but greater than 150 psig are allowed. Observed leakage shall be adjusted by multiplying the observed leakage by the square root of the quotient of 2235 divided by the test pressure.

The plant is in Mode 4. The following RCS leak rates are noted:

• Primary to secondary – SG 'A'	0.25 gpm
• Primary to secondary – SG 'B'	0.30 gpm
• Primary to secondary – SG 'C'	0.15 gpm
• Leakage by Prz Safeties to PRT	5.80 gpm
• Leakage from RCS to RCDT	4.00 gpm
• Total leakage from RCS	11.30 gpm

Which of the following RCS Technical Specification leakage limits is being exceeded for this Mode?

A. Pressure Boundary Leakage

B. Unidentified Leakage

C. Primary to Secondary Leakage

D. Identified Leakage

Answer:

D Identified Leakage

Question: 38

Given the following conditions:

- A large break LOCA has occurred.
- During the performance of the EOPs, a transition has been made to EPP-012, Loss of Emergency Coolant Recirculation.

Conditions upon entry to EPP-012 are:

- RWST level at 68%.
- Three (3) Containment Fan Coolers operating in slow speed.
- Containment pressure at 14 psig.
- Containment wide range sump level < 100 inches.

Which of the following describes the Containment Spray (CS) System configuration required?

a. One CS Pump running, taking a suction off the Containment Sump

b. Both CS Pumps running, taking a suction off the Containment Sump

c. One CS Pump running, taking a suction off the RWST

d. Both CS Pumps running, taking a suction off the RWST

Answer:

c. One CS Pump running, taking a suction off the RWST

QUESTION NUMBER: 38

TIER/GROUP: ***RO*** ***SRO*** 1/1

K/A: WE14EA2.1

Ability to determine and interpret the following as they apply to the (High Containment Pressure) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A IMPORTANCE: ***RO*** ***SRO*** 3.8

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.13

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis CNMT spray operation (EPP-012 or FRP-J.1)

REFERENCES: EPP-012
FRP-J.1

SOURCE: ***New*** ☒ ***Significantly Modified*** ☐ ***Direct*** ☐

Bank Number NA

JUSTIFICATION:

a. Plausible since one CS pump should be running based on conditions, but RWST level is adequate to continue taking suction from the tank.

b. Plausible since two CS pumps would normally be running at this containment pressure, but EPP-012 requires CS reduction to conserve RWST inventory.

c. **CORRECT** With the RWST level > 23.4%, containment pressure between 10 and 45 psig, and 3 fan coolers operating, one CS pump should be running with suction from the RWST.

d. Plausible since two CS pumps would normally be running at this containment pressure and suction should be aligned to RWST, but EPP-012 requires CS reduction to conserve RWST inventory.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of plant conditions to determine proper operator actions

REFERENCES SUPPLIED: EPP-012, Table 1 (page 12)

Instructions	Response Not Obtained
12. Determine CNMT Spray Requirements:	
a. Spray pump suction - ALIGNED TO RWST	a. GO TO Step 14.

b. Determine required number of CNMT spray pumps from Table 1:

TABLE 1: CONTAINMENT SPRAY REQUIREMENTS			
RWST LEVEL	CONTAINMENT PRESSURE	MINIMUM # OF FAN COOLER UNITS RUNNING	REQUIRED # OF CNMT SPRAY PUMPS
GREATER THAN 23.4%	GREATER THAN 45 PSIG	N/A	2
	BETWEEN 10 PSIG AND 45 PSIG	0	2
		2	1
		4	0
	LESS THAN 10 PSIG	N/A	0
BETWEEN 3% AND 23.4%	GREATER THAN 45 PSIG	N/A	2
	BETWEEN 10 PSIG AND 45 PSIG	2	1
		3	0
	LESS THAN 10 PSIG	N/A	0
LESS THAN 3%	N/A	N/A	0

c. Verify spray pumps - REQUIRED NUMBER RUNNING

d. Reset CNMT spray signal.

e. Align CNMT spray pump(s) stopped in Step 12c for standby operation:

- o Shut CNMT spray pump discharge valve(s):

  1CT-50 (A CT Pump)
  1CT-88 (B CT Pump)

- o Shut CNMT spray chemical addition valve(s):

  1CT-12 (A CT Pump)
  1CT-11 (B CT Pump)

Instructions	Response Not Obtained
3. Check CNMT Spray Requirements:	
a. CNMT pressure - HAS INCREASED TO GREATER THAN 10 PSIG	a. RETURN TO procedure and step in effect.
b. EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION" - PREVIOUSLY IN EFFECT	b. GO TO Step 3e.
c. Operate CNMT spray using EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION".	
d. GO TO Step 4.	
e. Verify CNMT spray pumps - RUNNING	
f. Check RWST level - GREATER THAN 23.4% (2/4 Low-Low alarm)	f. Verify CNMT spray system valves aligned for recirculation: o Verify the following valves - OPEN: 1CT-102 1CT-105 1CT-50 1CT-88 GO TO Step 3h.
g. Verify CNMT spray system valves aligned for injection: o Verify the following valves - OPEN: 1CT-26 1CT-71 1CT-50 1CT-88 1CT-11 1CT-12	
h. Verify Phase B isolation valves - SHUT. (Refer to OMM-004, "POST TRIP/SAFEGUARDS REVIEW" Attachment 9.)	
i. Stop all RCPs.	
4. Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED	

Question: 39

Given the following conditions:

- A loss of secondary heat sink has occurred and FRP-H.1, Response to Loss of Secondary Heat Sink, is being performed.
- Containment pressure is 0.5 psig.
- All RCPs are stopped.
- SG levels (WR) are all between 30% and 35% and decreasing slowly.
- Core exit thermocouple temperatures are stable.
- PRZ pressure is 2270 psig and increasing slowly.
- AFW is **NOT** available.
- The crew has just attempted to start the MFW Pumps, but neither Main Feedwater Pump can be started.

Which of the following actions should be taken to provide core cooling?

a. Depressurize the RCS to inject the CLAs

b. Depressurize at least one SG below CBP discharge pressure

c. Restart one RCP and establish an RCS vent path

d. Initiate SI flow and establish an RCS vent path

Answer:

b. Depressurize the SG below CBP discharge pressure

QUESTION NUMBER: 39
TIER/GROUP: ***RO*** ***SRO*** 1/2

K/A: WE05EA2.2

Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink) Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

K/A IMPORTANCE: ***RO*** ***SRO*** 4.3

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.11

DESCRIBE the purpose of the following EOPs, including the type of event for which they were designed and the major actions performed
- FRP-H.1

REFERENCES: FRP-H.1

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number EOP-3.11 026

JUSTIFICATION:

a. Plausible since this would provide cooling, but the only method to depressurize the RCS would be to open PRZ PORVs and saturation conditions would prevent the RCS from depressurizing to a low enough pressure.

b. **CORRECT** With AFW and MFW unavailable, efforts must be made to establish condensate flow prior to being required to initiate RCS bleed and feed.

c. Plausible since restarting an RCP is an option in FRP-C.1 to remove heat, but RCPs are turned off in FRP-H.1 to minimize heat input into the RCS due to the loss of heat sink.

d. Plausible since this action will be taken if efforts are unsuccessful in establishing a secondary heat removal path, but conditions have not yet been met for bleed and feed.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of given conditions to discriminate between potential actions

REFERENCES SUPPLIED:

FOLDOUT

- <u>RCS BLEED AND FEED INITIATION CRITERIA</u>

  <u>IF</u> any of the following occurs, <u>THEN</u> immediately perform Steps 12 through 21 for RCS bleed and feed.

  - SG wide range level - ANY TWO LESS THAN 10% [35%]

  - PRZ pressure - GREATER THAN OR EQUAL TO 2335 PSIG DUE TO LOSS OF SECONDARY HEAT SINK

  - RCS temperature <u>AND</u> pressure - INCREASING DUE TO LOSS OF SECONDARY HEAT SINK

- <u>COLD LEG RECIRCULATION SWITCHOVER CRITERIA</u>

  <u>IF</u> RWST level decreases to less than 23.4% (2/4 Low-Low alarm), <u>THEN</u> GO TO EPP-010, "TRANSFER TO COLD LEG RECIRCULATION", Step 1.

- <u>AFW SUPPLY SWITCHOVER CRITERIA</u>

  <u>IF</u> CST level decreases to less than 10%, <u>THEN</u> switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

- <u>RHR RESTART CRITERIA</u>

  <u>IF</u> RCS pressure decreases to less than 190 PSIG, <u>THEN</u> restart RHR pumps to supply water to the RCS.

Instructions	Response Not Obtained

NOTE: After stopping all RCPs, RCS pressure and temperature will increase as natural circulation is established. A large loop ΔT prior to PRZ PORV opening confirms natural circulation. This must be considered while evaluating bleed and feed criteria.

6. Stop All RCPs.	
7. Establish Main FW Flow To At Least One SG:	
a. Check condensate system - IN SERVICE	a. Place condensate system in service. (Refer to OP-134, "CONDENSATE SYSTEM", Section 5.0.) IF condenstate system can NOT be placed in service, THEN GO TO Step 11.
b. Establish main FW flow using Attachment 3.	
c. Main FW flow to SG(s) - ESTABLISHED	c. GO TO Step 7e.
d. GO TO Step 8.	
e. Any preheater bypass valve OR main FW isolation valve - OPEN	e. GO To Step 11.
f. Any main FW pump - RUNNING	f. GO TO Step 9.
g. GO TO Step 11.	

Instructions	Response Not Obtained
8. Check SG Levels:	
a. Any narrow range level - GREATER THAN 10% [40%]	a. GO TO Step 8c.
b. RETURN TO procedure and step in effect.	
c. Check secondary heat sink adequate by observing both of the following: o Any SG wide range level - INCREASING o Core exit TCs - STABLE OR DECREASING	c. GO TO Step 8f.
d. Restore narrow range level to greater than 10% [40%] in at least one SG.	
e. RETURN TO procedure and step in effect.	
f. Check any main FW pump - RUNNING	f. GO TO Step 9.
g. GO TO Step 11.	
9. Establish Condensate Flow To At Least One SG:	
a. Establish condensate flow using Attachment 4.	
b. Condensate flow to SGs - ESTABLISHED	b. GO TO Step 11.

EOP-3.11 026
A loss of secondary heat sink has occurred. Attempts are made to restore main feedwater using FRP-H.1, Response to Loss of Secondary Heat Sink. The operators observe the following conditions:

-All RCPs are stopped
-SG level (WR) are all at 10 percent and decreasing
-Core exit thermocouple temperatures are increasing
-PRZ pressure has begun to increase rapidly and is now above 2400 psig

Based on the above conditions, what will be the method of core cooling?

A. Depressurize the RCS to inject the CLA

B. Depressurize the SG below CBP discharge pressure

C. Restart all RCPs and establish an RCS vent path

✓D. Verify SI flow and establish an RCS vent path

Question: 40

Given the following conditions:

- While at 100% power, a steam line break occurs.
- Safety injection actuates.
- The steam break is isolated per EPP-014, Faulted SG Isolation.

Which of the following describes the expected EOP flowpath used to stabilize and restore plant systems upon exiting EPP-014?

a. PATH-1, Entry Point C, then to EPP-008, SI Termination

b. PATH-1, Entry Point C, then to EPP-009, Post-LOCA Cooldown and Depressurization

c. Directly to EPP-008, SI Termination

d. Directly to EPP-009, Post-LOCA Cooldown and Depressurization

Answer:

a. PATH-1, Entry Point C, then to EPP-008, SI Termination

QUESTION NUMBER: 40
TIER/GROUP: ***RO*** ***SRO*** 1/1

K/A: WE02EA2.1

Ability to determine and interpret the following as they apply to the (SI Termination) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A IMPORTANCE: ***RO*** ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.1

DESCRIBE the purpose of the following emergency procedures including the type of event for which they were designed and the major actions performed
d. EPP-008, SI Termination

REFERENCES: PATH-1
EPP-014

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.1 025

JUSTIFICATION:

a. **CORRECT** Once a faulted SG has been isolated, SI termination is important to prevent overfilling/overpressurizing the RCS, but SI termination criteria must first be verified in PATH-1.

b. Plausible since PATH-1 must be entered to determined SI termination criteria, but the transition from PATH-1 will be to EPP-008.

c. Plausible since SI termination is important to prevent overfilling/overpressurizing the RCS, but SI termination criteria must first be verified in PATH-1.

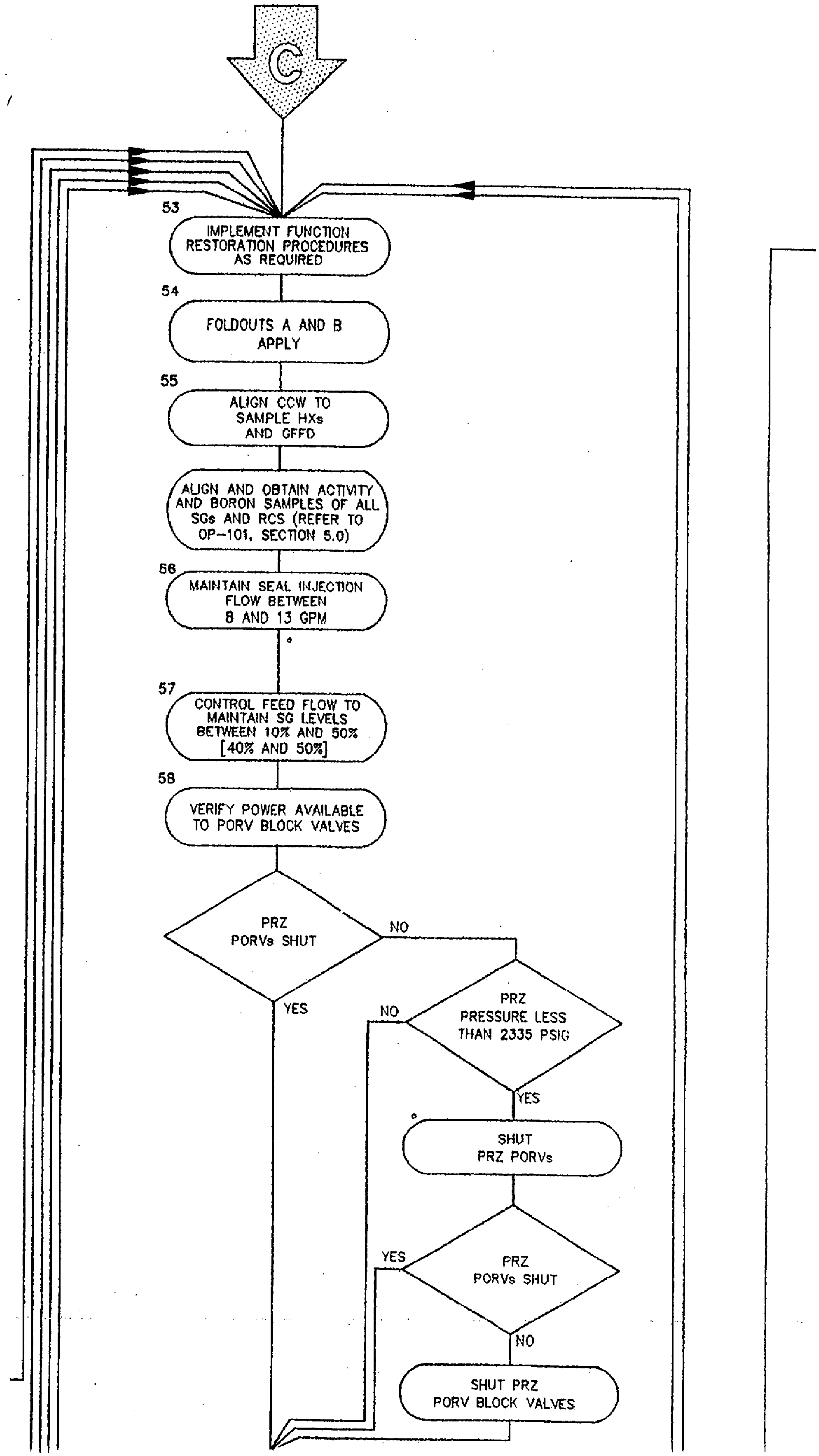
d. Plausible since cold shutdown conditions are likely to be required to effect repairs on the faulted SG, but the cooldown should be performed using the GPs after SI is terminated.

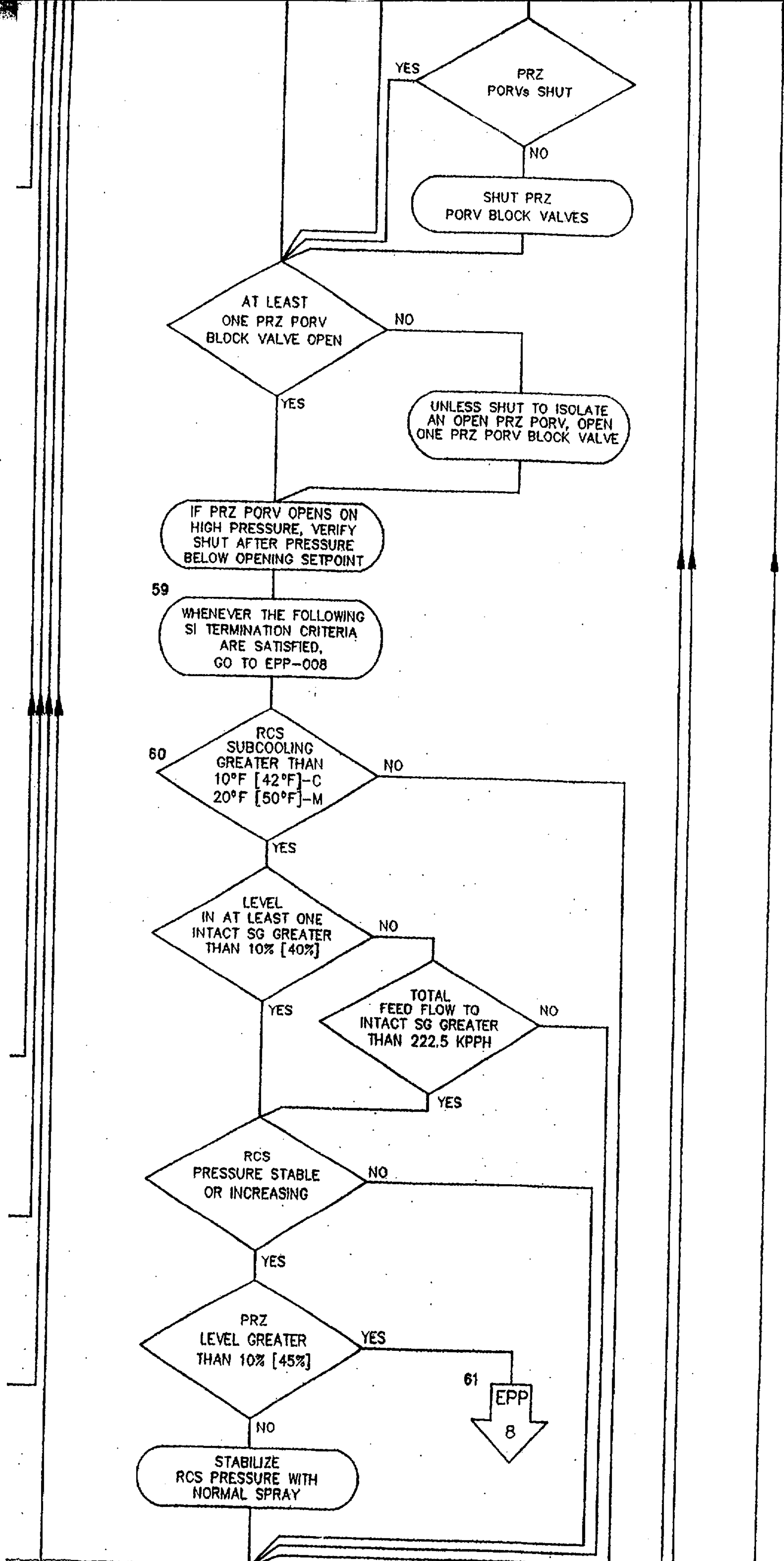
DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural purposes and flowpaths

REFERENCES SUPPLIED:

Instructions	Response Not Obtained
7. Check Secondary Radiation:	
a. Check for all of the following:	a. GO TO PATH-2, entry point J.
o SG blowdown radiation - NORMAL	
o Main steamline radiation - NORMAL	
8. Check SG Levels:	
a. Any level - INCREASING IN AN UNCONTROLLED MANNER	a. GO TO Step 9.
b. GO TO PATH-2, entry point J.	
9. Check If SI Has Been Terminated:	
a. SI flow - GREATER THAN 200 GPM	a. GO TO Step 10.
b. GO TO PATH-1, entry point C.	


C
53
IMPLEMENT FUNCTION RESTORATION PROCEDURES AS REQUIRED
54
FOLDOUTS A AND B APPLY
55
ALIGN CCW TO SAMPLE HXs AND GFFD
ALIGN AND OBTAIN ACTIVITY AND BORON SAMPLES OF ALL SGs AND RCS (REFER TO OP-101, SECTION 5.0)
56
MAINTAIN SEAL INJECTION FLOW BETWEEN 8 AND 13 GPM
57
CONTROL FEED FLOW TO MAINTAIN SG LEVELS BETWEEN 10% AND 50% [40% AND 50%]
58
VERIFY POWER AVAILABLE TO PORV BLOCK VALVES
PRZ PORVs SHUT
NO
YES
PRZ PRESSURE LESS THAN 2335 PSIG
NO
YES
SHUT PRZ PORVs
PRZ PORVs SHUT
YES
NO
SHUT PRZ PORV BLOCK VALVES


PRZ PORVs SHUT
YES
NO
SHUT PRZ PORV BLOCK VALVES
AT LEAST ONE PRZ PORV BLOCK VALVE OPEN
NO
YES
UNLESS SHUT TO ISOLATE AN OPEN PRZ PORV, OPEN ONE PRZ PORV BLOCK VALVE
IF PRZ PORV OPENS ON HIGH PRESSURE, VERIFY SHUT AFTER PRESSURE BELOW OPENING SETPOINT
59
WHENEVER THE FOLLOWING SI TERMINATION CRITERIA ARE SATISFIED, GO TO EPP-008
60
RCS SUBCOOLING GREATER THAN 10°F [42°F]-C 20°F [50°F]-M
NO
YES
LEVEL IN AT LEAST ONE INTACT SG GREATER THAN 10% [40%]
NO
YES
TOTAL FEED FLOW TO INTACT SG GREATER THAN 222.5 KPPH
NO
YES
RCS PRESSURE STABLE OR INCREASING
NO
YES
PRZ LEVEL GREATER THAN 10% [45%]
YES
61
EPP 8
NO
STABILIZE RCS PRESSURE WITH NORMAL SPRAY

Question: 56

Given the following conditions:

- Containment temperature is 124 °F.
- Containment hydrogen concentration is 2.2%.
- RCS pressure is 600 psig.
- FRP-I.3, Response to Voids in Reactor Vessel, is being implemented.

Which of the following identifies the **MAXIMUM** allowed Reactor Vessel head venting time?

a. 3.6 minutes

b. 5.6 minutes

c. 7.6 minutes

d. 9.6 minutes

Answer:

c. 7.6 minutes

QUESTION NUMBER: 56
TIER/GROUP: ***RO*** ***SRO*** 2/2

K/A: 0022.1.25

Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data (Reactor Coolant System).

K/A IMPORTANCE: ***RO*** ***SRO*** 3.1

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.12

DISCUSS the following frequent questions related to FRP-I.1, FRP-I.2, and FRP-I.3 emergency procedures; k. Given conditions, determine the maximum venting time using FRP-I.3 Attachment 1 and Figure 2

REFERENCES: FRP-I.3

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number EOP-3.12 013

JUSTIFICATION:

a. Plausible if the 1600 psig line is used on figure 2 instead of the 600 psig line, but actual time should be 7.6 minutes using correct curves and calculations.

b. Plausible if calculation error made (value selected to be consistent with other values), but actual time should be 7.6 minutes using correct curves and calculations.

c. **CORRECT** Maximum allowed venting time is 7.6 minutes using Attachment 1 and Figure 1 of FRP-I.3.

d. Plausible if second line after 400 psig line is misinterpreted as 600 psig line (actually 440 psig), but actual time should be 7.6 minutes using correct curves and calculations.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Application of data and calculation to determine requirements

REFERENCES SUPPLIED: FRP-I.3, Attachment 1 and Figure 2

INSTRUCTIONS FOR DETERMINING VENTING TIME

1. Determine CNMT Volume at STP 'A':

$$A = (2.266 \times 10^6\ FT^3) \times \frac{492°R}{(\text{CNMT temperature } °F + 460°R)}$$

124

A = 1.91E6 (FT³)

2. Determine Maximum Hydrogen volume that can be vented 'B':

2.2

$$B = \frac{(3.0\% - \text{CNMT Hydrogen Concentration}) \times \text{'A'}}{100\%}$$ 1.91

B = 15280 (FT³)

3. Determine Hydrogen flow rate as a function of RCS pressure 'C':

   a. Check RCS pressure and mark on Figure 2.

   b. Using Figure 2, read hydrogen flow rate 'C'.

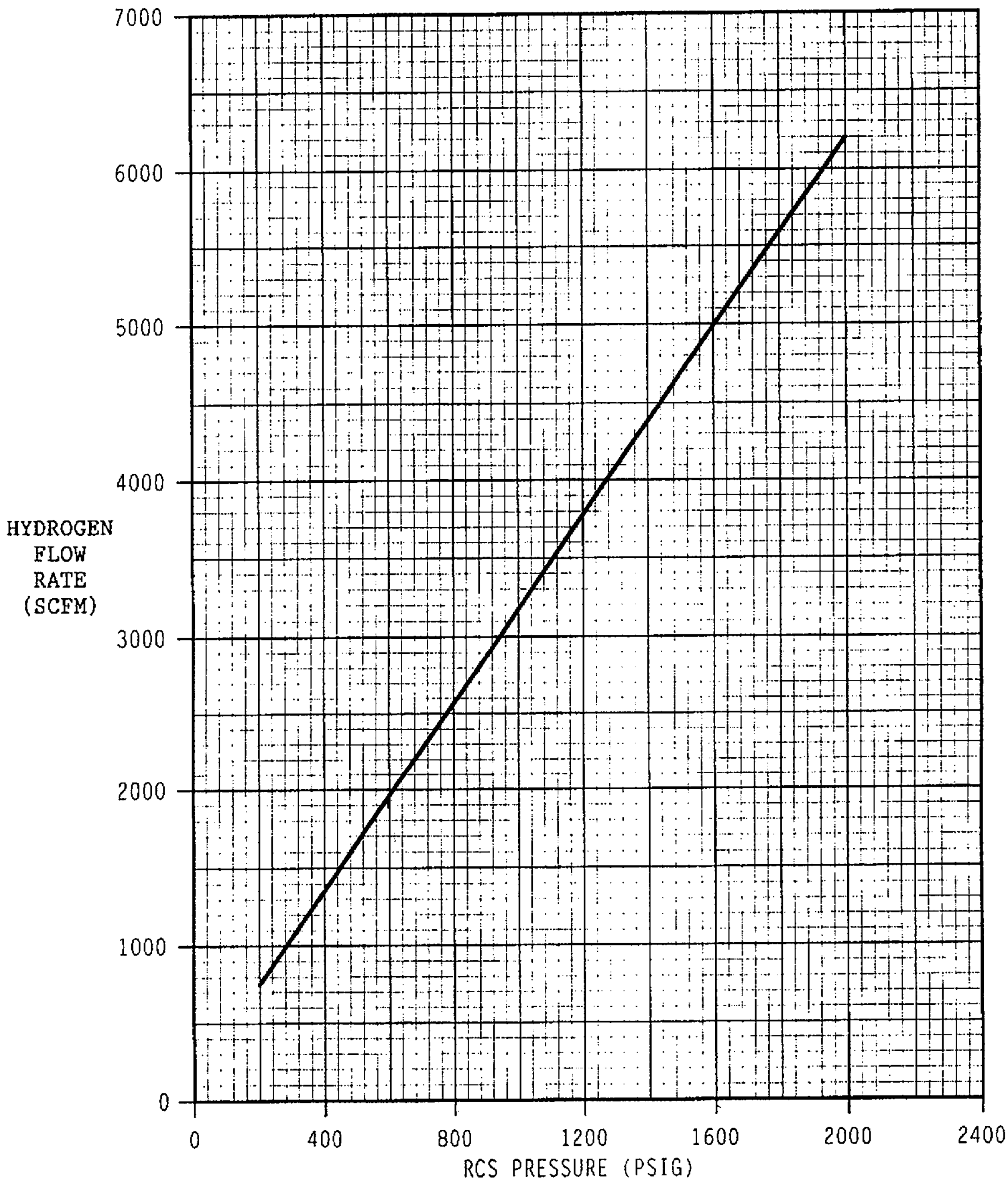
C = 2550 (FT³/MIN)

4. Calculate maximum venting time 'D':

$$\text{Maximum venting time} = \frac{B}{C} = \_\_\_\_\_\_$$

D = 6.0 (MINUTES)

FIGURE 2: HYDROGEN FLOW RATE VERSUS RCS PRESSURE



EOP-3.12 013

Using FRP-I.3 Attachment 1 and Figure 1, determine the maximum venting time for the following CNMT & RCS conditions.

1. Containment temperature = 115 F
2. CNMT hydrogen concentration = 2.6%
3. RCS pressure = 1720 psig

Question: 57

Given the following conditions:

- The plant is in Mode 4.
- A work activity to increase the reliability of the Control Room Emergency Filtration System is being planned.
- With one of the filtration systems inoperable in Modes 1-4, the system must be returned to operable within 7 days.

Which of the following describes the required work schedule for this activity, assuming the plant is maintained in Mode 4?

a. Work during normal working hours until the activity is complete

b. Work during normal working hours until less than 50% of the allotted LCO time is remaining, and then work on a 24 hour/day schedule until the activity is complete

c. Work during normal working hours until less than 72 hours of the allotted LCO time is remaining, and then work on a 24 hour/day schedule until the activity is complete

d. Work on a 24 hour/day schedule until the activity is complete

Answer:

c. Work during normal working hours until less than 72 hours of the allotted LCO time is remaining, and then work on a 24 hour/day schedule until the activity is complete

QUESTION NUMBER: 57
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.2.17

Knowledge of the process for managing maintenance activities during power operations.

K/A IMPORTANCE: ***RO*** ***SRO*** 3.5

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: PP-2.4-2

DISCUSS the WCC personnel responsibilities as described in ADM-NGGC-0104, Work Management Process

REFERENCES: ADM-NGGC-0104

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number PP-3.4 010

JUSTIFICATION:

a. Plausible since initial work schedule would be normal working hours, but must increase to 24 hours/day when < 72 hours before expiration.

b. Plausible since initial work schedule would be normal working hours, but must increase to 24 hours/day when < 72 hours before expiration instead of < 50% which would be 84 hours remaining.

c. **CORRECT** LCOs that are greater than 72 hours may be worked during normal hours until remaining time before expiration < 72 hours, at which time work shall continue on 24 hour/day schedule.

d. Plausible since this work schedule would be required if activity carries over until remaining time before expiration is < 72 hours, but normal work hours can be used until this time.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural requirements

REFERENCES SUPPLIED:

9.10 Planning WR/JOs with No Approved Maintenance Procedure Available

9.10.6 (Continued)

3. The Implementing Supervisor shall note case and usage determination in the blanks provided in the WORK INSTRUCTIONS.

4. Work instructions developed per this section shall have a safety screening per plant procedures. The completed safety screening should remain with the work package.

5. The Manager - Operations or Manager - Maintenance or their designee shall approve WR/JOs planned per this section.

9.11 Limiting Conditions of Operation/System Outages

9.11.1 It is acceptable to enter an LCO or an online system outage, when the intent is to increase availability, increase reliability or to reduce shutdown risk associated with safe shutdown/decay heat removal systems or components, provided the work is assessed in accordance with site specific methodology for managing risk.

9.11.2 The planned work time, including return to service for a system or component outage and associated testing for operability, should not exceed 50% of the LCO time as specified in Technical Specifications unless prior Plant General Manager approval is obtained. The remaining 50% is for emergent work and additional testing for operability.

9.11.3 The on-line work schedule for LCOs of equal to or less than 72 hours that impact continued plant operation shall be 24 hours/day until equipment is returned to operability.

9.11.4 LCOs that are greater than 72 hours may be worked during normal working hours until remaining time before expiration is less than 72 hours, at which time work impacting continued plant operation shall continue on a 24 hour/day schedule.

PP-3.4 010
Which of the following statements is correct concerning entering a LCO for pre-planned maintenance per ADM-NGGC-0104, Work Management Process?

A. LCOs that involve plant modifications require the Manager-Operations' approval in addition to the Manager-Operations' approval.

✓B. Work will proceed on a 24-hour a day basis for LCOs less than or equal to 72 hours.

C. The length of time required to complete work for items of LCO times less than or equal to 72 hours should be less than 50% of the LCO to allow sufficient time for planned testing.

D. Voluntary initiation of an LCOs is a routine evolution for performance of preventative maintenance, no management approval is required.

Question: 58

Given the following conditions:

- A small break LOCA has occurred.
- The Unit-SCO has just been directed to implement FRPs.

The STA reports the following CSFST conditions:

- Heat Sink YELLOW
- Inventory YELLOW
- Subcriticality MAGENTA
- Containment MAGENTA
- Core Cooling RED
- Integrity RED

Which of the following procedures should be entered?

a. FRP-C.1, Response to Inadequate Core Cooling

b. FRP-J.1, Response to High Containment Pressure

c. FRP-P.1, Response to Imminent Pressurized Thermal Shock

d. FRP-S.1, Response to Nuclear Power Generation / ATWS

Answer:

a. FRP-C.1, Response to Inadequate Core Cooling

QUESTION NUMBER: 58

TIER/GROUP: ***RO*** ***SRO*** 1/1

K/A: WE06EA2.1

Ability to determine and interpret the following as they apply to the (Degraded Core Cooling) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A IMPORTANCE: ***RO*** ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.19-2

DESCRIBE Control Room usage of status trees as it relates to the following
a. Priority of status trees

REFERENCES: EOP-Users Guide

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. **CORRECT** Highest priority red path procedure must be entered first and Core Cooling is a higher priority than Integrity.

b. Plausible since this is the highest procedure in the FRP-J series, but the highest priority condition is Core Cooling in this condition.

c. Plausible since this is a red path condition, but Core Cooling is a higher priority than Integrity.

d. Plausible since Subcriticality is the highest priority CSF and this is the highest procedure in the FRP-S series, but red paths have priority over magenta.

DIFFICULTY:

Comprehensive/Analysis [ ] ***Knowledge/Recall*** [X] ***Rating*** 3

Knowledge of hierarchy of functional restoration procedures

REFERENCES SUPPLIED:

5.2 Control Room Usage of Status Trees

5.2.1 Description

Status Trees are used to evaluate the current state of predefined Critical Safety Functions. Status Trees ask a series of questions about plant conditions, and in general, each question asked depends on the answer to the previous question. This dependency results in a branching pattern, which is referred to as a "tree".

There are six different trees, each one evaluating a separate safety aspect (Critical Safety Function) of the plant. A hard copy of the Status Trees is contained in procedure EOP-CSFST. Electronic equivalents are displayed on ERFIS using the SPDS functions. At any given time, a Critical Safety Function status is represented by a single path through its tree. Since each path is unique, it is uniquely labeled at its end point, or terminus. This labeling consists of color-coding and/or line-pattern-coding of the terminus and last branch line, plus a transition to an appropriate FRP if required by that safety status. If the status is normal for a particular Critical Safety Function, no transition is specified, and the condition is clarified by the words CSF SAT.

Color-coding can be either RED, MAGENTA, YELLOW, or GREEN, with GREEN representing a "satisfied" safety status. Each non-green color represents an action level that should be addressed according to the rules of implementation as discussed Section 5.2.3.

5.2.2 Priority of Status Trees

The six Critical Safety Functions and their associated Status Trees are prioritized as follows:

1. Subcriticality (S)
2. Core Cooling (C)
3. Heat Sink (H)
4. Integrity (P)
5. Containment (J)
6. Inventory (I)

The Status Trees are arranged in EOP-CSFST and on SPDS consistent with their priority to facilitate monitoring and proper implementation.

5.2.3 General Usage

The Status Trees are always evaluated in order of their priority. When manually monitoring the Status Trees, questions are answered based on plant conditions at the time, and the appropriate branch line followed to the next question. An individual Status Tree evaluation is complete when the user arrives at a color-coded or line pattern-coded terminus. ERFIS continually updates the status of each Status Tree.

The operator is initially directed to "monitor" the CSFSTs. "Monitoring" is for information only, since the initial actions of PATH-1 should be effective in dealing with any non-satisfied condition. For this reason, instructions to implement FRPs are not given in PATH-1 until the initial actions are completed. Also, if a challenge to the CSFSTs clears during the initial actions of PATH-1, the associated FRP should not be implemented. Generally, any time PATH-1 is exited to transition to another EOP, FRPs are to be implemented as dictated by the status of the CSFSTs.

Exceptions to this are transitions made out of PATH-1 early due to an ATWS, loss of secondary heat sink, or loss of all AC power. In these cases, FRPs are implemented as directed by action steps in these procedures. For example, an ATWS occurs and a transition is made from PATH-1 to FRP-S.1. At the end of this FRP, the operator is directed to "RETURN TO procedure and step in effect AND implement FRPs as required." The operator transitions back to PATH-1, Step 2 and notes that the Heat Sink status tree indicates a valid RED condition. He then must transition to FRP-H.1 to address the loss of secondary heat sink. Note that this bypasses the steps in PATH-1 which verify actuation of safeguards equipment. As described in Section 6.4, it is expected that actuation of safeguards equipment be verified by the operators as soon as practical.

Once the operator is directed to implement FRPs, the rules of implementation apply during all subsequent EOP Network actions, including EOPs that may not have the step "Implement FRPs as required". The following conventions apply when reviewing the CSFSTs for possible FRP implementation:

- o If any RED terminus is encountered, the operator is required to immediately stop any PATH or EPP in progress and to perform the Function Restoration Procedure (FRP) required by the terminus.
- o If, during the performance of any RED-condition FRP, a RED condition of higher priority arises, then the higher priority condition should be addressed first, and the lower priority RED-condition FRP suspended. Otherwise, the FRP must be performed to the point of a defined transition regardless of whether the RED condition has been cleared during performance of the FRP.

5.2.3 General Usage (continued)

- o If any MAGENTA terminus is encountered, the operator is expected to monitor all of the remaining trees, and then, if no RED is encountered, suspend any PATH or EPP in progress and perform the FRP required by the MAGENTA terminus.

- o If during the performance of a MAGENTA-condition FRP, any RED condition or higher priority MAGENTA condition arises, then the RED or higher priority MAGENTA condition is to be addressed first, and the original MAGENTA-condition FRP suspended. Otherwise, the FRP must be performed to the point of a defined transition regardless of whether the MAGENTA condition has been cleared during the performance of the FRP.

- o Once an FRP is entered due to a RED or MAGENTA condition, that FRP is performed to completion, unless preempted by some higher priority condition. It is expected that the actions in the FRP will clear the RED or MAGENTA condition before all the operator actions are complete. However, the FRPs should be performed to the point of the defined transition to a specific EOP (or SAMG) or to the "procedure and step in effect."

- o If during performance of an FRP, a lower priority RED or MAGENTA condition arises, but clears prior to completion of the higher priority FRP, the lower priority FRP is not performed. (References 2.2.2.12 and 2.2.2.13)

The above rules are generally true, however, there are exceptions. Any exceptions will be explicitly stated in a NOTE or CAUTION in the procedure in effect. An example, is the CAUTION at the beginning of FRP-H.1 which informs operators FRP-H.1 should NOT be implemented if feed flow has been reduced at the direction of another procedure and minimum feed flow is available. As discussed in Section 5.1.7, this could occur during implementation of EPP-015, or after transition from EPP-015 before instructions to restore feed flow to intact SGs are given in another EOP. In either case, FRP-H.1 should not be implemented unless attempts to restore feed flow to the intact SG(s) fail.

Under certain conditions, the non-satisfied conditions may exist for only a short period of time before clearing. Non-satisfied conditions on ERFIS may also momentarily "flicker". Examples of these conditions are as follows:

- o A MAGENTA condition occurs on the CONTAINMENT CSFST following a slow increase in CNMT pressure to the Hi-3 setpoint, but quickly clears following automatic actuation of CNMT spray.

- o A MAGENTA or RED condition on the INTEGRITY CSFST "flickers" in due to a downward spike in cold leg temperature.

Question: 59

The Superintendent - Shift Operations has designated the following personnel to be on the Fire Brigade Team:

- Leader - Outside AO (licensed Reactor Operator)
- Member 2 - Turbine Building AO (non-licensed)
- Member 3 - HP Technician
- Member 4 - I&C Technician
- Member 5 - Mechanic

Which of the following describes the makeup of the team?

a. The team makeup is acceptable

b. The Team Leader must be replaced by a licensed Senior Reactor Operator

c. Member 2 must be replaced by a licensed Reactor Operator or Senior Reactor Operator

d. Member 3, 4, or 5 must be replaced by an operator

Answer:

d. Member 3, 4, or 5 must be replaced by an operator

QUESTION NUMBER: 59
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.4.26

Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.

K/A IMPORTANCE: ***RO*** ***SRO*** 3.3

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: PP-3.1-2

OUTLINE the method for conducting shift turnover

REFERENCES: OMM-002

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number ADOP2-3 018

JUSTIFICATION:

a. Plausible since the leader and an additional member is from Operations, but the leader and 2 additional members must be from Operations.

b. Plausible since an SRO has more authority than an RO, but the leader must only be from the Operations group and is not required to be licensed.

c. Plausible since an SRO or RO has more knowledge of systems affecting plant safety and reactivity than a non-licensed operator, but the member must only be from the Operations group and is not required to be licensed.

d. **CORRECT** The fire bridage leader and 2 additional members must be from Operations. The other 2 members may be from other groups.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of administrative procedural requirements

REFERENCES SUPPLIED:

Superintendent - Shift Operations Shift Turnover Checklist

6. ERO STAFFING

Safe Shutdown Personnel		**Fire Brigade Team**	
S-SO	______	**Leader	______
USCO	______	**Member 2	______
CO	______	**Member 3	______
BOP	______	Member 4	______
SS RAB AO	______	Member 5	______
EC	______	**First Aid Team**	
STA	______	*OPS Member	______
		*Member 2	______
Radiation Control Team		**Damage Control Team**	
Surveys (usually Chem Tech)	______	*I&C Tech	______
Exposure Control (usually HP Tech)	______	*Mechanic	______
*Exposure Control (usually HP Tech)	______	**Chemistry Team**	______
		***Potable Water License**	______

* May also be on the Fire Brigade
** Must be from Operations
*** May fill any other position

On-coming S-SO

Signature ______________________

Off-going S-SO

Signature ______________________

ADOP2-3 018

With the plant in Mode 1, the Shift Superintendant - Operations is in the process of completing the turnover package in accordance with OMM-002. Which of the following individuals may be designate as the Fire Brigade Team Leader?

A. Turbine Building AO (nonlicensed)

B. Balance of Plant Operator

✓C. Clearance Center Operator (licensed RO)

D. Control Room SCO

Question: 60

Given the following conditions:

- Following a large break LOCA, PATH-1 is in progress.
- 1A-SA RHR pump is out of service due to a ground.
- 1B-SB RHR pump is running with 3000 gpm flow.
- 'B' Train of RHR has **NO** power to the valves powered from 'B' Train (fire in 1B21-SB).

Which of the following procedures should be implemented upon exiting PATH-1?

a. EPP-009, Post LOCA Cooldown and Depressurization

b. EPP-010, Transfer to Cold Leg Recirculation

c. EPP-011, Transfer to Hot Leg Recirculation

d. EPP-012, Loss of Emergency Coolant Recirculation

Answer:

d. EPP-012, Loss of Emergency Coolant Recirculation

QUESTION NUMBER: 60

TIER/GROUP: ***RO*** ***SRO*** 1/2

K/A: WE11EA2.1

Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A IMPORTANCE: ***RO*** ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.1

DEMONSTRATE the below-assumed operator knowledge from the SHNPP Step Deviation Documents and WOG ERGs that support performance of EOP actions
j. Verification of cold leg recirculation capability

REFERENCES: EOP-Guide-1

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number EOP-3.1 038

JUSTIFICATION:

a. Plausible since adequate RHR injection flow exists, but a transition is required to EPP-012 due to having no power available to the valves.

b. Plausible since this would be the normal transition upon receiving an RWST low-low level condition, but a transition is required to EPP-012 due to having no power available to the valves.

c. Plausible since this would be a normal transition several hours after transitioning to cold leg recirculation, but a transition is required to EPP-012 due to having no power available to the valves.

d. **CORRECT** One of the two trains of RHR must be functional to ensure cold leg recirculation capability, but with power not available to the valves they will not be able to reposition as needed to provide recirculation.

DIFFICULTY:

Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Analysis of plant conditions to determine procedural requirements

REFERENCES SUPPLIED:

Instructions	Response Not Obtained
68. Initiate Evaluation Of Plant Status:	
a. RHR system - CAPABLE OF COLD LEG RECIRCULATION (Refer to Attachment 3.)	a. GO TO EPP-012, "LOSS OF EMERGENCY COOLANT RECIRCULATION", Step 1.
b. Check auxiliary <u>AND</u> radwaste processing building radiation - NORMAL	b. GO TO Step 68d.
c. GO TO Step 69.	
d. High Radiation - DUE TO LOSS OF RCS INVENTORY OUTSIDE CNMT	d. Identify AND isolate leakage. GO TO Step 69.
e. GO TO EPP-013, "LOCA OUTSIDE CONTAINMENT", Step 1.	
69. Check RCS Status:	
a. Check for both of the following: o RCS pressure - LESS THAN 190 PSIG o Any RHR HX header flow - GREATER THAN 1000 GPM	a. GO TO EPP-009, "POST LOCA COOLDOWN AND DEPRESSURIZATION", Step 1.

COMPONENTS REQUIRED FOR COLD LEG RECIRCULATION

1. At least one train of the following components must be functional:

   a. Train A:

      RHR PUMP A
      1RH-1 (RCS loop A to RHR pump A)
      1RH-2 (RCS loop A to RHR pump A)
      1SI-300 (CNMT sump to RHR pump A)
      1SI-310 (CNMT sump to RHR pump A)
      1SI-322 (RWST to RHR pump A)
      1RH-30 (RHR HX A outlet flow control)
      1SI-340 (Low Head SI train A to cold leg)

   b. Train B:

      RHR PUMP B
      1RH-39 (RCS loop B to RHR pump B)
      1RH-40 (RCS loop B to RHR pump B)
      1SI-301 (CNMT sump to RHR pump B)
      1SI-311 (CNMT sump to RHR pump B)
      1SI-323 (RWST to RHR pump B)
      1RH-66 (RHR HX B outlet flow control)
      1SI-341 (Low Head SI train B to cold leg)

2. At least one train of the following components should be functional, but it is NOT required:

   a. Train A:

      1RH-20 (RHR HX A bypass flow control)
      1RH-31 (RHR pump A mini flow)

   b. Train B:

      1RH-58 (RHR HX B bypass flow control)
      1RH-69 (RHR pump B mini flow)

Question: 76

Which of the following conditions would require a One-Hour Notification in accordance with AP-617, Reportability Determination and Notification?

a. A manual reactor trip is actuated from 40% power due to a trip of the running Main Feedwater Pump

b. An automatic safety injection is actuated at 100% power due to an I&C Technician lifting an incorrect lead

c. While at 400°F during a plant cooldown, all warning sirens in Lee County are reported to be out-of-service due to severe weather.

d. While at 400°F during a plant heatup following a refueling outage, the plant is cooled down to Mode 4 to meet a Technical Specification action statement.

Answer:

c. While at 400°F during a plant cooldown, all warning sirens in Lee County are reported to be out-of-service due to severe weather.

QUESTION NUMBER: 76
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.4.30

Knowledge of which events related to system operations/status should be reported to outside agencies.

K/A IMPORTANCE: ***RO*** ***SRO*** 3.6

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: PP-2.17-2

Given a specific plant situation and a copy of AP-617, evaluate whether to make notifications per PEPs or AP-617.

REFERENCES: AP-617

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since a shutdown required from Mode 1 required by Technical Specifications is a 1-hour notification, but trips from power are 4-hour notifications.

b. Plausible since safety injection actuations due to valid signals are 1-hour notifications, but a signal as a result of human error are not considered valid actuations.

c. **CORRECT** Loss of Emergency Response Capability identifies a loss of all warning sirens in any single county as a One-Hour Notification.

d. Plausible since a shutdown required from Mode 1 or Mode 2 required by Technical Specifications is a 1-hour notification, but cooldowns from Mode 3 only require an LER.

DIFFICULTY:

Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Interpretation and application of conditions to determine reporting requirements

REFERENCES SUPPLIED: AP-617, Attachment 1

I. **INTRODUCTION**

A. Lesson objectives

Lesson Objectives TP

Upon completion of this lesson, the student should be able to:

1. Given a copy of OMM-001 and an operating situation, DETERMINE the following:
   - If prompt notification to management is required
   - How soon the management notification should be made if required
   - Unit SCO responsibility after he determines the plant is in Tech Spec 3.0.3.
   - Who is responsible for independent assessment of notifications required by AP-617
2. Given a plant-specific situation and a copy of AP-617, EVALUATE whether to make notifications per Peps or AP-617
3. Concerning notifications to NRC per AP-617, STATE the following:
   - Method for handling reports of physical security events
   - Who is responsible for implementing the procedure
   - Method for handling unanswered questions from NRC
   - What to do if NRC requests that the phone line stay open
   - After initial notification to NRC has been made, evaluate whether an immediate follow-up notification is required
   - The appropriate and correct information for the NRC event notification worksheet
4. LOCATE guidance in the SHNPP Plant Operating Manual regarding on-site or off-site reports in the following instances and DETERMINE who should be notified in each case:
   - Oil spills
   - Hazardous substance spills
   - Fish kills

IMMEDIATE NOTIFICATION REQUIREMENTS

I. ONE HOUR NOTIFICATIONS (continued)

	NOTIFICATION	REFERENCE	WRITTEN FOLLOW-UP
I.A.4	SAFETY INJECTION (See Note 4)		
	Any event that results or should have resulted in Emergency Core Cooling System (ECCS) discharge into the reactor coolant system as a result of a valid signal. (See Note 10) Safety Injection actuation by spurious/invalid signals is covered by II.A.2. Inadvertent accumulator injections are covered by II.A.2.	§50.72(b)(1)(iv)	LER required by §50.73 (a)(2)(iv); a T.S. Special Report may be required, see Attachment 2
I.A.5	LOSS OF EMERGENCY RESPONSE CAPABILITY (See Note 4)		
	Any event that results in a major loss of assessment capability, offsite response capability, or communications capability (e.g., significant portion of Control Room indication, Emergency Notification System, or offsite notification system). This includes loss of any of the following: a) All dedicated FTS-2000 phone links to the NRC, as determined by the Emergency Planning Organization. b) Offsite siren capability as follows: i) Greater than 16 of the 81 sirens (20% of system) reported as out of service, or ii) All sirens in a single county out of service (See Note 13). The Customer Service Center or on-call ERO SEC or EOM will notify the Control Room of a siren problem by telephone. c) Selective Signaling System phones from the Control Room, ACP, or EOF to local, county, and state warning points. Reporting is required only if these communication links can<u>not</u> be compensated for by other readily available off-site communication systems. d) National Weather Service primary <u>and</u> back-up NOAA Weather Radio transmitters at Fayetteville <u>or</u> primary <u>and</u> back-up NOAA Weather Radio transmitters at Durham. The National Weather Service will contact the Control Room if either of these two conditions exists.	§50.72(b)(1)(v)	None

Question: 77

The following series of procedure transitions are made:

- A transition is made from PATH-1, Step 69, to EPP-009, Post-LOCA Cooldown and Depressurization.
- While performing EPP-009, Step 16, a foldout page item directs a transition to PATH-2, Entry Point J.
- While performing PATH-2, Step 9, a MAGENTA path on the CSFST directs a transition to FRP-P.1, Response to Imminent Pressurized Thermal Shock.

The last step in FRP-P.1 states, "Return to Procedure and Step in Effect."

The crew should transition to ...

a. PATH-1, Step 69.

b. EPP-009, Step 16.

c. PATH-2, Entry Point J.

d. PATH-2, Step 9.

Answer:

d. PATH-2, Step 9.

QUESTION NUMBER: 77
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.4.6

Knowledge of symptom based EOP mitigation strategies.

K/A IMPORTANCE: ***RO*** ***SRO*** 4.0

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.19-3

DESCRIBE Control Room usage of EPPs, foldouts, and FRPs as it relates to the following: d. Transitions from EOPs and place keeping

REFERENCES: EOP Users Guide

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number 98RO-72

JUSTIFICATION:

a. Plausible since this is the first procedure addressed, but should return to last procedure/step.

b. Plausible since this transition was the last EPP that was being addressed prior to entry into the FRPs, but should return to last procedure/step.

c. Plausible since this transition was the last PATH that was being addressed prior to entry into the FRPs, but should return to last procedure/step.

d. **CORRECT** The procedure/step in effect which led to transition to the final procedure being performed should be entered. A series of procedures implemented ending with this statement, would require the procedures be referenced in reverse order.

DIFFICULTY:
Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 2

Knowledge of procedural transition requirements

REFERENCES SUPPLIED:

5.3.8 Transitions from EOPs and Placekeeping

Unless the Severe Accident Management Guidance is implemented, each EOP ends with either a specific transition to another EOP if further operator guidance is required, or with the plant being maintained in a stable condition. Often in the EOPs, the final transition is to "procedure and step in effect." "Step in effect" refers to whichever step was being performed when a symptom-based transition was made into the present procedure. This wording results since transitions into the present procedure may be performed in accordance with rules of usage and not from a specific procedure and step.

As an example, assume an operator is performing EOP "A", when symptoms appear requiring transition to EOP "B". While performing EOP "B", in accordance with a FOLDOUT item, he finds it necessary to go to EOP "C". After completing the actions in "C", he returns to the procedure and step from which he entered "C", that is, back to EOP "B". After completing EOP "B", the operator would return to the procedure and step from which he entered "B", in this case, EOP "A". This example assumes that EOPs "B" and "C" both end with the transition words "Return To Procedure And Step In Effect".

Placekeeping methods should be used and are especially important in cases like the example above to ensure an accurate account of the "procedure and step in effect". Suggested methods include but are not limited to any of the following:

- Noting on the PATH boards and/or procedure pages the transitions being made.
- Placing "sticky notes" at steps with a notation sufficient to ensure the path of procedure implementation can be followed.
- Maintaining a log of procedure transitions which includes the procedure and step number. This can be documented using the PEP Emergency Log form.

The following series of procedure transitions are made:

- A transition is made from PATH-1, Step 38, to PATH-2, Entry Point J
- While performing PATH-2, Step 16, a transition to EPP-020, SGTR with Loss of Reactor Coolant: Subcooled Recovery, is made.
- During the implementation of EPP-020, Step 4, a MAGENTA path for CONTAINMENT is identified and a transition is made to FRP-J.1, Response to High Containment Pressure.

The last step in FRP-J.1 states, "Return to Procedure and Step in Effect."

The crew should transition to …

A. PATH-1, Step 38.

B. PATH-2, Entry Point J.

C. PATH-2, Step 16

D. EPP-020, Step 4.

Answer:

D EPP-020, Step 4.

Question: 78

A reactor startup is being performed following a mid-cycle outage per GP-004.

Estimated Critical Conditions are as follows:

TIME	1830
BORON CONC.	1215 ppm
CONT BANK 'C' POSTION	218 steps
CONT BANK 'D' POSTION	90 steps
ECC - 500 PCM POSITION	45 steps on Bank 'D'
ECC + 500 PCM POSITION	197 steps on Bank 'D'
ROD INSERTION LIMIT	0 steps on Bank 'D'

The Actual Critical Conditions are as follows:

TIME	1836
BORON CONC.	1198 ppm
CONT BANK 'C' POSTION	110 steps
CONT BANK 'D' POSTION	0 steps

Which of the following actions must be taken?

a. Shut down the reactor using GP-006 **AND** borate, as needed, to increase RCS boron concentration to 1215 ppm

b. Maintain critical conditions **AND** borate, as needed, to increase RCS boron concentration to 1215 ppm

c. Shut down the reactor using GP-006 **AND** initiate Emergency Boration per AOP-002

d. Trip the reactor **AND** initiate Emergency Boration per AOP-002

Answer:

c. Shut down the reactor using GP-006 **AND** initiate Emergency Boration per AOP-002

QUESTION NUMBER: 78
TIER/GROUP: ***RO*** ***SRO*** 2/1

K/A: 001A2.12

Ability to (a) predict the impacts of the following malfunction or operations on the CRDS- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Erroneous ECP calculation

K/A IMPORTANCE: ***RO*** ***SRO*** 4.2

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: GP-3.4-R2

DETERMINE the required actions if the actual critical position is outside the allowable band of the estimated critical position

REFERENCES: GP-004

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number GP-3.4-R2 001

JUSTIFICATION:

a. Plausible since a reactor shutdown is required, but emergency boration is to be initiated due to being critical below the RIL.

b. Plausible since increasing boron concentration would increase rod position, but a reactor shutdown and emergency boration is required.

c. **CORRECT** The reactor must be shutdown and emergency boration initiated due to being below the zero power RIL.

d. Plausible since emergency boration is required, but the reactor should be shutdown instead of tripped.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of given data sets to determine required procedural response

REFERENCES SUPPLIED:

5.0 PROCEDURE (continued)

25. Record additional values of time and temperature every 15 minutes after the last 1/M data point until achieving criticality. ________

26. Within 15 minutes of achieving criticality, check that the lowest T_{avg} is above 551°F. ________

NOTE:
- The maximum allowable administrative difference between the ECC and the actual critical condition is 500 pcm.
- The following Step is only required to be performed if criticality is not achieved within 500 pcm of the ECC.

27. If criticality is not achieved within 500 pcm of the Estimated Critical Condition: (N/A all Substeps if criticality is achieved within 500 pcm of the ECC)

    a. If criticality is achieved before reaching the Minimum Estimated Critical Rod Height/Maximum Estimated Boron Concentration (rod height or Boron concentration for 500 pcm below ECC, as listed in Step 5.0.0.015): (Otherwise N/A these Steps)

        (1) Immediately shutdown the Reactor using GP-006. ________

        (2) If criticality was achieved at a rod height less than the Rod Insertion Limit, initiate emergency boration per AOP-002. ________

        (3) Evaluate the conditions leading to the premature criticality. ________

        (4) Perform a new GP-004 for any subsequent startup. ________

    b. If criticality is not achieved by the Maximum Estimated Critical Rod Height/Minimum Estimated Boron concentration (rod height or Boron concentration for 500 pcm above the ECC, as listed in Step 5.0.0.015): (Otherwise N/A these Steps)

        (1) Reinsert all control rods. ________

        (2) Evaluate the conditions resulting in not achieving criticality. ________

        (3) Before any subsequent startup, complete a new ECC and 1/M Data Plot using the same GP-004 and startup number. (Reference 2.5.0.03) ________

28. Rotate the ROD BANK SELECTOR Switch to MAN. ________

GP-3.4-R2 001

During the performance of GP-004, actual critical rod height was 28 steps on Bank D. The estimated critical position was 99 steps on Bank D with the ± 500 pcm limits being 47 steps to 173 steps on Bank D. Which of the following would be the correct action for the above-stated condition?

✓A. Immediately shut down the reactor using GP-006

B. Evaluate conditions leading to the premature criticality and continue the plant startup

C. Borate to raise Bank D above 47 steps prior to increasing power to the POAH (i.e., no shutdown required)

D. Emergency borate concurrent with inserting all control rods.

Question: 79

Given the following conditions:

- Three hours ago, Chemistry reported that secondary chemistry parameters were exceeding Action Level 2 limits.
- Reactor power is currently 38% and being reduced at 10% per hour.
- Chemistry now reports that Action Level 3 limits have been exceeded.

Which of the following actions should be taken?

a. Stabilize the plant at the current power level

b. Continue the power reduction at the current rate until < 30% power

c. Initiate a rapid plant shutdown

d. Trip the reactor

Answer:

c. Initiate a rapid plant shutdown

QUESTION NUMBER: 79
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.1.34

Ability to maintain primary and secondary plant chemistry within allowable limits.

K/A IMPORTANCE: ***RO*** ***SRO*** 2.9

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: AOP-3.33-R1

OUTLINE the requirements for primary and secondary chemistry being out of tolerance per AOP-033, Chemistry Out of Tolerance.

REFERENCES: AOP-033

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number AOP-3.33-R1 001

JUSTIFICATION:

a. Plausible since a change in chemistry Action Levels has occurred, but Action Level 3 conditions are worse than Action Level 2 conditions so a rapid shutdown is required.

b. Plausible since chemistry Action Level limits are only applicable above 30% power, but Action Level 3 requires a rapid plant shutdown.

c. **CORRECT** Any secondary chemistry limits exceeding Action 3 Level limits requires that a rapid plant shutdown be commenced.

d. Plausible since the plant must be rapidly shutdown, but it is preferable to perform a shutdown as a trip may result in pertubations to the plant that may worsen chemisty.

DIFFICULTY:

Comprehensive/Analysis ☐ ***Knowledge/Recall*** ☒ ***Rating*** 3

Knowledge of procedural requirements

REFERENCES SUPPLIED:

3.2 Follow-up Actions (continued)

NOTE: Secondary chemistry Action Level limits are only applicable at greater than 30% Reactor power.

4. IF any secondary chemistry parameter is out of normal range, THEN perform the following:

   a. Perform actions as requested by Chemistry.

   b. IF any secondary chemistry parameter exceeds Action Level 1 limits, THEN perform the following:

      (1) Notify the Manager - Operations.

      (2) IF Chemistry informs the Control Room that secondary chemistry parameters are NOT less than Action Level 1 limits 7 days following confirmation of an excursion, THEN initiate Action Level 2 response for parameters that have Action Level 2 limits.

   c. IF any secondary chemistry parameter exceeds Action Level 2 limits OR Action Level 2 response is required, THEN initiate Action Level 2 response, as follows:

      (1) Reduce Reactor power to less than 30% within 8 hours following Action Level 2 confirmation per GP-006, Normal Plant Shutdown from Power Operation to Hot Standby.

      (2) Perform actions, as requested by Chemistry, to return the parameter to within normal limits within 100 hours following Action Level 2 confirmation.

      (3) IF the parameter is NOT less than the Action Level 1 limit 100 hours following Action Level 2 confirmation, THEN initiate Action Level 3 response for parameters that have Action Level 3 limits.

      (4) IF both of the following conditions are satisfied, THEN terminate the power reduction:

         - Source of impurity ingress is eliminated
         - Parameter values are less than Action Level 2 limits

   d. IF any secondary chemistry parameter exceeds Action Level 3 limits OR Action Level 3 response is required, THEN initiate Action Level 3 response, as follows:

      (1) Initiate rapid plant shutdown per Attachment 2 of GP-006, Normal Plant Shutdown from Power Operation to Hot Standby.

AOP-3.33-R1 001

AOP-033, Chemistry Out of Tolerance, requires a secondary chemistry parameter that is in Action Level 1 to be restored to within normal limits within ___________________.

A. 4 hours

B. 1 day

✓C. 1 week

D. 100 hours

Question: 80

Given the following conditions:

- The plant is operating at 100% power.
- A tube leak has been detected on 'B' SG.
- The Condenser Vacuum Pump Rad Monitor, REM-1TV-3534, and Curve H-X-15 are being monitored every 15 minutes to estimate the leak rate.

Which of the following readings noted on REM-1TV-3534 is the **MINIMUM** reading that would require a plant shutdown per Technical Specifications?

a. 5.5 E -7

b. 1.05 E -6

c. 1.45 E -6

d. 1.55 E -6

Answer:

c. 1.45 E -6

QUESTION NUMBER: 80
TIER/GROUP: ***RO*** ***SRO*** 1/2

K/A: 037AA2.10

Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Tech-Spec limits for RCS leakage

K/A IMPORTANCE: ***RO*** ***SRO*** 4.1

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: AOP-3.16

For a primary-to-secondary leak, DESCRIBE when a power reduction or unit shutdown is required.

REFERENCES: AOP-016
Curve H-X-15

SOURCE: ***New*** ☒ ***Significantly Modified*** ☐ ***Direct*** ☐

Bank Number NA

JUSTIFICATION:

a. Plausible since this exceeds the PSAL 1 limit, but this would not require the shutdown.

b. Plausible since this exceeds 100 gpd, but the limit requiring a shutdown is 150 gpd.

c. **CORRECT** Lowest level that would exceed 150 gpd (PSAL 2) which would require a TS shutdown.

d. Plausible since this exceeds the 150 gpd (PSAL 2) limit which would require a TS shutdown, but this is not the lowest level that would require the shutdown.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 2

Interpretation of plant data on curve and comparison to procedural requirements

REFERENCES SUPPLIED: Curve H-X-15

3.2 Follow-up Actions (continued)

13. Perform the following applicable step(s) based on leak locations:

Leak Location	Applicable Step
Primary-to-Secondary	3.2.14
Outside CNMT (CVCS)	3.2.15
RCP Thermal Barrier	3.2.16
Into ECCS Accumulator	3.2.17
From PORV	3.2.18
From RV Flange	3.2.19
Into CNMT	3.2.20
Sampling System OR Unknown	3.2.21

R 14. Perform the following for a primary-to-secondary leak (Ref SOER 93-01, Recommendation1):

R a. Notify Chemistry to implement CRC-804, Primary-To-Secondary Leak Rate Monitoring, to quantify leak rate and determine location and trend (Ref: FSAR Section 11.5.2).

b. Estimate Primary-To-Secondary leak rate every 15 minutes based on the following:

- Condenser Vacuum Pump Rad Monitor, REM-1TV-3534(Grid 2).
- Curve H-X-15

c. Determine leaking SG(s) using the following as guidance:

- Individual SGBD samples
- Main steam line radiation monitor levels
- Local surveys of SGBD lines

d. IF turbine building vent stack radiation monitor reaches the alert alarm, THEN notify Chemistry to sample the stack for assessment of offsite dose impact.

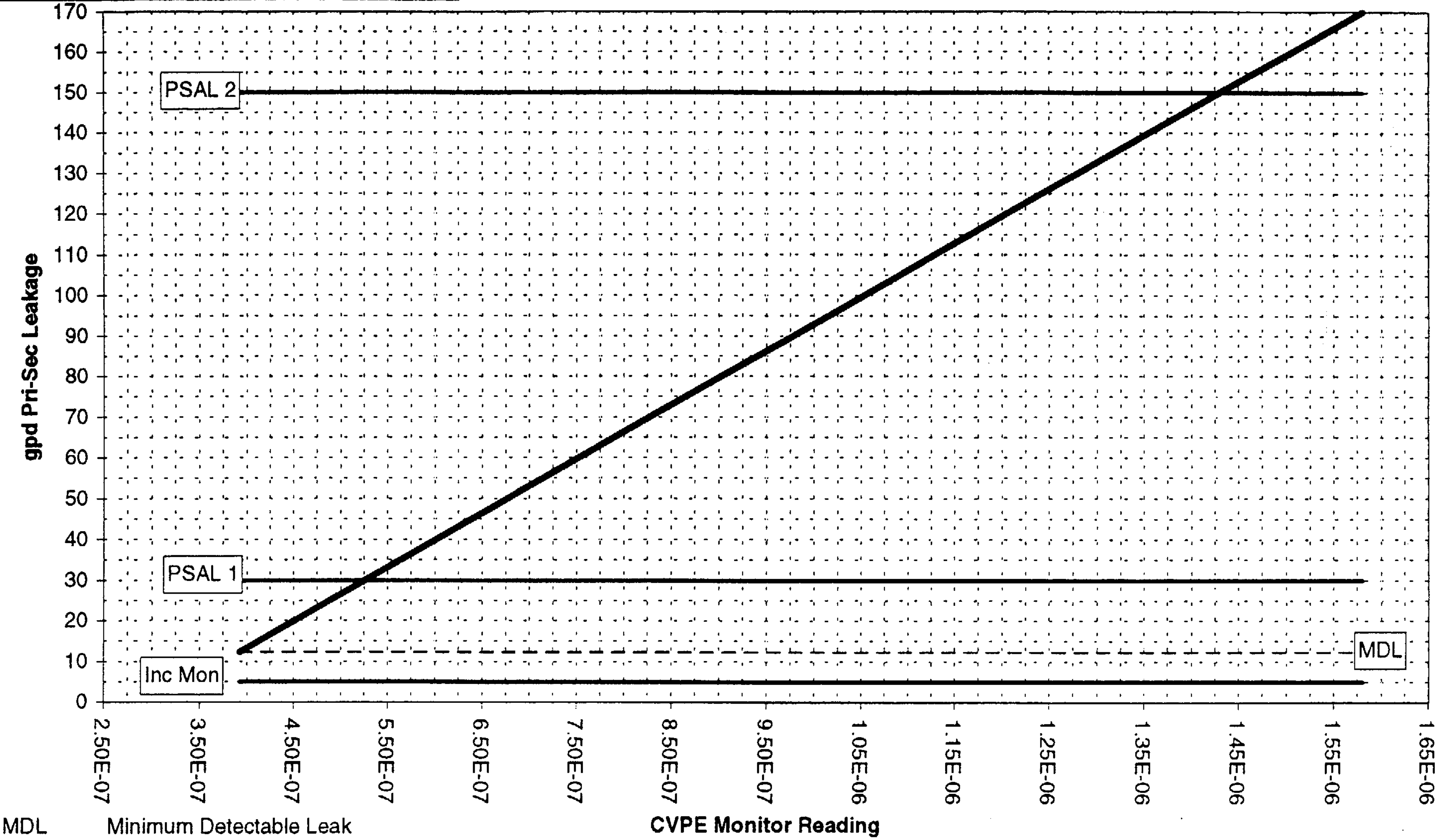
Curve H-X-15	Rev No. 1
Originator Don H. Edwards	Date 4/14/00
Supervisor Jerry Thompson	Date 4/14/00
Superintendent-Shift Operations [signature]	Date 4-15-00

P/S Leak Rate Using Monitor
(Based on Xe-133 Monitor Equivalent)

Total CVPE dilution flow is 155 scfm

CVPE Alert = 29.6 gpd

CVPE Alarm = 148.69 gpd



MDL Minimum Detectable Leak
Inc Mon Increased Monitoring
PSAL Primary to Secondary Action Level

Note: Dilution flow is equal to Total Motivating Air flo
+ Nitrogen flow + Air In Leakage flow

Question: 96

Which of the following would require a call to chemistry so they can initiate surveillances per RST-204 and RST-211?

a. Load reduction from 100% to 80% at 2 MWe/min

b. Load reduction from 100% to 90% at 10 MWe/min

c. Loss of one running MFP from 78% power

d. Loss of one running HDP from 100% power

Answer:

c. Loss of one running MFP from 78% power

QUESTION NUMBER: 96
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.1.14

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

K/A IMPORTANCE: ***RO*** ***SRO*** 3.3

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: GP-3.6

Properly APPLY the precautions and limitations of GP-006

REFERENCES: GP-006

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number GP-3.6 004

JUSTIFICATION:

a. Plausible since this is greater than a 15% change, but the change in any one hour period will be less than 15%.

b. Plausible since the rate of change is greater than 15% per hour, but the total change will be less than 15%.

c. **CORRECT** These surveillances are required to be initiated on power changes of greater than 15% in any one hour period. A loss of a MFW pump would cause a runback to 60%, a change of 18%.

d. Plausible since a trip of both HDPs will cause a runback, but the runback will only be to 90% with a total change of less than 15%.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Comparison of different events to determine procedural requirements

REFERENCES SUPPLIED:

3.0 PREREQUISITES (continued)

8. Verify all Prerequisites are met, then obtain Unit SCO permission to perform this procedure.

______________________________ Signature   __________ Date

4.0 PRECAUTIONS AND LIMITATIONS

1. When Reactor power is changed, monitor the Bypass Permissive Status Panel to verify correct permissive circuit operation.

2. Do **NOT** exceed load changes of 45 MW/min (5%/min) as specified in the Turbine-Generator instruction manual.

3. Automatic control rod withdrawal is blocked as Turbine load is decreased below Control Interlock C-5.

4. Following a load decrease, xenon worth increases must be anticipated and boron concentration adjustments made as required to maintain the control rods above the minimum insertion limit while maintaining AFD limits.

5. Using curve F-x-2, ensure that Axial Flux Difference is maintained within allowable limits of Tech Spec 3.2.1. (Reference 2.1.0.040)

6. Following a 10 ppm or greater change in Reactor Coolant System boron concentration, the Pressurizer Heaters should be energized to initiate opening of the Pressurizer Spray Valves, to equalize the boron concentration between the Pressurizer and the Reactor Coolant System.

7. In MODE 1 and 2, a shutdown margin of at least 1770 pcm must be maintained. In MODE 3, 4 and 5 a shutdown margin specified in the Core Operating Limits Report (COLR) in PLP-106 must be maintained. These are verified as follows:

   a. With the Reactor critical, verify the control rods are above the minimum rod insertion limits.

   b. With the Reactor subcritical and in MODE 3, 4 or 5, perform OST-1036.

8. Following a load change greater than 15% of rated thermal power in any 1 hour period, Chemistry must be notified of the need to initiate surveillances as specified in applicable Sections of RST-204 and RST-211 per Tech Spec 3.4.8 and 4.11.2.

9. Component Cooling Water to the Reactor Coolant Pumps must be supplied any time that an RCP is operating and must **NOT** be terminated to an idle RCP until the plant has been cooled to the cold plant conditions and the RCP has been idle for at least 30 minutes.

10. RCP Seal Injection flow should be maintained at all times when the Reactor Coolant System pressure is above atmospheric or when the Reactor Coolant System is being filled.

11. Two Intermediate Range Channels and 3 Power Range Channels are required to be operable to reduce power below permissive P-10.

Question: 97

Given the following conditions:

- An accident has occurred which has resulted in activation of the Emergency Plan.
- A repair team is preparing to enter an area to effect repairs that will protect a piece of valuable company property.
- The dose rate in the area is 25 Rem/hour.

Which of the following identifies the **MAXIMUM** amount of time that each individual can stay in the area without exceeding allowable emergency dose limits?

a. 12 minutes

b. 24 minutes

c. 36 minutes

d. 60 minutes

Answer:

b. 24 minutes

QUESTION NUMBER: 97
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.3.1

Knowledge of 10CFR20 and related facility radiation control requirements.

K/A IMPORTANCE: ***RO*** ***SRO*** 3.0

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 4

OBJECTIVE: PP-3.7-R2

Given a radiological situation, ASSESS the exposure limits of personnel entering the area, including emergency exposure limits

REFERENCES: PEP-330

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number PP-3.7-R2 001

JUSTIFICATION:

a. Plausible since the normal 10CFR20 limits are 5 Rem annual which would only allow 12 minutes, but for this type of emergency the limits are raised to 10 Rem for a single exposure.

b. **CORRECT** The dose limit for protecting valuable company property is 10 Rem. With a dose rate of 25 Rem, an individual can stay in the area for 0.4 hours, or 24 minutes.

c. Plausible since this would be a valid calculation if the limit for this condition were 15 Rem, but the limit is 10 Rem.

d. Plausible since this would be the limit for lifesaving or protection of large populations is 25 Rem, but the limit for this condition is 10 Rem.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Calculation of data to determine procedural requirements met

REFERENCES SUPPLIED:

Limitations for Lifesaving and Emergency Reentry/Repair Actions

1. A Declared Pregnant Woman shall not take part in these actions.

2. Internal exposure should be minimized by the use of the most appropriate respiratory protection or ALARA practice whenever possible, and contamination should be controlled by the use of protective clothing when practical.

3. Emergency worker exposures during lifesaving and repair/reentry efforts should be limited to the following:

DOSE LIMIT (Rem TEDE)	ACTIVITY	CONDITION
5	All	All
10	Protecting valuable property	Lower dose not practicable
25	Lifesaving or protection of large populations	Lower dose not practicable
>25	Lifesaving or protection of large populations	Only on a voluntary basis to persons fully aware of the risks involved

4. Limit dose to the lens of the eye to three (3) times the above values and doses to any other organ (including thyroid, skin and body extremities) to ten (10) times the above values.

5. Entry into radiation fields of greater than 25 Rem/hr or exposure in excess of 5 Rem TEDE shall not be permitted unless specifically authorized by the Site Emergency Coordinator.

6. In emergency situations where a exposure in excess of 25 Rem TEDE would be required, the following additional criteria shall be considered:

   a. Rescue personnel must be volunteers.

   b. Rescue personnel should have a full awareness of the risks involved (See Attachment 2).

   c. Other things being equal, volunteers above the age of 45 should be selected whenever possible for the purpose of avoiding unnecessary genetic effects.

   d. Exposure under these conditions should be limited to once in a lifetime, and shall be included when calculating future lifetime permissible exposures.

PP-3.7-R2 001
Which one of the following doses is the maximum dose allowed in lifesaving situations?

A. 10 rem TEDE

✓B. 25 rem TEDE

C. 50 rem TEDE

D. 75 rem TEDE

Question: 98

Given the following conditions:

- A small break LOCA has occurred.
- Core exit thermocouple temperatures are approximately 618 °F and stable.
- RCS hot legs temperatures are approximately 550 °F.
- RCS cold leg temperatures are approximately 330 °F.
- RCS pressure is 1100 psig.

Which of the following describes the status of RCS inventory and core cooling?

a. The core is covered and being cooled by natural circulation

b. The core is partially uncovered and being cooled by natural circulation

c. The core is covered and being cooled by reflux boiling

d. The core is partially uncovered and being cooled by reflux boiling

Answer:

d. The core is partially uncovered and being cooled by reflux boiling

QUESTION NUMBER: 98
TIER/GROUP: ***RO*** ***SRO*** 1/2

K/A: 009EA2.39

Ability to determine or interpret the following as they apply to a small break LOCA: Adequate Core Cooling

K/A IMPORTANCE: ***RO*** ***SRO*** 4.7

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: BD-3.10-2

Describe the overall response of the reactor coolant systems in terms of RCS pressure, water inventory, and temperature to a small cold leg break with no high head safety injection

REFERENCES: LP-BD-3.10
Steam Tables

SOURCE: ***New*** ☐ ***Significantly Modified*** ☐ ***Direct*** ☒

Bank Number 98RO-14

JUSTIFICATION:

a. Plausible since a large deltaT might incorrectly indicate that natural circulation is occurring, but the core is uncovered and reflux boiling is occurring.

b. Plausible since the core is uncovered, but reflux boiling is occurring.

c. Plausible since reflux boiling is occurring, but the core is uncovered.

d. **CORRECT** TCs are superheated, which requires that heat be added to steam (core is uncovered). With no heat removal between core exit and hot leg temp detectors, they should be nearly the same. Reflux boiling results in a C/D of the hot leg temp indications as steam condenses in the hot leg side of the SG and flows back to the core.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 4

Analysis and use of tables to determine plant conditions - high difficulty due to unusual plant conditions

REFERENCES SUPPLIED: Steam Tables

(4) Break flow decreases and SI flow increases as pressure drops

(5) Vessel level increases as makeup exceeds loss

(6) At the end of Mode 4

(a) Decay heat is removed predominantly by the break

(b) Secondary becomes a heat source

MCD-TP-19.0, MCD-TP-20.0

e. MODE 5—Decay heat removal during transition from core boiling to natural circulation

(1) Vessel level increases above hot leg nozzles

(a) Disrupts steam flow through SG tubes to break

(b) Reduces heat removal capability

(2) Core exit temperature and steam pressure increases

(a) Compresses two-phase mixture

(b) Vessel level drops

(c) Water pushed back into SG tubes

(3) If sufficient water is available in the vessel and if steam in the U-tubes can be condensed, natural circulation may start

(4) If noncondensable gases prevent initiating natural circulation, pressure may rise to the PRZ safeties setpoint

(a) Safeties setpoint above SI pump shutoff head

(b) Core level drops to below top of hot leg nozzles

(c) Steam flows to SG

(5) Modes 3, 4, and 5 will reoccur (less severely)

(6) In all probability, noncondensables will not prevent refilling

(a) Noncondensable gases were probably blown out by steam when the loop seal cleared

MCD-TP-32.0

(3) Reduction in steam generation rate reduces reflux flow again at about 10250 seconds

(4) Complete core uncovering at about 12000 seconds stops reflux

MCD-TP-33.0

f. Temperature in upper core region begins to increase rapidly at 10250 seconds

(1) Upper core mode exceeds 1200°F at 11000 seconds

(2) Primary indication of inadequate core cooling

(3) Operator must take action to recover

(4) > 1200°F based on highest expected peak clad temperatures for best-estimate large break LOCA

4. Recovery description

a. HHSI actuation

MCD-TP-34.0

(1) Most direct and effective

(2) Core recovered in approximately 10 minutes

(3) Core cooling reestablished within 2 minutes while core is being recovered

b. Depressurize all intact SGs

(1) Rapidly dump steam from all SGs

MCD-TP-35.0, MCD-TP-36.0

(2) Steam pressure drops

(a) Increased primary to secondary heat transfer results

(b) RCS pressure follows SG pressure because steam in the U-tubes rapidly condenses

(c) Momentary flow reversal occurs in pump and loop seal

(3) Initial temperature rise is due to reestablishment of natural circulation

(4) Core completely cooled within 2 minutes of operator action

Question: 99

Given the following conditions:

- A reactor trip and safety injection has occurred.
- A transition has been made to FRP-H.1, Response to Loss of Secondary Heat Sink.
- RCS bleed and feed has been initiated.
- Core exit thermocouples are still rising.
- RCS hot leg temperatures are all approximately 650 °F and rising slowly.
- All SG levels are approximately 5% wide range.
- Containment pressure is 6 psig.
- The TDAFW Pump has been made available.

Which of the following describes how AFW flow should be restored to the SGs?

a. Feed one SG at 50 KPPH until core exit thermocouples start decreasing

b. Feed one SG at 50 KPPH until SG narrow range level is > 40%

c. Feed one SG at maximum rate until core exit thermocouples start decreasing

d. Feed one SG at maximum rate until SG narrow range level is > 40%

Answer:

d. Feed one SG at maximum rate until SG narrow range level is > 40%

QUESTION NUMBER: 99
TIER/GROUP: ***RO*** ***SRO*** 2/1

K/A: 059A2.04

Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Feeding a dry SG

K/A IMPORTANCE: ***RO*** ***SRO*** 3.4

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: EOP-3.11-6

Given the following EOP steps, notes, and cautions, DESCRIBE the associated basis
c. Feed restoration (H1)

REFERENCES: FRP-H.1

SOURCE: ***New*** [X] ***Significantly Modified*** [ ] ***Direct*** [ ]

Bank Number NA

JUSTIFICATION:

a. Plausible since this would be the flow limit while feeding a "hot, dry" SG, but with core exit TCs rising maximum flow is required.

b. Plausible since this would be the flow limit while feeding a "hot, dry" SG, but with core exit TCs rising maximum flow is required.

c. Plausible since maximum flow is required, but it must be maintained until SG level is above 40% NR.

d. **CORRECT** With core exit TCs rising, even though the SG is considered to be hot and dry, maximum AFW flow is required in an attempt to remove heat from the core.

DIFFICULTY:
Comprehensive/Analysis [X] ***Knowledge/Recall*** [ ] ***Rating*** 3

Analysis of plant conditions to differentiate between operator responses

REFERENCES SUPPLIED: FRP-H.1, Attachment 1

GUIDANCE ON RESTORATION OF FEED FLOW

NOTE:
- A hot, dry SG is one where the corresponding RCS hot leg temperature is greater than 550°F AND wide range level is less than 10% [35%].
- Feed flow should be restored to hot, dry SGs one at a time.
- After RCS bleed and feed has been initiated it is preferred, but NOT required, that feed flow be restored to one SG at a time.

Before RCS bleed and feed:

1. Feed at least one intact SG, whose wide range level is greater than 10% [35%], at maximum rate.
2. Feed flow should NOT be established to a hot, dry SG until the corresponding RCS hot leg temperature has decreased to less than 550°F.

After RCS bleed and feed:

1. IF core exit TCs are stable OR decreasing, THEN feed one intact SG at 50 KPPH. WHEN wide range level increases to greater than 10% [35%], THEN feed flow may be increased to maximum rate.
2. IF core exit TCs are increasing, THEN feed one intact SG at maximum rate until SG narrow range level is greater than 10% [40%]. Do NOT reduce feed flow if core exit TCs become stable OR decreasing.
3. Feed flow should NOT be established to another hot, dry SG until the corresponding RCS hot leg temperature has decreased to less than 550°F.
4. WHEN all RCS hot leg temperatures are less than 550°F, THEN check the SG being fed (active SG) for symptoms indicating a faulted OR ruptured condition.
5. IF the active SG is faulted OR ruptured, THEN perform the following:
   a. Establish feed flow to another intact SG.
   b. IF an intact SG does NOT exist, THEN a decision should be made to use the best available SG, which may be the currently active SG.
   c. WHEN the heat load has been transferred to a backup SG, THEN isolate the faulted OR ruptured SG to prevent further radiation releases.

Question: 100

Given the following conditions:

- On May 1, at 0100, a plant shutdown was initiated from 100% in preparations for conducting a refueling.
- The reactor was shutdown at 1100 on the same date.
- CCW heat exchanger outlet temperature is currently 88 °F.

When is the **EARLIEST** that fuel movement in the reactor vessel is allowed to begin?

a. May 6th at 0200

b. May 6th at 1200

c. May 7th at 1200

d. May 7th at 2200

Answer:

d. May 7th at 2200

QUESTION NUMBER: 100
TIER/GROUP: ***RO*** ***SRO*** 3

K/A: 2.2.26

Knowledge of refueling administrative requirements.

K/A IMPORTANCE: ***RO*** ***SRO*** 3.7

10CFR55 CONTENT: ***55.41(b) RO*** ***55.43(b) SRO*** 5

OBJECTIVE: FHS-2.0-5

APPLY Technical Specifications and License Requirements to the Fuel Handling System: c. Use a copy of technical specifications or PLP-114 to determine specific actions to take for inoperable Fuel Handling Equipment

REFERENCES: PLP-114

SOURCE: ***New*** ☐ ***Significantly Modified*** ☒ ***Direct*** ☐

Bank Number 98SRO-80

JUSTIFICATION:

a. Plausible since this is calculated value based on 88 °F and start time of 0100, but should be based on 93 °F and start time of 1100.

b. Plausible since this is calculated value based on 88 °F and start time of 1100, but should be based on 93 °F.

c. Plausible since this is calculated value based on 93 °F and start time of 0100, but should be based on start time of 1100.

d. CORRECT Effective CCW temperature is 93 °F (88 + 5). Time of subcriticality is 1100 on May 1st. The required time for subcriticality is approximately 155 hours. This would allow fuel to be moved no earlier than May 7th at 2200.

DIFFICULTY:
Comprehensive/Analysis ☒ ***Knowledge/Recall*** ☐ ***Rating*** 3

Interpretation of plant data and calculation to meet procedural requirements

REFERENCES SUPPLIED: PLP-114, Figure 1

Refueling Operations

1.0 OPERATIONAL REQUIREMENTS - DECAY TIME

1.1 The reactor shall be subcritical for a minimum period of time as determined by Figure 1.

APPLICABILITY: During movement of irradiated fuel in the reactor vessel.

ACTION:

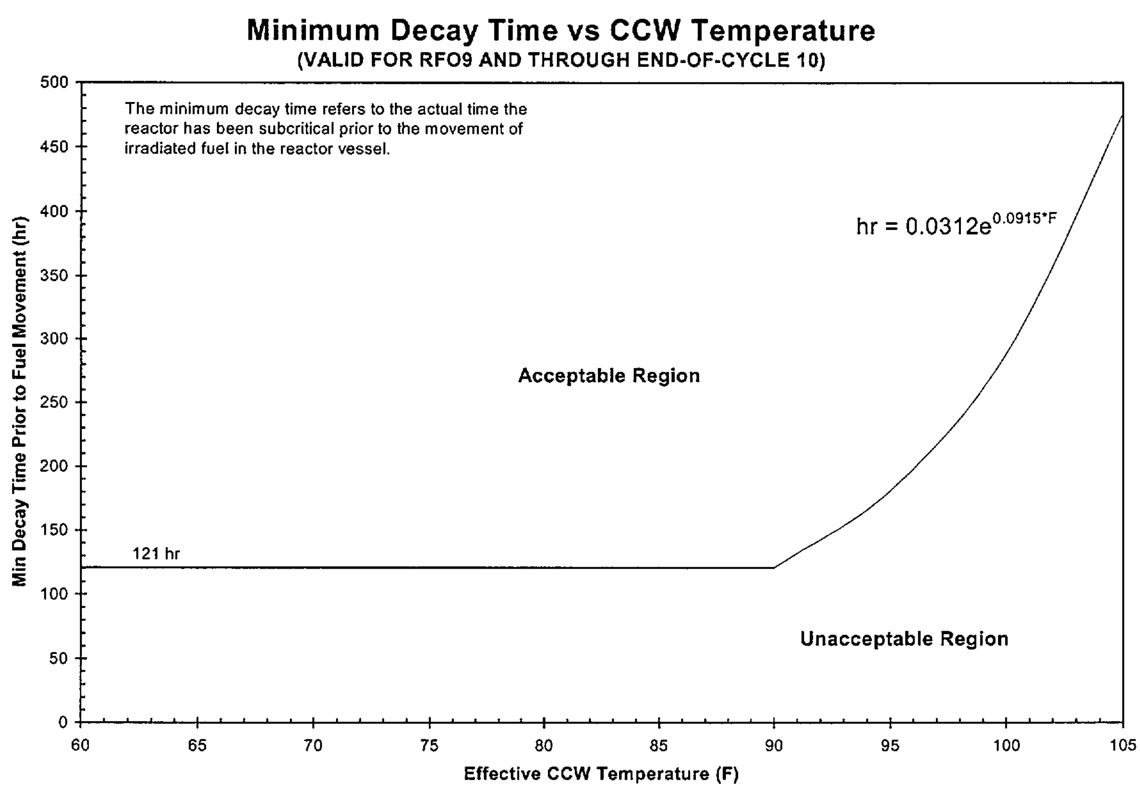
With the reactor subcritical for a time less than determined by Figure 1, suspend all operations involving movement of irradiated fuel in the reactor vessel. Fuel movement in the reactor vessel may continue provided the minimum decay time is in the acceptable region as shown on Figure 1.

2.0 SURVEILLANCE REQUIREMENTS

2.1 The reactor shall be determined to have been subcritical for a minimum period of time as determined by Figure 1 by verification of the date and time of subcriticality prior to movement of irradiated fuel in the reactor vessel.

2.2 CCW temperature shall be monitored every 12 hours during the movement of fuel in the reactor vessel to ensure the temperature used to determine decay time is not exceeded.

Figure 1



NOTE: Effective CCW Temperature refers to actual CCW heat exchanger outlet temperature plus 5F.

On September 1, at 0600, a plant shutdown was initiated from 100% in preparations for conducting a refueling. The reactor was shutdown at 1800 on the same date. CCW heat exchanger outlet temperature is currently 95°F.

When is the **EARLIEST** that fuel movement in the reactor vessel is allowed to begin?

A. September 8th at 1300

B. September 9th at 0100

C. September 12th at 2000

D. September 13th at 0800

Answer:

D September 13th at 0800

NOTE: PLP-114, FIGURE 1, MINIMUM DECAY TIME VS. CCW TEMPERATURE, IS REQUIRED TO ANSWER THIS QUESTION.

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information

Name: **ANSWER KEY**	Region: **II**
Date:	Facility/Unit: **HARRIS**
License Level: **RO**	Reactor Type: **WESTINGHOUSE**
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected ____ hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

____
Applicant's Signature

Results

Examination Value	________ Points
Applicant's Score	________ Points
Applicant's Grade	________ Percent

Question: 1

Given the following conditions:

- A Safety Injection has just occurred.
- Following the SI, leakage from the CCW system to the ESW system is suspected.

Which of the following sets of conditions would provide confirmation of this diagnosis in the **SHORTEST** period of time?

a. Decreasing CCW surge tank level **AND** ESW discharge radiation alarm

b. Automatic makeup to the CCW surge tank **AND** ESW discharge sample

c. Decreasing CCW surge tank level **AND** ESW discharge sample

d. Automatic makeup to the CCW surge tank **AND** ESW discharge radiation alarm

Answer:

c. Decreasing CCW surge tank level **AND** ESW discharge sample

Question: 2

Which of the following conditions would require that Attachment 2, "Cycle Log," of OMM-013, Cycle and Transient Monitoring Program, be completed?

a. During a reactor startup, a failed Source Range channel results in a Source Range High Flux Trip

b. With the plant at 100% power, a failed actuation relay results in Auxiliary Feedwater flow to the SGs

c. With the plant in Mode 3, a trip of Emergency Bus 1A-SA normal supply breaker 105 results in EDG 1A-SA starting automatically

d. With the plant at 100% power, a failed pressurizer level instrument results in normal letdown isolating

Answer:

b. With the plant at 100% power, a failed actuation relay results in Auxiliary Feedwater flow to the SGs

Question: 3

Which of the following indications are **BOTH** used by EPP-013, LOCA Outside Containment, to identify that the leak is isolated?

a. RCS pressure increasing **AND** RAB radiation decreasing

b. RCS pressure increasing **AND** Local observation

c. PRZ level increasing **AND** Local observation

d. PRZ level increasing **AND** RAB radiation decreasing

Answer:

b. RCS pressure increasing **AND** Local observation

Question: 4

Given the following conditions:

- Control Room Ventilation is in a normal lineup with 'A' Train fans in operation.
- Power is lost to the 'B' Train North Emergency Intake Radiation Monitor.

What is the response of the Control Room Ventilation System to this failure?

a. Remains in the normal alignment, but a subsequent Train 'A' radiation monitor reaching the high alarm will cause an isolation

b. Isolation occurs and **CANNOT** be reset

c. Isolation occurs, but can be reset

d. Remains in the normal alignment, but a subsequent Train 'B' radiation monitor reaching the high alarm will cause an isolation

Answer:

c. Isolation occurs, but can be reset

Question: 5

Given the following conditions:

- The plant is operating at 100% power with 'A' Train equipment in service.
- The 1B-SB emergency bus supply breaker (125) opens.

Which of the following is expected to occur?

a. The 1B-SB EDG will start and breaker 125 will reclose

b. Both sequencers will run and load equipment selected by the UV program

c. 1MS-72, MS 'C' to Aux FW Turbine, will open

d. The 'B' ESW Header will be supplied by the NSW System

Answer:

c. 1MS-72, MS 'C' to Aux FW Turbine, will open

Question: 6

Given the following conditions:

- Emergency Boration is required.
- 1CS-278, Emergency Boric Acid Addition, **CANNOT** be opened.

Which of the following alignments will provide adequate boric acid flow?

	1CS-283 **Boric Acid to Boric Acid Blender FCV-113A**	**1CS-156** **Makeup to CSIP Suction FCV-113B**	**1CS-155** **Makeup to VCT FCV-114A**	**1CS-291** **CSIP Suction from RWST LCV-115B**	**1CS-292** **CSIP Suction from RWST LCV-115D**	**1CS-165** **VCT Outlet LCV-115C**	**1CS-166** **VCT Outlet LCV-115E**
a.	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	CLOSED	OPEN
b.	OPEN	CLOSED	OPEN	CLOSED	CLOSED	OPEN	CLOSED
c.	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	OPEN	OPEN
d.	OPEN	CLOSED	CLOSED	OPEN	CLOSED	OPEN	CLOSED

Answer:

d.	OPEN	CLOSED	CLOSED	OPEN	CLOSED	OPEN	CLOSED

Question: 7

Given the following conditions:

- The plant is in Mode 5 on RHR cooling.
- A 170 gpm leak develops from the RCS.
- Letdown has been isolated.

Which of the following methods of makeup is to be used?

a. Normal Charging from VCT

b. Normal Charging from RWST

c. Opening SI Accumulator Isolation valves

d. CSIP flow through the BIT valves

Answer:

d. CSIP flow through the BIT valves

Question: 8

The generator is being taken off the line during a normal shutdown.

Which of the following describes the proper sequence for operation of the generator output breakers, 52-7 and 52-9?

a. Trip the turbine and verify the generator lockout opens both generator output breakers

b. Manually open one generator output breaker, trip the turbine, and manually open the second output breaker

c. Manually open both the generator output breakers, then trip the turbine

d. Manually open one generator output breaker, trip the turbine, and allow the generator lockout to open the second output breaker

Answer:

b. Manually open one generator output breaker, trip the turbine, and manually open the second output breaker

Question: 9

Which of the following is the most significant action the operator can take during a SGTR concurrent with a loss of off-site power to minimize the PTS challenge?

a. Maintain the RCS temperature at or below the required cooldown target temperature

b. Secure AFW flow to the affected SG once minimum required level is achieved

c. Ensure the affected SG does **NOT** become water solid

d. Terminate SI after meeting termination criteria

Answer:

d. Terminate SI after meeting termination criteria

Question: 10

Given the following conditions:

- A reactor trip and safety injection has occurred.
- Containment pressure is 4.5 psig.
- SI has **NOT** been reset.
- Phase A has **NOT** been reset.
- Phase B has **NOT** been reset.

Which of the following describes the conditions required to allow opening of the SG sample valves?

a. Containment pressure must be reduced below 3.0 psig before SI can be reset to allow opening the sample valves

b. SI can be reset to allow opening the sample valves

c. Containment pressure must be reduced below 3.0 psig before Phase A can be reset to allow opening the sample valves

d. Phase A can be reset to allow opening the sample valves

Answer:

b. SI can be reset to allow opening the sample valves

Question: 11

Given the following conditions:

- Condenser vacuum is 5.4 inches Hg and degrading.
- Turbine first stage pressure is 38% turbine load.
- Turbine load is being reduced.

Which of the following actions must be taken?

a. Continue reducing turbine load as necessary to maintain condenser vacuum

b. Trip the reactor and verify the turbine trips

c. Trip the turbine and verify the reactor trips

d. Trip the turbine and verify the plant stabilizes on the steam dumps

Answer:

b. Trip the reactor and verify the turbine trips

Question: 12

Given the following conditions:

- The plant is operating at 100% power.
- Bank 'C' control rod D12 DRPI is indicating 206 steps
- Bank 'C' Step Counters are indicating 228 steps

When comparing incore thermocouple positions to determine if the rod is actually out of position, which of the following thermocouples should be compared?

a. Compare incore thermocouple C12 to the average of incore thermocouples C08, D03, D05, and H13

b. Compare incore thermocouple C12 to the average of incore thermocouples F09, F11, F13, H11, and H13

c. Compare incore thermocouple E12 to the average of incore thermocouples E08, E10, E14, and G15

d. Compare incore thermocouple E12 to the average of incore thermocouples D05, E04, L12, and M11

Answer:

d. Compare incore thermocouple E12 to the average of incore thermocouples D05, E04, L12, and M11

Question: 13

Which of the following sets of conditions would **NOT** permit waiving the Independent Verification requirement for a clearance removal?

	EXPECTED DOSE	AREA TEMPERATURE
a.	12 mRem	105°F
b.	9 mRem	115°F
c.	6 mRem	125°F
d.	3 mRem	135°F

Answer:

b.	9 mRem	115°F

Question: 14

Given the following conditions:

- The RCS is solid.
- 'B' RCP is running.
- Both trains of RHR cooling are in service.
- The RCS is at 300 psig and 160 °F

Which of the following describes the **INITIAL** effect of each of the following events on RCS pressure?

	HCV-142 (RHR to letdown) fails SHUT	**FCV-122 (charging flow control) fails OPEN**
a.	Increase	Increase
b.	Increase	Decrease
c.	Decrease	Increase
d.	Decrease	Decrease

Answer:

a.	Increase	Increase

Question: 15

With the plant at 100 percent steady-state condition, the following occurs:

- ALB-07-4-3, VCT HIGH-LOW LEVEL, alarms.
- ALB-06-7-3, TOTAL MAKEUP WATER FLOW DEVIATION, alarms.
- ALB-06-8-4, BORIC ACID FLOW DEVIATION, alarms.
- VCT level is at 14.5% and decreasing at the same rate it has been for the last few days.

Which of the following procedures should be addressed?

a. AOP-002, Emergency Boration

b. AOP-003, Malfunction of Reactor Makeup Control

c. AOP-016, Excessive Primary Plant Leakage

d. AOP-017, Loss of Instrument Air

Answer:

b. AOP-003, Malfunction of Reactor Makeup Control

Question: 16

Given the following conditions:

- While performing an OP valve lineup, two valves are found under clearance.
- One of the valves is in the position required by the OP valve lineup.
- The other valve is **NOT** in the position required by the OP valve lineup.

Which of the following describes the action to take for each valve?

a.
- CORRECT POSITION - initial as being in the correct position, using the clearance number as a reference
- WRONG POSITION - enter the clearance number in the initials space

b.
- CORRECT POSITION - circle the component number on the checklist **AND** leave the initial space blank
- WRONG POSITION - make a note in the comment section **AND** leave the initial space blank

c.
- CORRECT POSITION - enter the clearance number in the initials space
- WRONG POSITION - circle the component number on the checklist **AND** leave the initial space blank

d.
- CORRECT POSITION - initial as being in the correct position, using the clearance number as a reference
- WRONG POSITION - make a note in the comment section **AND** leave the initial space blank

Answer:

a.
- CORRECT POSITION - initial as being in the correct position, using the clearance number as a reference
- WRONG POSITION - enter the clearance number in the initials space

Question: 17

A leak in the Instrument Air system has occurred.

Which of the following describes an automatic response **AND** the pressure at which the response will occur?

a. The Standby Air Compressor starts at 105 psig

b. The in-service Air Dryer is bypassed at 90 psig

c. 1SA-506 opens to supply Instrument Air from Service Air at 90 psig

d. The FW preheater bypass valves shut at 66 psig

Answer:

d. The FW preheater bypass valves shut at 66 psig

Question: 18

Given the following conditions:

- Essential Services Chilled Water System (ESCWS) 'A' Train is in service.
- A reactor trip and safety injection occurs.

Which of the following describes the expected ESCWS alignment?

a.
- Both ESCW chillers running
- ESCWS trains split with 'A' Train supplying the non-safety ESCWS loop

b.
- Both ESCW chillers running
- ESCWS trains split with the non-safety ESCWS loop isolated

c.
- **ONLY** 'A' Train ESCWS chiller running
- ESCWS trains cross-connected with the non-safety ESCWS loop isolated

d.
- **ONLY** 'A' Train ESCWS chiller running
- ESCWS trains cross-connected with the 'A' Train supplying the non-safety ESCWS loop

Answer:

b.
- Both ESCW chillers running
- ESCWS trains split with the non-safety ESCWS loop isolated

Question: 19

Given the following conditions:

- An SGTR has occurred.
- A transition has been made from PATH-2 to EPP-020, SGTR with Loss of Reactor Coolant: Sub-Cooled Recovery.
- After several steps have been completed in EPP-020, it becomes apparent that the wrong procedure is being implemented.

Which of the following actions should be taken?

a. Return to the point in PATH-2 where the transition was made to EPP-20

b. Return to the top left entry in PATH-2

c. Return to the point in PATH-1 where the transition was made to PATH-2

d. Return to the top left entry in PATH-1

Answer:

d. Return to the top left entry in PATH-1

Question: 20

During the review of a clearance request to support preventative maintenance work activities, it is determined that there is an existing Standard Clearance.

Which of the following would be the appropriate course of action?

a. The work can be performed under the Standard Clearance, and the technician signing on is responsible for ensuring adequate clearance boundary

b. The work can be performed under the Standard Clearance, and Clearance Preparer is responsible for ensuring adequate clearance boundary

c. The work can be performed using the Standard Clearance to create a new clearance if the Clearance Preparer and Verifier confirm the accuracy of the Standard Clearance

d. The work **CANNOT** be performed using the Standard Clearance since Standard Clearance use is limited to support corrective maintenance work activities only

Answer:

c. The work can be performed using the Standard Clearance to create a new clearance if the Clearance Preparer and Verifier confirm the accuracy of the Standard Clearance

Question: 21

Given the following conditions:

- A reactor trip and safety injection has occurred.
- ESW pump operation is being verified in PATH-1.
- Containment pressure is 7 psig.
- RCS pressure is 950 psig.
- SI Flow indicator FI-943, Normal HDR Flow, indicates 0 gpm.
- Both CSIPs are running and all SI valves are properly aligned.

Which of the following actions is to be taken?

a. Trip the RCPs immediately due to RCP Trip Criteria being met

b. Leave the RCPs running until a transition is made to Entry Point C

c. Leave the RCPs running until containment pressure reaches 10 psig

d. Trip the RCPs immediately due to a loss of CCW cooling to the pumps

Answer:

a. Trip the RCPs immediately due to RCP Trip Criteria being met

Question: 22

Given the following conditions:

- The plant is in Mode 5.
- ALB-08-1-4, RWMU STORAGE TANK MINIMUM/HIGH LEVEL, alarms.
- RWMU tank level is decreasing with **NO** VCT makeup in progress.

Which one of the following procedures would be the most appropriate to implement?

a. AOP-003, Malfunction of Reactor Makeup Control

b. AOP-008, Accidental Release of Liquid Waste

c. AOP-016, Excessive Primary Plant Leakage

d. AOP-020, Loss of Reactor Coolant Inventory / RHR While Shutdown

Answer:

b. AOP-008, Accidental Release of Liquid Waste

Question: 23

Given the following conditions:

- Fuel cladding failure has occurred.
- The CVCS Cation Bed demineralizer has been placed in service.

Which of the following **ALL** provide positive indications of the fuel cladding failure?

a.
- RCS boron decreasing
- Chemistry samples
- Volume Control Tank Room radiation monitor alarming

b.
- RCS boron decreasing
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

c.
- Chemistry samples
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

d.
- RCS boron decreasing
- Chemistry samples
- Gross Failed Fuel Detector alarming

Answer:

c.
- Chemistry samples
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

Question: 24

Given the following conditions:

- The plant is at 30% power.
- A dropped control rod has just been re-aligned.
- While attempting to reset the Rod Control Urgent Failure alarm, the operator inadvertently operates the Rod Control Start Up switch.

Which of the following describes the effect of operating the incorrect switch?

a. All Control Bank control rods drop into the core, causing an automatic reactor trip

b. All rods, including Control Bank and Shutdown Bank rods, drop into the core, causing an automatic reactor trip

c. All rods remain in their current position and there is **NO** effect on the Rod Control System circuitry

d. All rods remain in their current position, but the Rod Control System circuitry senses all rods are fully inserted

Answer:

d. All rods remain in their current position, but the Rod Control System circuitry senses all rods are fully inserted

Question: 25

Given the following conditions:

- ALB-26-1-4, ANNUN SYS 1 POWER SUPPLY FAILURE, alarms.
- Investigation determines a 12 VDC (1C#1) power supply has failed.

Which of the following ALBs should be considered inoperable?

a. Containment Spray & Accumulator System

b. Chemical Volume Control System

c. Reactor First Out System

d. Auxiliary Feedwater System

Answer:

c. Reactor First Out System

Question: 26

Given the following conditions:

- Several Fuel Handling Building (FHB) area radiation monitors on both trains have reached the high alarm setpoint.
- AOP-005 has directed the operator to verify that the FHB ventilation has shifted to the emergency exhaust lineup.
- Both FHB Emergency Exhaust Fans, E-12 and E-13, are RUNNING.
- FHB Emergency Exhaust Fan Inlets, 1FV-2 SA and 1FV-4 SB, are OPEN

Which of the following additional alignments is expected?

a.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **OPEN**

b.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **RUNNING**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **OPEN**

c.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

d.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **RUNNING**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

Answer:

c.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

Question: 27

Why do actions concerning CNMT spray operation contained in EPP-12, Loss of Emergency Coolant Recirculation, take precedence over the actions contained in FRP-J.1, Response to High Containment Pressure?

a. Actions required by EPPs always have priority over those in FRPs

b. CNMT spray is **NOT** used if the plant is in a recirculation mode

c. CNMT pressure should be too low to require CNMT spray

d. Conservation of RWST inventory has priority over containment pressure control

Answer:

d. Conservation of RWST inventory has priority over containment pressure control

Question: 28

Following a load reduction, Axial Flux Difference (AFD) is being verified.

Using the attached curve numbered F-10-2, which of the following combinations of power and AFD are outside the acceptable operating limits?

	POWER	AFD
a.	82%	-17
b.	77%	-21
c.	63%	-27
d.	56%	-30

Answer:

b.	77%	-21

Question: 29

Given the following conditions:

- The unit is operating at 50% power.
- LT-460, Channel III Pressurizer Level, has failed and all associated bistables are in the tripped condition.
- Power is subsequently lost to UPS Bus IDP-1A-SI.

Which train(s) of Reactor Protection will actuate, if any, resulting in a Reactor Trip?

a. Neither train

b. Train SA **ONLY**

c. Train SB **ONLY**

d. Both trains

Answer:

d. Both trains

Question: 30

Given the following conditions:

- Reactor power is 80% and stable.
- Tavg is stable.
- Pressurizer level is stable with the control system in AUTO.
- A small leak develops across the differential pressure bellows for the controlling channel of pressurizer level, resulting in pressure equalizing across the bellows.

How will this leak affect the operation of FCV-122, Charging Flow Control Valve?

a. It will throttle open slightly during the course of the pressure equalization and then return to its original position

b. It will throttle closed slightly during the course of the pressure equalization and then return to its original position

c. It will throttle open slightly during the course of the pressure equalization and remain in that position

d. It will throttle closed slightly during the course of the pressure equalization and remain in that position

Answer:

d. It will throttle closed slightly during the course of the pressure equalization and remain in that position

Question: 31

Which of the following describes the result if 1B Condensate Pump trips on motor overcurrent at 80% power?

	CONDENSATE BOOSTER PUMPS	MAIN FEED PUMPS
a.	1A and 1B Remain Running	1A and 1B Remain Running
b.	1B Trips	1B Trips
c.	1B Trips	1A and 1B Remain Running
d.	1A and 1B Remain Running	1B Trips

Answer:

b.	1B Trips	1B Trips

Question: 32

Given the following conditions:

- A Loss of Coolant Accident (LOCA) has occurred.
- Containment pressure is 2 psig.
- Containment hydrogen concentration is 3.5%.
- Containment temperature is 140 °F.
- Containment temperature prior to the accident was 90 °F.

Which one of the following is the required power setting for the 1A Hydrogen Recombiner?

a. 44.7 kW

b. 45.8 kW

c. 46.7 kW

d. 47.9 kW

Answer:

d. 47.9 kW

Question: 33

During operation at 100% power, an inadvertent SI occurs on 'B' Train **ONLY**.

Which of the following actions is required?

a. Manually actuate SI on 'A' Train

b. Continue in PATH-1 noting which 'A' Train ESF equipment is **NOT** running

c. Start ONLY the 'A' Train of ESF equipment for which the redundant 'B' Train equipment failed

d. Transition directly to EPP-008, SI Termination

Answer:

a. Manually actuate SI on 'A' Train

Question: 34

Given the following conditions:

- The plant is at 22% power during a shutdown.
- Intermediate Range Channel N-35 has been declared inoperable as a result of failing to meet Operational Test Criteria of MST-I0167.
- The test was performed, per GP-006, during a Tech Spec 3.0.3 required shutdown (i.e., the shutdown must continue).
- OWP-RP-21 has been performed, which places the LEVEL TRIP BYPASS switch in the BYPASS position and verifies the associated light on the Bypass Permissive Light Panel.
- The I&C Supervisor states that both control and instrument power must be removed from the drawer to replace a bistable module.

Assuming the instrument and control power are removed for the remainder of the shutdown, the shutdown continues and ...

a. the reactor trips when the fuses are removed.

b. the reactor trips when power is reduced below P-10.

c. the reactor trips when power is reduced below P-6.

d. **NO** reactor trip occurs.

Answer:

b. the reactor trips when power is reduced below P-10.

Question: 35

Given the following conditions:

- A reactor trip and safety injection has occurred.
- Instrument Bus SIII de-energizes, causing a loss of power to PT-2250A, AFW Pump A Suct Press.

Which of the following describes the effect of the loss of this instrument on MDAFW Pump 1A-SA?

	MDAFW PUMP 1A-SA ALREADY RUNNING	**MDAFW PUMP 1A-SA NOT RUNNING**
a.	Automatically Trips	Can Be Started
b.	Automatically Trips	**CANNOT** Be Started
c.	Remains Running	Can Be Started
d.	Remains Running	**CANNOT** Be Started

Answer:

c.	Remains Running	Can Be Started

Question: 36

Given the following conditions:

- EPP-008, SI Termination, is being performed following an inadvertent SI.
- One CSIP has been secured.
- The normal CSIP miniflow isolation valves will **NOT** open.

Which of the following actions should be taken?

a. Maintain BIT flow until the miniflow isolation valves are manually opened

b. Direct an NLO to open the valves locally and continue to the next step once the directions have been provided

c. Initiate and maintain at least 30 GPM RCP seal injection flow until the miniflow isolation valves are open

d. Initiate and maintain at least 60 GPM CSIP flow until the miniflow isolation valves are open

Answer:

d. Initiate and maintain at least 60 GPM CSIP flow until the miniflow isolation valves are open

Question: 37

Given the following conditions:

- The plant is operating at 100% power.
- The Steam Dump System is in the T-AVG Mode.
- A transient results in a rapid loss of load to 45%.

Which of the following describes the **INITIAL** response of the listed valves to this event?

	CONDENSER DUMPS	**ATMOSPHERIC DUMPS**	**INTERCEPT VALVES**
a.	Open	Open	Remain Open
b.	Open	Open	Close
c.	Open	Remain Closed	Remain Open
d.	Remain Closed	Open	Close

Answer:

a.	Open	Open	Remain Open

Question: 38

Given the following conditions:

- The plant is operating at 100% power.
- Charging flow is 150 gpm.
- Letdown flow is 45 gpm.
- Seal injection flow is 10 gpm to each RCP.
- RCP #1 Seal Return is 3 gpm from each RCP.
- Pressurizer level is stable.

Which of the following describes the RCS leak rate **AND** the required action based on the leak rate?

	LEAK RATE	REQUIRED ACTION
a.	126 gpm	Perform a plant shutdown per GP-006
b.	126 gpm	Manually trip the reactor and initiate safety injection
c.	135 gpm	Perform a plant shutdown per GP-006
d.	135 gpm	Manually trip the reactor and initiate safety injection

Answer:

b.	126 gpm	Manually trip the reactor and initiate safety injection

Question: 39

Given the following conditions:

- A fire has occurred in cable spread Room A - RAB 286 which requires a plant shutdown.
- 'A' SG pressure is 950 psig.
- 'A' SG wide range level is 70%.
- 'A' SG narrow range level is unavailable.
- AFW flow is being supplied to 'A' SG.

Which of the following actions should be taken?

a. Decrease AFW flow to lower 'A' SG wide range level to < 67%

b. Decrease AFW flow to lower 'A' SG wide range level to < 50%

c. Increase AFW flow to raise 'A' SG wide range level to > 50%

d. Increase AFW flow to raise 'A' SG wide range level to > 67%

Answer:

a. Decrease AFW flow to lower 'A' SG wide range level to < 67%

Question: 40

You are the on-shift control operator and you are assigned to perform an Operations Surveillance Test (OST).

Which of the following must be performed by someone other than you?

a. Sign off step completion for actions that you direct the AOs to perform

b. Complete the prerequisites section before the test starts

c. Sign the test verifying that **ALL** prerequisites have been met and that the Unit SCO has given permission for the test to begin

d. Sign the test as completed with **NO** exceptions and submit to Document Records

Answer:

d. Sign the test as completed with **NO** exceptions and submit to Document Records

Question: 41

Following a steam break inside containment, the Containment Spray System actuated.

Containment pressure has been reduced to 2.5 psig. The following signals have been reset:

- Safety Injection
- Phase A
- Phase B
- Containment Spray

Several minutes after securing Containment Spray, containment pressure increases to 11 psig due to a subsequent large break LOCA.

Which of the following describes the expected response of the Containment Spray System?

	CS PUMPS	**CS DISCHARGE VALVES**
a.	Automatically Start	Automatically Open
b.	Automatically Start	Must be Manually Opened
c.	Must be Manually Started	Automatically Open
d.	Must be Manually Started	Must be Manually Opened

Answer:

a.	Automatically Start	Automatically Open

Question: 42

Given the following conditions:

- A load rejection has occurred, causing RCS pressure to increase.
- The PRZ Spray Valves and PRZ PORVs have opened.
- During the pressure transient, PRZ pressure transmitter PT-445 failed high.

Which of the following will occur?

a. PRZ PORVs 445A and 445B will close as PT-444 senses a lowering pressure; PRZ PORV 444B will close when RCS pressure drops below 2000 psig

b. All PRZ PORVs will remain open as PT-444 senses a lowering pressure and must be manually closed

c. PRZ PORVs 445A and 445B will close as PT-444 senses a lowering pressure; PRZ PORV 444B will remain open and must be manually closed

d. PRZ PORV 444B will close as PT-444 senses a lowering pressure; PRZ PORVs 445A and 445B will close when RCS pressure drops below 2000 psig

Answer:

d. PRZ PORV 444B will close as PT-444 senses a lowering pressure; PRZ PORVs 445A and 445B will close when RCS pressure drops below 2000 psig

Question: 43

Given the following conditions:

- Instrument Bus SI is de-energized.
- A reactor trip and safety injection occurs.

Which of the following describes the plant response AND required operator actions?

a.
- 'A' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'A' Train equipment

b.
- 'B' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'B' Train equipment

c.
- 'A' Train safeguards equipment will **NOT** automatically function
- 'A' Train equipment must be manually aligned/started **ONLY** if the corresponding 'B' Train equipment fails

d.
- 'B' Train safeguards equipment will **NOT** automatically function
- 'B' Train equipment must be manually aligned/started **ONLY** if the corresponding 'A' Train equipment fails

Answer:

a.
- 'A' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'A' Train equipment

Question: 44

Given the following conditions:

- Reactor power is 8% during a plant startup.
- 1A Main Feed Pump is operating.
- The Main Feed Regulating Valves are in MAN and are throttled open.
- The Main Feed Regulating Bypass Valves are in AUTO and are throttled open.
- 'C' SG level rises to 85%.

Which of the following will occur?

a. 1A Main Feed Pump trips **AND** MFW is isolated to 'C' SG **ONLY**

b. 1A Main Feed Pump trips **AND** MFW is isolated to all SGs

c. 1A Main Feed Pump remains running **AND** MFW is isolated to 'C' SG **ONLY**

d. 1A Main Feed Pump remains running **AND** MFW is isolated to all SGs

Answer:

b. 1A Main Feed Pump trips **AND** MFW is isolated to all SGs

Question: 45

A high (red) alarm on the Containment Leak Detection Monitor particulate channel (3502A-SA) causes which of the following automatic isolations/trips to occur?

a.
- Containment Normal Purge
- Containment Pre-Entry Purge
- Containment Vacuum Relief

b.
- Containment Normal Purge **ONLY**

c.
- Containment Pre-Entry Purge **ONLY**

d.
- Containment Vacuum Relief **ONLY**

Answer:

b.
- Containment Normal Purge **ONLY**

Question: 46

Which of the following events would result in increasing radiation levels in the Plant Vent Stack?

a. Steam Generator Tube Rupture

b. Waste Gas Decay Tank Rupture

c. Fuel Handling Accident

d. Radioactive Spill in the Chemistry Hot Lab

Answer:

c. Fuel Handling Accident

Question: 47

Given the following conditions:

- The plant is operating at 22% power.
- PRZ pressure transmitter PT-444 has failed high.
- 1RC-107, PRZ Spray Valve 444C, has stuck open.

Which of the following actions is to be taken?

a. Stop 1A RCP and stabilize the plant at power

b. Trip the reactor and stop 1A RCP

c. Stop 1C RCP and stabilize the plant at power

d. Trip the reactor and stop 1C RCP

Answer:

a. Stop 1A RCP and stabilize the plant at power

Question: 48

Which of the following gives the parameters monitored for SI Reinitiation criteria on the EPP-009, Post LOCA Cooldown and Depressurization, foldout page?

a. RCS subcooling and RVLIS level

b. Pressurizer level and RCS pressure

c. RCS pressure and RVLIS level

d. RCS subcooling and pressurizer level

Answer:

d. RCS subcooling and pressurizer level

Question: 49

The plant was operating at 100% power when an accident occurred.

Assuming **NO** operator action is taken, a Main Steam Line Isolation Signal (MSIS) will be generated when ...

a. PRZ pressure drops below 1850 psig.

b. containment pressure rises to 2.0 psig.

c. steam line pressure drops below 601 psig.

d. steam line pressure drops faster than 100 psig/sec.

Answer:

c. steam line pressure drops below 601 psig.

Question: 50

Given the following conditions:

- Power is at 45% during a power increase following a short maintenance outage.
- Rod K-6 in Control Bank 'D' is determined to be inoperable due to a power cabinet malfunction.
- The rod, determined to be at 153 steps, is **NOT** capable of being moved, but is considered to be trippable.
- The crew realigns the remaining rods in Control Bank 'D' with the inoperable rod.

What is the maximum power level that can be achieved under these conditions while maintaining **ALL** associated alarms clear?

a. 45%

b. 50%

c. 75%

d. 80%

Answer:

c. 75%

Question: 51

Given the following conditions:

- The plant was operating at 100% power when an accident occurred.
- All feedwater is isolated to three faulted SGs IAW EPP-015, Uncontrolled Depressurization of All SGs.
- The STA reports a red path requirement for the heat sink CSF.

Which of the following describes why FRP-H.1, Response to Loss of Secondary Heat Sink, would **NOT** be used in this situation?

a. FRPs are implemented only after completion of PATH-1, entry Point C

b. Feed flow has been reduced by operator action

c. RHR is capable of providing an adequate heat sink

d. Heat transfer coupling has been lost between the RCS and the SGs

Answer:

b. Feed flow has been reduced by operator action

Question: 52

ALB-15-1-3, Protection System A/B Trouble, has alarmed.

Local indications are as follows:

	Train A	Train B
General Warning Light	On	Off
#1 48-V DC Power Supply	On	On
#1 15-V DC Power Supply	On	On
#2 48-V DC Power Supply	Off	On
#2 15-V DC Power Supply	Off	On
Trip Bypass Breaker	Racked Out/Open	Racked Out/Open

These conditions would be caused by ...

a. a loss of instrument Channel SIII power supply.

b. a loss of instrument Channel SIV power supply.

c. a logic test switch being out of position inside an SSPS 'A' Train cabinet.

d. a logic test switch being out of position inside an SSPS 'B' Train cabinet.

Answer:

a. a loss of instrument Channel SIII power supply.

Question: 53

Given the following conditions:

- Reactor power is at 30% and stable.
- Control Bank 'D' rods are at 185 steps.
- RCS Tavg is 564 °F.
- All control systems are in automatic.
- TE-144, Letdown HX Outlet Temp, fails high.

Which of the following describes the expected response of RCS temperature and rod position?

	RCS TAVG	**BANK 'D' POSITION**
a.	Greater than 564 °F	Greater than 185 steps
b.	Greater than 564 °F	Less than 185 steps
c.	Less than 564 °F	Greater than 185 steps
d.	Less than 564 °F	Less than 185 steps

Answer:

b.	Greater than 564 °F	Less than 185 steps

Question: 54

A large break LOCA has occurred and PATH-1 is being performed.

The following have been reset:

- Safety Injection
- Phase A Isolation
- Phase B Isolation

The RWST level subsequently decreases to the Low-Low level setpoint.

Which of the following describes the response of the RHR Pump and the Containment Spray Pump Suction Valves?

	RHR CONTAINMENT SUMP SUCTION VALVES	**RWST TO RHR SUCTION VALVES**	**CONTAINMENT SPRAY CONTAINMENT SUMP SUCTION VALVES**	**RWST TO CONTAINMENT SPRAY SUCTION VALVES**
a.	Must be manually opened	Must be manually closed	Automatically open	Must be manually closed
b.	Automatically open	Automatically close	Automatically open	Must be manually closed
c.	Automatically open	Must be manually closed	Must be manually opened	Must be manually closed
d.	Automatically open	Must be manually closed	Automatically open	Automatically close

Answer:

d.	Automatically open	Must be manually closed	Automatically open	Automatically close

Question: 55

How is the clearance preparer notified of a Temporary Modification which affects an item being placed under clearance?

a. The standard clearances in PTR are updated with Temporary Modification information

b. The 400 screen of EDBS for each component affected lists the applicable Temporary Modifications

c. The Category A drawings are annotated with the ESR number of the applicable Temporary Modifications

d. During the schedule review, the responsible engineer notifies the WCC of any Temporary Modifications which may affect clearances needed for the current schedule

Answer:

c. The Category A drawings are annotated with the ESR number of the applicable Temporary Modifications

Question: 56

What are the normal and alternate power supplies to PIC-17?

	Normal	Alternate
a.	UPS Instrument Bus IDP-1A-S1	Appendix R Inverter
b.	UPS Instrument Bus IDP-1A-S1	UPP-1
c.	Appendix R Inverter	UPS Instrument Bus IDP-1A-S1
d.	Appendix R Inverter	UPP-1

Answer:

a.	UPS Instrument Bus IDP-1A-S1	Appendix R Inverter

Question: 57

Given the following conditions:

- A rapid shutdown is required per GP-006.
- It is estimated that 1300 gallons of boric acid will be required to complete the shutdown, but the actual required volume has **NOT** yet been calculated.

The actual required volume must be calculated prior to ...

a. commencing the boration.

b. borating > 500 gallons.

c. borating > 650 gallons.

d. reducing turbine load.

Answer:

b. borating > 500 gallons.

Question: 58

Given the following conditions:

- The AutoLog is **NOT** functioning.
- The Reactor Operator is maintaining a manual log.

The following log entries have been made:

- 0956 B-SB CSIP trip
- 1005 Started A-SA CSIP per AOP-018
- 1011 Established normal letdown

At 1030, the Reactor Operator realizes he forgot to make a 0957 entry that letdown had been isolated.

Which of the following entries would be a proper entry in accordance with OMM-016, Operator Logs?

a. *1030 Isolated normal letdown

b. L.E. 1030 Isolated normal letdown

c. *0957 Isolated normal letdown

d. L.E. 0957 Isolated normal letdown

Answer:

d. L.E. 0957 Isolated normal letdown

Question: 59

Both Condensate Pumps, both Condensate Booster Pumps (CBPs), and the 'A' Main Feed Pump (MFP) are running.

Which of the following will cause an automatic start of the 'B' MFP?

a. 'A' MFP trips on low lube oil pressure

b. 'A' MFP trips on low discharge pressure

c. A' MFP trips on low flow

d. 'A' MFP control switch is taken to the STOP position

Answer:

a. 'A' MFP trips on low lube oil pressure

Question: 60

Given the following conditions:

- The plant was at 100% power when a Main Steam Line break occurred outside containment.
- 'A' SG is indicating 400 psig.
- Containment pressure is -0.27 inches water gauge.

Which of the following Containment Ventilation fans will be operating?

a. Containment Pre-entry Purge Exhaust

b. Containment Pre-entry Purge Make-up

c. Normal Containment Purge Make-up

d. Airborne Radioactivity Removal

Answer:

d. Airborne Radioactivity Removal

Question: 61

Given the following conditions:

- At 1315, the Reactor Operator must leave the Control Room for a short period of time.
- All requirements for this short term relief have been conducted
- An entry has been made into OMM-002, Attachment 14, Documentation of Short Term Assumption of Duties.

An entry must also be made in the Control Operators Log if the relieved operator does **NOT** resume the watch by ...

a. 1330.

b. 1345.

c. 1415.

d. 1515.

Answer:

c. 1415.

Question: 62

Given the following conditions:

- A loss of off-site power has occurred.
- The plant is being cooled down and depressurized per EPP-005, Natural Circulation Cooldown.
- The RCS cooldown rate is 40 °F/hour.
- RVLIS Upper Range indication is 96% and lowering slowly.
- The S-SO has determined that RCS depressurization must continue.

Which of the following actions should be taken?

a. Continue in EPP-005, Natural Circulation Cooldown, AND maintain the cooldown rate <50 °F/hour

b. Initiate safety injection to collapse the vessel head voids

c. Transition to EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, AND continue the cooldown and depressurization

d. Transition to EPP-007, Natural Circulation Cooldown with Steam Void in Vessel without RVLIS, AND continue the cooldown and depressurization

Answer:

c. Transition to EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, AND continue the cooldown and depressurization

Question: 63

Given the following conditions:

- CP&L hired an employee on May 5th of this year.
- The employee's TEDE for this year prior to May 5th was 400 mRem.
- The employee's TEDE at SHNPP for this year is 1500 mRem.

Which of the following describes the **MAXIMUM ADDITIONAL** exposure allowed at CP&L facilities for this employee for the remainder of the year, without receiving an extension, **AND** what is the **LOWEST** level of authorization required if an extension is required during non-emergency conditions?

	MAXIMUM ADDITIONAL EXPOSURE W/OUT EXTENSION	**LOWEST LEVEL OF AUTHORIZATION FOR EXTENSION**
a.	100 mRem	E&RC Manager
b.	100 mRem	Site Vice President
c.	500 mRem	E&RC Manager
d.	500 mRem	Site Vice President

Answer:

d.	500 mRem	Site Vice President

Question: 64

Given the following conditions:

- The unit is operating at 20% power with all systems in automatic.
- Bank 'D' control rods are at 130 steps.
- Control Bank 'C' rod H6 drops to the bottom of the core.
- **NO** rod control urgent failure alarms occur.

Where will thermal power and RCS Tavg stabilize in response to the dropped rod **WITHOUT** any operator action?

a.
- Reactor thermal power will be lower than prior to the dropped rod
- RCS Tavg will be more than 5 °F lower than the temperature prior to the dropped rod

b.
- Reactor thermal power will be lower than prior to the dropped rod
- RCS Tavg will be within 1 °F of the temperature prior to the dropped rod

c.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be within 1 °F of the temperature prior to the dropped rod

d.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be more than 5 °F lower than the temperature prior to the dropped rod

Answer:

c.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be within 1 °F of the temperature prior to the dropped rod

Question: 65

Which of the following identifies when the Diesel and Motor Fire Pumps will start on lowering Fire Header pressure?

	MOTOR FIRE PUMP	**DIESEL FIRE PUMP**
a.	93 psig	83 psig
b.	83 psig	93 psig
c.	93 psig	105 psig
d.	105 psig	83 psig

Answer:

a.	93 psig	83 psig

Question: 66

Given the following conditions:

- The plant is at 100% power.
- One minute ago, the normal feeder breaker to 6.9kV bus 1A-SA (BKR 105) tripped open.
- The 1A-SA EDG failed to start.

Which of the following actions is required?

a. Start 1B-SB MDAFW Pump to supply the SGs

b. Manually start RHR pump 1A-SA in Load Block 9

c. Open all load breakers on 6.9kV bus 1A-SA

d. Place the 1A-SA EDG Emergency Stop switch to EMER STOP

Answer:

d. Place the 1A-SA EDG Emergency Stop switch to EMER STOP

Question: 67

Given the following conditions:

- The plant is at 100% power.
- 1A and 1B ESW Pumps are off.
- 'A' and 'B' ESW headers are being supplied from NSW.
- 1A NSW Pump is running.
- 1B NSW Pump is off.

Subsequently, the following events occur:

- A breaker failure results in a loss of power to 1A-SA.
- The 'A' EDG starts, re-energizes the bus, and sequences the loads properly.

Which of the following describes how the ESW alignment is affected?

	'A' TRAIN ESW HEADER SUPPLY	**'B' TRAIN ESW HEADER SUPPLY**
a.	1A ESW Pump	1B ESW Pump
b.	1A ESW Pump	1A NSW Pump
c.	1A NSW Pump	1B ESW Pump
d.	1A NSW Pump	1A NSW Pump

Answer:

b.	1A ESW Pump	1A NSW Pump

Question: 68

During FRP-C.1, Response to Inadequate Core Cooling, the steam generators are depressurized to 90 psig.

Which of the following is the basis for stopping at 90 psig?

a. To prevent N2 injection into the RCS from the Cold Leg Accumulators

b. To maintain gases in solution while low head SI recovers core cooling

c. To ensure the SG U-Tubes remain covered

d. To maintain adequate pressure for running any available RCPs

Answer:

a. To prevent N2 injection into the RCS from the Cold Leg Accumulators

Question: 69

The plant is operating at 100% power with the following conditions:

Time	Ambient Temp	CT Basin Temp
1200	40 °F	64 °F
1600	30 °F	60 °F
2000	25 °F	55 °F

Which of the following describes the correct CT Deicing Gate Valve alignment for these conditions?

	1600	**2000**
a.	Full Open	Full Open
b.	Full Open	Half Open
c.	Half Open	Full Open
d.	Half Open	Half Open

Answer:

b.	Full Open	Half Open

Question: 70

Reactor power is being increased and is at 37%.

All indications for 1A and 1C RCPs are normal.

Given the following conditions for 1B RCP:

- ALB-008-4-3, RCP 'B' SEAL #1 LEAKOFF HIGH/LOW FLOW, alarms.
- #1 seal leakoff flow has increased to 6.8 gpm.
- Shaft vibration levels are 6 mils and increasing at 0.4 mil/hr.
- Frame vibration levels are 2.1 mils and increasing at 0.3 mil/hr.
- Motor upper radial bearing temperature is 172 °F and stable.
- Motor lower radial bearing temperature is 176 °F and stable.
- Motor upper thrust bearing temperature is 168 °F and stable.
- Motor lower thrust bearing temperature is 178 °F and stable.
- Pump radial bearing temperature is 193 °F and increasing slowly.
- Seal inlet water temperature is 198 °F and increasing slowly.
- Pump bearing water temperature is 158 °F and increasing slowly.
- Motor stator winding temperature is 310 °F and increasing slowly.

Which of the following actions should be taken, in accordance with AOP-018?

a. Trip the reactor and trip 1B RCP immediately

b. Trip 1B RCP immediately and perform a plant shutdown

c. Be in Hot Standby within 6 hours, then stop 1B RCP

d. Trip 1B RCP within 10 minutes and perform a plant shutdown

Answer:

b. Trip 1B RCP immediately and perform a plant shutdown

Question: 71

Given the following conditions:

- The plant is in Mode 3.
- ALB 5-6-1, CCW SURGE TANK HIGH-LOW LEVEL, alarms.
- ALB 10-4-5, RAD MONITOR SYSTEM TROUBLE, alarms.
- ALB 5-1-2A, RCP THERM BAR HDR HIGH FLOW, alarms.
- ALB 5-2-2B, RCP THERM BAR HDR HIGH TEMP, alarms.
- CCW RAD monitor alarm on RM-11 console, alarms.
- CCW surge tank level is increasing.

Which of the following actions should have automatically occurred?

a. 1CC-251, CCW From RCP Thermal Barrier Coolers, CLOSES

b. CCW Holdup Tank Transfer Pump, STARTS

c. CCW Drain Tank Transfer Pump, STARTS

d. 1CC-252, RCP Thermal Barriers Flow Control, CLOSES

Answer:

d. 1CC-252, RCP Thermal Barriers Flow Control, CLOSES

Question: 72

Given the following conditions:

- The plant is in Mode 3.
- 1A-SA CCW Pump is running.
- 1B-SB CCW Pump is in standby.
- A leak occurs, causing a low pressure condition in the CCW system.

Which of the following describes the response of the CCW system?

	A' TRAIN CCW HEADER SUPPLY	**NON-ESSENTIAL HEADER**
a.	1A-SA Pump **ONLY**	Isolated
b.	1A-SA Pump **ONLY**	**NOT** Isolated
c.	1A-SA **AND** 1B-SB Pumps	Isolated
d.	1A-SA **AND** 1B-SB Pumps	**NOT** Isolated

Answer:

d.	1A-SA **AND** 1B-SB Pumps	**NOT** Isolated

Question: 73

Given the following conditions:

- The unit is in a Refueling Outage.
- A spent fuel assembly is attached to the manipulator crane.
- A failure of the Reactor Vessel permanent cavity seal ring causes cavity level to drop approximately 3" every minute.
- Non-essential personnel have been evacuated from Containment.
- The Refueling Crew is in the process of placing the assembly in the Reactor Vessel when a Loss of Off-Site Power occurs.

Refueling Crew members are immediately evacuated from Containment because there are **NO** means for ...

a. making up to the cavity.

b. monitoring radiological levels inside Containment.

c. placing the fuel assembly in the vessel.

d. providing ventilation to Containment.

Answer:

c. placing the fuel assembly in the vessel.

Question: 74

Given the following conditions:

- A Loss of Off-Site Power has occurred.
- EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, is being performed.
- RVLIS indicates that voids exist in the upper head of the vessel.
- An hour later, Off-Site power is restored.
- Conditions are being established to start an RCP.

Prior to starting the RCP, pressurizer level must be ...

a. increased to accommodate the expected outsurge when the voids in the head are collapsed.

b. decreased to accommodate the expected insurge when the RCS heats up.

c. increased to accommodate the expected outsurge when the RCS cools down.

d. decreased to accommodate the expected insurge when PRZ spray flow lowers pressure.

Answer:

a. increased to accommodate the expected outsurge when the voids in the head are collapsed.

Question: 75

Which of the following describes the automatic actions performed by the AMSAC system **AND** the basis for each action?

a.
- Reactor is tripped to remove the heat source
- Turbine is tripped to preserve SG inventory

b.
- Reactor is tripped to remove the heat source
- AFW is initiated in anticipation of a loss of SG inventory

c.
- Turbine is tripped to preserve SG inventory
- AFW is initiated in anticipation of a loss of SG inventory

d.
- Turbine is tripped to establish a Tave-Tref deviation to force auto rod insertion
- AFW is initiated in anticipation of a loss of SG inventory

Answer:

c.
- Turbine is tripped to preserve SG inventory
- AFW is initiated in anticipation of a loss of SG inventory

Question: 76

Given the following conditions:

- The plant is at 80% power.
- A dropped rod in Group 2 of Control Bank 'D' has occurred.
- A recovery of the dropped rod has begun.
- The ROD CONTROL URGENT ALARM (ALB-013-7-1) has just alarmed.

The power cabinet causing the urgent alarm is ...

a. 1AC.

b. 2AC

c. 1BD.

d. 2BD.

Answer:

c. 1BD.

Question: 77

Given the following conditions:

- A plant cooldown is being performed per GP-007.
- RCPs 'A' and 'C' are running.
- RCS temperature is 170 °F.
- RCS pressure is 180 psig.
- VCT pressure is 30 psig.

Which of the following describes when the operating RCPs are to be stopped?

	A' RCP	C' RCP
a.	When the RCS is < 160 °F	Immediately
b.	Immediately	Immediately
c.	When the RCS is < 160 psig	Immediately
d.	When the RCS is < 160 °F	When the RCS is < 160 °F

Answer:

b.	Immediately	Immediately

Question: 78

Which of the following conditions would be considered a loss of Containment Integrity?

a. Failure of the inner door on the emergency air lock to seal with the plant in Mode 6 during core alterations

b. Failure of 1SP-948, RCS Sample, to open when given an OPEN signal with the plant in Mode 3

c. Equipment hatch **NOT** closed and sealed with the plant in Mode 5

d. Locking device on 1SA-80, Service Air Supply, is discovered missing with the plant in Mode 4

Answer:

d. Locking device on 1SA-80, Service Air Supply, is discovered missing with the plant in Mode 4

Question: 79

Given the following conditions:

- A LOCA has occurred inside Containment.
- Containment pressure is 5.5 psig.
- RCS Wide Range Pressure indications are:

(BLACK BEZELED INSTRUMENTS)
PI-440 = 1060 psig
PI-441 = 1040 psig
(YELLOW BEZELED INSTRUMENTS)
PI-402 = 980 psig
PI-403 = failed low
PI-402A = 700 psig

RCS pressure should be reported as ...

a. 700 psig.

b. 980 psig.

c. 1040 psig.

d. 1060 psig.

Answer:

b. 980 psig.

Question: 80

Given the following conditions:

- A reactor trip and safety injection has occurred.
- A transition has been made to FRP-H.1, Response to Loss of Secondary Heat Sink.
- The Condensate Storage Tank (CST) has emptied due to a rupture.

Which of the following will result in the Emergency Service Water System (ESW) supplying suction to the Auxiliary Feedwater (AFW) Pump?

a. Manual operator action when the CST drops below 10% level

b. Automatic alignment when the CST drops below 10% level

c. Manual operator action when AFW suction pressure drops below 14 psig

d. Automatic alignment when AFW suction pressure drops below 14 psig

Answer:

a. Manual operator action when the CST drops below 10% level

Question: 81

Given the following conditions:

- A reactor trip with SI has occurred.
- The immediate action steps, ECCS flow verifications, and AFW flow verifications are performed.
- SG levels are < 10% and the required AFW flow **CANNOT** be established.
- FRP-H.1, Response to Loss of Secondary Heat Sink, is entered.
- RCS pressure is checked and determined to be less than intact SG pressure.

Which of the following describes the plant conditions?

a. A large break LOCA is in progress **AND** a secondary heat sink is required

b. A large break LOCA is in progress **AND** a secondary heat sink is **NOT** required

c. A small break LOCA is in progress **AND** a secondary heat sink is required

d. A small break LOCA is in progress **AND** a secondary heat sink is **NOT** required

Answer:

b. A large break LOCA is in progress **AND** a secondary heat sink is **NOT** required

Question: 82

If the suction pipe from the 'B' Spent Fuel Pool to the Spent Fuel Pool Cooling Pump completely severed, level in the Spent Fuel Pool would decrease ...

a. to 18 feet above the fuel assemblies before the Emergency Makeup would automatically start.

b. to 18 feet above the fuel assemblies and stabilize without any automatic action.

c. to 12 feet above the fuel assemblies before the Emergency Makeup would automatically start.

d. to 12 feet above the fuel assemblies and stabilize without any automatic action.

Answer:

b. to 18 feet above the fuel assemblies and stabilize without any automatic action.

Question: 83

Given the following conditions:

- The plant is solid in Mode 5 with one (1) RCP in operation.
- RHR Pump A-SA is providing letdown flow with PK-145.1, LTDN PRESSURE 1CS-38, in **MAN**.
- CSIP A-SA is providing RCS makeup and seal injection.

If instrument air is lost to 1CS-38 (PCV-145), the operator should ...

a. trip CSIP A-SA.

b. trip RHR Pump A-SA.

c. control letdown flow using HC-142.1, RHR Letdown 1CS-28.

d. open one PRZ PORV.

Answer:

a. trip CSIP A-SA.

Question: 84

RCS temperature is 220 °F.

Which of the following sets of conditions is the **MINIMUM** required to meet the Technical Specification requirements for DC Electrical Sources?

	125 VDC BATTERIES		BATTERY CHARGERS			
	1A-SA	**1B-SB**	**1A-SA**	**1B-SA**	**1A-SB**	**1B-SB**
a.	Operable	Operable	Operable	Operable	Operable	Operable
b.	Operable	Operable	Operable	**NOT** Operable	**NOT** Operable	Operable
c.	Operable	**NOT** Operable	Operable	Operable	**NOT** Operable	**NOT** Operable
d.	**NOT** Operable	Operable	**NOT** Operable	Operable	Operable	Operable

Answer:

b.	Operable	Operable	Operable	**NOT** Operable	**NOT** Operable	Operable

Question: 85

Given the following conditions:

- A liquid waste discharge from a Treated Laundry and Hot Shower (TL&HS) Tank is in progress.
- REM-1WL-3540, Treated Laundry and Hot Shower Tank Pump Discharge Monitor, goes into high alarm.

Which of the following terminates the discharge?

a. The running TL&HS Tank Pump will automatically trip.

b. An operator must take manual action to shut the TL&HS Tank Pump Discharge Isolation Valve.

c. The running TL&HS Tank Pump Recirc Valve will automatically open.

d. The TL&HS Tank Pump Discharge Isolation Valve will automatically close.

Answer:

d. The TL&HS Tank Pump Discharge Isolation Valve will automatically close.

Question: 86

The unit is in Mode 3 with the reactor trip breakers closed.

If 125 VDC Bus 1A-SA deenergizes due to a fault on the bus ...

a. Train SA reactor trip breaker will open due to an undervoltage (UV) trip.

b. Train SA reactor trip breaker will open due to a shunt trip.

c. an undervoltage (UV) trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

d. a shunt trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

Answer:

d. a shunt trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

Question: 87

Given the following conditions:

- The plant experiences a reactor trip and SI from 100% power.
- **ONLY** one train of SI has actuated.
- Four Containment Fan Cooler fans are running in fast on one train.
- Two Containment Fan Cooler fans are running in slow on the other train.

Which of the following is the Containment Fan Cooler fan alignment following operator action in response to this situation?

a. Four fans running in slow

b. Four fans running in fast

c. Eight fans running in fast

d. Eight fans running in slow

Answer:

a. Four fans running in slow

Question: 88

Given the following conditions:

- A recovery from an SGTR on the 1B SG is being performed using the backfill method.
- ERFIS in **NOT** available.
- **NO** RCPs are running.
- RCS pressure channels read:
  PI-402 = 600 psig
  PI-403 = 620 psig
  PI-402A = 650 psig
- Thot channels read:
  TI-413 = 420 °F
  TI-423 = 480 °F
  TI-433 = 415 °F
- The five hottest ICCM TCs read:
  490 °F
  486 °F
  459 °F
  430 °F
  425 °F

Which of the following identifies the amount of subcooling present?

a. 8 °F

b. 18 °F

c. 30 °F

d. 40 °F

Answer:

a. 8 °F

Question: 89

Given the following conditions:

- ALB-13-6-2, RPI NON-URGENT ALARM, alarms.
- The General Warning LED for Control Rod H2 is flashing.
- The Data B Failure 1, 2, 3 LEDs are flashing.
- The position LED for Control Rod H2 at Step 48 is LIT.

Which of the following describes the **MINIMUM** and **MAXIMUM** known positions of Control Rod H2?

	MINIMUM POSITION	**MAXIMUM POSITION**
a.	38 Steps	52 Steps
b.	44 Steps	52 Steps
c.	38 Steps	58 Steps
d.	44 Steps	58 Steps

Answer:

a.	38 Steps	52 Steps

Question: 90

Which of the following describes the effect a Containment Phase A isolation will have on RCP seal leakoff?

a. No. 1 seal leakoff will discharge to the PRT via a relief valve

b. No. 1 seal leakoff will discharge to the RCDT via a relief valve

c. All No. 1 seal leakoff will be directed through the No. 2 seal and then to the PRT

d. All No. 1 seal leakoff will be directed through the No. 2 seal and then to the RCDT

Answer:

a. No. 1 seal leakoff will discharge to the PRT via a relief valve

Question: 91

During the performance of PATH-1, the crew must determine if RCS temperature is "stable at or trending to 557 °F."

Which of the following describes the temperature to be used when RCPs are running AND when RCPs are off?

	RCPs ON	**RCPs OFF**
a.	T-avg	Cold Leg Temps
b.	T-avg	Hot Leg Temps
c.	Incore TCs	Cold Leg Temps
d.	Incore TCs	Hot Leg Temps

Answer:

a.	T-avg	Cold Leg Temps

Question: 92

Given the following conditions:

- A reactor trip occurred due to a loss of offsite power.
- The plant is being cooled down on RHR per EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS.
- RVLIS upper range indicates greater than 100%.
- Three CRDM fans have been running during the entire cooldown.
- RCS cold leg temperatures are 190 °F.
- Steam generator pressures are 50 psig.

Steam should be dumped from all SGs to ensure ...

a. boron concentration is equalized throughout the RCS prior to taking a sample to verify cold shutdown boron conditions.

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

c. RCS and SG temperatures are equalized prior to any subsequent RCP restart.

d. RCS temperatures do **NOT** increase during the required 29-hour vessel soak period.

Answer:

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

Question: 93

Given the following conditions:

- A Loss of Off-Site Power has occurred.
- ALB-17-5-5, CONDENSATE STORAGE TANK LOW MINIMUM LEVEL, alarms (65%).

Which of the following describes the significance of this alarm?

a. CST level is nearing the level where it will be inadequate to maintain the required suction pressure to the TDAFW pump

b. Manual swap to the backup source Emergency Service Water System should be initiated

c. Normal Condenser Makeup System must be manually isolated to prevent drain down of the CST

d. CST level is nearing the level where it will be inadequate to maintain hot standby for 12 hours

Answer:

d. CST level is nearing the level where it will be inadequate to maintain hot standby for 12 hours

Question: 94

Given the following conditions:

- RCS temperature is 300 °F.
- The Low Temperature Overpressure Protection system (LTOP) is armed.
- PT-441, RCS Wide Range Pressure, has failed low.

Which of the following describes the effect on LTOP?

a. **ONLY** PRZ PORV PCV-445A is available for LTOP

b. Both PRZ PORVs are available for LTOP

c. Neither PRZ PORV is available for LTOP

d. **ONLY** PRZ PORV PCV-444B is available for LTOP

Answer:

a. **ONLY** PRZ PORV PCV-445A is available for LTOP

Question: 95

Given the following conditions:

- Reactor power is at 70%.
- Rod Control is in AUTO.
- Bank 'D' control rods are at 195 steps.
- Loop 1 Tavg is 576 °F.
- Loop 2 Tavg is 574 °F.
- Loop 3 Tavg is 572 °F.

Which of the following failures will cause control rods to step out?

a. Loop 1 Thot fails high

b. Loop 3 Thot fails low

c. Loop 2 Tcold fails high

d. Loop 2 Tcold fails low

Answer:

d. Loop 2 Tcold fails low

Question: 96

Given the following conditions:

- A reactor trip has occurred due to a SG low-low level trip.
- RCS temperature has stabilized at no-load Tavg.

Which of the following describes the expected condition of the Feedwater System when directed to check the status?

	Main Feed Pumps	**Main Feed Reg Valves**	**Feed Isolation Valves**
a.	Tripped	Closed	Closed
b.	Tripped	Closed	Open
c.	Running	Open	Closed
d.	Running	Closed	Closed

Answer:

d.	Running	Closed	Closed

Question: 97

Which of the following air compressors would be available during a Loss of Off-Site Power?

a. A and B **ONLY**

b. A and C **ONLY**

c. B and C **ONLY**

d. A, B and C

Answer:

a. A and B **ONLY**

Question: 98

Given the following conditions:

- The plant is operating at 40% power.
- AOP-005, Radiation Monitoring System, has been entered.
- A high (red) alarm on REM-1WC-3544, WPB CCW HX Inlet Monitor, has just been received.

As a result of the high radiation alarm, which of the following will automatically occur?

a. 1CC-252, RCP Thermal Barrier Flow Control Valve, CLOSES

b. 3WC-4, WPB CCW Surge Tank Overflow Valve, CLOSES

c. 1CC-304, CCW to Gross Failed Fuel Detector, OPENS

d. 3WC-7, WPB CCW Surge Tank Drain Valve, OPENS

Answer:

b. 3WC-4, WPB CCW Surge Tank Overflow Valve, CLOSES

Question: 99

Given the following conditions:

- The plant has tripped from 100% power due to a trip of 'B' RCP.
- 'A' and 'C' RCPs are running.

Which of the following is the expected RVLIS Dynamic Head indication?

a. 36%

b. 41%

c. 63%

d. 100%

Answer:

c. 63%

Question: 100

Given the following conditions:

- A reactor shutdown is in progress.
- Intermediate Range Channel N-35 compensating voltage is set too low.
- Intermediate Range Channel N-36 compensating voltage is set correctly.

Which of the following describes the effect of N-35 being undercompensated?

a.
- Source Range Channel N-31 will automatically re-energize prematurely
- Source Range Channel N-32 will automatically re-energize at the correct power level

b.
- Both Source Range Channels N-31 and N-32 will automatically re-energize prematurely

c.
- Source Range Channel N-31 must be manually re-energized
- Source Range Channel N-32 will automatically re-energize at the correct power level

d.
- Both Source Range Channels N-31 and N-32 must be manually re-energized

Answer:

d.
- Both Source Range Channels N-31 and N-32 must be manually re-energized

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information	
Name: **ANSWER KEY**	Region: **II**
Date:	Facility/Unit: **HARRIS**
License Level: **SRO**	Reactor Type: **WESTINGHOUSE**
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected ____ hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

____
Applicant's Signature

Results	
Examination Value	________ Points
Applicant's Score	________ Points
Applicant's Grade	________ Percent

ANSWER KEY

Question: 1

Given the following conditions:

- A Safety Injection has just occurred.
- Following the SI, leakage from the CCW system to the ESW system is suspected.

Which of the following sets of conditions would provide confirmation of this diagnosis in the **SHORTEST** period of time?

a. Decreasing CCW surge tank level **AND** ESW discharge radiation alarm

b. Automatic makeup to the CCW surge tank **AND** ESW discharge sample

c. Decreasing CCW surge tank level **AND** ESW discharge sample

d. Automatic makeup to the CCW surge tank **AND** ESW discharge radiation alarm

Answer:

c. Decreasing CCW surge tank level **AND** ESW discharge sample

Question: 2

Which of the following conditions would require that Attachment 2, "Cycle Log," of OMM-013, Cycle and Transient Monitoring Program, be completed?

a. During a reactor startup, a failed Source Range channel results in a Source Range High Flux Trip

b. With the plant at 100% power, a failed actuation relay results in Auxiliary Feedwater flow to the SGs

c. With the plant in Mode 3, a trip of Emergency Bus 1A-SA normal supply breaker 105 results in EDG 1A-SA starting automatically

d. With the plant at 100% power, a failed pressurizer level instrument results in normal letdown isolating

Answer:

b. With the plant at 100% power, a failed actuation relay results in Auxiliary Feedwater flow to the SGs

Question: 3

Which of the following indications are **BOTH** used by EPP-013, LOCA Outside Containment, to identify that the leak is isolated?

a. RCS pressure increasing **AND** RAB radiation decreasing

b. RCS pressure increasing **AND** Local observation

c. PRZ level increasing **AND** Local observation

d. PRZ level increasing **AND** RAB radiation decreasing

Answer:

b. RCS pressure increasing **AND** Local observation

Question: 4

Given the following conditions:

- Control Room Ventilation is in a normal lineup with 'A' Train fans in operation.
- Power is lost to the 'B' Train North Emergency Intake Radiation Monitor.

What is the response of the Control Room Ventilation System to this failure?

a. Remains in the normal alignment, but a subsequent Train 'A' radiation monitor reaching the high alarm will cause an isolation

b. Isolation occurs and **CANNOT** be reset

c. Isolation occurs, but can be reset

d. Remains in the normal alignment, but a subsequent Train 'B' radiation monitor reaching the high alarm will cause an isolation

Answer:

c. Isolation occurs, but can be reset

Question: 5

Given the following conditions:

- The plant is operating at 100% power with 'A' Train equipment in service.
- The 1B-SB emergency bus supply breaker (125) opens.

Which of the following is expected to occur?

a. The 1B-SB EDG will start and breaker 125 will reclose

b. Both sequencers will run and load equipment selected by the UV program

c. 1MS-72, MS 'C' to Aux FW Turbine, will open

d. The 'B' ESW Header will be supplied by the NSW System

Answer:

c. 1MS-72, MS 'C' to Aux FW Turbine, will open

Question: 6

Given the following conditions:

- Emergency Boration is required.
- 1CS-278, Emergency Boric Acid Addition, **CANNOT** be opened.

Which of the following alignments will provide adequate boric acid flow?

	1CS-283 **Boric Acid to Boric Acid Blender FCV-113A**	**1CS-156** **Makeup to CSIP Suction FCV-113B**	**1CS-155** **Makeup to VCT FCV-114A**	**1CS-291** **CSIP Suction from RWST LCV-115B**	**1CS-292** **CSIP Suction from RWST LCV-115D**	**1CS-165** **VCT Outlet LCV-115C**	**1CS-166** **VCT Outlet LCV-115E**
a.	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	CLOSED	OPEN
b.	OPEN	CLOSED	OPEN	CLOSED	CLOSED	OPEN	CLOSED
c.	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	OPEN	OPEN
d.	OPEN	CLOSED	CLOSED	OPEN	CLOSED	OPEN	CLOSED

Answer:

d.	OPEN	CLOSED	CLOSED	OPEN	CLOSED	OPEN	CLOSED

Question: 7

Given the following conditions:

- The plant is in Mode 5 on RHR cooling.
- A 170 gpm leak develops from the RCS.
- Letdown has been isolated.

Which of the following methods of makeup is to be used?

a. Normal Charging from VCT

b. Normal Charging from RWST

c. Opening SI Accumulator Isolation valves

d. CSIP flow through the BIT valves

Answer:

d. CSIP flow through the BIT valves

Question: 8

The generator is being taken off the line during a normal shutdown.

Which of the following describes the proper sequence for operation of the generator output breakers, 52-7 and 52-9?

a. Trip the turbine and verify the generator lockout opens both generator output breakers

b. Manually open one generator output breaker, trip the turbine, and manually open the second output breaker

c. Manually open both the generator output breakers, then trip the turbine

d. Manually open one generator output breaker, trip the turbine, and allow the generator lockout to open the second output breaker

Answer:

b. Manually open one generator output breaker, trip the turbine, and manually open the second output breaker

Question: 9

Which of the following is the most significant action the operator can take during a SGTR concurrent with a loss of off-site power to minimize the PTS challenge?

a. Maintain the RCS temperature at or below the required cooldown target temperature

b. Secure AFW flow to the affected SG once minimum required level is achieved

c. Ensure the affected SG does **NOT** become water solid

d. Terminate SI after meeting termination criteria

Answer:

d. Terminate SI after meeting termination criteria

Question: 10

Given the following conditions:

- A reactor trip and safety injection has occurred.
- Containment pressure is 4.5 psig.
- SI has **NOT** been reset.
- Phase A has **NOT** been reset.
- Phase B has **NOT** been reset.

Which of the following describes the conditions required to allow opening of the SG sample valves?

a. Containment pressure must be reduced below 3.0 psig before SI can be reset to allow opening the sample valves

b. SI can be reset to allow opening the sample valves

c. Containment pressure must be reduced below 3.0 psig before Phase A can be reset to allow opening the sample valves

d. Phase A can be reset to allow opening the sample valves

Answer:

b. SI can be reset to allow opening the sample valves

Question: 11

Given the following conditions:

- Condenser vacuum is 5.4 inches Hg and degrading.
- Turbine first stage pressure is 38% turbine load.
- Turbine load is being reduced.

Which of the following actions must be taken?

a. Continue reducing turbine load as necessary to maintain condenser vacuum

b. Trip the reactor and verify the turbine trips

c. Trip the turbine and verify the reactor trips

d. Trip the turbine and verify the plant stabilizes on the steam dumps

Answer:

b. Trip the reactor and verify the turbine trips

Question: 12

Given the following conditions:

- The plant is operating at 100% power.
- Bank 'C' control rod D12 DRPI is indicating 206 steps
- Bank 'C' Step Counters are indicating 228 steps

When comparing incore thermocouple positions to determine if the rod is actually out of position, which of the following thermocouples should be compared?

a. Compare incore thermocouple C12 to the average of incore thermocouples C08, D03, D05, and H13

b. Compare incore thermocouple C12 to the average of incore thermocouples F09, F11, F13, H11, and H13

c. Compare incore thermocouple E12 to the average of incore thermocouples E08, E10, E14, and G15

d. Compare incore thermocouple E12 to the average of incore thermocouples D05, E04, L12, and M11

Answer:

d. Compare incore thermocouple E12 to the average of incore thermocouples D05, E04, L12, and M11

Question: 13

Which of the following sets of conditions would **NOT** permit waiving the Independent Verification requirement for a clearance removal?

	EXPECTED DOSE	AREA TEMPERATURE
a.	12 mRem	105°F
b.	9 mRem	115°F
c.	6 mRem	125°F
d.	3 mRem	135°F

Answer:

b.	9 mRem	115°F

Question: 14

Given the following conditions:

- The RCS is solid.
- 'B' RCP is running.
- Both trains of RHR cooling are in service.
- The RCS is at 300 psig and 160 °F

Which of the following describes the **INITIAL** effect of each of the following events on RCS pressure?

	HCV-142 (RHR to letdown) fails SHUT	**FCV-122 (charging flow control) fails OPEN**
a.	Increase	Increase
b.	Increase	Decrease
c.	Decrease	Increase
d.	Decrease	Decrease

Answer:

a.	Increase	Increase

Question: 15

With the plant at 100 percent steady-state condition, the following occurs:

- ALB-07-4-3, VCT HIGH-LOW LEVEL, alarms.
- ALB-06-7-3, TOTAL MAKEUP WATER FLOW DEVIATION, alarms.
- ALB-06-8-4, BORIC ACID FLOW DEVIATION, alarms.
- VCT level is at 14.5% and decreasing at the same rate it has been for the last few days.

Which of the following procedures should be addressed?

a. AOP-002, Emergency Boration

b. AOP-003, Malfunction of Reactor Makeup Control

c. AOP-016, Excessive Primary Plant Leakage

d. AOP-017, Loss of Instrument Air

Answer:

b. AOP-003, Malfunction of Reactor Makeup Control

Question: 16

Given the following conditions:

- A reactor shutdown is being performed.
- Source Range Channel N-31 is known to be failed high due to a detector problem.

Which of the following SR channel N-31 configurations will permit a continued normal shutdown when the Intermediate Range NIs drop below the P-6 reset point?

	INSTRUMENT POWER FUSES	**CONTROL POWER FUSES**	**LEVEL TRIP SWITCH POSITION**
a.	Removed	Installed	Bypass
b.	Installed	Removed	Bypass
c.	Removed	Installed	Normal
d.	Installed	Removed	Normal

Answer:

a.	Removed	Installed	Bypass

Question: 17

Given the following conditions:

- FRP-S.1, Response to Nuclear Power Generation/ATWS, is being implemented.
- An SI actuation has occurred.
- The Foldout page is applicable.

Which of the following actions should be taken?

a. Continue with FRP-S.1 while verifying proper operation of safeguard equipment

b. Continue with FRP-S.1 until the reactor is tripped or made subcritical, then immediately exit to PATH-1

c. Transition to PATH-1 and verify all automatic actions required for an SI have occurred, then return to FRP-S.1 only when directed by PATH-1

d. Reset SI and FW isolation as soon as possible to restore feed flow to the steam generators, then continue with FRP-S.1

Answer:

a. Continue with FRP-S.1 while verifying proper operation of safeguard equipment

Question: 18

Given the following conditions:

- The plant is operating at 100% power.
- While investigating an alarm condition at 0600, the S-SO determines that EDG 1B-SB is inoperable.
- Engineering reports at 1030 that a test deficiency on RHR Pump 1A-SA causes the pump to be declared inoperable.

When is the **LATEST** time that RHR Pump 1A-SA must be returned to service before TS 3.0.3 must be entered?

a. 1030

b. 1130

c. 1430

d. 1630

Answer:

c. 1430

Question: 19

Given the following conditions:

- 1CS-235, Charging Line Isolation, was closed to establish a clearance boundary for maintenance on 1CS-238.
- 1CS-235 had to be manually torqued shut.
- 1CS-235 is a Limitorque SMB-00/SB-00 motor-operated valve.

Prior to declaring 1CS-235 operable after the clearance is removed, the valve must be ...

a. verified to have the torque switch calibrated correctly.

b. stroked with the control switch.

c. monitored for seat leakage.

d. manually stroked full open.

Answer:

b. stroked with the control switch.

Question: 20

Given the following conditions:

- AOP-036, Safe Shutdown Following a Major Fire, is being implemented.
- A safety injection occurs concurrently with a loss of off-site power.
- 1A-SA EDG starts and loads.
- 1B-SB EDG fails to start.

Which of the following actions should be taken?

a. Continue with AOP-036 while referencing EOP-PATH 1

b. Follow EOP-PATH 1 and continue with AOP-036 when directed to perform a plant cooldown

c. Continue with AOP-036 while referencing EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses

d. Follow EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses, and continue with AOP-036 when directed to perform a plant cooldown

Answer:

b. Follow EOP-PATH 1 and continue with AOP-036 when directed to perform a plant cooldown

Question: 21

Given the following conditions:

- A reactor trip and safety injection has occurred.
- ESW pump operation is being verified in PATH-1.
- Containment pressure is 7 psig.
- RCS pressure is 950 psig.
- SI Flow indicator FI-943, Normal HDR Flow, indicates 0 gpm.
- Both CSIPs are running and all SI valves are properly aligned.

Which of the following actions is to be taken?

a. Trip the RCPs immediately due to RCP Trip Criteria being met

b. Leave the RCPs running until a transition is made to Entry Point C

c. Leave the RCPs running until containment pressure reaches 10 psig

d. Trip the RCPs immediately due to a loss of CCW cooling to the pumps

Answer:

a. Trip the RCPs immediately due to RCP Trip Criteria being met

Question: 22

Given the following conditions:

- The plant is in Mode 5.
- ALB-08-1-4, RWMU STORAGE TANK MINIMUM/HIGH LEVEL, alarms.
- RWMU tank level is decreasing with **NO** VCT makeup in progress.

Which one of the following procedures would be the most appropriate to implement?

a. AOP-003, Malfunction of Reactor Makeup Control

b. AOP-008, Accidental Release of Liquid Waste

c. AOP-016, Excessive Primary Plant Leakage

d. AOP-020, Loss of Reactor Coolant Inventory / RHR While Shutdown

Answer:

b. AOP-008, Accidental Release of Liquid Waste

Question: 23

Given the following conditions:

- Fuel cladding failure has occurred.
- The CVCS Cation Bed demineralizer has been placed in service.

Which of the following **ALL** provide positive indications of the fuel cladding failure?

a.
- RCS boron decreasing
- Chemistry samples
- Volume Control Tank Room radiation monitor alarming

b.
- RCS boron decreasing
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

c.
- Chemistry samples
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

d.
- RCS boron decreasing
- Chemistry samples
- Gross Failed Fuel Detector alarming

Answer:

c.
- Chemistry samples
- Gross Failed Fuel Detector alarming
- Volume Control Tank Room radiation monitor alarming

Question: 24

Given the following conditions:

- The plant is at 30% power.
- A dropped control rod has just been re-aligned.
- While attempting to reset the Rod Control Urgent Failure alarm, the operator inadvertently operates the Rod Control Start Up switch.

Which of the following describes the effect of operating the incorrect switch?

a. All Control Bank control rods drop into the core, causing an automatic reactor trip

b. All rods, including Control Bank and Shutdown Bank rods, drop into the core, causing an automatic reactor trip

c. All rods remain in their current position and there is **NO** effect on the Rod Control System circuitry

d. All rods remain in their current position, but the Rod Control System circuitry senses all rods are fully inserted

Answer:

d. All rods remain in their current position, but the Rod Control System circuitry senses all rods are fully inserted

Question: 25

Given the following conditions:

- ALB-26-1-4, ANNUN SYS 1 POWER SUPPLY FAILURE, alarms.
- Investigation determines a 12 VDC (1C#1) power supply has failed.

Which of the following ALBs should be considered inoperable?

a. Containment Spray & Accumulator System

b. Chemical Volume Control System

c. Reactor First Out System

d. Auxiliary Feedwater System

Answer:

c. Reactor First Out System

Question: 26

Given the following conditions:

- Several Fuel Handling Building (FHB) area radiation monitors on both trains have reached the high alarm setpoint.
- AOP-005 has directed the operator to verify that the FHB ventilation has shifted to the emergency exhaust lineup.
- Both FHB Emergency Exhaust Fans, E-12 and E-13, are RUNNING.
- FHB Emergency Exhaust Fan Inlets, 1FV-2 SA and 1FV-4 SB, are OPEN

Which of the following additional alignments is expected?

a.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **OPEN**

b.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **RUNNING**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **OPEN**

c.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

d.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **RUNNING**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

Answer:

c.
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

Question: 27

Why do actions concerning CNMT spray operation contained in EPP-12, Loss of Emergency Coolant Recirculation, take precedence over the actions contained in FRP-J.1, Response to High Containment Pressure?

a. Actions required by EPPs always have priority over those in FRPs

b. CNMT spray is **NOT** used if the plant is in a recirculation mode

c. CNMT pressure should be too low to require CNMT spray

d. Conservation of RWST inventory has priority over containment pressure control

Answer:

d. Conservation of RWST inventory has priority over containment pressure control

Question: 28

Following a load reduction, Axial Flux Difference (AFD) is being verified.

Using the attached curve numbered F-10-2, which of the following combinations of power and AFD are outside the acceptable operating limits?

	POWER	AFD
a.	82%	-17
b.	77%	-21
c.	63%	-27
d.	56%	-30

Answer:

b.	77%	-21

Question: 29

Given the following conditions:

- The unit is operating at 50% power.
- LT-460, Channel III Pressurizer Level, has failed and all associated bistables are in the tripped condition.
- Power is subsequently lost to UPS Bus IDP-1A-SI.

Which train(s) of Reactor Protection will actuate, if any, resulting in a Reactor Trip?

a. Neither train

b. Train SA **ONLY**

c. Train SB **ONLY**

d. Both trains

Answer:

d. Both trains

Question: 30

Given the following conditions:

- Reactor power is 80% and stable.
- Tavg is stable.
- Pressurizer level is stable with the control system in AUTO.
- A small leak develops across the differential pressure bellows for the controlling channel of pressurizer level, resulting in pressure equalizing across the bellows.

How will this leak affect the operation of FCV-122, Charging Flow Control Valve?

a. It will throttle open slightly during the course of the pressure equalization and then return to its original position

b. It will throttle closed slightly during the course of the pressure equalization and then return to its original position

c. It will throttle open slightly during the course of the pressure equalization and remain in that position

d. It will throttle closed slightly during the course of the pressure equalization and remain in that position

Answer:

d. It will throttle closed slightly during the course of the pressure equalization and remain in that position

Question: 31

Which of the following describes the result if 1B Condensate Pump trips on motor overcurrent at 80% power?

	CONDENSATE BOOSTER PUMPS	**MAIN FEED PUMPS**
a.	1A and 1B Remain Running	1A and 1B Remain Running
b.	1B Trips	1B Trips
c.	1B Trips	1A and 1B Remain Running
d.	1A and 1B Remain Running	1B Trips

Answer:

b.	1B Trips	1B Trips

Question: 32

Given the following conditions:

- A Loss of Coolant Accident (LOCA) has occurred.
- Containment pressure is 2 psig.
- Containment hydrogen concentration is 3.5%.
- Containment temperature is 140 °F.
- Containment temperature prior to the accident was 90 °F.

Which one of the following is the required power setting for the 1A Hydrogen Recombiner?

a. 44.7 kW

b. 45.8 kW

c. 46.7 kW

d. 47.9 kW

Answer:

d. 47.9 kW

Question: 33

During operation at 100% power, an inadvertent SI occurs on 'B' Train **ONLY**.

Which of the following actions is required?

a. Manually actuate SI on 'A' Train

b. Continue in PATH-1 noting which 'A' Train ESF equipment is **NOT** running

c. Start ONLY the 'A' Train of ESF equipment for which the redundant 'B' Train equipment failed

d. Transition directly to EPP-008, SI Termination

Answer:

a. Manually actuate SI on 'A' Train

Question: 34

Given the following conditions:

- The plant is at 22% power during a shutdown.
- Intermediate Range Channel N-35 has been declared inoperable as a result of failing to meet Operational Test Criteria of MST-I0167.
- The test was performed, per GP-006, during a Tech Spec 3.0.3 required shutdown (i.e., the shutdown must continue).
- OWP-RP-21 has been performed, which places the LEVEL TRIP BYPASS switch in the BYPASS position and verifies the associated light on the Bypass Permissive Light Panel.
- The I&C Supervisor states that both control and instrument power must be removed from the drawer to replace a bistable module.

Assuming the instrument and control power are removed for the remainder of the shutdown, the shutdown continues and ...

a. the reactor trips when the fuses are removed.

b. the reactor trips when power is reduced below P-10.

c. the reactor trips when power is reduced below P-6.

d. **NO** reactor trip occurs.

Answer:

b. the reactor trips when power is reduced below P-10.

Question: 35

Given the following conditions:

- A reactor trip and safety injection has occurred.
- Instrument Bus SIII de-energizes, causing a loss of power to PT-2250A, AFW Pump A Suct Press.

Which of the following describes the effect of the loss of this instrument on MDAFW Pump 1A-SA?

	MDAFW PUMP 1A-SA ALREADY RUNNING	**MDAFW PUMP 1A-SA NOT RUNNING**
a.	Automatically Trips	Can Be Started
b.	Automatically Trips	**CANNOT** Be Started
c.	Remains Running	Can Be Started
d.	Remains Running	**CANNOT** Be Started

Answer:

c.	Remains Running	Can Be Started

Question: 36

Given the following conditions:

- A Loss of All AC Power has occurred.
- EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses, directs that SI be actuated and immediately reset.

Actuating SI and immediately resetting it is performed to ensure the ...

a. EDG will be capable of tripping on any trip signal when started.

b. SI valves will **NOT** automatically realign when power is restored.

c. CCW pumps do **NOT** automatically start when power is restored.

d. DC battery capacity is conserved until power is restored.

Answer:

b. SI valves will **NOT** automatically realign when power is restored.

Question: 37

The plant is in Mode 4. The following RCS leak rates are noted:

• Primary to secondary – SG 'A'	0.08 gpm
• Primary to secondary – SG 'B'	0.11 gpm
• Primary to secondary – SG 'C'	0.07 gpm
• Leakage by PRZ Safeties to PRT	5.40 gpm
• Leakage from RCS to RCDT	4.00 gpm
• Total leakage from RCS	10.30 gpm

Which of the following RCS Technical Specification leakage limits is being exceeded for this Mode?

a. Pressure Boundary Leakage

b. Unidentified Leakage

c. Primary to Secondary Leakage

d. Identified Leakage

Answer:

c. Primary to Secondary Leakage

Question: 38

Given the following conditions:

- A large break LOCA has occurred.
- During the performance of the EOPs, a transition has been made to EPP-012, Loss of Emergency Coolant Recirculation.

Conditions upon entry to EPP-012 are:

- RWST level at 68%.
- Three (3) Containment Fan Coolers operating in slow speed.
- Containment pressure at 14 psig.
- Containment wide range sump level < 100 inches.

Which of the following describes the Containment Spray (CS) System configuration required?

a. One CS Pump running, taking a suction off the Containment Sump

b. Both CS Pumps running, taking a suction off the Containment Sump

c. One CS Pump running, taking a suction off the RWST

d. Both CS Pumps running, taking a suction off the RWST

Answer:

c. One CS Pump running, taking a suction off the RWST

Question: 39

Given the following conditions:

- A loss of secondary heat sink has occurred and FRP-H.1, Response to Loss of Secondary Heat Sink, is being performed.
- Containment pressure is 0.5 psig.
- All RCPs are stopped.
- SG levels (WR) are all between 30% and 35% and decreasing slowly.
- Core exit thermocouple temperatures are stable.
- PRZ pressure is 2270 psig and increasing slowly.
- AFW is **NOT** available.
- The crew has just attempted to start the MFW Pumps, but neither Main Feedwater Pump can be started.

Which of the following actions should be taken to provide core cooling?

a. Depressurize the RCS to inject the CLAs

b. Depressurize at least one SG below CBP discharge pressure

c. Restart one RCP and establish an RCS vent path

d. Initiate SI flow and establish an RCS vent path

Answer:

b. Depressurize the SG below CBP discharge pressure

Question: 40

Given the following conditions:

- While at 100% power, a steam line break occurs.
- Safety injection actuates.
- The steam break is isolated per EPP-014, Faulted SG Isolation.

Which of the following describes the expected EOP flowpath used to stabilize and restore plant systems upon exiting EPP-014?

a. PATH-1, Entry Point C, then to EPP-008, SI Termination

b. PATH-1, Entry Point C, then to EPP-009, Post-LOCA Cooldown and Depressurization

c. Directly to EPP-008, SI Termination

d. Directly to EPP-009, Post-LOCA Cooldown and Depressurization

Answer:

a. PATH-1, Entry Point C, then to EPP-008, SI Termination

Question: 41

Following a steam break inside containment, the Containment Spray System actuated.

Containment pressure has been reduced to 2.5 psig. The following signals have been reset:

- Safety Injection
- Phase A
- Phase B
- Containment Spray

Several minutes after securing Containment Spray, containment pressure increases to 11 psig due to a subsequent large break LOCA.

Which of the following describes the expected response of the Containment Spray System?

	CS PUMPS	**CS DISCHARGE VALVES**
a.	Automatically Start	Automatically Open
b.	Automatically Start	Must be Manually Opened
c.	Must be Manually Started	Automatically Open
d.	Must be Manually Started	Must be Manually Opened

Answer:

a.	Automatically Start	Automatically Open

Question: 42

Given the following conditions:

- A load rejection has occurred, causing RCS pressure to increase.
- The PRZ Spray Valves and PRZ PORVs have opened.
- During the pressure transient, PRZ pressure transmitter PT-445 failed high.

Which of the following will occur?

a. PRZ PORVs 445A and 445B will close as PT-444 senses a lowering pressure; PRZ PORV 444B will close when RCS pressure drops below 2000 psig

b. All PRZ PORVs will remain open as PT-444 senses a lowering pressure and must be manually closed

c. PRZ PORVs 445A and 445B will close as PT-444 senses a lowering pressure; PRZ PORV 444B will remain open and must be manually closed

d. PRZ PORV 444B will close as PT-444 senses a lowering pressure; PRZ PORVs 445A and 445B will close when RCS pressure drops below 2000 psig

Answer:

d. PRZ PORV 444B will close as PT-444 senses a lowering pressure; PRZ PORVs 445A and 445B will close when RCS pressure drops below 2000 psig

Question: 43

Given the following conditions:

- Instrument Bus SI is de-energized.
- A reactor trip and safety injection occurs.

Which of the following describes the plant response AND required operator actions?

a.
- 'A' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'A' Train equipment

b.
- 'B' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'B' Train equipment

c.
- 'A' Train safeguards equipment will **NOT** automatically function
- 'A' Train equipment must be manually aligned/started **ONLY** if the corresponding 'B' Train equipment fails

d.
- 'B' Train safeguards equipment will **NOT** automatically function
- 'B' Train equipment must be manually aligned/started **ONLY** if the corresponding 'A' Train equipment fails

Answer:

a.
- 'A' Train safeguards equipment will **NOT** automatically function
- Manual action must be taken to properly align/start 'A' Train equipment

Question: 44

Given the following conditions:

- Reactor power is 8% during a plant startup.
- 1A Main Feed Pump is operating.
- The Main Feed Regulating Valves are in MAN and are throttled open.
- The Main Feed Regulating Bypass Valves are in AUTO and are throttled open.
- 'C' SG level rises to 85%.

Which of the following will occur?

a. 1A Main Feed Pump trips **AND** MFW is isolated to 'C' SG **ONLY**

b. 1A Main Feed Pump trips **AND** MFW is isolated to all SGs

c. 1A Main Feed Pump remains running **AND** MFW is isolated to 'C' SG **ONLY**

d. 1A Main Feed Pump remains running **AND** MFW is isolated to all SGs

Answer:

b. 1A Main Feed Pump trips **AND** MFW is isolated to all SGs

Question: 45

A high (red) alarm on the Containment Leak Detection Monitor particulate channel (3502A-SA) causes which of the following automatic isolations/trips to occur?

a.
- Containment Normal Purge
- Containment Pre-Entry Purge
- Containment Vacuum Relief

b.
- Containment Normal Purge **ONLY**

c.
- Containment Pre-Entry Purge **ONLY**

d.
- Containment Vacuum Relief **ONLY**

Answer:

b.
- Containment Normal Purge **ONLY**

Question: 46

Which of the following events would result in increasing radiation levels in the Plant Vent Stack?

a. Steam Generator Tube Rupture

b. Waste Gas Decay Tank Rupture

c. Fuel Handling Accident

d. Radioactive Spill in the Chemistry Hot Lab

Answer:

c. Fuel Handling Accident

Question: 47

Given the following conditions:

- The plant is operating at 22% power.
- PRZ pressure transmitter PT-444 has failed high.
- 1RC-107, PRZ Spray Valve 444C, has stuck open.

Which of the following actions is to be taken?

a. Stop 1A RCP and stabilize the plant at power

b. Trip the reactor and stop 1A RCP

c. Stop 1C RCP and stabilize the plant at power

d. Trip the reactor and stop 1C RCP

Answer:

a. Stop 1A RCP and stabilize the plant at power

Question: 48

Which of the following gives the parameters monitored for SI Reinitiation criteria on the EPP-009, Post LOCA Cooldown and Depressurization, foldout page?

a. RCS subcooling and RVLIS level

b. Pressurizer level and RCS pressure

c. RCS pressure and RVLIS level

d. RCS subcooling and pressurizer level

Answer:

d. RCS subcooling and pressurizer level

Question: 49

The plant was operating at 100% power when an accident occurred.

Assuming **NO** operator action is taken, a Main Steam Line Isolation Signal (MSIS) will be generated when ...

a. PRZ pressure drops below 1850 psig.

b. containment pressure rises to 2.0 psig.

c. steam line pressure drops below 601 psig.

d. steam line pressure drops faster than 100 psig/sec.

Answer:

c. steam line pressure drops below 601 psig.

Question: 50

Given the following conditions:

- Power is at 45% during a power increase following a short maintenance outage.
- Rod K-6 in Control Bank 'D' is determined to be inoperable due to a power cabinet malfunction.
- The rod, determined to be at 153 steps, is **NOT** capable of being moved, but is considered to be trippable.
- The crew realigns the remaining rods in Control Bank 'D' with the inoperable rod.

What is the maximum power level that can be achieved under these conditions while maintaining **ALL** associated alarms clear?

a. 45%

b. 50%

c. 75%

d. 80%

Answer:

c. 75%

Question: 51

Given the following conditions:

- The plant was operating at 100% power when an accident occurred.
- All feedwater is isolated to three faulted SGs IAW EPP-015, Uncontrolled Depressurization of All SGs.
- The STA reports a red path requirement for the heat sink CSF.

Which of the following describes why FRP-H.1, Response to Loss of Secondary Heat Sink, would **NOT** be used in this situation?

a. FRPs are implemented only after completion of PATH-1, entry Point C

b. Feed flow has been reduced by operator action

c. RHR is capable of providing an adequate heat sink

d. Heat transfer coupling has been lost between the RCS and the SGs

Answer:

b. Feed flow has been reduced by operator action

Question: 52

ALB-15-1-3, Protection System A/B Trouble, has alarmed.

Local indications are as follows:

	Train A	Train B
General Warning Light	On	Off
#1 48-V DC Power Supply	On	On
#1 15-V DC Power Supply	On	On
#2 48-V DC Power Supply	Off	On
#2 15-V DC Power Supply	Off	On
Trip Bypass Breaker	Racked Out/Open	Racked Out/Open

These conditions would be caused by ...

a. a loss of instrument Channel SIII power supply.

b. a loss of instrument Channel SIV power supply.

c. a logic test switch being out of position inside an SSPS 'A' Train cabinet.

d. a logic test switch being out of position inside an SSPS 'B' Train cabinet.

Answer:

a. a loss of instrument Channel SIII power supply.

Question: 53

Given the following conditions:

- Reactor power is at 30% and stable.
- Control Bank 'D' rods are at 185 steps.
- RCS Tavg is 564 °F.
- All control systems are in automatic.
- TE-144, Letdown HX Outlet Temp, fails high.

Which of the following describes the expected response of RCS temperature and rod position?

	RCS TAVG	BANK 'D' POSITION
a.	Greater than 564 °F	Greater than 185 steps
b.	Greater than 564 °F	Less than 185 steps
c.	Less than 564 °F	Greater than 185 steps
d.	Less than 564 °F	Less than 185 steps

Answer:

b.	Greater than 564 °F	Less than 185 steps

Question: 54

A large break LOCA has occurred and PATH-1 is being performed.

The following have been reset:

- Safety Injection
- Phase A Isolation
- Phase B Isolation

The RWST level subsequently decreases to the Low-Low level setpoint.

Which of the following describes the response of the RHR Pump and the Containment Spray Pump Suction Valves?

	RHR CONTAINMENT SUMP SUCTION VALVES	**RWST TO RHR SUCTION VALVES**	**CONTAINMENT SPRAY CONTAINMENT SUMP SUCTION VALVES**	**RWST TO CONTAINMENT SPRAY SUCTION VALVES**
a.	Must be manually opened	Must be manually closed	Automatically open	Must be manually closed
b.	Automatically open	Automatically close	Automatically open	Must be manually closed
c.	Automatically open	Must be manually closed	Must be manually opened	Must be manually closed
d.	Automatically open	Must be manually closed	Automatically open	Automatically close

Answer:

d.	Automatically open	Must be manually closed	Automatically open	Automatically close

Question: 55

How is the clearance preparer notified of a Temporary Modification which affects an item being placed under clearance?

a. The standard clearances in PTR are updated with Temporary Modification information

b. The 400 screen of EDBS for each component affected lists the applicable Temporary Modifications

c. The Category A drawings are annotated with the ESR number of the applicable Temporary Modifications

d. During the schedule review, the responsible engineer notifies the WCC of any Temporary Modifications which may affect clearances needed for the current schedule

Answer:

c. The Category A drawings are annotated with the ESR number of the applicable Temporary Modifications

Question: 56

Given the following conditions:

- Containment temperature is 124 °F.
- Containment hydrogen concentration is 2.2%.
- RCS pressure is 600 psig.
- FRP-I.3, Response to Voids in Reactor Vessel, is being implemented.

Which of the following identifies the **MAXIMUM** allowed Reactor Vessel head venting time?

a. 3.6 minutes

b. 5.6 minutes

c. 7.6 minutes

d. 9.6 minutes

Answer:

c. 7.6 minutes

Question: 57

Given the following conditions:

- The plant is in Mode 4.
- A work activity to increase the reliability of the Control Room Emergency Filtration System is being planned.
- With one of the filtration systems inoperable in Modes 1-4, the system must be returned to operable within 7 days.

Which of the following describes the required work schedule for this activity, assuming the plant is maintained in Mode 4?

a. Work during normal working hours until the activity is complete

b. Work during normal working hours until less than 50% of the allotted LCO time is remaining, and then work on a 24 hour/day schedule until the activity is complete

c. Work during normal working hours until less than 72 hours of the allotted LCO time is remaining, and then work on a 24 hour/day schedule until the activity is complete

d. Work on a 24 hour/day schedule until the activity is complete

Answer:

c. Work during normal working hours until less than 72 hours of the allotted LCO time is remaining, and then work on a 24 hour/day schedule until the activity is complete

Question: 58

Given the following conditions:

- A small break LOCA has occurred.
- The Unit-SCO has just been directed to implement FRPs.

The STA reports the following CSFST conditions:

- Heat Sink YELLOW
- Inventory YELLOW
- Subcriticality MAGENTA
- Containment MAGENTA
- Core Cooling RED
- Integrity RED

Which of the following procedures should be entered?

a. FRP-C.1, Response to Inadequate Core Cooling

b. FRP-J.1, Response to High Containment Pressure

c. FRP-P.1, Response to Imminent Pressurized Thermal Shock

d. FRP-S.1, Response to Nuclear Power Generation / ATWS

Answer:

a. FRP-C.1, Response to Inadequate Core Cooling

Question: 59

The Superintendent - Shift Operations has designated the following personnel to be on the Fire Brigade Team:

- Leader - Outside AO (licensed Reactor Operator)
- Member 2 - Turbine Building AO (non-licensed)
- Member 3 - HP Technician
- Member 4 - I&C Technician
- Member 5 - Mechanic

Which of the following describes the makeup of the team?

a. The team makeup is acceptable

b. The Team Leader must be replaced by a licensed Senior Reactor Operator

c. Member 2 must be replaced by a licensed Reactor Operator or Senior Reactor Operator

d. Member 3, 4, or 5 must be replaced by an operator

Answer:

d. Member 3, 4, or 5 must be replaced by an operator

Question: 60

Given the following conditions:

- Following a large break LOCA, PATH-1 is in progress.
- 1A-SA RHR pump is out of service due to a ground.
- 1B-SB RHR pump is running with 3000 gpm flow.
- 'B' Train of RHR has **NO** power to the valves powered from 'B' Train (fire in 1B21-SB).

Which of the following procedures should be implemented upon exiting PATH-1?

a. EPP-009, Post LOCA Cooldown and Depressurization

b. EPP-010, Transfer to Cold Leg Recirculation

c. EPP-011, Transfer to Hot Leg Recirculation

d. EPP-012, Loss of Emergency Coolant Recirculation

Answer:

d. EPP-012, Loss of Emergency Coolant Recirculation

Question: 61

Given the following conditions:

- At 1315, the Reactor Operator must leave the Control Room for a short period of time.
- All requirements for this short term relief have been conducted
- An entry has been made into OMM-002, Attachment 14, Documentation of Short Term Assumption of Duties.

An entry must also be made in the Control Operators Log if the relieved operator does **NOT** resume the watch by ...

a. 1330.

b. 1345.

c. 1415.

d. 1515.

Answer:

c. 1415.

Question: 62

Given the following conditions:

- A loss of off-site power has occurred.
- The plant is being cooled down and depressurized per EPP-005, Natural Circulation Cooldown.
- The RCS cooldown rate is 40 °F/hour.
- RVLIS Upper Range indication is 96% and lowering slowly.
- The S-SO has determined that RCS depressurization must continue.

Which of the following actions should be taken?

a. Continue in EPP-005, Natural Circulation Cooldown, AND maintain the cooldown rate <50 °F/hour

b. Initiate safety injection to collapse the vessel head voids

c. Transition to EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, AND continue the cooldown and depressurization

d. Transition to EPP-007, Natural Circulation Cooldown with Steam Void in Vessel without RVLIS, AND continue the cooldown and depressurization

Answer:

c. Transition to EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, AND continue the cooldown and depressurization

Question: 63

Given the following conditions:

- CP&L hired an employee on May 5th of this year.
- The employee's TEDE for this year prior to May 5th was 400 mRem.
- The employee's TEDE at SHNPP for this year is 1500 mRem.

Which of the following describes the **MAXIMUM ADDITIONAL** exposure allowed at CP&L facilities for this employee for the remainder of the year, without receiving an extension, **AND** what is the **LOWEST** level of authorization required if an extension is required during non-emergency conditions?

	MAXIMUM ADDITIONAL EXPOSURE W/OUT EXTENSION	**LOWEST LEVEL OF AUTHORIZATION FOR EXTENSION**
a.	100 mRem	E&RC Manager
b.	100 mRem	Site Vice President
c.	500 mRem	E&RC Manager
d.	500 mRem	Site Vice President

Answer:

d.	500 mRem	Site Vice President

Question: 64

Given the following conditions:

- The unit is operating at 20% power with all systems in automatic.
- Bank 'D' control rods are at 130 steps.
- Control Bank 'C' rod H6 drops to the bottom of the core.
- **NO** rod control urgent failure alarms occur.

Where will thermal power and RCS Tavg stabilize in response to the dropped rod **WITHOUT** any operator action?

a.
- Reactor thermal power will be lower than prior to the dropped rod
- RCS Tavg will be more than 5 ^{o}F lower than the temperature prior to the dropped rod

b.
- Reactor thermal power will be lower than prior to the dropped rod
- RCS Tavg will be within 1 ^{o}F of the temperature prior to the dropped rod

c.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be within 1 ^{o}F of the temperature prior to the dropped rod

d.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be more than 5 ^{o}F lower than the temperature prior to the dropped rod

Answer:

c.
- Reactor thermal power will be the same as prior to the dropped rod
- RCS Tavg will be within 1 ^{o}F of the temperature prior to the dropped rod

Question: 65

Which of the following identifies when the Diesel and Motor Fire Pumps will start on lowering Fire Header pressure?

	MOTOR FIRE PUMP	**DIESEL FIRE PUMP**
a.	93 psig	83 psig
b.	83 psig	93 psig
c.	93 psig	105 psig
d.	105 psig	83 psig

Answer:

a.	93 psig	83 psig

Question: 66

Given the following conditions:

- The plant is at 100% power.
- One minute ago, the normal feeder breaker to 6.9kV bus 1A-SA (BKR 105) tripped open.
- The 1A-SA EDG failed to start.

Which of the following actions is required?

a. Start 1B-SB MDAFW Pump to supply the SGs

b. Manually start RHR pump 1A-SA in Load Block 9

c. Open all load breakers on 6.9kV bus 1A-SA

d. Place the 1A-SA EDG Emergency Stop switch to EMER STOP

Answer:

d. Place the 1A-SA EDG Emergency Stop switch to EMER STOP

Question: 67

Given the following conditions:

- The plant is at 100% power.
- 1A and 1B ESW Pumps are off.
- 'A' and 'B' ESW headers are being supplied from NSW.
- 1A NSW Pump is running.
- 1B NSW Pump is off.

Subsequently, the following events occur:

- A breaker failure results in a loss of power to 1A-SA.
- The 'A' EDG starts, re-energizes the bus, and sequences the loads properly.

Which of the following describes how the ESW alignment is affected?

	'A' TRAIN ESW HEADER SUPPLY	**'B' TRAIN ESW HEADER SUPPLY**
a.	1A ESW Pump	1B ESW Pump
b.	1A ESW Pump	1A NSW Pump
c.	1A NSW Pump	1B ESW Pump
d.	1A NSW Pump	1A NSW Pump

Answer:

b.	1A ESW Pump	1A NSW Pump

Question: 68

During FRP-C.1, Response to Inadequate Core Cooling, the steam generators are depressurized to 90 psig.

Which of the following is the basis for stopping at 90 psig?

a. To prevent N2 injection into the RCS from the Cold Leg Accumulators

b. To maintain gases in solution while low head SI recovers core cooling

c. To ensure the SG U-Tubes remain covered

d. To maintain adequate pressure for running any available RCPs

Answer:

a. To prevent N2 injection into the RCS from the Cold Leg Accumulators

Question: 69

The plant is operating at 100% power with the following conditions:

Time	Ambient Temp	CT Basin Temp
1200	40 °F	64 °F
1600	30 °F	60 °F
2000	25 °F	55 °F

Which of the following describes the correct CT Deicing Gate Valve alignment for these conditions?

	1600	2000
a.	Full Open	Full Open
b.	Full Open	Half Open
c.	Half Open	Full Open
d.	Half Open	Half Open

Answer:

b.	Full Open	Half Open

Question: 70

Reactor power is being increased and is at 37%.

All indications for 1A and 1C RCPs are normal.

Given the following conditions for 1B RCP:

- ALB-008-4-3, RCP 'B' SEAL #1 LEAKOFF HIGH/LOW FLOW, alarms.
- #1 seal leakoff flow has increased to 6.8 gpm.
- Shaft vibration levels are 6 mils and increasing at 0.4 mil/hr.
- Frame vibration levels are 2.1 mils and increasing at 0.3 mil/hr.
- Motor upper radial bearing temperature is 172 °F and stable.
- Motor lower radial bearing temperature is 176 °F and stable.
- Motor upper thrust bearing temperature is 168 °F and stable.
- Motor lower thrust bearing temperature is 178 °F and stable.
- Pump radial bearing temperature is 193 °F and increasing slowly.
- Seal inlet water temperature is 198 °F and increasing slowly.
- Pump bearing water temperature is 158 °F and increasing slowly.
- Motor stator winding temperature is 310 °F and increasing slowly.

Which of the following actions should be taken, in accordance with AOP-018?

a. Trip the reactor and trip 1B RCP immediately

b. Trip 1B RCP immediately and perform a plant shutdown

c. Be in Hot Standby within 6 hours, then stop 1B RCP

d. Trip 1B RCP within 10 minutes and perform a plant shutdown

Answer:

b. Trip 1B RCP immediately and perform a plant shutdown

Question: 71

Given the following conditions:

- The plant is in Mode 3.
- ALB 5-6-1, CCW SURGE TANK HIGH-LOW LEVEL, alarms.
- ALB 10-4-5, RAD MONITOR SYSTEM TROUBLE, alarms.
- ALB 5-1-2A, RCP THERM BAR HDR HIGH FLOW, alarms.
- ALB 5-2-2B, RCP THERM BAR HDR HIGH TEMP, alarms.
- CCW RAD monitor alarm on RM-11 console, alarms.
- CCW surge tank level is increasing.

Which of the following actions should have automatically occurred?

a. 1CC-251, CCW From RCP Thermal Barrier Coolers, CLOSES

b. CCW Holdup Tank Transfer Pump, STARTS

c. CCW Drain Tank Transfer Pump, STARTS

d. 1CC-252, RCP Thermal Barriers Flow Control, CLOSES

Answer:

d. 1CC-252, RCP Thermal Barriers Flow Control, CLOSES

Question: 72

Given the following conditions:

- The plant is in Mode 3.
- 1A-SA CCW Pump is running.
- 1B-SB CCW Pump is in standby.
- A leak occurs, causing a low pressure condition in the CCW system.

Which of the following describes the response of the CCW system?

	A' TRAIN CCW HEADER SUPPLY	**NON-ESSENTIAL HEADER**
a.	1A-SA Pump **ONLY**	Isolated
b.	1A-SA Pump **ONLY**	**NOT** Isolated
c.	1A-SA **AND** 1B-SB Pumps	Isolated
d.	1A-SA **AND** 1B-SB Pumps	**NOT** Isolated

Answer:

d.	1A-SA **AND** 1B-SB Pumps	**NOT** Isolated

Question: 73

Given the following conditions:

- The unit is in a Refueling Outage.
- A spent fuel assembly is attached to the manipulator crane.
- A failure of the Reactor Vessel permanent cavity seal ring causes cavity level to drop approximately 3" every minute.
- Non-essential personnel have been evacuated from Containment.
- The Refueling Crew is in the process of placing the assembly in the Reactor Vessel when a Loss of Off-Site Power occurs.

Refueling Crew members are immediately evacuated from Containment because there are **NO** means for ...

a. making up to the cavity.

b. monitoring radiological levels inside Containment.

c. placing the fuel assembly in the vessel.

d. providing ventilation to Containment.

Answer:

c. placing the fuel assembly in the vessel.

Question: 74

Given the following conditions:

- A Loss of Off-Site Power has occurred.
- EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS, is being performed.
- RVLIS indicates that voids exist in the upper head of the vessel.
- An hour later, Off-Site power is restored.
- Conditions are being established to start an RCP.

Prior to starting the RCP, pressurizer level must be ...

a. increased to accommodate the expected outsurge when the voids in the head are collapsed.

b. decreased to accommodate the expected insurge when the RCS heats up.

c. increased to accommodate the expected outsurge when the RCS cools down.

d. decreased to accommodate the expected insurge when PRZ spray flow lowers pressure.

Answer:

a. increased to accommodate the expected outsurge when the voids in the head are collapsed.

Question: 75

Which of the following describes the automatic actions performed by the AMSAC system **AND** the basis for each action?

a.
- Reactor is tripped to remove the heat source
- Turbine is tripped to preserve SG inventory

b.
- Reactor is tripped to remove the heat source
- AFW is initiated in anticipation of a loss of SG inventory

c.
- Turbine is tripped to preserve SG inventory
- AFW is initiated in anticipation of a loss of SG inventory

d.
- Turbine is tripped to establish a Tave-Tref deviation to force auto rod insertion
- AFW is initiated in anticipation of a loss of SG inventory

Answer:

c.
- Turbine is tripped to preserve SG inventory
- AFW is initiated in anticipation of a loss of SG inventory

Question: 76

Which of the following conditions would require a One-Hour Notification in accordance with AP-617, Reportability Determination and Notification?

a. A manual reactor trip is actuated from 40% power due to a trip of the running Main Feedwater Pump

b. An automatic safety injection is actuated at 100% power due to an I&C Technician lifting an incorrect lead

c. While at 400°F during a plant cooldown, all warning sirens in Lee County are reported to be out-of-service due to severe weather.

d. While at 400°F during a plant heatup following a refueling outage, the plant is cooled down to Mode 4 to meet a Technical Specification action statement.

Answer:

c. While at 400°F during a plant cooldown, all warning sirens in Lee County are reported to be out-of-service due to severe weather.

Question: 77

The following series of procedure transitions are made:

- A transition is made from PATH-1, Step 69, to EPP-009, Post-LOCA Cooldown and Depressurization.
- While performing EPP-009, Step 16, a foldout page item directs a transition to PATH-2, Entry Point J.
- While performing PATH-2, Step 9, a MAGENTA path on the CSFST directs a transition to FRP-P.1, Response to Imminent Pressurized Thermal Shock.

The last step in FRP-P.1 states, "Return to Procedure and Step in Effect."

The crew should transition to ...

a. PATH-1, Step 69.

b. EPP-009, Step 16.

c. PATH-2, Entry Point J.

d. PATH-2, Step 9.

Answer:

d. PATH-2, Step 9.

Question: 78

A reactor startup is being performed following a mid-cycle outage per GP-004.

Estimated Critical Conditions are as follows:

TIME	1830
BORON CONC.	1215 ppm
CONT BANK 'C' POSTION	218 steps
CONT BANK 'D' POSTION	90 steps
ECC - 500 PCM POSITION	45 steps on Bank 'D'
ECC + 500 PCM POSITION	197 steps on Bank 'D'
ROD INSERTION LIMIT	0 steps on Bank 'D'

The Actual Critical Conditions are as follows:

TIME	1836
BORON CONC.	1198 ppm
CONT BANK 'C' POSTION	110 steps
CONT BANK 'D' POSTION	0 steps

Which of the following actions must be taken?

a. Shut down the reactor using GP-006 **AND** borate, as needed, to increase RCS boron concentration to 1215 ppm

b. Maintain critical conditions **AND** borate, as needed, to increase RCS boron concentration to 1215 ppm

c. Shut down the reactor using GP-006 **AND** initiate Emergency Boration per AOP-002

d. Trip the reactor **AND** initiate Emergency Boration per AOP-002

Answer:

c. Shut down the reactor using GP-006 **AND** initiate Emergency Boration per AOP-002

Question: 79

Given the following conditions:

- Three hours ago, Chemistry reported that secondary chemistry parameters were exceeding Action Level 2 limits.
- Reactor power is currently 38% and being reduced at 10% per hour.
- Chemistry now reports that Action Level 3 limits have been exceeded.

Which of the following actions should be taken?

a. Stabilize the plant at the current power level

b. Continue the power reduction at the current rate until < 30% power

c. Initiate a rapid plant shutdown

d. Trip the reactor

Answer:

c. Initiate a rapid plant shutdown

Question: 80

Given the following conditions:

- The plant is operating at 100% power.
- A tube leak has been detected on 'B' SG.
- The Condenser Vacuum Pump Rad Monitor, REM-1TV-3534, and Curve H-X-15 are being monitored every 15 minutes to estimate the leak rate.

Which of the following readings noted on REM-1TV-3534 is the **MINIMUM** reading that would require a plant shutdown per Technical Specifications?

a. 5.5 E -7

b. 1.05 E -6

c. 1.45 E -6

d. 1.55 E -6

Answer:

c. 1.45 E -6

Question: 81

Given the following conditions:

- A reactor trip with SI has occurred.
- The immediate action steps, ECCS flow verifications, and AFW flow verifications are performed.
- SG levels are < 10% and the required AFW flow **CANNOT** be established.
- FRP-H.1, Response to Loss of Secondary Heat Sink, is entered.
- RCS pressure is checked and determined to be less than intact SG pressure.

Which of the following describes the plant conditions?

a. A large break LOCA is in progress **AND** a secondary heat sink is required

b. A large break LOCA is in progress **AND** a secondary heat sink is **NOT** required

c. A small break LOCA is in progress **AND** a secondary heat sink is required

d. A small break LOCA is in progress **AND** a secondary heat sink is **NOT** required

Answer:

b. A large break LOCA is in progress **AND** a secondary heat sink is **NOT** required

Question: 82

If the suction pipe from the 'B' Spent Fuel Pool to the Spent Fuel Pool Cooling Pump completely severed, level in the Spent Fuel Pool would decrease ...

a. to 18 feet above the fuel assemblies before the Emergency Makeup would automatically start.

b. to 18 feet above the fuel assemblies and stabilize without any automatic action.

c. to 12 feet above the fuel assemblies before the Emergency Makeup would automatically start.

d. to 12 feet above the fuel assemblies and stabilize without any automatic action.

Answer:

b. to 18 feet above the fuel assemblies and stabilize without any automatic action.

Question: 83

Given the following conditions:

- The plant is solid in Mode 5 with one (1) RCP in operation.
- RHR Pump A-SA is providing letdown flow with PK-145.1, LTDN PRESSURE 1CS-38, in **MAN**.
- CSIP A-SA is providing RCS makeup and seal injection.

If instrument air is lost to 1CS-38 (PCV-145), the operator should ...

a. trip CSIP A-SA.

b. trip RHR Pump A-SA.

c. control letdown flow using HC-142.1, RHR Letdown 1CS-28.

d. open one PRZ PORV.

Answer:

a. trip CSIP A-SA.

Question: 84

RCS temperature is 220 °F.

Which of the following sets of conditions is the **MINIMUM** required to meet the Technical Specification requirements for DC Electrical Sources?

	125 VDC BATTERIES		BATTERY CHARGERS			
	1A-SA	**1B-SB**	**1A-SA**	**1B-SA**	**1A-SB**	**1B-SB**
a.	Operable	Operable	Operable	Operable	Operable	Operable
b.	Operable	Operable	Operable	**NOT** Operable	**NOT** Operable	Operable
c.	Operable	**NOT** Operable	Operable	Operable	**NOT** Operable	**NOT** Operable
d.	**NOT** Operable	Operable	**NOT** Operable	Operable	Operable	Operable

Answer:

b.	Operable	Operable	Operable	**NOT** Operable	**NOT** Operable	Operable

Question: 85

Given the following conditions:

- A liquid waste discharge from a Treated Laundry and Hot Shower (TL&HS) Tank is in progress.
- REM-1WL-3540, Treated Laundry and Hot Shower Tank Pump Discharge Monitor, goes into high alarm.

Which of the following terminates the discharge?

a. The running TL&HS Tank Pump will automatically trip.

b. An operator must take manual action to shut the TL&HS Tank Pump Discharge Isolation Valve.

c. The running TL&HS Tank Pump Recirc Valve will automatically open.

d. The TL&HS Tank Pump Discharge Isolation Valve will automatically close.

Answer:

d. The TL&HS Tank Pump Discharge Isolation Valve will automatically close.

Question: 86

The unit is in Mode 3 with the reactor trip breakers closed.

If 125 VDC Bus 1A-SA deenergizes due to a fault on the bus ...

a. Train SA reactor trip breaker will open due to an undervoltage (UV) trip.

b. Train SA reactor trip breaker will open due to a shunt trip.

c. an undervoltage (UV) trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

d. a shunt trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

Answer:

d. a shunt trip signal will **NOT** be capable of opening Train SA reactor trip breaker.

Question: 87

Given the following conditions:

- The plant experiences a reactor trip and SI from 100% power.
- **ONLY** one train of SI has actuated.
- Four Containment Fan Cooler fans are running in fast on one train.
- Two Containment Fan Cooler fans are running in slow on the other train.

Which of the following is the Containment Fan Cooler fan alignment following operator action in response to this situation?

a. Four fans running in slow

b. Four fans running in fast

c. Eight fans running in fast

d. Eight fans running in slow

Answer:

a. Four fans running in slow

Question: 88

Given the following conditions:

- A recovery from an SGTR on the 1B SG is being performed using the backfill method.
- ERFIS in **NOT** available.
- **NO** RCPs are running.
- RCS pressure channels read:
  - PI-402 = 600 psig
  - PI-403 = 620 psig
  - PI-402A = 650 psig
- Thot channels read:
  - TI-413 = 420 °F
  - TI-423 = 480 °F
  - TI-433 = 415 °F
- The five hottest ICCM TCs read:
  - 490 °F
  - 486 °F
  - 459 °F
  - 430 °F
  - 425 °F

Which of the following identifies the amount of subcooling present?

a. 8 °F

b. 18 °F

c. 30 °F

d. 40 °F

Answer:

a. 8 °F

Question: 89

Given the following conditions:

- ALB-13-6-2, RPI NON-URGENT ALARM, alarms.
- The General Warning LED for Control Rod H2 is flashing.
- The Data B Failure 1, 2, 3 LEDs are flashing.
- The position LED for Control Rod H2 at Step 48 is LIT.

Which of the following describes the **MINIMUM** and **MAXIMUM** known positions of Control Rod H2?

	MINIMUM POSITION	**MAXIMUM POSITION**
a.	38 Steps	52 Steps
b.	44 Steps	52 Steps
c.	38 Steps	58 Steps
d.	44 Steps	58 Steps

Answer:

a.	38 Steps	52 Steps

Question: 90

Which of the following describes the effect a Containment Phase A isolation will have on RCP seal leakoff?

a. No. 1 seal leakoff will discharge to the PRT via a relief valve

b. No. 1 seal leakoff will discharge to the RCDT via a relief valve

c. All No. 1 seal leakoff will be directed through the No. 2 seal and then to the PRT

d. All No. 1 seal leakoff will be directed through the No. 2 seal and then to the RCDT

Answer:

a. No. 1 seal leakoff will discharge to the PRT via a relief valve

Question: 91

During the performance of PATH-1, the crew must determine if "RCS temperature is stable at or trending to 557 °F."

Which of the following describes the temperature to be used when RCPs are running AND when RCPs are off?

	RCPs ON	**RCPs OFF**
a.	T-avg	Cold Leg Temps
b.	T-avg	Hot Leg Temps
c.	Incore TCs	Cold Leg Temps
d.	Incore TCs	Hot Leg Temps

Answer:

a.	T-avg	Cold Leg Temps

Question: 92

Given the following conditions:

- A reactor trip occurred due to a loss of offsite power.
- The plant is being cooled down on RHR per EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS.
- RVLIS upper range indicates greater than 100%.
- Three CRDM fans have been running during the entire cooldown.
- RCS cold leg temperatures are 190 °F.
- Steam generator pressures are 50 psig.

Steam should be dumped from all SGs to ensure ...

a. boron concentration is equalized throughout the RCS prior to taking a sample to verify cold shutdown boron conditions.

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

c. RCS and SG temperatures are equalized prior to any subsequent RCP restart.

d. RCS temperatures do **NOT** increase during the required 29-hour vessel soak period.

Answer:

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

Question: 93

Given the following conditions:

- A Loss of Off-Site Power has occurred.
- ALB-17-5-5, CONDENSATE STORAGE TANK LOW MINIMUM LEVEL, alarms (65%).

Which of the following describes the significance of this alarm?

a. CST level is nearing the level where it will be inadequate to maintain the required suction pressure to the TDAFW pump

b. Manual swap to the backup source Emergency Service Water System should be initiated

c. Normal Condenser Makeup System must be manually isolated to prevent drain down of the CST

d. CST level is nearing the level where it will be inadequate to maintain hot standby for 12 hours

Answer:

d. CST level is nearing the level where it will be inadequate to maintain hot standby for 12 hours

Question: 94

Given the following conditions:

- RCS temperature is 300 °F.
- The Low Temperature Overpressure Protection system (LTOP) is armed.
- PT-441, RCS Wide Range Pressure, has failed low.

Which of the following describes the effect on LTOP?

a. **ONLY** PRZ PORV PCV-445A is available for LTOP

b. Both PRZ PORVs are available for LTOP

c. Neither PRZ PORV is available for LTOP

d. **ONLY** PRZ PORV PCV-444B is available for LTOP

Answer:

a. **ONLY** PRZ PORV PCV-445A is available for LTOP

Question: 95

Given the following conditions:

- Reactor power is at 70%.
- Rod Control is in AUTO.
- Bank 'D' control rods are at 195 steps.
- Loop 1 Tavg is 576 °F.
- Loop 2 Tavg is 574 °F.
- Loop 3 Tavg is 572 °F.

Which of the following failures will cause control rods to step out?

a. Loop 1 Thot fails high

b. Loop 3 Thot fails low

c. Loop 2 Tcold fails high

d. Loop 2 Tcold fails low

Answer:

d. Loop 2 Tcold fails low

Question: 96

Which of the following would require a call to chemistry so they can initiate surveillances per RST-204 and RST-211?

a. Load reduction from 100% to 80% at 2 MWe/min

b. Load reduction from 100% to 90% at 10 MWe/min

c. Loss of one running MFP from 78% power

d. Loss of one running HDP from 100% power

Answer:

c. Loss of one running MFP from 78% power

Question: 97

Given the following conditions:

- An accident has occurred which has resulted in activation of the Emergency Plan.
- A repair team is preparing to enter an area to effect repairs that will protect a piece of valuable company property.
- The dose rate in the area is 25 Rem/hour.

Which of the following identifies the **MAXIMUM** amount of time that each individual can stay in the area without exceeding allowable emergency dose limits?

a. 12 minutes

b. 24 minutes

c. 36 minutes

d. 60 minutes

Answer:

b. 24 minutes

Question: 98

Given the following conditions:

- A small break LOCA has occurred.
- Core exit thermocouple temperatures are approximately 618 °F and stable.
- RCS hot legs temperatures are approximately 550 °F.
- RCS cold leg temperatures are approximately 330 °F.
- RCS pressure is 1100 psig.

Which of the following describes the status of RCS inventory and core cooling?

a. The core is covered and being cooled by natural circulation

b. The core is partially uncovered and being cooled by natural circulation

c. The core is covered and being cooled by reflux boiling

d. The core is partially uncovered and being cooled by reflux boiling

Answer:

d. The core is partially uncovered and being cooled by reflux boiling

Question: 99

Given the following conditions:

- A reactor trip and safety injection has occurred.
- A transition has been made to FRP-H.1, Response to Loss of Secondary Heat Sink.
- RCS bleed and feed has been initiated.
- Core exit thermocouples are still rising.
- RCS hot leg temperatures are all approximately 650 °F and rising slowly.
- All SG levels are approximately 5% wide range.
- Containment pressure is 6 psig.
- The TDAFW Pump has been made available.

Which of the following describes how AFW flow should be restored to the SGs?

a. Feed one SG at 50 KPPH until core exit thermocouples start decreasing

b. Feed one SG at 50 KPPH until SG narrow range level is > 40%

c. Feed one SG at maximum rate until core exit thermocouples start decreasing

d. Feed one SG at maximum rate until SG narrow range level is > 40%

Answer:

d. Feed one SG at maximum rate until SG narrow range level is > 40%

Question: 100

Given the following conditions:

- On May 1, at 0100, a plant shutdown was initiated from 100% in preparations for conducting a refueling.
- The reactor was shutdown at 1100 on the same date.
- CCW heat exchanger outlet temperature is currently 88 °F.

When is the **EARLIEST** that fuel movement in the reactor vessel is allowed to begin?

a. May 6th at 0200

b. May 6th at 1200

c. May 7th at 1200

d. May 7th at 2200

Answer:

d. May 7th at 2200