

U.S. Nuclear Regulatory Commission**Site-Specific RO Written Examination****Applicant Information**

Name:

Date:

Facility/Unit:

Region: I II III IV Reactor Type: W CE BW GE

Start Time:

Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination, you must achieve a final grade of at least 80.00 percent. Examination papers will be collected 6 hours after the examination begins.

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

1. Unit 1 is operating at 85% power with the following conditions:

- STP-33.0B, Solid State Protection System Train B Operability Test, is in progress.
- The 'B' Reactor Trip Bypass Breaker has been racked in and closed.
- Control Bank D is at 203 steps.
- The Rod Control Bank Selector Switch is in AUTO.
- PS/446Z, FIRST STG IMPULSE PRESS SEL SWITCH, is in the Channel IV / PT447 position.

Subsequently, the following occurs:

- PT-447, TURB FIRST STG PRESS, fails HIGH.

Which one of the following completes the statements below?

The control rods will (1).

If the reactor is manually tripped at this time, the 'B' Reactor Trip Bypass Breaker (2) light will be LIT.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | insert | RED |
| B. | insert | GREEN |
| C. | withdraw | GREEN |
| D. | withdraw | RED |

2. Unit 1 is in Mode 3 and preparing to start the 1C RCP.

Which one of the following completes the statements below per SOP-1.1, Reactor Coolant System?

The 1C RCP oil lift pump handswitch white light indicates (1) .

The 1C RCP breaker closing operation (2) interlocked with a 2 minute time delay.

- A. 1) BOTH the oil lift pressure has reached 600 psig AND 2 minutes have elapsed
2) is NOT
- B. 1) ONLY that the oil lift pressure has reached 600 psig
2) IS
- C. 1) ONLY that the oil lift pressure has reached 600 psig
2) is NOT
- D. 1) BOTH the oil lift pressure has reached 600 psig AND 2 minutes have elapsed
2) IS

3. Unit 1 was operating at 100% power when the following occurred:

- The air supply to FCV-122, CHG FLOW REG, actuator has been severed and the valve has repositioned to its failed position.

Which ONE of the following completes the statement below?

FCV-122 is (1) and RCP seal injection flow will (2).

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | CLOSED | LOWER |
| B. | CLOSED | RISE |
| C. | OPEN | LOWER |
| D. | OPEN | RISE |

4. The following conditions exist on Unit 1:

- The operating crew is cooling down per UOP-2.2, Shutdown of Unit From Hot Standby to Cold Shutdown.
- MODE 5 has just been entered and the following conditions exist:
 - RCS temperature is 195°F.
 - BOTH 1A AND 1B RHR pumps are running in the cooldown mode.

Subsequently, PT-402, 1C LOOP RCS PRESS, fails HIGH.

Which one of the following describes the minimum required action(s), if any, to be performed per AOP-12.0, Residual Heat Removal Malfunction?

- A. No actions are required.
- B. Secure the 1A RHR pump ONLY.
- C. Secure the 1B RHR pump ONLY.
- D. Secure BOTH 1A AND 1B RHR pumps.

5. Unit 1 was operating at 100% power when the following conditions occurred:

- A LOCA is in progress.
- The operating crew is performing the actions of EEP-0.0, Reactor Trip or Safety Injection, and is at the step to "Check RCS intact".
- RCS pressure is 475 psig and lowering.

Which one of the following describes the current status of the ECCS system?

	<u>SI Accumulator Level</u>	<u>RHR Injection Flow</u>
A.	Stable and on-scale	Zero
B.	Dropping or off-scale low	Zero
C.	Dropping or off-scale low	Rising
D.	Stable and on-scale	Rising

6. Unit 1 has experienced a Reactor Trip and Safety Injection due to a faulted SG.
The following conditions exist:

- The operating crew is performing EEP-2.0, Faulted Steam Generator Isolation.
- SCMM is in the CETC mode.
- RCS pressure is 1900 psig and rising slowly.
- At the step for verifying SI termination criteria, the crew notes that PT-457, PRZR PRESS, has failed LOW.

Which one of the following completes the statements below?

Subcooling margin calculated by A Train ICCMS will (1).

Subcooling margin calculated by B Train ICCMS will (2).

(1)

(2)

- | | | |
|----|-----------------|-----------------|
| A. | be affected | NOT be affected |
| B. | NOT be affected | be affected |
| C. | be affected | be affected |
| D. | NOT be affected | NOT be affected |

7. Unit 2 was operating at 2% power with a plant startup in progress per UOP-1.2, Startup of the Unit from Hot Standby to Minimum Load and the following conditions occurred:

At 1000:

- DG-15-2, 2B S/U XFMR TO 2G 4160V Bus, trips open.

At 1005:

- DF-01-2, 2A S/U XFMR TO 2F 4160V Bus, trips open.

Which one of the following completes the statements below **at 1006** with no operator actions taken?

The Reactor Trip breakers will be (1).

DRPI rod bottom lights (2) be LIT.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | OPEN | WILL |
| B. | OPEN | will NOT |
| C. | CLOSED | WILL |
| D. | CLOSED | will NOT |

8. Unit 1 is in Mode 5 and forming a pressurizer steam space (drawing a bubble) per UOP-1.1, Startup of Unit from Cold Shutdown to Hot Standby. The vacuum refill procedure will NOT be performed. The following conditions exist:

- RCS pressure is being maintained at 325-375 psig.
- 1B RCP is running.
- 'A' Train RHR is on service with low pressure letdown aligned.
- RCS is in solid plant pressure control.
- Pressurizer temperature is 178°F and slowly rising.
- All PRZR heaters have been energized.

Which one of the following completes the statements below?

Per UOP-1.1, the pressurizer is at saturation conditions when (1) increases.

During this evolution, PRT level will (2).

- | <u>(1)</u> | <u>(2)</u> |
|------------------|-----------------|
| A. charging flow | remain constant |
| B. letdown flow | remain constant |
| C. letdown flow | rise |
| D. charging flow | rise |

9. Unit 2 was operating at 100% power when a Reactor Trip occurs and the following conditions exist:

- Q2B13PSV8010A, PZR SAFETY, has failed OPEN.
- Pressurizer pressure is 1020 psig.
- PRT pressure rises to 55 psig.
- Core Exit Thermocouples read 560°F.

Which one of the following completes the statements below?

Temperature on TI-469, SAFETY VLVS, will indicate approximately (1).

Pressurizer level will be (2).

Reference provided

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 546°F | rising |
| B. | 546°F | lowering |
| C. | 320°F | lowering |
| D. | 320°F | rising |

10. Unit 2 is operating at 100% power when the following occurs:

- A simultaneous dual Unit LOSP occurs:

Which one of the following completes the statement below?

The (1) CCW pump is being powered by the (2) DG.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 2A | 1-2A |
| B. | 2A | 1C |
| C. | 2C | 1-2A |
| D. | 2C | 1C |

11. The following conditions exist on Unit 1:

- An RCS leak is in progress.
- RCS pressure is 1600 psig and stable.
- Containment pressure is 3.1 psig and slowly rising.
- The crew has just transitioned to ESP-1.2, Post LOCA Cooldown and Depressurization.

Which one of the following completes the statement below?

The **minimum** SG narrow range water level must be greater than (1) to (2).

- A. 1) 31%
- 2) ensure SG tubes are covered to promote reflux boiling
- B. 1) 48%
- 2) ensure SG tubes are covered to promote reflux boiling
- C. 1) 31%
- 2) ensure adequate SG inventory to provide a secondary heat sink
- D. 1) 48%
- 2) ensure adequate SG inventory to provide a secondary heat sink

12. Unit 1 was operating at 100% power when a Reactor Trip and LOSP occurred. The following conditions exist:

- The 1A PZR HTR GROUP BACKUP handswitch is in AUTO.
- RCS pressure is 2000 psig.

Which one of the following correctly describes Pressurizer Heater operation per ESP-0.1, Reactor Trip Response?

- A. The 1A PZR Heaters will have power available, **NO** actions are required to energize them.
- B. The 1A PZR Heaters will have power available **AND** manual actions on the MCB are required to energize them.
- C. The 1A PZR Heaters will **NOT** have power available. Manual actions are required to align power to them on the EPB but **NO** other actions are required to energize them.
- D. The 1A PZR Heaters will **NOT** have power available. Manual actions are required to align power to them on the EPB **AND** manual actions on the MCB are required to energize them.

13. Unit 1 has experienced a Loss of Off-site Power and a Large Break LOCA. The following conditions exist:

- ESP-1.3, Transfer to Cold Leg Recirculation, has been completed.

Subsequently, the Shift Supervisor directs the OATC to perform ESP-1.4, Transfer to Simultaneous Cold and Hot Leg Recirculation and the following occurs:

- Power is lost to the 1G 4160V Bus and will not be restored for 18 hours.

Which one of the following completes the statement below?

At the completion of ESP-1.4, the running LHSI pump will be aligned for (1) leg recirculation and the running HHSI pump will be aligned for (2) leg recirculation.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | HOT | COLD |
| B. | COLD | COLD |
| C. | HOT | HOT |
| D. | COLD | HOT |

14. Unit 1 is operating at 100% power when the 1E 4160V bus becomes de-energized due to an electrical fault.

Which one of the following completes the statement below?

Pressurizer heater groups ____ have lost their normal power supply.

- A. 1C and 1D ONLY
- B. 1A, 1C and 1D ONLY
- C. 1B and 1E ONLY
- D. 1B, 1D and 1E ONLY

15. The following conditions exist on Unit 1:

- A loss of 'A' Train Auxiliary Building 125V DC Bus has occurred.

Which one of the following completes the statement below?

Placing the MCB Reactor Trip handswitch in TRIP would ____ if they were closed.

- A. open **ALL** reactor trip and bypass breakers
- B. **ONLY** open the 'B' reactor trip breaker and the 'B' reactor trip bypass breaker
- C. **ONLY** open the 'B' reactor trip breaker and the 'A' reactor trip bypass breaker
- D. open **BOTH** reactor trip breakers but **NOT** open either reactor trip bypass breaker

16. **The Integrated Plant Computer Display on the following page is provided for evaluation of this question.**

Unit 1 has experienced a reactor trip and the following conditions exist:

- The operating crew is verifying the immediate operator actions per EEP-0.0, Reactor Trip or Safety Injection.
- MLB-1, 1-1 and 11-1, SAFETY INJECTION, are NOT LIT.

The STA reports the following indications on the Plant Computer:

- PT0455 PRESSURIZER PRESSURE CHAN 1 is 1841 psig.
- PT0456 PRESSURIZER PRESSURE CHAN 2 is 1855 psig.
- PT0457 PRESSURIZER PRESSURE CHAN 3 is 1845 psig.
- PT0444A PRESSURIZER PRESSURE CHAN 4 is 1857 psig.
- PT0445A PRESSURIZER PRESSURE CHAN 5 is 1855 psig.
- PT0464 STEAM HEADER PRESSURE is 6.4 psig.

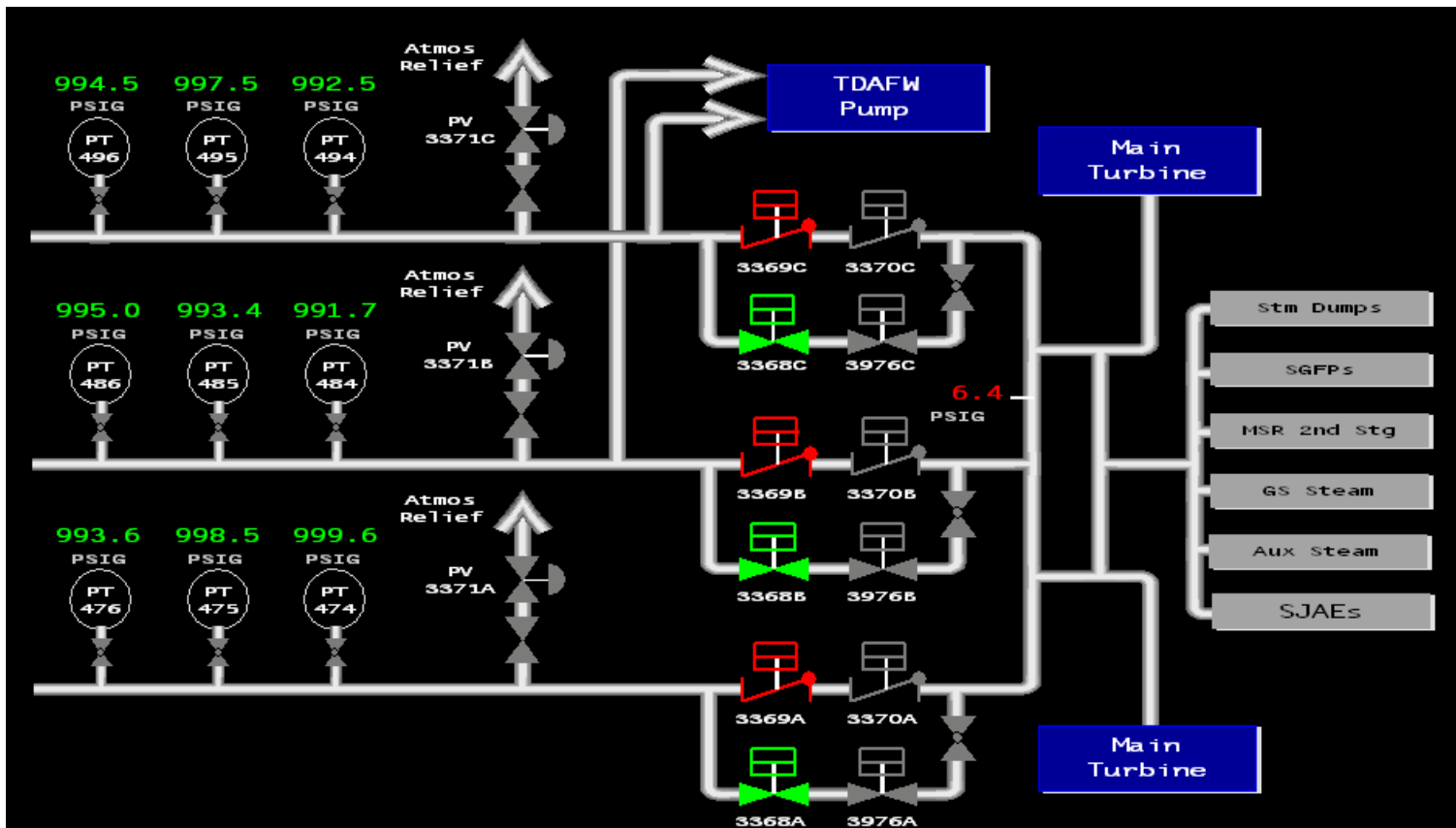
Which one of the following completes the statements below?

A Safety Injection (1) required.

MSIV-3370A, B and C (2) OPEN.

Reference Provided

	<u>(1)</u>	<u>(2)</u>
A.	IS	are NOT
B.	IS	ARE
C.	is NOT	are NOT
D.	is NOT	ARE



17. Unit 1 is performing a reactor startup per UOP-1.2, Startup Of Unit From Hot Standby To Minimum Load, when the following conditions occurred:

- The OATC pulled Control Bank D to 100 Steps by Step Demand Counter.
- Rod B8 was noted to be indicating 54 Steps by DRPI.

Which one of the following completes the statements below?

Rod B8's position is (1) .

Per Tech Spec Bases 3.1.7, Rod Position Indication, (2) is(are) the most reliable indication.

- A. 1) exactly 100 steps
2) the group step counters
- B. 1) approximately 100 steps
2) the group step counters
- C. 1) exactly 54 steps
2) DRPI
- D. 1) approximately 54 steps
2) DRPI

18. Unit 1 is operating at 100% power.

The following occurs:

- MOV-3052, CCW TO RCP CLRS, closes.
- DD3, CCW FLOW FROM RCP OIL CLRS LO, comes in to alarm.

Which one of the following completes the statements below?

The most limiting components for this event are the RCP (1).

The RCPs will be required to be stopped within approximately (2).

- A. 1) Motor Bearings
2) 2 minutes
- B. 1) Motor Bearings
2) 60 minutes
- C. 1) Pump Lower Radial Bearings
2) 2 minutes
- D. 1) Pump Lower Radial Bearings
2) 60 minutes

19. Unit 1 has experienced a Reactor Trip and SI due to a LOCA and the following conditions exist:

- The operators have transitioned to EEP-1.0, Loss of Reactor or Secondary Coolant.
- The Core Exit Thermocouples (CETCs) are reading as follows:
 - TWO CETCs are indicating a SHORT circuit.
 - THREE CETCs are 1204°F and rising.
 - All other CETCs are reading between 950°F and 1150°F and rising.

Which one of the following completes the statements below?

The indication for the SHORT circuited CETCs fail (1).

The (2) CETC is used to evaluate entry into FRP-C.2, Response To Degraded Core Cooling.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|-------------------------|
| A. | HIGH | hottest |
| B. | HIGH | 5 th hottest |
| C. | LOW | hottest |
| D. | LOW | 5 th hottest |

20. Unit 1 is operating at 100% power with the following conditions:

At 1000:

- Containment Pressure is 0 psig.
- Containment temperature is 100°F.
- MI-3319A, B, C and D, CTMT CLR SUPP AIR MOISTURE, indicate 72 Dewpoint °F.
- Containment Coolers are running in slow speed.

At 1015:

A LOCA occurs and the following conditions exist:

- Containment Pressure is 5 psig.
- Containment temperature is 150°F.
- MI-3319A, B, C and D, CTMT CLR SUPP AIR MOISTURE, indicate 130 Dewpoint °F.

Which one of the following completes the statements below at **1015?**

The Containment Cooler discharge will be through the (1).

The Containment Cooler fans will be drawing (2) amps than at 1000.

- | | <u>(1)</u> | <u>(2)</u> |
|----|---------------|------------|
| A. | ductwork | MORE |
| B. | dropout plate | MORE |
| C. | ductwork | LESS |
| D. | dropout plate | LESS |

21. Unit 1 is operating at 100% power and the following conditions exist:

- AOP-16.0, CVCS Malfunction, has just been exited after a charging flow controller failure.
- FK-122, CHG FLOW, is in MANUAL and has been repaired.

Subsequently, FK-122 is placed in AUTOMATIC and the following conditions exist:

- One 60 gpm orifice is on service.
- Charging flow is stable at 62 gpm.

Which one of the following completes the statement below?

If FK-122 were to go to minimum demand, charging flow would decrease to a **minimum** flow rate of (1) , which is designed to prevent (2).

- A. 1) 18 gpm
2) flashing downstream of the letdown orifices
- B. 1) 18 gpm
2) overheating of the charging pumps
- C. 1) 40 gpm
2) flashing downstream of the letdown orifices
- D. 1) 40 gpm
2) overheating of the charging pumps

22. Unit 1 is operating at 100% power when a Steam Break occurs on 1B SG and the following conditions exist:

- EE5, CTMT ISO PH B, is in alarm.
- All Phase B automatic actions have occurred.

Which one of the following completes the statements below?

CCW to the RCP Thermal Barrier Heat Exchanger (1) isolated.

Seal Injection (2) isolated.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | IS | is NOT |
| B. | is NOT | is NOT |
| C. | IS | IS |
| D. | is NOT | IS |

23. Unit 1 is in Mode 5 with the following conditions:

- 1B RHR pump is tagged out.
- All SG Wide Range levels are 84%.
- Pzr level is being maintained at 21% on LI-462, PRZR LVL.
- RCS temperature is 155°F.
- RCS pressure is 325 psig.
- All RCP's are secured.
- 1A RHR pump is running in the cooldown lineup.

Subsequently, the following occurs:

- 1A RHR pump trips on overcurrent and cannot be restarted.
- RCS temperature is 175°F and slowly rising.

Which one of the following completes the statements below?

Per AOP-12.0, Residual Heat Removal System Malfunction, the preferred method to re-establish core cooling is to establish (1).

Core cooling is monitored using (2).

- | <u>(1)</u> | <u>(2)</u> |
|--------------------------|---------------------------|
| A. feed and bleed | RCS cold leg temperatures |
| B. a secondary heat sink | RCS cold leg temperatures |
| C. feed and bleed | CETCs |
| D. a secondary heat sink | CETCs |

24. Unit 1 is operating at 100% power when the following occurs:

- A leak develops in the CCW system.
- CCW Surge Tank level is slowly lowering.
- AA4 and AB4, CCW SRG TK LVL A(B) TRN HI-LO, are in alarm.
- AA5, CCW SRG TK LVL A TRN LO-LO, has come into alarm.

Which one of the following completes the statements below?

CCW system automatic isolations are designed to occur at (1) in the CCW Surge Tank.

Using the NORMAL source of makeup water, the operator will open (2) to make up to the CCW Surge Tank.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|--|
| A. | 35 inches | MOV-3031A, MKUP TO CCW FROM RMW |
| B. | 20 inches | MOV-3031A, MKUP TO CCW FROM RMW |
| C. | 35 inches | MOV-3030A, MKUP TO CCW FROM DW STOR TK |
| D. | 20 inches | MOV-3030A, MKUP TO CCW FROM DW STOR TK |

25. Unit 2 is operating at 50% power when a simultaneous Dual Unit LOSP occurs.

- 4160V Bus 2G remains de-energized due to the DG not starting for that emergency bus.

Three (3) minutes after the LOSP, a Large Break LOCA occurs on Unit 2.

- Containment pressure peaked at 29 psig and is trending down.

Which one of the following completes the statement below?

The (1) Containment Spray pump is currently running and is powered from the (2) DG.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 2A | 1C |
| B. | 2B | 1C |
| C. | 2A | 1-2A |
| D. | 2B | 1-2A |

26. Unit 2 plant conditions are as follows:

- Containment Main Purge system is running.
- Containment radiation levels are **rising**.

Subsequently, R-24A, CTMT PURGE, loses control power.

Which one of the following completes the statements below?

Radiation levels (1) stop rising in the Main Exhaust Plenum.

CTMT Main Purge supply and exhaust fans (2) trip.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | WILL | will NOT |
| B. | will NOT | will NOT |
| C. | WILL | WILL |
| D. | will NOT | WILL |

27. Unit 1 is operating at 100% power and the following conditions exist:

- A blended make-up to the Spent Fuel Pool (SFP) is occurring.
- A calibration error results in FT-168, PRI WATER MKUP FLOW, providing a flow input to the Reactor Makeup System that is **less** than the actual flowrate.

Which one of the following completes the statements below?

The blended flow makeup resulted in a (1) of the SFP.

Per Tech Spec 3.7.14, Fuel Storage Pool Boron Concentration, the MINIMUM required SFP boron concentration is (2) ppm.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | boration | 2000 |
| B. | boration | 2200 |
| C. | dilution | 2000 |
| D. | dilution | 2200 |

28. Unit 1 is operating at 100% power with the following conditions:

- Reactor power is now 100.5% and slowly rising.
- Tavg is 570.5°F and slowly lowering.
- Pressurizer pressure is 2210 psig and slowly lowering.
- Turbine load is 890 MWe and lowering.
- SG pressures are 720 psig and slowly lowering.
- Containment pressure is 2.1 psig and slowly rising.

Which one of the following completes the statements below?

The event in progress is a (1) line break.

Per AOP-14.0, Secondary System Leakage, the operators are required to (2).

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|---------------------|
| A. | steam | reduce turbine load |
| B. | steam | trip the reactor |
| C. | feed | reduce turbine load |
| D. | feed | trip the reactor |

29. Unit 1 is operating at 100%. A fuel shuffle is being performed in the Unit 1 SFP.

At 1000:

- EH2, SFP LVL HI-LO, is in alarm.
- SFP level is 153' 3" and stable.

At 1015:

The SRO in charge of refueling reports that a fuel assembly has been dropped.

- FH5, SFP AREA RE-25 A OR B HI RAD, is in alarm.
- R-25A & B, SPENT FUEL BLDG EXH, reads off scale high.

Which one of the following completes the statements below?

The operating crew is required to enter (1) .

The crew is required to dispatch personnel to (2) per the applicable AOP.

Procedure titles are as follows:

AOP-30.0, Refueling Accident

AOP-49.3, Spent Fuel Pool Emergency

(1)

(2)

- | | | |
|----|----------|---|
| A. | AOP-49.3 | make up to the SFP using the RWST |
| B. | AOP-30.0 | make up to the SFP using the RWST |
| C. | AOP-49.3 | ensure all SFP hatches and doors are closed |
| D. | AOP-30.0 | ensure all SFP hatches and doors are closed |

30. Unit 1 is performing the actions of AOP-2.0, Steam Generator Tube Leakage, due to a tube leak on the 1A SG. The following conditions exist:

- RCS pressure is currently being reduced to minimize break flow.

The following parameters are observed:

- SG pressures are:

<u>1A SG</u>	<u>1B SG</u>	<u>1C SG</u>
948 psig	905 psig	900 psig

- RCS pressure is 916 psig.
 - The highest reading non-upperhead CETC is 518°F.
 - PRZR level is 43%.
- BOTH Subcooled Margin Monitors are malfunctioning.

Which one of the following completes the statements below?

The current value of subcooling is approximately (1).

The RCS pressure reduction (2) required to be stopped.

Reference Provided

	<u>(1)</u>	<u>(2)</u>
A.	22°F	IS
B.	22°F	is NOT
C.	18°F	IS
D.	18°F	is NOT

31. Unit 1 has experienced a tube rupture on the 1C SG.

The operating crew is at the step in EEP-3.0, Steam Generator Tube Rupture, to "Check SI termination criteria."

- The following plant conditions are observed:
 - RCS Subcooling is 22°F and slowly rising.
 - RCS pressure is 950 psig and slowly rising.
 - Pressurizer level is 45% and slowly rising.
 - AFW flow is 450 gpm.
 - 1A SG NR level is 29% and slowly rising.
 - 1B SG NR level is 26% and slowly rising.
 - 1C SG NR level is 65% and rising rapidly.

Which one of the following completes the statements below?

SI termination criteria (1) been met.

Per EEP-3.0, SI termination is necessary to prevent overfilling the (2).

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|-----------------|
| A. | has NOT | Steam Generator |
| B. | has NOT | Pressurizer |
| C. | HAS | Steam Generator |
| D. | HAS | Pressurizer |

32. Concerning R-70A/B/C, 1A/1B/1C SG TUBE LEAK DET, on Unit 1:

Which one of the following completes the statements below?

The R-70s are located (1) of the MSIVs.

A minimum reactor power level that the R-70s can accurately estimate a SG leak rate is (2) .

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | upstream | 25% |
| B. | downstream | 25% |
| C. | upstream | 10% |
| D. | downstream | 10% |

33. Which one of the following coincidences will cause an anticipated transient without trip (ATWT) mitigation system actuation circuitry (AMSAC) Main Turbine Trip?

(1) Turbine impulse pressure channels > 40%

AND

(2) SG NR levels < 10% for > 25 seconds.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 1 of 2 | 2 of 3 |
| B. | 2 of 2 | 2 of 3 |
| C. | 1 of 2 | 1 of 3 |
| D. | 2 of 2 | 1 of 3 |

34. Unit 1 is operating at 40% power when PR-4029, CONDENSER PRESSURE indicates as follows:

- PT0501 and PT0502 are 6 psia and rising rapidly.

Subsequently, Condenser pressure stabilizes at 12 psia.

Which one of the following completes the statements below?

The Steam Dump (1) controller is enabled.

The Steam Dumps are (2) .

- | <u>(1)</u> | <u>(2)</u> |
|-----------------|------------|
| A. Plant Trip | CLOSED |
| B. Plant Trip | OPEN |
| C. Loss of Load | CLOSED |
| D. Loss of Load | OPEN |

35. Unit 1 is operating at 4% power. The following conditions exist:

- 1A SGFP is running.
- All SG NR levels are in the programmed band.
- FCV-479/489/499, 1A/1B/1C SG FW BYP FLOW, controllers are in MANUAL and 35% open.

Subsequently, the 1A SGFP trips.

Which one of the following completes the statements below?

MOV-3232A/B/C, MAIN FW TO 1A/1B/C SG, will (1).

FCV-479/489/499, 1A/1B/1C SG FEED FLOW BYPASS FCVs, will (2).

- | | <u>(1)</u> | <u>(2)</u> |
|----|-------------|-------------|
| A. | remain OPEN | remain OPEN |
| B. | remain OPEN | CLOSE |
| C. | CLOSE | remain OPEN |
| D. | CLOSE | CLOSE |

36. Unit 1 is at 70% power with the following conditions:

- **R-15A, SJAE EXH**, is in alarm.
- **R-15B, TURB BLDG VNTL**, is in alarm.
- AOP-2.0, Steam Generator Tube Leakage, is in progress.
- The Turbine Building SO has placed the SJAE Filtration System in service.

Which one of the following completes the statement below?

After the SJAE Filtration system is placed in service, the reading on **R-15B** will (1) and the SJAE Filtration system will (2) .

(1)

(2)

- | | |
|--------------------|------------------------------------|
| A. decrease | be aligned in a recirc alignment |
| B. remain the same | be aligned in a recirc alignment |
| C. decrease | discharge to the Turbine Bldg roof |
| D. remain the same | discharge to the Turbine Bldg roof |

37. Unit 1 is operating at 100% when a LOSP occurred. The following conditions exist:

- The Emergency Diesel Generators failed to energize the ESF busses.
- The operating crew is conducting a secondary depressurization per ECP-0.0, Loss Of All AC Power.
- SG pressures are as follows:
 - 1A SG: 245 psig and lowering
 - 1B SG: 247 psig and lowering
 - 1C SG: 244 psig and lowering

Which one of the following completes the statements below?

Per ECP-0.0, this secondary pressure reduction is required to (1).

The reason the secondary pressure reduction is required to be stopped at the SG pressure specified in ECP-0.0 is to prevent (2).

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|---|
| A. | be STOPPED | injection of accumulator nitrogen into the RCS |
| B. | CONTINUE | injection of accumulator nitrogen into the RCS |
| C. | be STOPPED | a challenge to the Integrity Critical Safety Function |
| D. | CONTINUE | a challenge to the Integrity Critical Safety Function |

38. Unit 1 is operating at 100% power when the 1B SGFP trips.

Which one of the following completes the statements below for the 1B SGFP?

The HIGH PRESS. GOV. VALVE CLOSED light is (1) .

The LOW PRESS. GOV. VALVE CLOSED light is (2) .

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | LIT | LIT |
| B. | LIT | NOT lit |
| C. | NOT lit | LIT |
| D. | NOT lit | NOT lit |

39. Unit 2 is operating at 100% power when a SG tube leak occurs.

Which one of the following completes the statement below?

When R-23A, SGBD HX OUTLET, alarms, it will cause _____, to automatically close.

- A. HV-7614A/B/C, 2A/B/C SGBD ISO
- B. FCV-1152, SGB INLET STOP VALVE
- C. RCV-023B, SGBD DISCH TO ENVIRONMENT
- D. HV-7697A/B, 7698A/B and 7699A/B, 2A/B/C SGBD ISO

40. Unit 1 is operating at 33% power and the following conditions exist:

- 1A and 1B Condensate pumps are running.
- 1C Condensate pump is in OFF with a CAUTION TAG that says, "EMERGENCY USE ONLY."
- 1A SGFP is running.

Subsequently, the 1B Condensate pump trips and the following conditions are observed:

KB4, SGFP SUCTION PRESS LOW, comes into alarm and the operating crew observes the following on PR4039, SGFP SUCT PRESS:

<u>Time</u>				
<u>0 sec</u>	<u>10 sec</u>	<u>20 sec</u>	<u>30 sec</u>	<u>40 sec</u>
300 psig	275 psig	265 psig	270 psig	285 psig

At time 20 seconds, the 1C condensate pump was started.

Which one of the following completes the statements below?

At time 30 seconds, the 1A SGFP (1) be tripped.

The operating crew is required to (2).

- A. 1) will NOT
2) rapidly reduce Turbine load using AOP-17.1, Rapid Turbine Power Reduction
- B. 1) will NOT
2) check SGFP suction pressure stabilizes
- C. 1) WILL
2) trip the Reactor and enter EEP-0.0, Reactor Trip or Safety Injection.
- D. 1) WILL
2) trip the Main Turbine and enter AOP-3.0, Turbine Trip Below P-9 Setpoint.

41. Unit 1 is in Mode 3 with the following conditions:

- 1A MDAFW pump was started per UOP-1.2, Startup of Unit From Cold Shutdown to Hot Standby.
- There are no other AFW pumps running.
- All SG NR levels are 65%.

Subsequently, power is lost to the 1A Startup Transformer.

Which one of the following completes the statements below?

The TDAFW Pump (1) be running.

Total design AFW flow rate will be approximately (2) gpm.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | will NOT | 350 |
| B. | will NOT | 700 |
| C. | WILL | 700 |
| D. | WILL | 1050 |

42. Unit 1 was operating at 100% power when a Reactor Trip occurred and the following conditions exist:

- ESP-0.1, Reactor Trip Response, has just been entered.
- Pressurizer level is 12% and slowly lowering.
- SG NR levels are 40% and slowly rising.
- Tavg is 534°F and slowly lowering.
- RCS pressure is 2050 psig and slowly lowering.

Which one of the following actions will be performed FIRST as required by ESP-0.1 to address the cooldown?

- A. Minimize total AFW flow.
- B. Emergency borate the RCS.
- C. Close all MSIVs and MSIV Bypass Valves.
- D. Manually initiate SI and return to EEP-0.0, Reactor Trip or Safety Injection.

43. Unit 2 is operating at 100% power. The following conditions exist:

- SGBD is on service.
- #1 WMT release is in progress.
- The service water pond level has dropped to 179 feet, 10 inches.

Which one of the following combinations predicts the plant response to the change in pond level?

- A. 1) SW Dilution Flow on FR-4107, SW DILUTION FLOW, will lower;
2) RCV-023B, SGBD DISCH TO ENVIRONMENT, will automatically close.
- B. 1) SW Dilution Flow on FR-4107, SW DILUTION FLOW, will lower;
2) RCV-018, WMT DISCH TO ENVIRONMENT, will automatically close.
- C. 1) SW Pressure on PI-3001A & B, SW TO CCW HX HDR PRESS, will lower;
2) PCV-562 and 563, TRN B (A) DILUTION BYPASS PCV, will fully open.
- D. 1) SW Pressure on PI-3001A & B, SW TO CCW HX HDR PRESS, will lower;
2) MOV-538 and 539, SW B (A) HDR EMERG RECIRC TO POND, will fully open.

44. The following conditions exist on Unit 2:

- DG02-2, 2G 4160 V bus tie to 2L 4160 V bus, has tripped opened.

Which one of the following completes the statement below?

The ____ has lost Service Water cooling.

- A. 2C Instrument Air Compressor
- B. 2C Reactor Coolant Pump Motor Air Cooler
- C. 2C Component Cooling Water Heat Exchanger
- D. Steam Generator Blowdown Heat Exchanger

45. Unit 1 has experienced a Reactor trip with the following conditions:

- A Loss of All AC has occurred.
- ECP-0.0, Loss of All AC Power, is in progress.

Which one of the following completes the statements below?

The 1B Aux Building DC bus voltage will (1).

Per ECP-0.0, there may not be enough DC capacity to start a DG and sequence needed loads if power is not restored to the 125V DC battery chargers on each train within a MINIMUM of (2).

- A. 1) drop slowly at first; then later drop rapidly as the battery nears exhaustion
2) 30 min
- B. 1) drop slowly at first; then later drop rapidly as the battery nears exhaustion
2) 90 min
- C. 1) drop at a constant, linear rate the entire time the battery discharges
2) 30 min
- D. 1) drop at a constant, linear rate the entire time the battery discharges
2) 90 min

46. A loss of all AC power has occurred on Unit 1 and the following conditions exist:

- VA2, 1B DG GEN FAULT TRIP, has come into alarm.
- The crew has completed the step in ECP-0.0, Loss Of All AC Power, to verify breakers for major loads OPEN.
- A Safety Injection occurs on Unit 1 at this time.

Which one of the following completes the statements below?

The 2C DG will be started from the EPB in (1) using the START pushbutton.

All ESF loads will (2).

- A. 1) Mode 2
2) automatically start
- B. 1) Mode 2
2) have to be manually aligned
- C. 1) Mode 1
2) automatically start
- D. 1) Mode 1
2) have to be manually aligned

47. Unit 1 is operating at 100% power with the following conditions:

- A problem with 1B DG starting air system has occurred.
- The B Air receiver has been tagged out.

Which one of the following completes the statement below?

A MINIMUM of (1) psig must be available in the remaining air receiver to ensure five (5) start attempts are available.

1B DG's required minimum time to reach rated speed and voltage is (2) seconds after receiving an emergency start signal.

	<u>(1)</u>	<u>(2)</u>
A.	200	7
B.	200	12
C.	350	7
D.	350	12

48. Unit 1 was operating at 100% power when the following occurred:

- A complete loss of instrument air caused an automatic Reactor Trip.

The following conditions exist:

- All AFW pumps are running.
- All SG NR Levels are 25% and rising.
- The Shift Supervisor has directed AFW flow to be reduced.

Per AOP-6.0, Loss of Instrument Air, which one of the following methods below will be successful in reducing AFW flow?

Valve nomenclature:

- HV-3228A / B / C, TDAFWP TO 1A/1B/1C SG
- MOV-3764A / D / F, MDAFWP TO 1A/1B/1C SG ISO
- MOV-3350A / B / C, AFW TO 1A/1B/1C SG STOP VLV

- A. Place BOTH MDAFW pump MCB hand switches in the STOP position and release them.
- B. Throttle HV-3228A / B / C on the MCB.
- C. Close MOV-3764A / D / F on the BOP.
- D. Close MOV-3350A / B / C on the MCB.

49. There is a fire in the Control Room and the following conditions exist for Unit 1:

- FNP-1-AOP-28.2, Fire In The Control Room, has been entered.

Which one of the following completes the statements below?

During the conduct of AOP-28.2, the Diesel Generators are required to be placed in (1) and the output breakers (2) automatically close when the DGs are started after a Loss of Offsite Power.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | MODE 3 | WILL |
| B. | MODE 3 | will NOT |
| C. | MODE 4 | WILL |
| D. | MODE 4 | will NOT |

50. Unit 1 is operating at 100% power with the following conditions:

- The 1A Waste Gas Compressor is running and aligned to #7 WGDT.
- R-13, WGC SUCT, alarms.

Subsequently, the #7 WGDT relief valve lifts and fails to reset.

Which one of the following completes the statements below?

R-22, VENT STACK GAS, (1) trend up.

#7 WGDT relief valve (2) be manually isolated.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | WILL | CANNOT |
| B. | WILL | CAN |
| C. | will NOT | CANNOT |
| D. | will NOT | CAN |

51. Unit 1 is operating at 100% when the following condition occurs:

- R-19, SGBD SAMPLE, fails HIGH.

Which one of the following completes the statements below?

(1) valves will automatically close.

Per SOP-45.0, Radiation Monitoring System, the actions required to allow the Shift Chemist to obtain a sample of the SGs is to (2) .

- A. 1) HV-3328, HV-3329 AND HV-3330, STEAM GEN 1A/1B/1C SAMPLE ISO,
2) pull the INSTRUMENT power fuses for R-19
- B. 1) HV-3328, HV-3329 AND HV-3330, STEAM GEN 1A/1B/1C SAMPLE ISO,
2) place R-19 Operations Selector Switch to the RESET position
- C. 1) HV-3179A, 3180A, AND 3181A, STEAM GEN 1A/1B/1C LOWER BLOWDOWN,
2) pull the INSTRUMENT power fuses for R-19
- D. 1) HV-3179A, 3180A, AND 3181A, STEAM GEN 1A/1B/1C LOWER BLOWDOWN,
2) place R-19 Operations Selector Switch to the RESET position

52. Unit 1 is operating at 100% power.

Which one of the following meets the **MINIMUM** reactor coolant leakage detection system(s) that must be in operation and OPERABLE to prevent entering a REQUIRED ACTION STATEMENT of Tech Spec 3.4.15, RCS Leakage Detection Instrumentation?

- R-11 - CTMT PARTICULATE
- R-12 - CTMT GAS
- Containment Air Cooler Condensate Level Monitoring System (CACCLMS)

- A. R-11 ONLY
- B. R-11 AND R-12
- C. The CACCLMS ONLY
- D. R-12 AND the CACCLMS

53. Unit 1 has been operating at 100% power and the Gross Failed Fuel Detector (GFFD) has been steady at 2000 cpm during the entire fuel cycle.

At 1000:

- FG5, GFFD SYS TRBL, has just come into alarm.

At 1015:

- A Reactor Trip and Safety Injection occurs.

Which one of the following completes the statements below?

The **minimum** GFFD reading that would cause FG5 to come into alarm is (1) above background.

At 1020, flow through the GFFD (2) be isolated.

- | | <u>(1)</u> | <u>(2)</u> |
|----|-------------------------|------------|
| A. | 1 X 10 ⁴ cpm | will NOT |
| B. | 1 X 10 ⁴ cpm | WILL |
| C. | 1 X 10 ⁵ cpm | will NOT |
| D. | 1 X 10 ⁵ cpm | WILL |

54. Unit 1 is stable in Mode 3 following a Reactor Trip when the following conditions occur:

- Power has been lost to 4160V AC buses G, J, and L.

Which one of the following lists the valves that the OATC can close from the MCB to isolate a Service Water rupture in the Turbine Building?

Q1P16V514, SW TO TURB BLDG ISO B TRN

Q1P16V515, SW TO TURB BLDG ISO A TRN

Q1P16V516, SW TO TURB BLDG ISO A TRN

Q1P16V517, SW TO TURB BLDG ISO B TRN

- A. MOVs 514 and 517
- B. MOVs 514 and 516
- C. MOVs 515 and 517
- D. MOVs 515 and 516

55. Unit 1 is operating at 100% power with the following conditions:

- 1A Containment Cooler is isolated per SOP-12.1, Containment Air Cooling System.
- The following valves are closed with power available:
 - MOV-3019A, SW TO 1A CTMT CLR AND CTMT FPS
 - MOV-3441A, SW FROM 1A CTMT CLR
 - MOV-3024A, EMERG SW FROM 1A CTMT CLR
- MOV-3023A, 1A CTMT CLR SW DISCH, is OPEN.

Subsequently, a steam break occurs and containment pressure rises to 5 psig.

Which one of the following completes the statement below?

1A Containment Cooler service water flow will be _____.

- A. 0 gpm
- B. approximately 600 gpm
- C. approximately 800 gpm
- D. approximately 2000 gpm

56. Unit 1 is at 100% power with the following conditions:

- 1B DG is running for STP-80.1, Diesel Generator 1B Operability Test.
- The 1B DG is currently loaded to 1 MW.
- DG01, 1B S/U XFMR TO 1G 4160 V BUS, breaker is CLOSED.

Subsequently, the following occurs:

- WE2, 1F, 4KV BUS OV-OR-UV OR LOSS OF DC, and VE2, 1G, 4KV BUS OV-OR-UV OR LOSS OF DC, come into alarm.
- 1F and 1G 4160V bus voltages are reading 3825 volts.
- The crew has entered AOP-5.2, Degraded Grid.

Per AOP-5.2, which one of the following completes the statements below?

The 1B DG (1).

The reason for the above action is (2).

- A. 1) is required to be secured and aligned for AUTO START
2) because this places the 1B DG is in the most reliable condition
- B. 1) is required to be secured and aligned for AUTO START
2) because the LOSP Sequencer will not run LOSP loads if DG01 opens with 1B DG output breaker aligned to 1G 4160V bus
- C. 1) load is required to be raised to FULL LOAD and DG01 opened
2) to ensure adequate voltage for safety related equipment
- D. 1) load is required to be raised to FULL LOAD and DG01 opened
2) to prevent extended low load operation which would result in the buildup of combustion products in the engine exhausts

57. The following conditions exist on Unit 1:

- A rupture in the Instrument Air system has occurred.
- Instrument Air header pressure is 65 psig and lowering slowly.

Which one of the following completes the statements below?

V-902, AIR DRYER AUTO BYP, will be (1) .

V-904, NON-ESSENTIAL IA HDR AUTO ISO, will be (2) .

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | OPEN | OPEN |
| B. | OPEN | CLOSED |
| C. | CLOSED | OPEN |
| D. | CLOSED | CLOSED |

58. The following plant conditions exist on Unit 1:

- The Reactor has been tripped due to loss of Instrument Air.
- The operating crew is performing the actions of ESP-0.1, Reactor Trip Response.
- SG Atmospheric Relief Valves (ARVs) are aligned per SOP-62.0, Emergency Air System.

Subsequently, the operator applies 18 psig to the valve actuator for PCV-3371A, 1A MS ATMOS REL VLV.

Which one of the following completes the statements below?

PCV-3371A (1) open.

If PCV-3371A were fully open, (2).

A. 1) IS

2) a High Steam Flow - Lo Lo Tavg Main Steam Isolation may occur

B. 1) IS

2) Technical Specification cooldown limits may be exceeded

C. 1) is NOT

2) a High Steam Flow - Lo Lo Tavg Main Steam Isolation may occur

D. 1) is NOT

2) Technical Specification cooldown limits may be exceeded

59. Unit 1 has experienced a large break LOCA and the following conditions exist:

- PT-953, CTMT PRESS has reached the PHASE B setpoint.

Which one of the following completes the statement below?

A MINIMUM of (1) OR (2) PHASE B CTMT ISO CS ACTUATION handswitch(es) is(are) required to actuate a Phase B isolation.

- A. 1) 1 additional Containment pressure channel reaching 16.2 psig
2) TWO
- B. 1) 2 additional Containment pressure channels reaching 16.2 psig
2) ONE
- C. 1) 1 additional Containment pressure channel reaching 27 psig
2) TWO
- D. 1) 2 additional Containment pressure channels reaching 27 psig
2) ONE

60. The electronic log is malfunctioning. The control room has shifted to manual logs and the following entries have been made:

- 1000 Q1E21V061A, HHSI to 1C RCS loop CL iso, as left position; 1.5 turns OPEN.
- 1012 Started 1B CCW Pump.

At 1030:

- The OATC recognizes that an error was made on the 1000 log entry.
- Q1E21V061A should have been logged as throttled to 1.25 turns OPEN.

Per SOP-0.11, Watch Station Tours and Operator Logs, the OATC is required to correct the 1000 log entry by which one of the following methods?

- A. • Circle the incorrect entry in red.
 - Enter the correct information next to the incorrect information and record the date and initial.
- B. • Circle the incorrect entry in red.
 - At 1030 make a log entry with the correct information and designate it as a LATE ENTRY.
- C. • Draw a single line through the incorrect entry.
 - Enter the correct information next to the incorrect information and record the date and initial.
- D. • Draw a single line through the incorrect entry.
 - At 1030 make a log entry with the correct information and designate it as a LATE ENTRY.

61. Both Units are operating at 100% power with the following conditions:

- A non-licensed Fire Protection Administrator who is qualified as a Shift Communicator is on shift. *Note: The FPA is the designated Shift Communicator.*

Which one of the following completes the statements below?

Per EIP-0.0, Emergency Organization, a **minimum** of (1) licensed Plant Operators is required to staff the shift.

The **maximum** number of hours that a Plant Operator may work in any 24 hour period is (2) per NMP-AD-016-003, Scheduling and Calculating Work Hours.

	<u>(1)</u>	<u>(2)</u>
A.	3	12
B.	3	16
C.	4	12
D.	4	16

62. Unit 1 is operating at 100% power when the following occurs:

- STP-4.1, 1A Charging Pump Quarterly Inservice Test, is in progress.
- 1A Charging pump failed to start when the handswitch was taken to START.

Which one of the following are the required actions per SOP-0.0, General Instructions to Operations Personnel?

- A. Obtain Shift Manager's permission, THEN take the handswitch to START a second time.
- B. Take the handswitch to START a second time, THEN write a Condition Report to document the action.
- C. Write a condition report documenting the event and contact Maintenance.
- D. The System Operator will rackout and perform a visual inspection of the circuit breaker and write a condition report.

63. Per Tech Specs Bases 3.3.1, Reactor Trip System (RTS) Instrumentation, what is the basis of the Pressurizer Water Level - High Reactor trip?

- A. Protects the pressurizer safety valves against water relief.
- B. Provides the primary protection for preventing RCS over pressurization.
- C. Protects against loss of pressure control due to spray nozzle being submerged.
- D. Provides protection against exceeding containment design pressure in the event of a LOCA.

64. Unit 1 is in Mode 6 for a refueling outage.

- Two Plant Operators are required to enter a room that is posted as a **Locked High Radiation Area (LHRA)** to perform work.

Which one of the following completes the statements below?

The radiation level at which this posting is required is (1).

The LHRA key is obtained from (2).

- A. 1) > 100 mrem/hr
2) Health Physics Supervision
- B. 1) > 100 mrem/hr
2) the Shift Support Supervisor (SSS)
- C. 1) > 1000 mrem/hr
2) Health Physics Supervision
- D. 1) > 1000 mrem/hr
2) the Shift Support Supervisor (SSS)

65. Which one of the following completes the statements below for entry into the Dry Cask Storage Radiation Controlled Area (RCA)?

Per AP-42, Access Control, the operator (1) required to log in on the normal Auxiliary Building Access Control System (ACS) terminal prior to entering the Dry Cask Storage Area RCA.

Upon exiting from the Dry Cask RCA, the operator is required to perform a 2 minute frisk and also use the (2).

- A. 1) IS
2) Primary Access Point (PAP) exit portal monitors
- B. 1) IS
2) Auxiliary Building RCA exit portal monitors
- C. 1) is NOT
2) Primary Access Point (PAP) exit portal monitors
- D. 1) is NOT
2) Auxiliary Building RCA exit portal monitors

66. Which one of the following completes the statement below?

An employee who is a fully documented radiation worker and DOES NOT declare her pregnancy has an annual FNP Administrative TEDE limit of _____ .

- A. 450 mRem
- B. 500 mRem
- C. 2000 mRem
- D. 5000 mRem

67. Unit 1 is performing the actions of EEP-3.0, Steam Generator Tube Rupture, due to a tube rupture in the 1B SG.

- The 1B SG Narrow range level is 36% and rising.

Which one of the following completes the statements below?

The 1B SG narrow range level (1) adequate to begin the initial RCS cooldown.

The operational implication of having sufficient level in the 1B SG prior to the cooldown is to (2).

A. 1) is NOT

2) ensure a secondary side heat sink

B. 1) is NOT

2) prevent SG depressurization during the RCS cooldown

C. 1) IS

2) ensure a secondary side heat sink

D. 1) IS

2) prevent SG depressurization during the RCS cooldown

68. FRP-Z.1, Response to High Containment Pressure, has the following caution:

IF ECP-1.1, Loss of Emergency Coolant Recirculation, is in effect, THEN Containment Spray should be operated as directed in ECP-1.1.

Which one of the following describes the bases for giving priority to ECP-1.1?

ECP-1.1 directs the operation of the Containment Spray (CS) pumps to ensure _____.

- A. RWST level is conserved
- B. adequate NPSH for the RHR pumps is available
- C. the maximum available Containment heat removal systems are running
- D. automatic swapover of the CS pumps to the Containment sump is prevented

69. Unit 1 is operating at 100% power and the following conditions exist:

- #1 Waste Monitor Tank (WMT) release is in progress.
- The Unit 1 Rad Side SO is at the RCA exit preparing to enter the portal monitors.

Subsequently, the plant emergency alarms sounds and an announcement is made declaring a Site Area Emergency.

Which one of the following completes the statements below?

The Rad Side SO will go to the designated assembly area (1).

The designated assembly area for the Rad Side SO is the (2).

- A. 1) after securing the #1 WMT release
2) Operations Support Center (OSC)
- B. 1) after securing the #1 WMT release
2) Control Room
- C. 1) immediately
2) Operations Support Center (OSC)
- D. 1) immediately
2) Control Room

70. The crew has transitioned to ECP-1.2, LOCA Outside Containment.

- Step 2 of ECP-1.2 is in progress and the first flow path has been isolated.

The following conditions exist:

- Aux Building radiation levels are rising slowly.
- Safety Injection flow is stable.
- Aux Building sump levels are rising slowly.
- PI-402 and 403, RCS 1C/1A LOOP RCS NR PRESS, are rising.

Which one of the following completes the statements below per ECP-1.2?

The first flow path that was isolated was (1) injection.

The intersystem LOCA (2) been isolated.

- | | <u>(1)</u> | <u>(2)</u> |
|----|--------------|------------|
| A. | RCP seal | HAS |
| B. | RCP seal | has NOT |
| C. | RHR cold leg | HAS |
| D. | RHR cold leg | has NOT |

71. Unit 1 was operating at 100% power when a Reactor Trip and SI occurred due to a steam line break in containment. The following conditions exist:

- The operating crew is performing the actions of EEP-2.0, Faulted Steam Generator Isolation.
- The maximum total AFW flow rate that can be achieved is 350 GPM.
- Containment pressure is 6 psig and falling.
- SG Narrow range levels are:
 - 1A - Off Scale Low
 - 1B - 32% and decreasing slowly
 - 1C - 34% and decreasing slowly

Which one of the following completes the statement below?

Secondary heat sink (1) adequate because (2).

- A. 1) IS
2) 1B and 1C SG levels are sufficient
- B. 1) is NOT
2) Neither SG levels nor AFW flow capability is sufficient
- C. 1) IS
2) AFW flow capability is sufficient
- D. 1) is NOT
2) 1B and 1C SG levels are sufficient but AFW flow capability is NOT sufficient

72. Unit 2 has experienced a large steam break inside containment and the following conditions exist:

- 1A SG Wide Range level indicates 0%.
- AFW flow to 1B and 1C SG is currently 500 gpm.
- FRP-P.1, Response To Imminent Pressurized Thermal Shock, has been entered on a RED Path.
- RCS cold leg temperature continues to decrease slowly.
- RCS pressure is 1500 psig and stable.

Which one of the following completes the statements below concerning the mitigation strategy of FRP-P.1?

The RCS cooldown must (1).

An RCS pressure reduction (2) required.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | continue | is NOT |
| B. | continue | IS |
| C. | be stopped | is NOT |
| D. | be stopped | IS |

73. A Dual Unit LOSP with a LOCA on Unit 1 has occurred and the following conditions exist:

- EEP-1.0, Loss of Reactor or Secondary Coolant, is in progress.

At 1000:

- WA2, 1-2A DG GEN FAULT TRIP, comes into alarm.

At 1015:

- The following alarms are received:
 - CF3, 1A OR 1B RHR PUMP OVERLOAD TRIP
 - CH2, RWST LVL A TRN LO
 - CH3, RWST LVL B TRN LO

Which one of the following states:

- 1) the status of Unit 1 emergency recirculation capability
and
 - 2) the action(s) that the applicable procedure(s) direct?
- A. 1) One train ONLY of emergency recirculation capability has been lost.
2) Transfer to Cold Leg **AND** Containment Spray recirculation at this time.
- B. 1) One train ONLY of emergency recirculation capability has been lost.
2) Transfer to Cold Leg recirculation ONLY.
- C. 1) Both trains of emergency recirculation capability have been lost.
2) Minimize HHSI flow to the minimum required to remove decay heat while attempting to restore at least one train of emergency recirculation.
- D. 1) Both trains of emergency recirculation capability have been lost.
2) Secure HHSI pumps while attempting to restore at least one train of emergency recirculation.

74. The crew is responding to a Steam Line Break on Unit 1.

- Due to equipment failures, ECP-2.1, Uncontrolled Depressurization of All Steam Generators, has been entered.
- All SG Narrow Range levels are 25% and lowering.

Which one of the following completes the statement below?

Per ECP-2.1, AFW flow will be adjusted to (1) .

- A. 0 gpm to **each** SG to prevent excessive cooldown
- B. at least 20 gpm to **each** SG to prevent dryout of the SGs
- C. at least 20 gpm **total** AFW flow to minimize thermal stress to the SGs
- D. at least 395 gpm **total** AFW flow to maintain adequate heat sink

75. Which one of the following is the **first** Major Action Category in FRP-Z.2, Response To Containment Flooding, and reason for this in accordance with the background document?

- A. Identify unexpected sources of water in the sump since flooding could damage critical plant equipment.
- B. Evaluate the ECCS system status to determine a strategy to transition to simultaneous cold and hot leg recirculation.
- C. Have chemistry evaluate sump level, chemistry, and activity level to determine a strategy to transfer excess water out of containment.
- D. Notify the TSC of sump chemistry, and activity level to determine potential changes in the planned transition to simultaneous cold and hot leg recirculation.

REFERENCES

UNIT 1

10/18/12 9:25:43
FNP-1-AOP-2.0

STEAM GENERATOR TUBE LEAKAGE

Version 35.0

Step	Action/Expected Response	Response Not Obtained
34.2	<p>[CA] <u>WHEN</u> one of the following conditions occur, <u>THEN</u> stop the RCS pressure reduction.</p> <p>[] RCS pressure is less than affected SG pressure, <u>AND</u> pressurizer level greater than 15%.</p> <p style="padding-left: 40px;"><u>OR</u></p> <p>[] Pressurizer level greater than 63%.</p> <p style="padding-left: 40px;"><u>OR</u></p> <p>[] SUBCOOLED MARGIN MONITOR indication less than 16°F subcooled in CETC mode.</p>	

ANSWER KEY

ES-401

Site-Specific SRO Written Examination
Cover Sheet

Form ES-401-8

U.S. Nuclear Regulatory Commission Site-Specific SRO Written Examination	
Applicant Information	
Name:	
Date:	Facility/Unit:
Region: I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/>	Reactor Type: W <input type="checkbox"/> CE <input type="checkbox"/> BW <input type="checkbox"/> GE <input type="checkbox"/>
Start Time:	Finish Time:
Instructions	
<p>Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination you must achieve a final grade of at least 80.00 percent overall, with 70.00 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require a final grade of 80.00 percent to pass. You have 8 hours to complete the combined examination, and 3 hours if you are only taking the SRO portion.</p>	
Applicant Certification	
All work done on this examination is my own. I have neither given nor received aid.	
_____ Applicant's Signature	
Results	
RO/SRO-Only/Total Examination Values	_____ / _____ / _____ Points
Applicant's Scores	_____ / _____ / _____ Points
Applicant's Grade	_____ / _____ / _____ Percent

ANSWER KEY

Unit 1 is operating at 85% power with the following conditions:

- STP-33.0B, Solid State Protection System Train B Operability Test, is in progress.
- The 'B' Reactor Trip Bypass Breaker has been racked in and closed.
- Control Bank D is at 203 steps.
- The Rod Control Bank Selector Switch is in AUTO.
- PS/446Z, FIRST STG IMPULSE PRESS SEL SWITCH, is in the Channel IV / PT447 position.

Subsequently, the following occurs:

- PT-447, TURB FIRST STG PRESS, fails HIGH.

Which one of the following completes the statements below?

The control rods will (1).

If the reactor is manually tripped at this time, the 'B' Reactor Trip Bypass Breaker (2) light will be LIT.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | insert | RED |
| B. | insert | GREEN |
| C✓ | withdraw | GREEN |
| D. | withdraw | RED |

PT-447 failing low will cause rods to insert continuously and failing high will cause rods to withdraw.

Per **FSD-A181007**, Figure 2 Sheet 2, a manual reactor trip will open the 'B' Reactor Trip Bypass Breaker.

Distracter Analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible if the applicant reverses the system response so that the rod control system would insert rods to suppress the indicated power rise due to the failure instead of trying to adjust actual reactor power and Tavg to match the failed indication.
- Second part is incorrect (See C.2). Plausible if the applicant believes that during the performance of STP-33.0B, the 'B' Reactor Trip Bypass Breaker will not open since that train is being tested.
- B. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See C.2).
- C. Correct. First part is correct. Impulse pressure, PT-477 is used to calculate Tref. Since PT-447 failed high, Tref fails to the 100% power Tref and the rod control system will step rods out in order to raise current Tavg to match Tref. Impulse pressure is also used to determine turbine power as compared to reactor power in the rod control circuitry. When PT-447 fails high, the rapid rate of change of impulse power as compared to reactor power will also cause rods to step out while impulse pressure is changing.
- This scenario has been run on desktop simulator and the rods will step out (IC 058).
- Second part is correct. FSD A18007, Figure 2 sheet 2, shows that a manual trip actuation will open the 'B' Reactor Trip Bypass Breaker.
- D. Incorrect. First part is correct (See C.1).
- Second part is incorrect (See A.2).

K/A: **001AA2.01** Continuous Rod Withdrawal - Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal : Reactor tripped breaker indicator

Importance Rating: 4.2 4.2

Technical Reference: FSD-A181007, Reactor Protection System, Ver 18
FNP-1-EEP-0.0, Reactor Trip or Safety Injection, Ver 44
FNP-1-AOP-100, Instrumentation Malfunction, Ver 12

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if entry into AOP-100, Instrument Malfunction is required.
(OPS-52521Q02)

ANALYZE plant conditions and DETERMINE the successful completion of any step in (1) EEP-0, Reactor Trip or Safety Injection [...]. (OPS-52530A07)

Question History: WATTS BAR MAY 09

K/A match: This question requires the applicant to **determine that a continuous rod withdrawal is occurring** due to the failure of PT-447. After the reactor is tripped, the applicant is then required to **interpret the reactor trip bypass breaker indication as to whether or not it is open.**

SRO justification: N/A

2. 003A3.05 002

Unit 1 is in Mode 3 and preparing to start the 1C RCP.

Which one of the following completes the statements below per SOP-1.1, Reactor Coolant System?

The 1C RCP oil lift pump handswitch white light indicates (1) .

The 1C RCP breaker closing operation (2) interlocked with a 2 minute time delay.

- A. 1) BOTH the oil lift pressure has reached 600 psig AND 2 minutes have elapsed
2) is NOT
- B. 1) ONLY that the oil lift pressure has reached 600 psig
2) IS
- C✓ 1) ONLY that the oil lift pressure has reached 600 psig
2) is NOT
- D. 1) BOTH the oil lift pressure has reached 600 psig AND 2 minutes have elapsed
2) IS

SOP-1.1

3.6 DO NOT attempt to start a RCP unless its oil lift pump has been delivering oil to the upper thrust shoes for at least two minutes. Observe the oil lift pumps indicating lights to verify correct oil pump motor operation and oil pressure. The oil lift pumps should run at least 1 minute after the RCP's are started. **An interlock will prevent starting a RCP until 600 psig oil pressure is established.**

Note prior to step 4.3.11 - The oil lift pump must be operated for at least 2 minutes prior to starting the RCP.

4.3.18 Verify that the Oil Lift Pump for RCP 1C has run for at least two minutes, and is producing adequate pressure (white light ON).

Distracter Analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible since the procedure requires both conditions to be met before starting the RCP. The applicant could have the misconception that the light is associated with both the time and oil pressure.
- Second part is correct (See C.2).
- B. Incorrect. First part is correct (See C.1)
- Second part is incorrect (See C.2). Plausible if the applicant thinks that the procedural requirement of allowing the oil lift pump to run for at least two minutes is to satisfy a closing time delay interlock.
- C. Correct. First part is correct. RCP oil pressure must be a minimum of 600 psig for the white light to come on. This may occur in as little as 1 minute or as long as 6 minutes, but the white light is not time dependent, it is only pressure dependent.
- Second part is correct. The RCP breaker interlock is with the oil pressure switch not the 2 minute procedural requirement.
- D. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (B.2).

K/A: **003A3.05** Reactor Coolant Pump System (RCPS) - Ability to monitor automatic operation of the RCPS, including: RCP lube oil and bearing lift pumps

Importance Rating: 2.7* 2.6

Technical Reference: FNP-1-SOP-1.1, Reactor Coolant System, Ver 47.2

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Reactor Coolant Pumps, to include the following (OPS-40301D02):

- Oil lift system

Question History: MOD VOGTLE 12

K/A match: The only AUTO features of the RCP LO and Brg lift pump is the white light will come on when the pressure reaches 600 psig and then the permissive will clear at 600 psig allowing the RCP breaker to be closed. Applicant must be **able to monitor the white indicating light for the RCP oil lift pump** which indicates the discharge pressure of that pump is > 600 psig and have knowledge that when the light comes on, the permissive **automatically** allows the RCP circuit breaker being capable of closing due to oil pressure and is time.

SRO justification: N/A

3. 004K3.08 003

Unit 1 was operating at 100% power when the following occurred:

- The air supply to FCV-122, CHG FLOW REG, actuator has been severed and the valve has repositioned to its failed position.

Which ONE of the following completes the statement below?

FCV-122 is (1) and RCP seal injection flow will (2).

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | CLOSED | LOWER |
| B. | CLOSED | RISE |
| C✓ | OPEN | LOWER |
| D. | OPEN | RISE |

AOP-6.0 Table 1:

Component No.	Name	Failed Position
Q1E21V347 (1-CVC-FCV-122)	CHG FLOW REG	OPEN

ARP-1.4, DC4 - SEAL WTR INJ FLTR HI Δ PProbable Cause.

2. High seal injection flow rate.
3. Chg Flow Q1E21FCV122. (Also labeled Q1E21V347) failed closed.

Distracter Analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible if the applicant does recall the fail position of FCV-122.
- Second part is correct (See C.2). Logical connection to the first part if the applicant believes that FCV-122 is upstream of the seal injection line and the closure of FCV-122 would stop seal injection flow.
- B. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (See C.2). Logical connection to the first part if the applicant thought that FCV-122 failed closed since it would be the correct seal injection response for this condition.
- C. Correct First part is correct. FCV-122 fails open.
- Second part is correct. The closure of FCV-122 will cause high seal injection flow and thus high filter DP due to all of the charging pump discharge flow being directed to the seal injection filter (See ARP-1.4, DC4 above). Conversely if the air line fails on FCV-122, the valve will fail open and a majority of the charging pump discharge flow will be directed to the normal charging path causing the seal injection flow to go down. (See P&ID D-175039, SH 6, Chemical and Vol Control System for system flow.)
- D. Incorrect. First part is correct (See C.1).
- Second part is incorrect (See C.2). Logical connection to the first part if the applicant assumes that more charging flow equates to more seal injection flow.

K/A: **004K3.08** Chemical and Volume Control System (CVCS) - Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: RCP seal injection

Importance Rating: 3.6 3.8

Technical Reference: P&ID D-175039, SH 6, Chemical and Vol Control System Ver 10
FNP-1-AOP-6.0, Loss of Instrument Air, Ver 40
FNP-1-ARP-1.4, DC4, Ver 53

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Chemical and Volume Control System, to include the components found on Figure 3, Chemical and Volume Control System and Figure 4, RCP-Seal Injection System (OPS-40301F02).

Question History: SURRY 09 1ST AUDIT

K/A match: The CVCS malfunction is that the air line to FCV-122 has been severed. Applicant must know how this **CVCS malfunction affects seal injection flow.**

SRO justification: N/A

4. 005A2.02 004

The following conditions exist on Unit 1:

- The operating crew is cooling down per UOP-2.2, Shutdown of Unit From Hot Standby to Cold Shutdown.
- MODE 5 has just been entered and the following conditions exist:
 - RCS temperature is 195°F.
 - BOTH 1A AND 1B RHR pumps are running in the cooldown mode.

Subsequently, PT-402, 1C LOOP RCS PRESS, fails HIGH.

Which one of the following describes the minimum required action(s), if any, to be performed per AOP-12.0, Residual Heat Removal Malfunction?

- A. No actions are required.
- B✓ Secure the 1A RHR pump ONLY.
- C. Secure the 1B RHR pump ONLY.
- D. Secure BOTH 1A AND 1B RHR pumps.

K/A: **005A2.02**

Residual Heat Removal System (RHRS) - Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Pressure transient protection during cold shutdown

Importance Rating: 3.5 3.7

Technical Reference: FSD-A181002, Residual Heat Removal, Ver 44
FNP-1-AOP-12, Residual Heat Removal Malfunction, Ver 25
FNP Technical Specifications, Ver 190

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if entry into AOP-12.0, RHR System Malfunction and/or STP-18.4, Containment Closure is required. (OPS-52520L02)

Question History: MOD ANO 05

K/A match: The applicant has to predict **how the failure of the loop pressure transmitter affects the RHR system** in that it removes one of the required Low Temperature Over Pressure Protection System reliefs from service. The applicant will apply that prediction to **AOP-12 to get to the action required to mitigate this malfunction.**

SRO justification: N/A

Unit 1 was operating at 100% power when the following conditions occurred:

- A LOCA is in progress.
- The operating crew is performing the actions of EEP-0.0, Reactor Trip or Safety Injection, and is at the step to "Check RCS intact".
- RCS pressure is 475 psig and lowering.

Which one of the following describes the current status of the ECCS system?

	<u>SI Accumulator Level</u>	<u>RHR Injection Flow</u>
A.	Stable and on-scale	Zero
B✓	Dropping or off-scale low	Zero
C.	Dropping or off-scale low	Rising
D.	Stable and on-scale	Rising

Desktop simulator IC-73 (100% power) - 10,000 gpm LOCA produced 477 psig in the RCS in ~17 min. It takes an estimated 15± minutes to get to the "Check RCS intact" step of EEP-1 which makes the value of RCS pressure valid.

EEP-1

9. Check if LSHI Pumps should be stopped.

9.1 Check RCS pressure - GREATER THAN 275 psig {435 psig}

EEB-1

ERP Step Text: Check if LHSI Pumps should be stopped.

Purpose: To stop the low-head SI pumps if RCS pressure is above their shutoff head to prevent damage to the pumps

Basis: Upon safety injection initiation all safeguard pumps are started regardless of the possibility of high RCS pressure with respect to the low-head safety injection pump shutoff head. On low-head systems where the pump recirculates on a small volume circuit there is concern for pump and motor overheating. Shutdown of the pump and placement in the standby mode, when the RCS pressure meets the criteria outlined in this step, allows for future pump operability. If SI has not been previously reset and the low-head SI pumps should be stopped, SI should be reset prior to stopping the pumps. SI can be reset regardless of containment pressure.

FSD - A181009

3.3.1.1 3 Safety injection accumulators shall function as passive safeguards components to rapidly inject [...] whenever the RCS pressure decreases below the tank cover gas pressure of 601 - 649 psig due to a loss of coolant accident

Distracter Analysis

- A. Incorrect. First part is incorrect (See B.1). Plausible if the applicant is unfamiliar with the injection pressures of the accumulators. The

applicant may believe that RCS pressure is high enough to prevent accumulator injection.

Second part is correct (See B.2). Logical connection to the first part if the applicant recognizes that RHR injects at a lower pressure than the accumulators.

B. Correct.

First part is correct. FSD-A181009, 3.3.13. Safety injection accumulators shall function as passive safeguards components to rapidly inject [...] whenever the RCS pressure decreases below the tank cover gas pressure of 601- 649 psig due to a loss of coolant accident.

Second part is correct. At 500 psig in the RCS, the accumulators will have injected but the RCS pressure will be above the RHR shut off head pressure. EEP-1 uses 435 psig (Adverse, because containment pressure is > 4 psig) as the criteria for RHR pump shut off head. (See EEP-1 and EEB-1 above).

C. Incorrect.

First part is correct (See B.1).

Second part is incorrect (See B.2) Logical connection to the first part if the applicant is unfamiliar with the injection pressures of the RHR pumps. If the applicant knows that the accumulators are(have) injecting(ed), they may also assume that RCS pressure is low enough to allow RHR injection.

D. Incorrect.

First part is incorrect (See A.1).

Second part is incorrect (See B.2). Logical connection to the first part if the applicant is unfamiliar with the injection pressures of the RHR pumps. The applicant may believe that the RHR pumps inject before the accumulators.

The
K/A: **006K5.06** Emergency Core Cooling System (ECCS) - Knowledge of the operational implications of the following concepts as they apply to ECCS: Relationship between ECCS flow and RCS pressure

Importance Rating: 3.5 3.9

Technical Reference: FSD-A181009, CVCS/HHSI/Accumulators/RMWS, Ver 39
FNP-1-EEP-1.0, Loss of Reactor or Secondary Coolant, Ver 31
FNP-0-EEB-1.0, Specific Background Document for FNP-1/2-EEP-1.0, Ver 4

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Emergency Core Cooling System, to include the components found on Figure 2, Accumulators, Figure 3, Refueling Water Storage Tank, and Figure 4, Emergency Core Cooling System (OPS-40302C02).

Question History: SUMMER 11

K/A match: The applicant is required to know **which ECCS components are injecting into the core (flow) based on RCS pressure.**

SRO justification: N/A

Unit 1 has experienced a Reactor Trip and Safety Injection due to a faulted SG. The following conditions exist:

- The operating crew is performing EEP-2.0, Faulted Steam Generator Isolation.
- SCMM is in the CETC mode.
- RCS pressure is 1900 psig and rising slowly.
- At the step for verifying SI termination criteria, the crew notes that PT-457, PRZR PRESS, has failed LOW.

Which one of the following completes the statements below?

Subcooling margin calculated by A Train ICCMS will (1).

Subcooling margin calculated by B Train ICCMS will (2).

(1)

(2)

- | | | |
|----|-----------------|-----------------|
| A. | be affected | NOT be affected |
| B✓ | NOT be affected | be affected |
| C. | be affected | be affected |
| D. | NOT be affected | NOT be affected |

SOP-68:

3.2 The normal display mode for the SMM is the “CETC” mode. This displays the margin to saturation (°F) using the highest core exit thermocouple (excluding upper head) **and the lowest pressure**. The “RTD” mode displays the margin to saturation (°F) using the hottest reactor coolant system (RCS) RTD (Th or Tc) and the lowest pressure. **The pressure inputs are from PT-402 and 403 and from PT-455 for A-train and PT-457 for B-train.**

Distracter Analysis

- A. Incorrect. First part is incorrect (See B.1). Plausible if the applicant thinks that PT-457 inputs to 'A' train SMM.
- Second part is incorrect (See B.2). Logical connection to the first part if the applicant recognizes that PT-457 is train related but assumes it inputs to the wrong train.
- B. Correct. First part is correct. PT-457 inputs to 'B' Train so the 'A' Train is unaffected.
- Second part is correct. PT-457 inputs to 'B' Train and the SMM uses the lowest pressure therefore the subcooling value of the 'B' Train will be affected (lower).
- C. Incorrect. First part is incorrect (See B.1). Plausible if the applicant thinks that PT-455 and 457 input to both trains of SMM which is incorrect. If they did input to both trains, this would be a correct answer. PT-402 and 403 input to both trains. This is a common misconception.
- Second part is correct (See B.2) A logical connection to the first part if the applicant thinks that PT-455 and 457 input to both trains of SMM instead of PT-402 and 403 which would make this a correct answer.
- D. Incorrect. First part is correct (See B.1). Plausible if the applicant thinks that PT-455 inputs to 'A' Train and PT-456 inputs to 'B' Train instead of PT-457 which would make this a correct answer.
- Second part is incorrect (See D.1). Logical connection to the first part based on D.1 discussion.

K/A: **006K6.18** Emergency Core Cooling System (ECCS) - Knowledge of the effect of a loss or malfunction on the following will have on the ECCS: Subcooling margin indicators

Importance Rating: 3.6 3.9

Technical Reference: FNP-1-SOP-68.0, Inadequate Core Cooling Monitoring System, Ver 8.1

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the following components associated with the Inadequate Core Cooling Monitor System (OPS-52202E02):

- Subcooled Margin Monitor (SMM)

Question History: NEW

K/A match: At step 8 of EEP 2, the Shift Supervisor is required to evaluate plant conditions to determine if ECCS flow can be terminated. Part of this determination is evaluating subcooling. The applicant has to **know the effect of the loss of PT-457 on the subcooling margin monitors in order to be able to provide the Shift Supervisor the correct subcooling value.**

SRO justification: N/A

Unit 2 was operating at 2% power with a plant startup in progress per UOP-1.2, Startup of the Unit from Hot Standby to Minimum Load and the following conditions occurred:

At 1000:

- DG-15-2, 2B S/U XFMR TO 2G 4160V Bus, trips open.

At 1005:

- DF-01-2, 2A S/U XFMR TO 2F 4160V Bus, trips open.

Which one of the following completes the statements below **at 1006** with no operator actions taken?

The Reactor Trip breakers will be (1).

DRPI rod bottom lights (2) be LIT.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | OPEN | WILL |
| B. | OPEN | will NOT |
| C✓ | CLOSED | WILL |
| D. | CLOSED | will NOT |

FSD-181007

Figure 2 Sheet 2 shows all signals that open the reactor trip breakers and none are present in this scenario.

Unit 2 Load list:

2A CRDM MG Set powered from 600V LC 2D which is power from 4160V 2F.

2B CRDM MG Set powered from 600V LC 2E which is power from 4160V 2G.

Rod Position Indication System (DRPI) has two power sources:

MCC 2D - Normal - is NOT powered from a DG.

MCC 2B - Alternate - IS powered from a DG and is the source which DRPI is NORMALLY aligned.

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible since the applicant may believe that the loss of power to both trains of safety related power causes the reactor trip breakers to open.
- Second part is correct (See D.2). Logical connection to the first part since the rod bottom lights would be lit if the applicant thought the reactor trip breakers opened.
- B. Incorrect First part is incorrect (See A.1).
- Second part is incorrect (See C.2). Plausible if the applicant believes that Rod Position Indication System (DRPI) is aligned to its normal power supply which would make this a correct answer. DRPI comes off B Train power and will lose power for a time while the 2B DG starts and loads. Then the rod bottom lights will be LIT.
- C. Correct. First part is correct. When the loss of the 2F bus occurs, the 2A CRDM MG Set will de-energize causing the rods to fall into the core. No reactor trip setpoints are exceeded at 1006 so the Reactor trip Breakers will not open.
- Second part is correct. Rod Position Indication System (DRPI) is normally aligned to its ALTERNATE power supply which is a vital bus. When the DG re-energizes the 2G bus, the rod bottom lights will be LIT.
- D. Incorrect. First part is correct (See C.1).
- Second part is incorrect (See B.2). Logical connection to the first part for two reasons. If the applicant thought there was no trip (rods did not fall into the core) this would be the correct conclusion. If the applicant knew that the trip breakers would not open they could still believe the plausibility of B.2.

K/A: **007EA2.06** Reactor Trip - Ability to determine or interpret the following as they apply to a reactor trip: Occurrence of a reactor trip

Importance Rating: 4.3 4.5

Technical Reference: FNP-2-SOP-41.0, Control Rod Drive and Position Indication System, Ver 35.1
A351199, Unit 2 Electrical Load List, Ver 61

References provided: None

Learning Objective: RECALL AND DESCRIBE the operation and function of the following reactor trip signals, permissives, control interlocks, and engineered safeguards actuation signals associated with the Reactor Protection System (RPS) and Engineered Safeguards Features (ESF) to include setpoint, coincidence, rate functions (if any), reset features, and the potential consequences for improper conditions to include those items in the following tables (OPS-52201I07):

- Table 1, Reactor Trip Signals

Question History: MOD FNP EXAM BANK

K/A match: The applicant is required to **interpret plant conditions and determine if a reactor trip has occurred.**

SRO justification: N/A

Unit 1 is in Mode 5 and forming a pressurizer steam space (drawing a bubble) per UOP-1.1, Startup of Unit from Cold Shutdown to Hot Standby. The vacuum refill procedure will NOT be performed. The following conditions exist:

- RCS pressure is being maintained at 325-375 psig.
- 1B RCP is running.
- 'A' Train RHR is on service with low pressure letdown aligned.
- RCS is in solid plant pressure control.
- Pressurizer temperature is 178°F and slowly rising.
- All PRZR heaters have been energized.

Which one of the following completes the statements below?

Per UOP-1.1, the pressurizer is at saturation conditions when (1) increases.

During this evolution, PRT level will (2).

- | <u>(1)</u> | <u>(2)</u> |
|------------------|-----------------|
| A. charging flow | remain constant |
| B✓ letdown flow | remain constant |
| C. letdown flow | rise |
| D. charging flow | rise |

UOP-1.1:

5.11 WHEN pressurizer temperature increases to the saturation temperature for 375 psig (approximately 442°F) as indicated by **increasing RCS pressure or letdown flow**, THEN **establish** a steam space in the pressurizer as follows

5.11.5 WHEN VCT level increases to 81%, THEN **verify** VCT HI LVL DIVERT VLV Q1E21LCV115A in the fully diverted position.

Distracter analysis

- A. Incorrect. First part is incorrect (See B.1). Plausible if the applicant thinks that FCV-122 is in auto and will open to raise charging flow in response to the RCS pressure rise. FCV-122 operates in automatic based on pressurizer level and median Tavg (See AOP-100 Section 1.2 Figure 1 in reference material)
- Second part is correct (See B.2).
- B. Correct. First part is correct. UOP-1.1: 5.11 WHEN pressurizer temperature increases to the saturation temperature for 375 psig (approximately 442°F) as indicated by **increasing RCS pressure or letdown flow**, THEN establish a steam space in the pressurizer as follows:
- Second part is correct. LCV-115A diverts to the RHT.
- C. Incorrect. First part is correct (See B.1).
- Second part is incorrect (See above). Plausible if the applicant improperly believes that letdown diverts to the PRT vice RHT.
- D. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (See C.2).

K/A: **007K5.02** Pressurizer Relief Tank/Quench Tank System (PRTS) - Knowledge of the operational implications of the following concepts as they apply to PRTS: Method of forming a steam bubble in the PZR

Importance Rating: 3.1 3.4

Technical Reference: FNP-1-UOP-1.1, Startup of Unit from Cold Shutdown to Hot Standby, Ver 94.3

References provided: None

Learning Objective: DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Pressurizer System components and equipment, to include the following (OPS-40301E07):

- Normal Control Methods

Question History: MOD FNP 12

K/A match: The applicant has to know the **effect on the PRT level (operational implications) during the formation of a steam bubble in the pressurizer.**

SRO justification: N/A

9. 008AK1.01 009

Unit 2 was operating at 100% power when a Reactor Trip occurs and the following conditions exist:

- Q2B13PSV8010A, PZR SAFETY, has failed OPEN.
- Pressurizer pressure is 1020 psig.
- PRT pressure rises to 55 psig.
- Core Exit Thermocouples read 560°F.

Which one of the following completes the statements below?

Temperature on TI-469, SAFETY VLVS, will indicate approximately (1).

Pressurizer level will be (2).

Reference provided

	<u>(1)</u>	<u>(2)</u>
A.	546°F	rising
B.	546°F	lowering
C.	320°F	lowering
D✓	320°F	rising

WOG Executive Guideline - During situations where a steam vent path is established from the pressurizer vapor space and where RCS subcooling is not indicated, pressurizer level may not be a true indication of RCS inventory. This can result from steam generated in the reactor vessel, passing through the pressurizer surge line and preventing the water inventory of the pressurizer from draining into the RCS loops. This holdup of water can result in a stable or even increasing indicated pressurizer level while RCS water inventory is actually decreasing. Pressurizer level should be relied on only with hot leg or core exit subcooling present. In SI termination steps in the ERGs, pressurizer level is only checked after adequate RCS subcooling is confirmed.

Distracter analysis

A. Incorrect. First part is incorrect (See D.1). Plausible if applicant believes that the temperature of the steam in the Pressurizer is the same temperature as the steam entering the PRT. 546°F is the approximate saturation temperature for 1035 psia. This was the error made at the TMI accident.

Second part is correct (See D.2).

B. Incorrect. First part is incorrect (See A.1).

Second part is incorrect (See D.2). This is initially true but in the scenario given, subcooling is lost in the core and a bubble is formed in the vessel upper head. This will result in the Pzr level rising instead of lowering as one would expect. Plausible since during a LOCA event the normal response is that Pzr level decreases.

C. Incorrect. First part is correct. (See D.1)

Second part is incorrect (See B.2).

D. Correct. First part is correct. Using the steam tables and the following pressures:

$$1020 \text{ psig} + 15 = 1035 \text{ psia (RCS)}$$

$$55 \text{ psig} + 15 = 70 \text{ psia (PRT)}$$

$$\sim 320^\circ\text{F}$$

Second part is correct. Since the break is at the top of the pressurizer, the pressurizer level will be rising. This scenario was run on the desktop simulator. Pressurizer level was rising at 1020 psig.

K/A: **008AK1.01** Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) - Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: Thermodynamics and flow characteristics of open or leaking valves

Importance Rating: 3.2 3.7

Technical Reference: Properties of saturated and superheated steam, 1967
Westinghouse Owners Group, ERG Executive Guideline.

References provided: Steam tables

Learning Objective: SELECT AND ASSESS the Pressurizer System instrument/equipment response expected when performing Pressurizer System evolutions, including the Normal Condition, the Failed Condition, Associated Alarms, Associated Trip Setpoints, to include the components found on Figure 3, Pressurizer and Pressurizer Relief Tank (OPS-52101E07)

Question History: MOD HARRIS 09

K/A match: Applicant has to **determine the safety valve tailpeice temperature using steam tables (Thermodynamics and flow characteristics) and pressurizer level trend (operational implications) during a stuck open PORV condition.**

SRO justification: N/A

10. 008K2.02 010

Unit 2 is operating at 100% power when the following occurs:

- A simultaneous dual Unit LOSP occurs:

Which one of the following completes the statement below?

The (1) CCW pump is being powered by the (2) DG.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 2A | 1-2A |
| B. | 2A | 1C |
| C. | 2C | 1-2A |
| D✓ | 2C | 1C |

2C CCW pump is power from the 2F 4160V bus which is powered from the 1C DG in the above scenario.

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible since, with the exception of spent fuel pool cooling, every other train related pump with an 'A' designation is an 'A' train pump. The applicant may not recall that the CCW system is "backwards"
- Second part is incorrect (See C.2). Plausible because if there was an LOSP on Unit 2 only, the 1-2A DG would be assigned to the Unit 2 'A' train busses. However, there is a DUAL UNIT LOSP and the 1C DG gets assigned to the Unit 2 'A' Train busses. Applicants often get confused as to the assignment of 'A' train DGs during various loss of power scenarios.
- B. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2).
- C. Incorrect. First part is correct (See D.1).
- Second part is incorrect (See A.2).
- D. Correct. First part is correct. FSD A-181000: 3.1.5.4 [...] Without offsite power available and with or without the presence of SIAS signal, the on-service train CCW pump shall trip, then both train CCW pumps start by the diesel generator loading sequencers (ESS or LOSP).
- The 2C CCW pump is the 'A' train pump therefore it will be powered from the 1C DG.
- Second part is correct. Under the conditions in the stem, the 1C DG will tie to Unit 2 and supply the 2F, 2K and 2H busses (See FSD A181005 in reference material).

K/A: 008K2.02 Component Cooling Water System (CCWS) - Knowledge of bus power supplies to the following: CCW pump, including emergency backup

Importance Rating: 3.0* 3.2*

Technical Reference: FSD-A181000, Component Cooling Water, Ver 24
FSD-A181005, Diesel Generators, Ver 44

References provided: None

Learning Objective: NAME AND IDENTIFY the Bus power supplies, for those electrical components associated with the CCW System, to include the following: (OPS-40204A04):

Question History: NEW

K/A match: Requires the applicant to **know the normal bus power supply to the CCW pumps** in order to **know the correct DG that is its emergency backup power supply.**

SRO justification: N/A

The following conditions exist on Unit 1:

- An RCS leak is in progress.
- RCS pressure is 1600 psig and stable.
- Containment pressure is 3.1 psig and slowly rising.
- The crew has just transitioned to ESP-1.2, Post LOCA Cooldown and Depressurization.

Which one of the following completes the statement below?

The **minimum** SG narrow range water level must be greater than (1) to (2).

- A. 1) 31%
- 2) ensure SG tubes are covered to promote reflux boiling
- B. 1) 48%
- 2) ensure SG tubes are covered to promote reflux boiling
- C✓ 1) 31%
- 2) ensure adequate SG inventory to provide a secondary heat sink
- D. 1) 48%
- 2) ensure adequate SG inventory to provide a secondary heat sink

ESB-1.2

ERP Step Text - Check intact SG levels

Purpose: To ensure adequate feed flow or SG inventory for secondary heat sink requirements

ESP-1.2

8. Check any intact SG narrow range level - GREATER THAN 31% {48%}

Distracter analysis

- A. Incorrect. First part is correct (See C.1).
- Second part is incorrect (See C.2). Plausible if the applicant does not understand the mechanism of reflux boiling and improperly assumes this leak rate is sufficient to allow reflux boiling to be the method of heat removal at some time during the event. Reflux boiling is mentioned in ECP-1.1, Loss of Emergency Cooling Recirculation as a method of cooling if the RCS is NOT full.
- B. Incorrect. First part is incorrect (See C.1). Plausible if the applicant applies adverse containment numbers as this would be the correct level.
- Second part is incorrect (See A.2).
- C. Correct. First part is correct. With containment pressure < 4 psig, adverse numbers are not warranted. The required SGWL is >31% (See Step 8 of ESP-1.2 above).
- Second part is correct. This is the correct reason for maintaining SGWL above 31% (See ESB-1.2 above). Additionally, at this leak rate, the RCS will remain full as the HHSI pump flow exceeds break flow and reflux cooling will not occur.
- (Ran on desktop simulator - IC 073, 200 gpm leak rate, trip and SI at 2000 psig Pzr pressure -- SI flow rate ~230 gpm at 2200 psig)
- D. Incorrect. First part is incorrect (See B.1).
- Second part is correct (See C.2).

K/A: **009EK2.03** Small Break LOCA - Knowledge of the interrelations between the small break LOCA and the following: S/Gs

Importance Rating: 3.0 3.3*

Technical Reference: FNP-1-ESP-1.2, Post LOCA Cooldown and Depressurization., Ver 24.
FNP-1-ESB-1.2, Specific Background Document for FNP-1/2-ESP-1.2, Ver 2.1

References provided: None

Learning Objective: STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with ESP-1.2, Post LOCA Cooldown and Depressurization. (OPS-52531F03)

Question History: VOGTLE 10

K/A match: The applicant must know how the **SGs interrelate to the RCS during a Small Break LOCA in that they are required to provide a secondary heat sink for the RCS.**

SRO justification: N/A

12. 010A2.01 012

Unit 1 was operating at 100% power when a Reactor Trip and LOSP occurred. The following conditions exist:

- The 1A PZR HTR GROUP BACKUP handswitch is in AUTO.
- RCS pressure is 2000 psig.

Which one of the following correctly describes Pressurizer Heater operation per ESP-0.1, Reactor Trip Response?

- A. The 1A PZR Heaters will have power available, **NO** actions are required to energize them.
- B✓ The 1A PZR Heaters will have power available **AND** manual actions on the MCB are required to energize them.
- C. The 1A PZR Heaters will **NOT** have power available. Manual actions are required to align power to them on the EPB but **NO** other actions are required to energize them.
- D. The 1A PZR Heaters will **NOT** have power available. Manual actions are required to align power to them on the EPB **AND** manual actions on the MCB are required to energize them.

ESP-0.1

Attachment 3

1.10.4 WHEN pressurizer heater group 1A operation is desired,
THEN place HTR GRP 1A BLOCKING BYPASS SW to BYPASS.

1.10.5 IF required,
THEN manually energize pressurizer heater group 1A.

Distracter analysis

- A. Incorrect. See B. Plausible if the applicant fails to recall that by procedure, the heater switch is taken to off, then the blocking bypass switch is taken to BYPASS and the heater control switch placed in ON to energize the heaters.
- B. Correct. The BIF LOSEP sequencer reenergizes the emergency section of 600v LC A on an LOSEP at step 6. By procedure, the heater switch is taken to off, then the blocking bypass switch is taken to BYPASS and the heater control switch placed in ON to energize the heaters.
- C. Incorrect. See B. Plausible if the if the applicant confuses the 1A with the 1B PZR heaters which require EPB alignment and fails to recall that by procedure, the heater switch is taken to off, then the blocking bypass switch is taken to BYPASS and the heater control switch is placed in ON to energize the heaters.
- D. Incorrect. See B. Plausible if the if the applicant confuses the 1A with the 1B PZR heaters which require EPB alignment but recognizes the heater switch is taken to off, then the blocking bypass switch is taken to BYPASS and the heater control switch placed in ON to energize the heaters.

K/A: 010A2.01 Pressurizer Pressure Control System (PZR PCS) - Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Heater failures

Importance Rating: 3.3 3.6

Technical Reference: FNP-1-ESP-0.1, Reactor Trip Response, Ver 32
FNP-1-EEP-0.0, Reactor Trip or Safety Injection, Ver 44

References provided: None

Learning Objective: NAME AND IDENTIFY the Bus power supplies, for those electrical components associated with the Pressurizer Pressure and Level Control System, to include those items in Table 4- Power Supplies (OPS-52201H04).

Question History: FNP EXAM BANK

K/A match: **The LOSP causes the pressurizer heaters to become unavailable for use (failed) until operator action is taken to mitigate their loss.** The applicant must know how to re-energize the PRZR heaters when they are lost during an LOSP.

SRO justification: N/A

Unit 1 has experienced a Loss of Off-site Power and a Large Break LOCA. The following conditions exist:

- ESP-1.3, Transfer to Cold Leg Recirculation, has been completed.

Subsequently, the Shift Supervisor directs the OATC to perform ESP-1.4, Transfer to Simultaneous Cold and Hot Leg Recirculation and the following occurs:

- Power is lost to the 1G 4160V Bus and will not be restored for 18 hours.

Which one of the following completes the statement below?

At the completion of ESP-1.4, the running LHSI pump will be aligned for (1) leg recirculation and the running HHSI pump will be aligned for (2) leg recirculation.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | HOT | COLD |
| B. | COLD | COLD |
| C. | HOT | HOT |
| D✓ | COLD | HOT |

ESP-1.4 intends to align LHSI to HOT leg and leave HHSI aligned for Cold leg recirculation. However, during realignment, if any portion of the LHSI system cannot be reconfigured (Step 1), then the system is returned to its original lineup of Cold leg recirc and the available HHSI train is aligned for HOT leg recirculation. Step 4 has the operator assess the re-alignment and if the final requirement is not met, they are directed to Step 1 and contacting the Technical Support Center for guidance

We have recently developed a JPM that causes the alignment to be in a cold/cold or hot/hot alignment since some failures can lead you there. That is precisely the reason the procedure will direct you to the TSC staff if a final alignment other than cold/hot or hot/cold is reached by the end of the procedure.

The final alignment of LHSI and HHSI can be confusing when coupled with power losses and/or equipment failures.

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible since the applicant may believe the procedure allows only one train of LHSI to be aligned to the Hot Leg. This would be correct if it were HHSI.
- Second part is incorrect (See B.2). Plausible if the applicant believes that if one train cannot be realigned then neither will be aligned. This would be correct if it were LHSI.
- B. Incorrect. First part is correct (See D.1)
- Second part is incorrect (See A.2).
- C. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2). Plausible since when power is lost or equipment malfunctions, there are allowances to come back to steps in the procedure and perform them when power is restored and/or equipment repaired such as in ESP-1.3 when the charging suction and discharge header MOVs are aligned. Any alignment is possible in this procedure once malfunctions occur.
- D. Correct. First part is correct. Per ESP-1.4 Step 1, if both trains of LHSI cannot be aligned to Hot Leg recirc then both trains are left aligned to cold leg recirc.
- Second part is correct. ESP-1.4 Step 2 will align the A train HHSI to Hot Leg recirc and Step 3 will leave B train in its original alignment.

K/A: **011EK2.02** Large Break LOCA - Knowledge of the interrelations between the Large Break LOCA and the following: Pumps

Importance Rating: 2.6* 2.7*

Technical Reference: FNP-1-ESP-1.4, Transfer To Simultaneous Cold and Hot Leg Recirculation, Ver 16.

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing [...] (2) ESP-1.4, Transfer to Simultaneous Cold Leg and Hot Leg Recirculation. (OPS-52531G06)

Question History: FNP EXAM BANK

K/A match: The applicant is required to know the **interrelation between the RHR/Charging Pumps and the RCS during a Large Break LOCA. Based on the scenario given, the applicant must determine the final pump alignment.**

SRO justification: N/A

Unit 1 is operating at 100% power when the 1E 4160V bus becomes de-energized due to an electrical fault.

Which one of the following completes the statement below?

Pressurizer heater groups ____ have lost their normal power supply.

- A. 1C and 1D ONLY
- B. 1A, 1C and 1D ONLY
- C✓ 1B and 1E ONLY
- D. 1B, 1D and 1E ONLY

Load

Pressurizer Heater Group A 600V LC A (Normal) 4160V D

Pressurizer Heater Group B 600V LC C (Normal) 4160V E

Pressurizer Heater Group C 600V LC M 4160V D

Pressurizer Heater Group D 600V LC M 4160V D

Pressurizer Heater Group E 600V LC N (Unit 1 and 2) 4160V E

Distracter analysis

- A. Incorrect. See C. Plausible since these heaters are powered from the same LC. The applicant may believe that this is the only LC affected by the power loss. Although 1A heaters are also powered from the same 4160V Bus as these heaters, the applicant may believe the 1A heaters are powered from the Emergency Bus (1F) since they are sequenced on after an LOSP.
- B. Incorrect. See C. Plausible since this would be the impact for the loss of 1D 4160V bus and the applicant may think these heaters are supplied by 1E 4160V bus.
- C. Correct. Per Unit 1 Electrical Load List:
1E 4160V Bus supplies 1C Load Center (LC) and 1N LC.
1C LC - 1B pressurizer heaters.
1N LC - 1E pressurizer heaters
- D. Incorrect. See C. Plausible if the applicant knows that 2 sets of heaters are powered from the same LC but cannot correctly recall which ones. The 1B heaters is a partially correct answer and would be included if the applicant thinks these heaters are powered from the same 4160V bus as the 1B heaters.

K/A: **011K2.02** Pressurizer Level Control System (PZR LCS) - Knowledge of bus power supplies to the following: PZR heaters

Importance Rating: 3.1 3.2

Technical Reference: A506250, Unit 1 Electrical Load List, Ver 74.0

References provided: None

Learning Objective: NAME AND IDENTIFY the Bus power supplies, for those electrical components associated with the Pressurizer Pressure and Level Control System, to include those items in Table 4- Power Supplies (OPS-52201H04).

Question History: NEW

K/A match: Applicant is required to **know the power supplies to the pressurizer heaters** in order to determine which ones have lost power. The power supply has to go back to the 4160V bus so the applicant also has to know the LC supplies as well.

SRO justification: N/A

15. 012A4.06 015

The following conditions exist on Unit 1:

- A loss of 'A' Train Auxiliary Building 125V DC Bus has occurred.

Which one of the following completes the statement below?

Placing the MCB Reactor Trip handswitch in TRIP would ____ if they were closed.

- A. ✓ open **ALL** reactor trip and bypass breakers
- B. **ONLY** open the 'B' reactor trip breaker and the 'B' reactor trip bypass breaker
- C. **ONLY** open the 'B' reactor trip breaker and the 'A' reactor trip bypass breaker
- D. open **BOTH** reactor trip breakers but **NOT** open either reactor trip bypass breaker

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3.3.2 pg 3-10

The **first method** of tripping the breaker (i.e., reactor trip or bypass breakers) is by a loss or drop of rated voltage to the **Undervoltage Relay (UV)**. **The relay is normally energized from the 48 volt DC from the RPS**. When the voltage is removed by an automatic reactor trip signal, the relay is de-energized and releases the UV trip lever, which actuates the trip shaft, causing the breaker to unlatch from the closed position.

The **second method** of tripping the trip shaft is by the shunt trip lever when the normally de-energized shunt trip (SHTR) coil is energized. When energized, the **SHTR coil is powered from the 125 volt DC system** used to close the reactor trip and bypass breaker closing circuits.

Distracter analysis

- A. Correct. Without 'A' train DC, the UV coils from the 'A' Train Reactor Protection System (RPS) will still open 'A' Trip and 'B' Bypass breakers. 'B' train RPS deenergizes the UV coils for 'B' Trip and 'A' Bypass breakers. 'B' Train Aux Building DC will open the 'B' Trip breaker.
- B. Incorrect. See A. Plausible if the applicant did not recall that the UV coils from RPS will trip ALL Trip and Bypass breakers. Since both listed breakers are 'B' breakers, this adds to plausibility due to the applicant thinking the 'B' train is unaffected and still would cause a reactor trip if the system worked this way.
- C. Incorrect. See A. Plausible since this is how the RPS opens the Trip and Bypass breakers. The applicant may recall that this is how the RPS works but not realize that the loss of 'A' Train DC has no effect on the RPS.
- D. Incorrect. See A. Plausible if the applicant thinks that the Trip breakers are tripped by RPS and the Bypass breakers from Aux Building DC. Since the Shunt trip coils on the Bypass breakers can ONLY be operated locally, the applicant may think that without DC the Bypass breakers will not open.

K/A: **012A4.06** Reactor Protection System (RPS) - Ability to manually operate and/or monitor in the control room: Reactor trip breakers

Importance Rating: 4.3 4.3

Technical Reference: FSD-A181007 Reactor Protection System, Ver 18
D-177198, Sheet 2, Ver 3

References provided: None

Learning Objective: RECALL AND DESCRIBE the operation and function of the following reactor trip signals, permissives, control interlocks, and engineered safeguards actuation signals associated with the Reactor Protection System (RPS) and Engineered Safeguards Features (ESF) to include setpoint, coincidence, rate functions (if any), reset features, and the potential consequences for improper conditions to include those items in the following tables (OPS-52201107):

- Table 1, Reactor Trip Signals

Question History: FNP 10

K/A match: Requires the applicant to **monitor the effect on the Reactor Trip and Bypass Breaker Positions due to a loss of DC when they are manually tripped (operated).**

SRO justification: N/A

The Integrated Plant Computer Display on the following page is provided for evaluation of this question.

Unit 1 has experienced a reactor trip and the following conditions exist:

- The operating crew is verifying the immediate operator actions per EEP-0.0, Reactor Trip or Safety Injection.
- MLB-1, 1-1 and 11-1, SAFETY INJECTION, are NOT LIT.

The STA reports the following indications on the Plant Computer:

- PT0455 PRESSURIZER PRESSURE CHAN 1 is 1841 psig.
- PT0456 PRESSURIZER PRESSURE CHAN 2 is 1855 psig.
- PT0457 PRESSURIZER PRESSURE CHAN 3 is 1845 psig.
- PT0444A PRESSURIZER PRESSURE CHAN 4 is 1857 psig.
- PT0445A PRESSURIZER PRESSURE CHAN 5 is 1855 psig.
- PT0464 STEAM HEADER PRESSURE is 6.4 psig.

Which one of the following completes the statements below?

A Safety Injection (1) required.

MSIV-3370A, B and C (2) OPEN.

Reference Provided

	<u>(1)</u>	<u>(2)</u>
A✓	IS	are NOT
B.	IS	ARE
C.	is NOT	are NOT
D.	is NOT	ARE

EEP- 0.0 -

III. The following are symptoms that require safety injection, if one has not occurred:

<u>SI Signal</u>	<u>Instrumentation</u>	<u>Setpoint</u>	<u>Coinc</u>
1. Pressurizer pressure low	PT 455, 456, 457	1850psig	2/3

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The Main Steam Line Isolation is initiated by the following:

b. Low steam pressure; = 585 psig on 2/3 S.G.

Distracter Analysis

A. Correct. First part is correct.

<u>SI Signal</u>	<u>Instrumentation</u>	<u>Setpoint</u>	<u>Coinc</u>
1. Pressurizer pressure low	PT 455, 456, 457	1850psig	2/3

Second part is correct. Even though MSIV-3369A/B/C indicate OPEN, the downstream steam header pressure is 6.4 psig while the upstream pressure is >900 psig on all SGs, MSIV-3370A/B/C must be closed even though they are not modeled on the IPC.

B. Incorrect. First part is correct (See A.1)

Second part is incorrect (See A.2). Plausible if the applicant fails to evaluate steam pressure and assumes that since MSIV-3369A/B/C are open then MSIV-3370A/B/C must also be open.

C. Incorrect. First part is incorrect (See A.1). Plausible if the applicant has the misconception that the control channels, PT 444A and 445A are used to evaluate pressure instead of the protection channels PT-455, 456 and 457.

Second part is correct (See A.2).

D. Incorrect. First part is incorrect (See C.1).

Second part is incorrect (See B.2).

K/A: **013G2.1.19** Engineered Safety Features Actuation System (ESFAS) - Ability to use plant computers to evaluate system or component status

Importance Rating: 3.9 3.8

Technical Reference: FNP-1-EEP-0.0, Reactor Trip or Safety Injection, Ver 44
FSD - A181007, Reactor Protection System, Ver 18

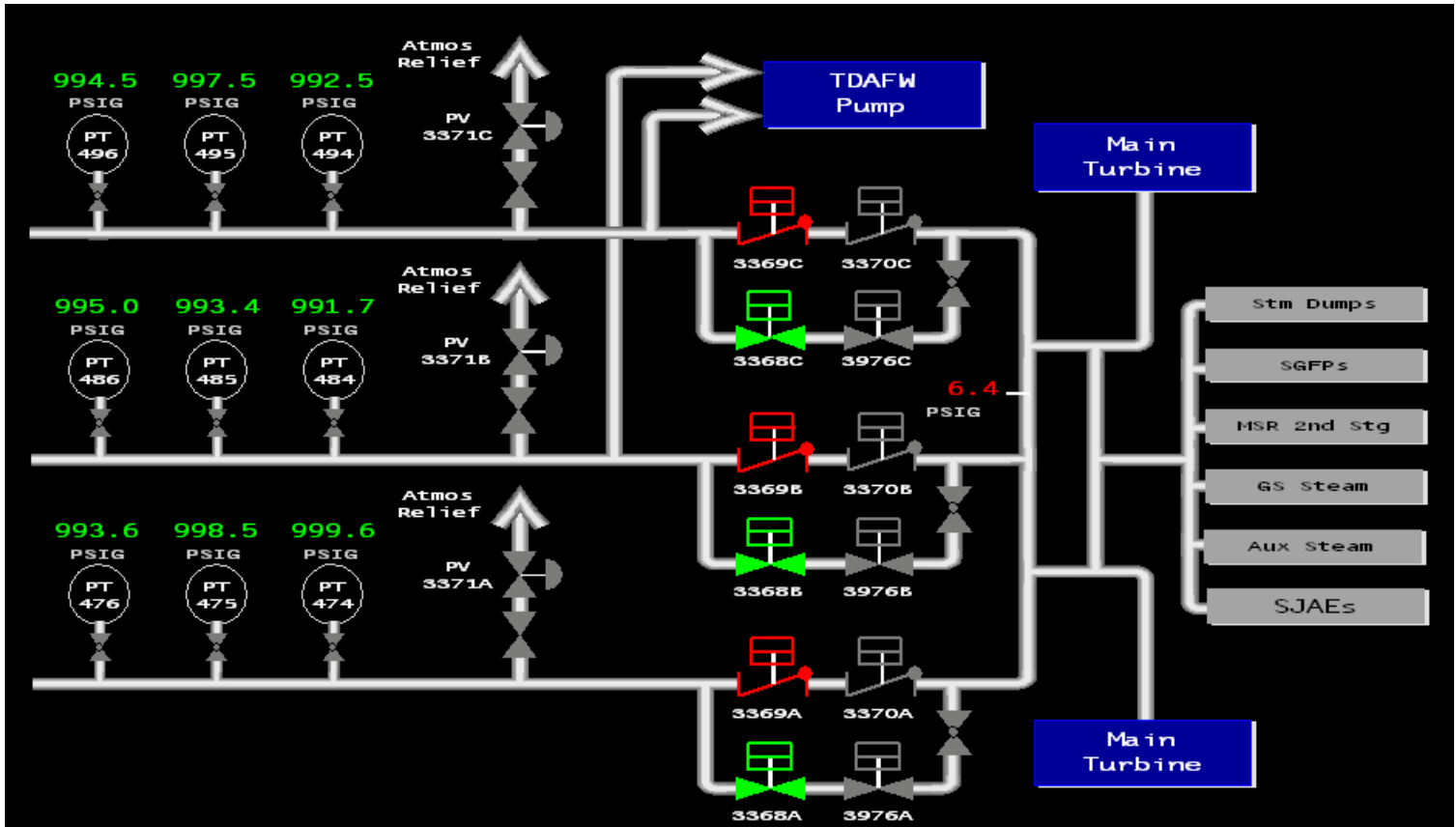
References provided: Screen Image of the Integrated Plant Computer

Learning Objective: DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Emergency Core Cooling System components and equipment, to include the following (OPS-40302C07):
[...]
• Automatic actuation including setpoint (example SI, Phase A, Phase B, MSLIAS, LO SP, SG level)
[...]
• Actions needed to mitigate the consequence of the abnormality

Question History: NEW

K/A match: Applicant must **evaluate a set of data from the plant computer and based on that determine if ESFAS system actuation is necessary.**

SRO justification: N/A



Unit 1 is performing a reactor startup per UOP-1.2, Startup Of Unit From Hot Standby To Minimum Load, when the following conditions occurred:

- The OATC pulled Control Bank D to 100 Steps by Step Demand Counter.
- Rod B8 was noted to be indicating 54 Steps by DRPI.

Which one of the following completes the statements below?

Rod B8's position is (1) .

Per Tech Spec Bases 3.1.7, Rod Position Indication, (2) is(are) the most reliable indication.

- A. 1) exactly 100 steps
2) the group step counters
- B. 1) approximately 100 steps
2) the group step counters
- C. 1) exactly 54 steps
2) DRPI
- D✓ 1) approximately 54 steps
2) DRPI

The Bank Demand Position Indication System counts the pulses from the Rod Control System that move the rods. There is one step counter for each group of rods. Individual rods in a group all receive the same signal to move and should, therefore, all be at the same position indicated by the group step counter for that group. The Bank Demand Position Indication System is considered highly precise (± 1 step or $\pm ?$ inch). **If a rod does not move one step for each demand pulse, the step counter will still count the pulse and incorrectly reflect the position of the rod.**

The DRPI System provides a highly accurate indication of actual control rod position, but at a lower precision than the step counters. This system is based on inductive analog signals from a series of coils spaced along a hollow tube with a center to center distance of 3.75 inches, which is 6 steps. To increase the reliability of the system, the inductive coils are connected alternately to data system A or B. Thus, if one system fails, the DRPI will go on half accuracy with an effective coil spacing of 7.5 inches, which is 12 steps. Therefore, the normal indication accuracy of the DRPI System is ± 4 steps (all coils operable and 1 step added for manufacturing and temperature tolerances), and the maximum uncertainty is ± 10 steps (only one data system A or B coils operable). With an indicated deviation of 12 steps between the group step counter and DRPI, the maximum deviation between actual rod position and the demand position could be 22 steps.

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible if the applicant does not recall that the Step Demand Counter only counts electrical impulses and thinks it actually measures rod location.
- Second part incorrect (See D.2). Plausible if the applicant thinks that since the group step counters are the most precise indication, they are the most reliable.
- B. Incorrect. First part is incorrect (See D.1). Plausible if the applicant does not recall that the Step Demand Counter only counts electrical impulses. Each bank has 2 Step Demand Counters that step in 1 step increments. Control Bank D Group 1 will move 1 step then Control Bank D Group 2 will move one step. If bank 1 moves 1 step and the rod control switch is released before bank 2 moves, bank 1 would be at 100 steps and bank 2 would be at 99 steps. This is commonly known as $99^{1/2}$ steps. The applicant may reason that this is a potential reason to call rods by step counter as approximate.
- Second part is incorrect (See A.2).
- C. Incorrect First part is incorrect (See D.1). Plausible since the DRPI lights change only every 6 steps and 54 steps is a DRPI display light location. The applicant may think that since a DRPI display light is lit, the rod is exactly at that position.
- Second part is correct (See D.2).
- D. Correct. First part is correct. Since DRPI measures actual rod position based on the location of the rod in reference to the measurement coils and the step counter only counts electrical pulses, the rod is at ~54 steps. Also, the accuracy of DRPI is ± 4 steps so the rod height is approximate.
- Second part is correct. DRPI is the most reliable because it actually senses the location of the rod using coils.

K/A: **014K5.01** Rod Position Indication System (RPIS) - Knowledge of the operational implications of the following concepts as they apply to the RPIS: Reasons for differences between RPIS and step counter

Importance Rating: 2.7 3.0

Technical Reference: FNP Technical Specifications Bases, Ver 58

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the following components associated with the Digital Rod Position Indication System (OPS-52201F02):

- Rod Position Detectors

Question History: FNP 01

K/A match: This question **requires the applicant to determine the location of rod B8 (operational implication)** based on their **knowledge of the differences, based on design, of how rod heights are measured between rod control (step counters) and DRPI in that DRPI is the most reliable indication.**

SRO justification: N/A

18. 015/17AA2.02 018

Unit 1 is operating at 100% power.

The following occurs:

- MOV-3052, CCW TO RCP CLRS, closes.
- DD3, CCW FLOW FROM RCP OIL CLRS LO, comes in to alarm.

Which one of the following completes the statements below?

The most limiting components for this event are the RCP (1).

The RCPs will be required to be stopped within approximately (2).

A✓ 1) Motor Bearings

2) 2 minutes

B. 1) Motor Bearings

2) 60 minutes

C. 1) Pump Lower Radial Bearings

2) 2 minutes

D. 1) Pump Lower Radial Bearings

2) 60 minutes

DD1 - CAUTION: RCP's with #1 Seal Leakoff less than 2.5 gpm may develop lower bearing and seal temperatures that exceed 225°F within 1 to 2 hours following a loss of seal injection.

DD3 - On a complete Loss of CCW Flow to RCP Motor Bearing Oil Coolers, the bearing temperature will exceed 195°F in approximately 2 minutes.

4. IF any RCP Motor Bearing Temperature exceeds 195°F, THEN:

- A. IF the Reactor is critical, THEN trip the reactor.
- B. Stop the RCP.
- C. Perform the actions required by FNP-1-EOP-0, REACTOR TRIP OR SAFETY INJECTION.
- D. Perform action of FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW as time allows.

MOV-3052 isolate CCW flow to the RCP oil coolers and the RCP thermal barrier heat exchanger which functions to cool the lower radial bearing on a loss of RCP seal injection flow.

Distracter analysis

- A. Correct. First part is correct. The RCP motor bearings are the most limiting components for this scenario since the CCW flow is lost and RCP motor bearing temperatures will increase rapidly.

Second part is correct. The RCP motor bearing temperatures will increase to 195°F with 2 minutes. The ARP has the operator trip the reactor and secure all RCPs for this failure.
- B. Incorrect. First part is correct (See A.1).

Second part is incorrect (See A.2) Plausible since 60 minutes is the time the lower radial bearing temperature will rise in 1-2 hours on a loss of RCP's with #1 Seal Leakoff less than 2.5 gpm following a loss of seal injection. Plausible since this is a time requirement for a RCP malfunction on the same Annunciator panel as DD3.
- C. Incorrect. First part is incorrect (See A.1) RCP lower radial bearings are cooled from two sources. A loss of the CCW will not cause the lower radial bearing temperatures to rise. Plausible since CCW is normal cooling to components and this is one of a few components with 2 cooling sources.

Second part is correct (See A.2).
- D. Incorrect. First part is incorrect (See C.1).

Second part is incorrect (See B.2).

K/A: **015AA2.02** Reactor Coolant Pump (RCP) Malfunctions - Ability to determine and interpret **Abnormalities in RCP** air vent flow paths and/or **oil cooling system** as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow):

Importance Rating: 2.8 3.0

Technical Reference: FNP-1-ARP-1.4, DD1 and DD3, Ver 53

References provided: None

Learning Objective: LIST AND DESCRIBE the sequence of major actions associated with AOP-9.0, Loss of Component Cooling Water. (OPS-52520I04).

EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing AOP-9.0, Loss of Component Cooling Water. (OPS-52520I06).

Question History: NEW

K/A match: The malfunction of the RCP is the closure of MOV-3052. The applicant must determine/interpret that a loss of CCW to the RCP oil coolers **and** lower radial bearings has resulted, then must interpret how this malfunction affects the RCP components (oil coolers and seal) and the time required for action to be taken.

SRO justification: N/A

Unit 1 has experienced a Reactor Trip and SI due to a LOCA and the following conditions exist:

- The operators have transitioned to EEP-1.0, Loss of Reactor or Secondary Coolant.
- The Core Exit Thermocouples (CETCs) are reading as follows:
 - TWO CETCs are indicating a SHORT circuit.
 - THREE CETCs are 1204°F and rising.
 - All other CETCs are reading between 950°F and 1150°F and rising.

Which one of the following completes the statements below?

The indication for the SHORT circuited CETCs fail (1).

The (2) CETC is used to evaluate entry into FRP-C.2, Response To Degraded Core Cooling.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|-------------------------|
| A. | HIGH | hottest |
| B. | HIGH | 5 th hottest |
| C. | LOW | hottest |
| D✓ | LOW | 5 th hottest |

CSF-0.2

5th hottest CETC <1200 °F? **NO** → Go to FRP-C.1

↓ **YES**

RCS SUBCOOLING **NO** → 5th hottest CETC <700 °F? NO → Go To
from CETC > FRP-C.2
16°F {45°F}?

↓ **YES**

CSF - SAT

U263686 pg 3-5

The signal conditioning panel contains the open thermocouple detection circuitry, noise filtering capacitors, and the cold reference junction compensation circuitry. Cold junction compensation is accomplished by measuring the barrier temperature utilizing a semiconductor temperature sensor located on the signal conditioning panel. The temperature sensor circuit produces an output voltage, that is equivalent to the temperature of the barrier strip. This output voltage is read in through one of the channels on the Analog Input Boards (DT1748 and DT1748-24EX boards'. The thermocouple signals are then compensated in the software by adding the value of the cold reference junction to the thermocouple signals. **If any of the thermocouples are open or shorted the signal conditioning panels open thermocouple detection circuitry will cause the input to be driven down to 0V.**

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible if the applicant does not recall if a thermocouple fails high or low when shorted. An RTD that experiences an open circuit will cause a high temperature reading. The applicant could confuse RTD and thermocouple operating theory.
- Second part is incorrect (See D.2). Plausible if the applicant doesn't recall that the 5th hottest is selected to allow for failed high thermocouples. This is a common misconception.
- B. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2).
- C. Incorrect. First part is correct (See D.1).
- Second part is incorrect (See A.2).
- D. Correct. First part is correct. Thermocouples that are shorted fail low.
- Second part is correct. See CSF-0.2 above.

K/A: **017K6.01** In-Core Temperature Monitor System (ITM) - Knowledge of the effect of a loss or malfunction of the following ITM system components: Sensors and detectors

Importance Rating: 2.7 3.0

Technical Reference: FNP-1-CSF-0.2 Core Cooling, Ver 17
FNP-0-CSB-0.0, Specific Background Document For
FNP-1/2-CSF-0, Critical Safety Function Status Trees, Ver 1
U-263686, ICCMS Tech Manual Vol II, Ver 2
OPS-31701G, Sensors and detectors, Ver 4

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the following components associated with the Inadequate Core Cooling Monitor System (OPS-52202E02):

- CETC Monitor

Question History: NEW

K/A match: The applicant is required to **have a knowledge of the effect of a shorted CETC on the incore temperature monitoring system.**

SRO justification: N/A

Unit 1 is operating at 100% power with the following conditions:

At 1000:

- Containment Pressure is 0 psig.
- Containment temperature is 100°F.
- MI-3319A, B, C and D, CTMT CLR SUPP AIR MOISTURE, indicate 72 Dewpoint °F.
- Containment Coolers are running in slow speed.

At 1015:

A LOCA occurs and the following conditions exist:

- Containment Pressure is 5 psig.
- Containment temperature is 150°F.
- MI-3319A, B, C and D, CTMT CLR SUPP AIR MOISTURE, indicate 130 Dewpoint °F.

Which one of the following completes the statements below at **1015?**

The Containment Cooler discharge will be through the (1).

The Containment Cooler fans will be drawing (2) amps than at 1000.

	<u>(1)</u>	<u>(2)</u>
A.	ductwork	MORE
B✓	dropout plate	MORE
C.	ductwork	LESS
D.	dropout plate	LESS

Added that the Containment Coolers are running in Slow Speed prior to the LOCA. The FSD states that the design of the Containment Cooler motor is based on 80Hp in Fast and 115 Hp during a LOCA when the coolers are running in slow. However, there is no data to determine at what point the mass of Containment atmosphere increases to the point where the Slow speed fan would draw more current than Fast speed. With the Containment Cooler in Slow at the beginning of the event, the applicant will only have to evaluate the current drawn by the cooler based on atmospheric conditions (humidity) which meets the K/A - *Containment Cooling System (CCS) - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment humidity.*

Tech Spec 3.6.6 Bases:

In post accident operation following an actuation signal, unless an LOSP signal is present, the Containment Cooling System fans are designed to start automatically in slow speed if not already running. If an LOSP signal is present, only the two fans selected (one per train) will receive an auto-start signal and will start in slow speed. If running in high (normal) speed, the fans automatically shift to slow speed. **The fans**

are operated at the lower speed during accident conditions to prevent motor overload from the higher mass atmosphere. In addition, if temperature at the cooler discharge reaches 135°F, fusible links holding dropout plates will open and the fan discharge will no longer be directed through the common discharge header. This function helps to protect the fans in a post-accident environment by reducing the back pressure on the fans.

FSD- A181013:

3.1.2.5 A 125 hp motor is provided for fan operation to meet the design brake horsepower requirement of **105 hp during low-speed operation following a LOCA**. During normal operation, the design brake horsepower of the fan in **high-speed operation is 80 hp**.

Distracter analysis

A. Incorrect. First part is incorrect (See B.1). When containment temperature reaches ~135°F, the dropout plates fall open. Plausible if the applicant believes that the links melt at 160°F to 175°F which is when the fire damper fusible links melt.

Second part is correct (See B.2).

B. Correct. First part is correct. The dropout plates open at ~ 135°F.

Second part is correct. The higher mass atmosphere in Containment due to the LOCA will cause the fan motors to draw more current.

C. Incorrect. First part is incorrect (See A.1).

Second part is incorrect (See B.2). Plausible if the applicant only thought that the increase in temperature caused air density to lower and did not consider other factors affecting Containment atmosphere.

D. Incorrect. First part is correct (See B.1).

Second part is incorrect (See C.2).

Medium break LOCA run on desktop simulator produced the approximate values.

K/A: **022A1.03** Containment Cooling System (CCS) - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment humidity

Importance Rating: 3.1 3.4

Technical Reference: FSD-A181013, Containment Ventilation System, Ver 14.

References provided: None

Learning Objective: DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Containment Spray and Cooling System components and equipment, to include the following (OPS-40302D07):

- Normal Control Methods
- Abnormal and Emergency Control Methods
- Automatic actuation including setpoint (example SI, Phase-B, LOSP) and the effect of selecting the containment cooler control to local.

Question History: NEW

K/A match: Requires the applicant to **monitor changes in containment humidity and based on this predict the changes in the parameters of the containment cooler fans in an environment with more humidity (water vapor) and will draw more current. The dropout plate will actuate at 135°F to reduce the back pressure on the fans.**

SRO justification: N/A

Unit 1 is operating at 100% power and the following conditions exist:

- AOP-16.0, CVCS Malfunction, has just been exited after a charging flow controller failure.
- FK-122, CHG FLOW, is in MANUAL and has been repaired.

Subsequently, FK-122 is placed in AUTOMATIC and the following conditions exist:

- One 60 gpm orifice is on service.
- Charging flow is stable at 62 gpm.

Which one of the following completes the statement below?

If FK-122 were to go to minimum demand, charging flow would decrease to a **minimum** flow rate of (1) , which is designed to prevent (2) .

- A. ✓ 1) 18 gpm
2) flashing downstream of the letdown orifices
- B. 1) 18 gpm
2) overheating of the charging pumps
- C. 1) 40 gpm
2) flashing downstream of the letdown orifices
- D. 1) 40 gpm
2) overheating of the charging pumps

3.3 In auto, CHG FLOW FK 122 minimum demand corresponds to 18 gpm charging flow. This ensures adequate cooling to the regenerative heat exchanger to prevent flashing downstream of the letdown orifices with one 60 gpm orifice on service. With two orifices on service, approximately 40 gpm charging flow is required for regenerative heat exchanger cooling.

Distracter analysis

- A. Correct. First part is correct. Minimum charging flow in AUTOMATIC is 18 gpm.
- Second part is correct. Per P&L 3.3, 18 gpm ensures adequate cooling to the regenerative heat exchanger to prevent flashing downstream of the letdown orifices with one 60 gpm orifice on service.
- B. Incorrect. First part is correct. (See A.1)
- Second part is incorrect (See A.2). Plausible if the applicant thinks that reduced charging flow would equate to reduced mini-flow flow which is incorrect. Also, the charging miniflow goes through the seal water return HX and temperature would be unaffected by changing charging flows.
- C. Incorrect. First part is incorrect (See A.1). Plausible since Figure 1 of SOP-2.1, re-establishing LTDN after isolation with no equipment malfunction, has the operator establish 40 gpm flow rate in step 1 when placing one orifice on service.
- Second part is correct (See A.2).
- D. Incorrect. First part is incorrect (See C.1).
- Second part is incorrect (See B.2).

K/A: 022AK1.04	Loss of Reactor Coolant Makeup - Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: Reason for changing from manual to automatic control of charging flow valve controller.
Importance Rating:	2.9 3.0
Technical Reference:	FNP-1-SOP-2.1, Chemical and Volume Control System Plant Startup and Operation, Ver 131
References provided:	None
Learning Objective:	<p>RECALL AND DISCUSS the Precautions and Limitations (P&L), Notes and Cautions (applicable to the “Reactor Operator”) found in the following Procedures (OPS-52101F08).</p> <ul style="list-style-type: none"> • SOP-2.1, CVCS Plant Startup and Operation. <p>[...]</p>
Question History:	NEW
K/A match:	<p>There has been a loss of CVCS flow due to a controller failure. FK-122 has been placed in manual and is now being placed in AUTO. A reason for placing FK-122 in AUTO and not leaving it in MANUAL is to ensure adequate cooling to the regenerative heat exchanger to prevent flashing downstream of the letdown orifices with one 60 gpm orifice on service should the controller fail to minimum demand based on current plant conditions. The operational implication would be that flashing would occur if Chg flow were to fall to <18 gpm and cause damage to the orifices and piping due to water hammer and the flashing of water to steam. A loss of letdown would be the result. This question meets the KA in that it asks the minimum flow rate for being in auto if a controller were to fail and the reason.</p>
SRO justification:	N/A

22. 022K4.03 022

Unit 1 is operating at 100% power when a Steam Break occurs on 1B SG and the following conditions exist:

- EE5, CTMT ISO PH B, is in alarm.
- All Phase B automatic actions have occurred.

Which one of the following completes the statements below?

CCW to the RCP Thermal Barrier Heat Exchanger (1) isolated.

Seal Injection (2) isolated.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A✓ | IS | is NOT |
| B. | is NOT | is NOT |
| C. | IS | IS |
| D. | is NOT | IS |

EE5

Automatic Action:

1. The following valves close

c) CCW FROM RCP THRM BARR Q1P17HV3045

f) CCW FROM RCP THRM BARR Q1P17HV3184

FSD A181003

3.3.1.2 The seal water injection lines to the RCP are considered as open flow paths post-LOCA. The high pressure inflow through these lines during the injection and recirculation phases precludes any containment to atmosphere leakage. In the event of a loss of seal water flow through these lines, a water seal in the charging pump suction and discharge piping precludes containment to atmosphere leakage.

Distracter analysis

- A. Correct. First part is correct. Phase B isolates CCW cooling to the RCP Thermal Barrier Heat Exchanger.
- Second part is correct. Seal injection is NOT isolated by SI, Phase A or Phase B.
- B. Incorrect. First part is incorrect (See A.1). Plausible if the applicant does not recall all the components isolated on a Phase B. Since CCW is water solid and cools the thermal barrier hx, they may believe it is not isolated on a phase B.
- Second part is correct (See A.2).
- C. Incorrect. First part is correct (See A.1).
- Second part is incorrect (See B.2). Plausible if the applicant believes that Phase B isolates RCP seal injection lines. Seal return is isolated on an SI and the applicant could confuse the two.
- This is a plausible combination if the applicant reasons that the shutdown seal will actuate and seal injection and CCW to the thermal barrier hx are no longer needed
- D. Incorrect. First part is incorrect (See C.1).
- Second part is incorrect (See C.2).

K/A: 022K4.03 Containment Cooling System (CCS) - Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: Automatic containment isolation.

Importance Rating: 3.6* 4.0

Technical Reference: FNP-1-ARP-1.5, EE5, CTMT ISO PH B, Ver 58.0
FSD-A181009, CVCS/HHSI/ACCUM/RMWS, Ver 38
FSD-181003, Containment Isolation System, Ver 26.

References provided: None

Learning Objective: DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Containment Structure and Isolation System components and equipment, to include the following (OPS-40302B07):

- [...]
- [...]
- Automatic actuation including setpoint (example SI, Phase A, Phase B, MSLIAS, LOSEP, SG level)

Question History: MOD SUMMER 11

K/A match: Requires the applicant to know the **design feature of the Phase B Containment Isolation that isolates CCW cooling to the RCP Thermal Barrier Heat Exchanger.**

SRO justification: N/A

Unit 1 is in Mode 5 with the following conditions:

- 1B RHR pump is tagged out.
- All SG Wide Range levels are 84%.
- Pzr level is being maintained at 21% on LI-462, PRZR LVL.
- RCS temperature is 155°F.
- RCS pressure is 325 psig.
- All RCP's are secured.
- 1A RHR pump is running in the cooldown lineup.

Subsequently, the following occurs:

- 1A RHR pump trips on overcurrent and cannot be restarted.
- RCS temperature is 175°F and slowly rising.

Which one of the following completes the statements below?

Per AOP-12.0, Residual Heat Removal System Malfunction, the preferred method to re-establish core cooling is to establish (1).

Core cooling is monitored using (2).

<u>(1)</u>	<u>(2)</u>
A. feed and bleed	RCS cold leg temperatures
B. a secondary heat sink	RCS cold leg temperatures
C. feed and bleed	CETCs
D. a secondary heat sink	CETCs

ARG-1

If the RCS is intact and the loops are not isolated with SG nozzle dams or loop isolation valves, a secondary heat sink using half or more SGs will be an effective alternate mode of decay heat removal that will last for several hours or longer. Since there would be no significant fluid inventory losses for this case, makeup requirements can easily be met with a minimum amount of charging flow or possibly RWST (or VCT) gravity feed if initiated early enough. For this situation, it should also be possible to refill and pressurize the RCS and then operate the RCPs to sweep the noncondensibles from the loops and thereby improve the primary-to-secondary heat transfer.

AOP-12:

24. Check SGs available.

- Check SG primary nozzle dams
- REMOVED.
- Check SG primary manways -
INSTALLED.

- Check SG secondary handhole covers - INSTALLED.

NOTE: Establishing a secondary heat sink will reduce RCS heat up and pressurization rate to provide more time for recovery actions.

25. Verify secondary heat sink established.

25.1 Maintain wide range level in all available SGs greater than 75% using FNP-1-SOP-22.0, AUXILIARY FEEDWATER SYSTEM.

25.2 IF SG steam space intact, THEN open atmospheric relief valves to prevent SG pressurization.

1A(1B,1C) MS ATMOS
REL VLV
PC 3371A adjusted
PC 3371B adjusted
PC 3371C adjusted

25.3 IF SGBD system available, AND AFW system available, THEN establish blowdown from available SGs using FNP-1-SOP-16.3, STEAM GENERATOR FILLING AND DRAINING.

Feed and Bleed or Feed and Spill would be established if both of these conditions were met.

29.1 Check RCS level LESS than 121 ft 11 in AND core exit T/Cs GREATER than 200°F.

Distracter analysis

A. Incorrect. First part is incorrect (See D.1). Plausible if the applicant believes that establishing a secondary heat sink is not correct because RCS temperature is less than 200°F and so steaming the SG would not be an option. Feed and Bleed is only used when RCS level is < 121 ft 11 in and RCS temp is > 200°F.

Second part is incorrect (See D.2). Plausible since Tcold is used in other procedures (ESP-0.2) to evaluate cooldown and the applicant could believe that it is used here. Also, Tcold would not

give an accurate indication of core temperature.

B. Incorrect. First part is correct (See D.1).

Second part is incorrect (See A.2).

C. Incorrect. First part is incorrect (See A.1).

Second part is correct (See D.2).

D. Correct. First part is correct. Since the RCS is filled and intact, establishing a secondary heat sink is the correct action per AOP-12.

Second part is correct. AOP-12 directs the use of CETCs

K/A: 025AA1.01 Loss of Residual Heat Removal System (RHRS) - Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: RCS/RHRS cooldown rate

Importance Rating: 3.6 3.7

Technical Reference: Background Information for WOG Abnormal Response Guideline ARG-1 Loss of RHR While Operating at Mid-Loop Conditions, Ver 2
FNP-1-AOP-12.0, RHR System Malfunction, Ver 25

References provided: None

Learning Objective: LIST AND DESCRIBE the sequence of major actions associated with AOP-12.0, RHR System Malfunction and/or STP-18.4, Containment Closure. (OPS-52520L04)

Question History: MOD FNP EXAM BANK

K/A match: Requires the applicant to **know how the RCS is operated to establish a cooldown rate on a loss of RHR and the method which temperature is monitored.**

SRO justification: N/A

Unit 1 is operating at 100% power when the following occurs:

- A leak develops in the CCW system.
- CCW Surge Tank level is slowly lowering.
- AA4 and AB4, CCW SRG TK LVL A(B) TRN HI-LO, are in alarm.
- AA5, CCW SRG TK LVL A TRN LO-LO, has come into alarm.

Which one of the following completes the statements below?

CCW system automatic isolations are designed to occur at (1) in the CCW Surge Tank.

Using the NORMAL source of makeup water, the operator will open (2) to make up to the CCW Surge Tank.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|--|
| A. | 35 inches | MOV-3031A, MKUP TO CCW FROM RMW |
| B. | 20 inches | MOV-3031A, MKUP TO CCW FROM RMW |
| C. | 35 inches | MOV-3030A, MKUP TO CCW FROM DW STOR TK |
| D✓ | 20 inches | MOV-3030A, MKUP TO CCW FROM DW STOR TK |

ARP AA5: 20 inches

Automatic Action

1. Closes CCW Valves (Q1P17HV3096A&B) to isolate CCW to/from Evaporator Packages and H2 Recombiners. (Q1P17LSLL3027CD-A)
2. Trips closed Q1P17HV2229, CCW to Sample Cooler (Q1P17LSLL3027CD-A).

Operator Action

- 4.1 Attempt to fill CCW surge tank using Normal Make-up to maintain level above the lo level alarm point as follows;
- 4.2. IF unable to fill the CCW Surge Tank per the Normal Make-up method, THEN attempt to fill CCW surge tank using Emergency Make-up to maintain level above the lo level alarm point as follows;
5. IF a loss of CCW cooling has occurred, THEN refer FNP-1-AOP-9.0, LOSS OF COMPONENT COOLING WATER.

Distracter analysis

- | | |
|---------------|--|
| A. Incorrect. | First part is incorrect (See D.1). Plausible since this is the Surge tank LO Level alarm setpoint.

Second part is incorrect (See D.2). Plausible if candidate cannot recall which of the two makeup sources is the NORMAL source. |
| B. Incorrect. | First part is correct (See D.1).

Second part is incorrect (See A.2). |
| C. Incorrect. | First part is incorrect (See A.1).

Second part is correct (See D.2). |
| D. Correct. | First part is correct. AA5 Setpoint is 20 inches which causes the automatic closure of HV3096A&B and HV2229.

Second part is correct. Demin water storage tank is the normal source for makeup to the CCW surge tank. |

K/A: **026AG2.4.50** Loss of Component Cooling Water (CCW) - Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

Importance Rating: 4.2 4.0

Technical Reference: FNP-1-ARP-1.1 - AA5, CCW SRG TK LVL A TRN LO-LO, Ver 53.1

References provided: None

Learning Objective: SELECT AND ASSESS the following instrument/equipment response expected when performing CCW System evolutions including the fail condition, alarms, and trip setpoints (OPS-52102G07).

- Surge Tank Level

Question History: NEW

K/A match: Requires the applicant to **determine at which level the automatic isolations of the CCW system occur (verify system alarm setpoints which is when these valves close) and know what source of water is used to fill the surge tank (operate controls identified in the ARP to raise the CCW Surge Tank level).**

SRO justification: N/A

Unit 2 is operating at 50% power when a simultaneous Dual Unit LOSP occurs.

- 4160V Bus 2G remains de-energized due to the DG not starting for that emergency bus.

Three (3) minutes after the LOSP, a Large Break LOCA occurs on Unit 2.

- Containment pressure peaked at 29 psig and is trending down.

Which one of the following completes the statement below?

The (1) Containment Spray pump is currently running and is powered from the (2) DG.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 2A | 1C |
| B. | 2B | 1C |
| C✓ | 2A | 1-2A |
| D. | 2B | 1-2A |

In the LOSP the 1-2A DG will tie onto the unit 1 A Train busses. Then when the SI and subsequent phase B signal comes in the 1-2A DG and 1C DG will load shed, and then 1-2A DG will align to Unit 2 and the 2A CS pump will start at step 2.

FSD-A181008: 3.1.5.2

Without offsite power available, the CSS pumps shall start by the diesel generator ESS loading sequencer. Starting will occur at step two of the sequence if the "P" signal is present at that time. If the "P" signal occurs between the completion of step two and step six of the ESS sequence, then starting will occur at the completion of step six of the loading sequence. If the "P" signal occurs after the completion of step six, starting will take place immediately.

Pg 2-1 CSS initiation is automatic upon a containment pressure hi-3 signal ("P" signal)

FSD-A181005

LOSP on both units and LOCA on Unit 2:

For LOSP on both units and LOCA on Unit 2, the alignment of the diesel generators will be as follows:

- 1-2A Unit 2 Buses 2F and 2K
- 1C Unit 1 Buses 1F, 1K and 1H
- 1B Unit 1 Buses 1G, 1L and 1J
- 2B Unit 2 Buses 2G, 2L and 2J

Distracter analysis

- A. Incorrect. First part is correct (See C.1).
Second part is incorrect (See C.2). Plausible since the 1C and 1-2A DGs align to either Unit's 'A' Train depending on the scenario and the applicant may not recall the proper DG alignment for this scenario.
- B. Incorrect. First part is incorrect (See C.1). Plausible if the applicant does not recall the CS pump power supplies.
Second part is incorrect (See A.2)
- C. Correct. First part is Correct. The normal power supply to 2A CS pump is 2F 4160V AC bus.
Second part is correct. For LOSP on both units and LOCA on Unit 2, the alignment of the diesel generators will be as follows:
 - 1-2A Unit 2 Buses 2F and 2K
- D. Incorrect. First part is incorrect (See B.1).
Second part is correct (See C.1).

K/A: **026K2.01** Containment Spray System (CSS) - Knowledge of bus power supplies to the following: Containment spray pumps.

Importance Rating: 3.4* 3.6

Technical Reference: FSD-A181008, Containment Spray System, Ver 24.
A-351199, Unit 2 Load List, Ver 61
FSD-A181005, Diesel Generators, Ver 44.
FSD-A181007, Reactor Protection System, Ver 18

References provided: None

Learning Objective: NAME AND IDENTIFY the Bus power supplies, for those electrical components associated with the Containment Spray and Cooling System, to include those items in Table 3- Power Supplies (OPS-40302D04).

Question History: NEW

K/A match: Requires the applicant to **know the normal power supply to the 2B CS pump** and the 1-2A DG alignment and power supply to the 2A CS pump upon an LOSP with a subsequent SI.

SRO justification: N/A

Unit 2 plant conditions are as follows:

- Containment Main Purge system is running.
- Containment radiation levels are **rising**.

Subsequently, R-24A, CTMT PURGE, loses control power.

Which one of the following completes the statements below?

Radiation levels (1) stop rising in the Main Exhaust Plenum.

CTMT Main Purge supply and exhaust fans (2) trip.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A✓ | WILL | will NOT |
| B. | will NOT | will NOT |
| C. | WILL | WILL |
| D. | will NOT | WILL |

SOP-45:

3.5 The radiation monitors fail to a “High Radiation” **condition on loss of instrument and/or control power** that will result in actuation of associated automatic functions.

FH4: CP RE 24A or B HI RAD

PROBABLE CAUSE

1. High Radiation Level in the Containment Purge Exhaust Line.
2. The radiation monitors fail to a “High Radiation” condition on loss of instrument and/or **control power** that will result in actuation of associated automatic functions.

AUTOMATIC ACTION

1. Isolates Containment by closing Purge Supply and Exhaust Valves 2-CP-HV-3196, 2-CP-HV-3197, 2-CP-HV-3198A, B, C, & D, 2-CP-HV-2867C & D and 2-CP-HV-2866C & D.

Distracter analysis

- A. Correct. First part is correct. Per SOP-45, a radiation monitor that has lost control power will initiate its automatic actions.
- Second part is correct. R-24A will NOT automatically secure the main purge supply and exhaust fans.
- B. Incorrect. First part is incorrect (See B.1). Plausible if candidate does not recall that a loss of control power will cause the actuation of associated automatic functions.
- Second part correct (See B.2).
- C. Incorrect. First Part is incorrect (See A.1).
- Second part is incorrect. (See B.1). Plausible since it could seem logical to the applicant that when the main purge supply and exhaust dampers shut, the fan would also automatically secure.
- D. Incorrect. First part is correct (See B.1)
- Second part is incorrect (See C.2). Plausible if the applicant does not recall what auto functions are actuated by R-24A and believes that R-24A will trip the fans. Additionally, with the Aux Building main exhaust fan running, the applicant could reason that there is still a negative pressure on the CTMT purge outlet causing CTMT radiation release to the plant vent stack to continue.

K/A: **029A1.02** Containment Purge System (CPS) - Ability to predict and/or monitor changes in parameters to prevent exceeding design limits) associated with operating the Containment Purge System controls including: Radiation levels

Importance Rating: 3.4 3.4

Technical Reference: FNP-2-ARP-1.6, FH4, CP RE 24A or B HI RAD, Ver 59
FNP-2-SOP-45.0, Radiation Monitoring System, Ver 38.1

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Containment Ventilation and Purge System, to include those items in Table 6-Component Locations (OPS-40304A02).

Question History: NEW

K/A match: Requires the applicant to **predict, based on a loss of control power to R-24A, when the earliest time the radiation release is terminated thereby preventing the off site radiation exposure limit from potentially being exceeded.**

SRO justification: N/A

Unit 1 is operating at 100% power and the following conditions exist:

- A blended make-up to the Spent Fuel Pool (SFP) is occurring.
- A calibration error results in FT-168, PRI WATER MKUP FLOW, providing a flow input to the Reactor Makeup System that is **less** than the actual flowrate.

Which one of the following completes the statements below?

The blended flow makeup resulted in a (1) of the SFP.

Per Tech Spec 3.7.14, Fuel Storage Pool Boron Concentration, the MINIMUM required SFP boron concentration is (2) ppm.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | boration | 2000 |
| B. | boration | 2200 |
| C✓ | dilution | 2000 |
| D. | dilution | 2200 |

Tech Specs 3.7.14

The fuel storage pool boron concentration shall be ≥ 2000 ppm.

APPLICABILITY: When fuel assemblies are stored in the fuel storage pool.

FSD-A181009

5.30.5.1 **Flow measurement (FT-168) shall be provided downstream of the blender to indicate total makeup flow** to the charging header and as input to the Reactor Makeup Control System.

5.30.5.2 Upstream **boric acid flow measurement (FT-113) shall be provided to serve as input to the Reactor Makeup Control System.**

5.78.1.1 This differential pressure transmitter (and associated orifice flow element) shall provide measurement of the total makeup flow from the boric acid blender. **It shall also provide input to the Reactor Makeup Control System for regulation of RMW flow** and shall alert the operator of a deviation from the selected flow setpoint.

Distracter analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible if the candidate thinks that the lower signal results in less RMW added and therefore more acid for a given volume which would result in a boration of the SFP.
- Second part is correct (See C.2).
- B. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (See C.2). Plausible because the applicant could confuse the SFP minimum boron concentration with the accumulators minimum boron concentration which is 2200 ppm.
- C. Correct. First part is correct. FT-168 will regulate total makeup flow to 120 gpm. This is a combination of acid flow and Reactor Makeup Water (RMW) flow. The amount of acid flow will be determined by the properly functioning FT-113. This means that the malfunctioning LOWER signal sent to FK-168 by FT-168 will cause the system to raise the flow of RMW to achieve a "sensed" total flow of 120 gpm resulting in more RMW than expected therefore a lower boron concentration in the makeup water supplied to the SFP. This will result in a dilution of the SFP.
- Second part is correct. Tech Spec 3.7.14 requires the SFP boron concentration to be ≥ 2000 ppm.
- D. Incorrect. First part is correct (See C.1).
- Second part is incorrect (See B.2).

K/A: **033K4.05** Spent Fuel Pool Cooling System (SFPCS) - Knowledge of design feature(s) and/or interlock(s) which provide for the following: Adequate SDM (boron concentration)

Importance Rating: 3.1 3.3

Technical Reference: Unit 1 Technical Specifications, Ver 190
D-175043, SH1, Spent Fuel Pool Cooling, ver 27
D-175036, SH 1, Reactor Makeup Water, Ver 22

References provided: None

Learning Objective: RECALL AND APPLY the LCO and APPLICABILITY for Technical Specifications (TS) or TRM requirements, and the REQUIRED ACTIONS for 1 HR or less TS or TRM requirements, and the relevant portions of BASES that DEFINE the OPERABILITY and APPLICABILITY of the LCO associated with the Spent Fuel Pool Cooling and Purification and Refueling Water Storage Tank Purification Systems components and attendant equipment alignment, to include the following (OPS-52108L01):

[...]

- 3.7.14, Fuel Storage Pool Boron Concentration

RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Reactor Makeup Control and Chemical Addition System, to include the following (OPS-40301G02):

[...]

- Inter connections with other systems
- Primary Water Makeup Flow Controller, FK-168

Question History: MOD NORTH ANNA 08

K/A match: Requires the applicant to evaluate **knowledge of TS requirement for minimum boron concentration, which provides for adequate SDM**. Also evaluates candidates ability to **predict effect of an equipment malfunction which could adversely affect ability to maintain desired boron concentration**.

SRO justification: N/A

Unit 1 is operating at 100% power with the following conditions:

- Reactor power is now 100.5% and slowly rising.
- Tavg is 570.5°F and slowly lowering.
- Pressurizer pressure is 2210 psig and slowly lowering.
- Turbine load is 890 MWe and lowering.
- SG pressures are 720 psig and slowly lowering.
- Containment pressure is 2.1 psig and slowly rising.

Which one of the following completes the statements below?

The event in progress is a (1) line break.

Per AOP-14.0, Secondary System Leakage, the operators are required to (2).

- | | |
|------------|---------------------|
| <u>(1)</u> | <u>(2)</u> |
| A. steam | reduce turbine load |
| B✓ steam | trip the reactor |
| C. feed | reduce turbine load |
| D. feed | trip the reactor |

AOP-14:

1. [CA] Evaluate plant status for safe operation.

Pressurizer level
GREATER THAN 15%

AND

Pressurizer pressure
GREATER THAN 2000 psig

AND

Steam generator pressure
GREATER THAN 650 psig

AND

**Containment pressure
LESS THAN 2 psig**

AND

IF main generator on line,
THEN

(check reactor power) - (turbine power + any steam dump power)
mismatch LESS THAN 10%.

AND

IF main generator off line,
THEN check reactor power less than ~ 15%

1. Perform the following

1.1 **Verify reactor tripped**

1.2 IF reactor tripped,
THEN CLOSE SG
main steam isolation and
bypass valves

AOP-14, step 9 and note above step 9 says:

The intent of step 9 is to reduce reactor power to within the capacity of the AFW system if possible and step 9 has the crew reduce power per UOP-3.1 and UOP-2.1 if the above trip criteria is not met.

Distracter analysis

- A. Incorrect. First part is correct (See B.1).
- Second part is incorrect (See B.2). Plausible since UOP-3.1, Power Operation, requires a reduction in turbine load if 100% power is exceeded. This would be the correct thing to do if containment pressure did not meet the reactor trip criteria. Also Step 7 and 9 and note above step 9 addresses ramping the unit down to mode 2 if the trip criteria is not exceeded in the previous steps.
- B. Correct. First part is correct. All the conditions in the stem - Tavg lowering, RCS Pressure lowering and MWe lowering **are indicative of a steam break** where the steam is exiting the piping before reaching the turbine. The containment parameters show that the break is in containment.
- Second part is correct. With containment pressure greater than 2 psig, reactor trip criteria is met.
- C. Incorrect. First part is incorrect on a feedline break, Rx power would be stable, turbine MWe would be stable, and RCS pressure would be stable. SG pressure would not lower and Tavg would be rising. Plausible if the applicant misdiagnoses the event. AOP-14 addresses a steam or feed break and they have similar characteristics.
- Second part is incorrect (See A.1).
- D. Incorrect. First part is incorrect (See C.1).
- Second part is correct (See B.2).

K/A: **035A2.01** Steam Generator System (S/GS) - Ability to (a) predict the impacts of **Faulted or ruptured S/Gs** on the S/GS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations

Importance Rating: 4.5 4.6

Technical Reference: FNP-1-AOP-14.0, Secondary System Leakage. Ver 10.0

References provided: None

Learning Objective: STATE AND EXPLAIN the operational implications for all Cautions, Notes, and Actions associated with AOP-14, Secondary System Leakage. (OPS-52521O03)

Question History: MOD VOTGLE 12

K/A match: Applicant must **predict that a steam break has occurred based on the impact to plant parameters (which is a backward logic way to meet the first part of the KA). The parameters include but are not limited to SGs since the trip criteria in AOP-14 is due to ctmt pressure. Applicant must determine the proper procedural response to mitigate a faulted SG inside ctmt.**

SRO justification: N/A

Unit 1 is operating at 100%. A fuel shuffle is being performed in the Unit 1 SFP.

At 1000:

- EH2, SFP LVL HI-LO, is in alarm.
- SFP level is 153' 3" and stable.

At 1015:

The SRO in charge of refueling reports that a fuel assembly has been dropped.

- FH5, SFP AREA RE-25 A OR B HI RAD, is in alarm.
- R-25A & B, SPENT FUEL BLDG EXH, reads off scale high.

Which one of the following completes the statements below?

The operating crew is required to enter (1) .

The crew is required to dispatch personnel to (2) per the applicable AOP.

Procedure titles are as follows:

AOP-30.0, Refueling Accident

AOP-49.3, Spent Fuel Pool Emergency

(1)

(2)

- | | | |
|----|----------|---|
| A. | AOP-49.3 | make up to the SFP using the RWST |
| B. | AOP-30.0 | make up to the SFP using the RWST |
| C. | AOP-49.3 | ensure all SFP hatches and doors are closed |
| D✓ | AOP-30.0 | ensure all SFP hatches and doors are closed |

AOP-30 Symptoms or entry conditions

1. This procedure is entered when a fuel handling accident causes damage to a fuel assembly in conjunction with a high radiation indication on any of the following:

R-2 CTMT 155 ft

R-5 SFP ROOM

R-24A(B) CTMT PURGE

R-25A(B) SPENT FUEL BLDG EXH

Step 1.6. Dispatch personnel to close all spent fuel area fuel handling hatches.

Step 5. Verify all access doors to accident area - CLOSED

Step 20 has the operator makeup to the refueling cavity from the RHR system if the cavity is low.

AOP-49.3 B. Symptoms or entry conditions

1. A report of damage to and/or leakage from the SPENT FUEL POOL caused

by an external threat is received.

2. Any condition outside the design basis of the plant that will result in a long term loss of Spent Fuel Pool cooling.

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible based on the name of the procedures. The applicant may believe that since there is no refueling occurring (Unit 1 at 100%), AOP-30 does not apply and AOP-49.3 applies since there is "an emergency" in the SFP.
- Second part is incorrect (See D.2). Plausible since this is an action of AOP-49.3 to keep all assemblies covered with water and would seem logical since there was a SFP HI-LO level alarm and a damaged fuel assembly lying on the racks. The applicant may think that keeping the damaged assembly covered with water is a required action.
- B. Incorrect. First part is correct (See D.1)
- Second part is incorrect (See D.2). Plausible since AOP-30 directs filling the refueling cavity. The applicant could easily confuse this action with filling the SFP. It could seem logical since there was a SFP HI-LO level alarm and a damaged fuel assembly lying on the racks. The applicant may think that keeping the damaged assembly covered with water is a required action.
- C. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2). This is a logical connection to AOP-49.3 since during a SFP Emergency, the applicant could assume the affected area would be isolated as radiation levels are high.
- D. Correct. First part is correct. This scenario meets the entry requirements of AOP-30.0.
- Second part is correct. This action is taken per step 1.6 and 5.

K/A: **036AG2.1.7** Fuel Handling Incidents - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Importance Rating: 4.4 4.7

Technical Reference: FNP-1-AOP-30.0, Refueling Accident, Ver 19

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if entry into AOP-30.0, Refueling Accident is required. (OPS-52521H02)

Question History: MOD FNP 05

K/A match: Requires the applicant to **interpret plant instrumentation (rad monitors and SFP alarm) and reports from the field and determine the applicable procedure to enter and the appropriate action to take (operational judgment).**

SRO justification: N/A

Unit 1 is performing the actions of AOP-2.0, Steam Generator Tube Leakage, due to a tube leak on the 1A SG. The following conditions exist:

- RCS pressure is currently being reduced to minimize break flow.

The following parameters are observed:

- SG pressures are:

<u>1A SG</u>	<u>1B SG</u>	<u>1C SG</u>
948 psig	905 psig	900 psig

- RCS pressure is 916 psig.
 - The highest reading non-upperhead CETC is 518°F.
 - PRZR level is 43%.
- BOTH Subcooled Margin Monitors are malfunctioning.

Which one of the following completes the statements below?

The current value of subcooling is approximately (1).

The RCS pressure reduction (2) required to be stopped.

Reference Provided

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 22°F | IS |
| B. | 22°F | is NOT |
| C✓ | 18°F | IS |
| D. | 18°F | is NOT |

AOP-2:

Step 34.2

[CA] WHEN one of the following conditions occur, THEN stop the RCS pressure reduction.

RCS pressure is less than affected SG pressure, AND pressurizer level greater than 15%.

OR

Pressurizer level greater than 63%.

OR

SUBCOOLED MARGIN MONITOR indication less than 16°F subcooled in CETC mode.

Distracter analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible since the applicant may determine subcooling based on ruptured SG pressure vs. RCS pressure. This would be a common misconception since in a SGTR procedure the ruptured SG is the focus for determining SG pressure less than RCS pressure and is the pressure referred to when determining the required CETC temperature to cooldown to. $948 \text{ psig} + 15 = 963 \text{ psia}$ which is 540°F . $540^\circ\text{F} - 518^\circ\text{F} = 22^\circ\text{F}$ subcooling.
- Second part is correct (See C.2).
- B. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (See C.2). Subcooling is greater than 16°F , however, RCS pressure is less than the affected SG pressure and pZR level is $>15\%$. Therefore the pressure reduction is required to be stopped. Plausible since the subcooling is met and the PZR level is $<63\%$, so one more evaluation as to be done. This evaluation has two components and one of the two components is met. Also if the candidate were to compare RCS pressure vs one of the other two SG pressure, then the pressure reduction would be continued.
- C. Correct. First part is correct. $916 \text{ psig} + 15 = 931 \text{ psia}$ which is $\sim 536^\circ\text{F}$. $536^\circ\text{F} - 518^\circ\text{F} = 18^\circ\text{F}$ subcooling.
- Second part is correct. AOP-2.0 has the operator evaluate 3 components, two of which do not require the RCS pressure reduction to be stopped. However, RCS pressure is less than affected SG pressure, (RCS pressure is 916 psig and SG pressure is 948 psig) AND pressurizer level greater than 15% (at 43%).
- D. Incorrect. First part is correct (See C.1)
- Second part is incorrect (See B.2).

K/A: **037AK1.01** Steam Generator (S/G) Tube Leak - Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak: Use of steam tables

Importance Rating: 2.9* 3.3

Technical Reference: FNP-1-AOP-2.0, Steam Generator Tube Leakage, Ver 35 Properties of saturated and superheated steam, 1967

References provided: Steam tables and AOP-2.0 step 34.2 Ver 35.0

Learning Objective: ANALYZE plant conditions and DETERMINE the successful completion of any step in AOP-2.0, SG Tube Leakage. (OPS-52520B07)

Question History: MOD CATAWBA 09

K/A match: Applicant is required to **use the steam tables** to determine current value of subcooling and the **whether or not the RCS depressurization is required to be stopped during a SG tube leak scenario.**

SRO justification: N/A

Unit 1 has experienced a tube rupture on the 1C SG.

The operating crew is at the step in EEP-3.0, Steam Generator Tube Rupture, to "Check SI termination criteria."

- The following plant conditions are observed:
 - RCS Subcooling is 22°F and slowly rising.
 - RCS pressure is 950 psig and slowly rising.
 - Pressurizer level is 45% and slowly rising.
 - AFW flow is 450 gpm.
 - 1A SG NR level is 29% and slowly rising.
 - 1B SG NR level is 26% and slowly rising.
 - 1C SG NR level is 65% and rising rapidly.

Which one of the following completes the statements below?

SI termination criteria (1) been met.

Per EEP-3.0, SI termination is necessary to prevent overfilling the (2).

	<u>(1)</u>	<u>(2)</u>
A.	has NOT	Steam Generator
B.	has NOT	Pressurizer
C✓	HAS	Steam Generator
D.	HAS	Pressurizer

EEP-3

20 [CA] Check SI termination criteria.

20.1 Check SUBCOOLED MARGIN MONITOR indication - GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE.

20.2 Check secondary heat sink available.

Total feed flow to SGs -
GREATER THAN 395 gpm
AVAILABLE.

**Narrow range level in at
least one intact SG -
GREATER THAN 31%{48%}.**

20.3 Check RCS pressure - STABLE OR RISING.

20.4 Check pressurizer level - GREATER THAN 13%{43%}.

EEB-3

Step 20 Basis: [...] **If SI flow is not terminated, leakage into the secondary will eventually fill the steam generator with water and lift the atmospheric relief valves.** This could damage the relief valve and main steamline which would complicate subsequent recovery and aggravate the radiological consequences. Hence, SI must be terminated when the criteria in subsequent steps are satisfied to prevent steam generator overflow

Distracter analysis

A. Incorrect. First part is incorrect (See C.1). Plausible if the applicant believes that due to the SI, adverse numbers are applicable. If they were applicable, then this would be a correct answer due to subcooling.

Second part is correct (See C.1)

B. Incorrect. First part is incorrect. (See A.1).

Second part is incorrect (See A.2). Plausible since this is the reason to terminate SI in EEP-0 and ESP-1.1 for a spurious SI. The applicant could confuse the basis for these procedures with the basis for the step in EEP-3.

C. Correct. First part is correct. SI termination criteria has been met.

Second part is correct. EEP-3 background document - **If SI flow is not terminated, leakage into the secondary will eventually fill the steam generator with water and lift the atmospheric relief valves.** This could damage the relief valve and main steamline which would complicate subsequent recovery and aggravate the radiological consequences. Hence, SI must be terminated when the criteria in subsequent steps are satisfied to prevent steam generator overflow

D. Incorrect. First part is correct (See C.2).

Second part is incorrect (See B.2)

This question was written with these values for the following reasons:

RCS subcooling is low but above the $16^{\circ}\text{F}\{45^{\circ}\text{F}\}$. If adverse numbers were used it makes plausibility greater for this parameter.

Przr level is about where you would expect it after cooldown and depress and still above both parameters. $13\%\{43\}$ and to meet plausibility for KA.

SG NR is below value of **Narrow range level in at least one intact SG - GREATER THAN $31\%\{48\}$ but AFW flow is > 395 gpm. One does not meet SI termination and one does, and SGWL for 1C SG is so high to meet plausibility for KA.**

K/A: **038EK3.02** Steam Generator Tube Rupture (SGTR) - Knowledge of the reasons for the following responses as the apply to the SGTR: Prevention of secondary PORV cycling

Importance Rating: 4.4 4.5

Technical Reference: FNP-1-EEP-3.0, Steam Generator Tube Rupture, Ver 27
FNP-0-EEB-3.0, Specific Background Document For
FNP-1/2-EEP-3.0, Ver 2

References provided: None

Learning Objective: STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with EEP-3, Steam Generator Tube Rupture. (OPS-52530D03)

Question History: NEW

K/A match: Requires the applicant to know that **preventing the SG PORVs from lifting due to filling the SGs solid will prevent a radiological release from the atmospherics.**

SRO justification: N/A

Concerning R-70A/B/C, 1A/1B/1C SG TUBE LEAK DET, on Unit 1:

Which one of the following completes the statements below?

The R-70s are located (1) of the MSIVs.

A minimum reactor power level that the R-70s can accurately estimate a SG leak rate is (2) .

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A✓ | upstream | 25% |
| B. | downstream | 25% |
| C. | upstream | 10% |
| D. | downstream | 10% |

FSD-A181015

3.2.8 These detectors are located to monitor the main steam lines upstream of the safety relief valves for the presence of Nitrogen-16 activity in the steam lines and alert the operator when setpoints are exceeded.

SOP-69

Step 3.1 - **The system receives a reactor power input from power range channel N-43. IF N-43 fails OR is in Test OR is less than 20% power, THEN the system cannot accurately estimate a leak rate in the AV mode, and the indicators will display "PN <20%".** If desired, the Counting Room can configure the N-16 system in the ME counts per second (C/S) mode using FNP-0-CCP-31, LEAK RATE DETERMINATION. While not able to provide a leak rate determination, this mode can be used to indicate if leakage is increasing based on the indication trending up. The AV mode is the preferred mode of operation above 20% reactor power. The ME mode should only be utilized below 20% reactor power.

Distracter analysis

- A. Correct. First part is correct. R-70s are located to monitor the main steam lines upstream of the safety relief valves.
- Second part is correct. R-70s are accurate at reactor power >20%.
- B. Incorrect. First part is incorrect (See A.1). Plausible if the applicant does not recall the location of these monitors.
- Second part is correct (See A.2).
- C. Incorrect. First part is correct (See A.1).
- Second part is incorrect (See A.2). Plausible if the applicant fails to recall the power at which the R-70's are accurate.
- D. Incorrect. First part is incorrect (See B.1).
- Second part is incorrect (See C.2).

33. 045K1.19 033

Which one of the following coincidences will cause an anticipated transient without trip (ATWT) mitigation system actuation circuitry (AMSAC) Main Turbine Trip?

(1) Turbine impulse pressure channels > 40%

AND

(2) SG NR levels < 10% for > 25 seconds.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 1 of 2 | 2 of 3 |
| B✓ | 2 of 2 | 2 of 3 |
| C. | 1 of 2 | 1 of 3 |
| D. | 2 of 2 | 1 of 3 |

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C-20 Interlock. Control interlock C-20 is used to enable the Anticipated Transient Without Trip (ATWT) Mitigation System Actuation Circuitry (AMSAC) . When turbine load is > 40% on 2/2 turbine impulse channel detectors and steam generator narrow range water level decreases to <10% on 2/3 steam generators for 25 seconds, the AMSAC system will trip the main turbine and provide an auto start signal to all AFW pumps. There is a time delay drop out associated with the impulse pressure portion of the signal such that for 260 sec after impulse pressure decreases below 40%, AMSAC is still enabled.

A. Incorrect. First part is incorrect (See B.1). Plausible since various control and permissive interlocks use a 1 of 2 logic to enable or disable functions. The applicant could confuse AMSAC (C-20) with any of these.

Second part is correct (See B.2).

B. Correct. First part is correct. 2 of 2 turbine impulse channels > 40% enables AMSAC.

Second part is correct. 2 of 3 SG NR levels < 10% for > 25% actuates AMSAC.

C. Incorrect. First part is incorrect (See A.1).

Second part is incorrect (See B.2). Plausible because the Low Low SGWL is 1 of 3 SGWL less than 28% NR. The applicant could improperly believe that AMSAC is 1 of 3 as is the Low Low SGWL logic.

D. Incorrect. First part is correct (See B.1).

Second part is incorrect (See C.2).

K/A: 045K1.19 Main Turbine Generator (MT/G) System - Knowledge of the physical connections and/or cause-effect relationships between the MT/G system and the following systems: ESFAS

Importance Rating: 3.4* 3.6

Technical Reference: FSD-A181007, Reactor Protection System, Ver 18

References provided: None

Learning Objective: DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Main Turbine and Auxiliaries System components and equipment, to include the following (OPS-40202A07):

 [...]

 • Turbine Trips

 Actions needed to mitigate the consequence of the abnormality.

Question History: MOD CALLOWAY AUG 05

K/A match: AMSAC is listed as a back up to the reactor trip system and ESFAS in the FSAR. This question requires the applicant to know the **cause and effect** of relationship between AMSAC and the Main Turbine. Conditions which cause AMSAC to be enabled and produce a turbine trip.

SRO justification: N/A

34. 051AK3.01 034

Unit 1 is operating at 40% power when PR-4029, CONDENSER PRESSURE indicates as follows:

- PT0501 and PT0502 are 6 psia and rising rapidly.

Subsequently, Condenser pressure stabilizes at 12 psia.

Which one of the following completes the statements below?

The Steam Dump (1) controller is enabled.

The Steam Dumps are (2) .

- | <u>(1)</u> | <u>(2)</u> |
|-----------------|------------|
| A✓ Plant Trip | CLOSED |
| B. Plant Trip | OPEN |
| C. Loss of Load | CLOSED |
| D. Loss of Load | OPEN |

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C-9 Interlock. C-9 is the condenser-available interlock. This interlock allows the steam dump valves to be armed if the condenser is available. It also prevents an overpressure condition which could damage the condenser. To activate C-9, both condenser pressures shall be < 8 inches Hg vacuum, and 1/2 circulation water pump motor breakers must be shut.

8 inches of Hg vacuum is 10.8 psia.

See references Figure 2, Sheet 10 of FSD-A181007.

Distracter analysis

- A. Correct. First part is correct. A turbine trip results which causes a reactor trip, thus enabling the plant trip controller.
- Second part is correct. C-9 is NOT enabled at 12 psia therefore the steam dumps do not operate and are closed.
- B. Incorrect. First part is correct (See A.1).
- Second part is incorrect (See A.2) Plausible if the applicant cannot recall that the vacuum setpoint for the C-9 interlock is <10.8 psia and believes that adequate condenser vacuum exists for steam dump operation.
- C. Incorrect. First part is incorrect (See A.1). Plausible if the applicant fails to recognize that the turbine trip causes a reactor trip at this power. If rx power were less than 35% then a rx trip would not occur and the turbine trip would cause the LOL controller to be the controlling controller.
- Second part is correct (See A.2).
- D. Incorrect. First part is incorrect (See C.1).
- Second part is incorrect (See B.2)

K/A: 051AK3.01 Loss of Condenser Vacuum - Knowledge of the reasons for the following responses as they apply to the Loss of Condenser Vacuum: Loss of steam dump capability upon loss of condenser vacuum

Importance Rating: 2.8* 3.1

Technical Reference: FSD-A181007, Reactor Protection System, Ver 18

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the following components associated with the Steam Dump System to include the components found on Figure 5, Steam-Dump Control (OPS-52201G02).

Question History: FNP EXAM BANK

K/A match: Requires the applicant to know on a **loss of vacuum** which controller the steam dumps will operate on and **the reason** the steam dumps will not operate (loss of capability). On a loss of vacuum the reason is **because** the C-9 interlock (vacuum) is not met. This is not stated in the stem but is inherent to the question.

SRO justification: N/A

35. 054AA2.05 035

Unit 1 is operating at 4% power. The following conditions exist:

- 1A SGFP is running.
- All SG NR levels are in the programmed band.
- FCV-479/489/499, 1A/1B/1C SG FW BYP FLOW, controllers are in MANUAL and 35% open.

Subsequently, the 1A SGFP trips.

Which one of the following completes the statements below?

MOV-3232A/B/C, MAIN FW TO 1A/1B/C SG, will (1).

FCV-479/489/499, 1A/1B/1C SG FEED FLOW BYPASS FCVs, will (2).

- | | <u>(1)</u> | <u>(2)</u> |
|----|-------------|-------------|
| A. | remain OPEN | remain OPEN |
| B. | remain OPEN | CLOSE |
| C✓ | CLOSE | remain OPEN |
| D. | CLOSE | CLOSE |

For this event the applicant has to analyze the situation. For a SGFP trip, AOP-13 is required to be entered and a Rx trip is initiated >5% power. If the applicant thought the Rx was tripped, then the dumps would be controlling at 547°F and a FWI signal would be generated. This would directly affect the bypass valves. Since the bypass valves are rarely used, an applicant may not realize the link and open/close signals. Since we are <5% power, the RTBs are not opened and AFW will auto start to raise SGWL due to both SGFPs tripped. This will keep level high. MOV-3232A/B/C close when both SGFPs are tripped. This has to be analyzed and known for these two particular valves.

Distracter analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible if the applicant thinks that this valve only automatically shuts on a feedwater isolation (FWI). A FWI has NOT occurred at this time.
- Second part is correct (See C.1).
- B. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect. (See C.1). Plausible if the applicant thinks that a FWI has occurred.
- C. Correct. First part is correct. D175073, Sheet 1 shows that these valves close on a SGFP trip.
- Second part is correct. The bypass valves are in manual and therefore remain open since there is NO feedwater isolation (FWI). A FWI occurs with a P-4 signal (Rx Trip) coincident with a low Tavg, Safety Injection and a Hi-Hi SGWL (P-14).
- D. Incorrect. First part is correct (See C.1).
- Second part is incorrect (See B.2).

K/A: **054AA2.05** Loss of Main Feedwater (MFW) - Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): Status of MFW pumps, regulating and stop valves

Importance Rating: 3.5 3.7

Technical Reference: D-175073, SH 1, Main Feedwater System, Ver 18
FSD-181007, Reactor Protection System, Ver 18

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if entry into AOP-13, Loss of Main Feedwater is required.
(OPS-52520M02)

Question History: NEW

K/A match: Requires the applicant to **determine the status of feed system STOP valves and bypass FCVs upon a loss of Main Feedwater.**

SRO justification: N/A

Unit 1 is at 70% power with the following conditions:

- **R-15A, SJAE EXH**, is in alarm.
- **R-15B, TURB BLDG VNTL**, is in alarm.
- AOP-2.0, Steam Generator Tube Leakage, is in progress.
- The Turbine Building SO has placed the SJAE Filtration System in service.

Which one of the following completes the statement below?

After the SJAE Filtration system is placed in service, the reading on **R-15B** will (1) and the SJAE Filtration system will (2) .

(1)

(2)

- | | |
|--------------------|------------------------------------|
| A. decrease | be aligned in a recirc alignment |
| B. remain the same | be aligned in a recirc alignment |
| C✓ decrease | discharge to the Turbine Bldg roof |
| D. remain the same | discharge to the Turbine Bldg roof |

D170064/D-175027:

These drawings show that R-15A is upstream of the normally off service SJAE filtration system. R-15B is downstream of the SJAE filtration system. When the SJAE filtration system is placed on service, R-15B reading will decrease. The SJAE filtration system discharges directly to the turbine building roof and cannot be diverted elsewhere.

Distracter analysis

- A. Incorrect. First part is correct (See C.1).
- Second part is incorrect (See C.2). Plausible since the turbine building ventilation system is capable of bypassing the SJAE filter system which is similar to a recirc alignment. Recirc would seem reasonable to minimize radioactive release to the outside atmosphere. The SJAE filtration system discharges directly to the turbine building roof and cannot be diverted elsewhere. The Penetration Room Filtration system on the rad side does have recirc alignment MOVs and a student could confuse the two systems or apply the concepts from one system to the other.
- B. Incorrect. First part is incorrect (See C.1). Plausible if the applicant cannot recall the location of R-15B and believes it is upstream of the SJAE filtration system. R-15A is located before the SJAE filtration system and remain the same would be the correct answer.
- Second part is incorrect (See A.2).
- C. Correct. First part is correct. R-15B is downstream of the SJAE filtration system. When the SJAE filtration system is placed on service, R-15B reading will decrease.
- Second part is correct. The SJAE filtration system discharges directly to the turbine building roof and cannot be diverted elsewhere.
- D. Incorrect. First part is incorrect (See B.1).
- Second part is correct (See C.2).

K/A: **055A3.03** Condenser Air Removal System (CARS) - Ability to monitor automatic operation of the CARS, including: Automatic diversion of CARS exhaust

Importance Rating: 2.5* 2.7*

Technical Reference: D-170064, SH1, Condenser Vacuum System, Ver 19
D-175027, SH 1, HVAC: TUBINE BLDG, Ver 21

References provided: None

Learning Objective: LABEL, DRAW AND ILLUSTRATE the Condensate and Feedwater System flow paths, to include the components on the following figures (OPS-40201B05, Part A):

- Figure 3, Condenser Air Removal System

Question History: MOD FNP 11

K/A match: Requires the applicant to **monitor the R-15B reading and determine its response when the SJAE filtration system is placed on service.** FNP has no automatic diversion of the SJAE exhaust system. (10/24/12) Chief Examiner said using manual diversion based on our plant design is acceptable.

SRO justification: N/A

Unit 1 is operating at 100% when a LOSP occurred. The following conditions exist:

- The Emergency Diesel Generators failed to energize the ESF busses.
- The operating crew is conducting a secondary depressurization per ECP-0.0, Loss Of All AC Power.
- SG pressures are as follows:
 - 1A SG: 245 psig and lowering
 - 1B SG: 247 psig and lowering
 - 1C SG: 244 psig and lowering

Which one of the following completes the statements below?

Per ECP-0.0, this secondary pressure reduction is required to (1).

The reason the secondary pressure reduction is required to be stopped at the SG pressure specified in ECP-0.0 is to prevent (2).

(1)

(2)

- | | | |
|----|------------|---|
| A✓ | be STOPPED | injection of accumulator nitrogen into the RCS |
| B. | CONTINUE | injection of accumulator nitrogen into the RCS |
| C. | be STOPPED | a challenge to the Integrity Critical Safety Function |
| D. | CONTINUE | a challenge to the Integrity Critical Safety Function |

ECP-0.0:

17. Reduce intact SGs pressure to 260 psig.

ECB-0.0:

The target SG pressure for Step 16 should ensure that RCS pressure is above the minimum pressure to preclude injection of accumulator nitrogen into the RCS. The target SG pressure should be based on the nominal SG pressure to preclude nitrogen addition, plus margin for controllability (e.g., 100 psi).

Distracter analysis

A. Correct. First part is correct. Per ECP- 0.0, Reduce intact SGs pressure to 260 psig.

Second part is correct: Per ECB-0.0, [...] Should ensure that RCS pressure is above the minimum pressure to preclude injection of accumulator nitrogen into the RCS.

B. Incorrect. First part is incorrect (See A.1). Plausible since the limit in the background document is 160 psig. The limit in the procedure adds a 100 psig for margin of controllability and the applicant could confuse these two numbers and believe that the depressurization must continue.

Second part is correct (See A.2).

C. Incorrect. First part is correct (See A.1)

Second part is incorrect (See A.2). Plausible since this is the reason for the Tcold temperature limit of 280°F during the pressure reduction but NOT the reason for stopping at 260 psig.

D. Incorrect. First part is incorrect (See B.1)

Second part is incorrect (See C.2)

K/A: **056AK3.02** Loss of Offsite Power - Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Actions contained in EOP for loss of offsite power

Importance Rating: 4.4 4.7

Technical Reference: FNP-1-ECP-0.0, Loss Of All AC Power, Ver 26
FNP-0-ECB-0.0, Specific Background Document for
FNP-1/2-ECP-0.0, Ver 3.1

References provided: None

Learning Objective: STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with (1) ECP-0.0, Loss of All AC Power; [...] (OPS-52532A03)

Question History: NEW

K/A match: This question presents a scenario where a **Loss of Offsite Power** occurs and the Emergency DGs fail to energize the ESF busses. The Applicant is required to **know the reason that the secondary depressurization is stopped at 260 psig (reasons for the actions contained in the EOP).**

SRO justification: N/A

Unit 1 is operating at 100% power when the 1B SGFP trips.

Which one of the following completes the statements below for the 1B SGFP?

The HIGH PRESS. GOV. VALVE CLOSED light is (1) .

The LOW PRESS. GOV. VALVE CLOSED light is (2) .

	<u>(1)</u>	<u>(2)</u>
A✓	LIT	LIT
B.	LIT	NOT lit
C.	NOT lit	LIT
D.	NOT lit	NOT lit

U-161792 - Tab 3, Section 5, Page 1

When a trip condition occurs, signals from the electronic controller close the steam valves.

Ran on desktop simulator. Inserted SGFP trip from 100% power and both governor valves went closed.

From OPS-52104C Ver 2 pg 15 -

Initially, as the feed pump turbine accelerates from operation on the turning gear to operating speed, both the LP and HP stop valves are open. The first governor valve to open on an increase speed signal from the control system is the LP governor. Since reheat steam is not available, the turbine speed does not increase. Once the LP governor valves begin to reach their fully open position, the HP governor valve begins to open. The turbine now accelerates to the demanded speed using the main steam supply via the HP governor valve.

As main turbine load is increased, reheat steam pressure in the shell side of the MSR's also increases. At approximately 25 percent main turbine power, the reheat steam pressure is high enough to cause the feed pump turbine speed to increase. In an effort to maintain the desired feed pump turbine speed, the control system begins to shut the HP governor valve. Once the HP governor valve approaches the fully shut position, the control system starts closing the LP governor valves. During 100 percent power operation, the governor valve alignment is as follows:

1. The HP governor valve is fully shut.
2. The LP governor valve is throttled partially shut and consequently controls feed pump turbine speed.

** Some validators selected the correct answer but stated that they struggled with determining the response of governor valves when the SGFP tripped.*

Distracter analysis

- A. Correct. First part is correct. The Servo controller shuts the HP governor valve when the SGFP turbine trips.
- Second part is correct. The Servo controller shuts the LP governor valve when the SGFP turbine trips.
- B. Incorrect. First part is correct (See A.1). Logical connection to the second part because this is the normal position of the HP governor valve at 100% power.
- Second part is incorrect (See A.2). Plausible if the applicant thinks that the HP and LP Governor Valves remain in their pre-trip positions on a SGFP trip because the HP and LP STOP valves go shut.
- C. Incorrect. First part is incorrect (See A.1). Plausible if the applicant thinks that the HP and LP Governor Valves remain in their pre-trip positions on a SGFP trip because the HP and LP STOP valves go shut. If the applicant thought the HP governor valve controlled speed at high power then it would make this a plausible correct answer coupled with the second part.
- Second part is correct (See A.2). Logical connection to the first part if the applicant thinks that the HP governor valve controls speed at high power.
- D. Incorrect. First part is incorrect (See A.1) Plausible if the applicant thinks that the HP and LP Governor Valves remain in their pre-trip positions on a SGFP trip because the HP and LP STOP valves go shut. Logical connection to the second part if the applicant thinks that both the HP and LP governor valves are open at 100% power.
- Second part is incorrect (See A.2) Plausible if the applicant thinks that the HP and LP Governor Valves remain in their pre-trip positions on a SGFP trip because the HP and LP STOP valves go shut. Logical connection to the first part if the applicant thinks that both the HP and LP governor valves are open at 100% power.

K/A: 059A4.01 Main Feedwater (MFW) System - Ability to manually operate and monitor in the control room: MFW turbine trip indication

Importance Rating: 3.1* 3.1*

Technical Reference: U-161792, SGFP Drive Turbine and Accessories, Ver 12

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if entry into AOP-13, Loss of Main Feedwater is required. (OPS-52520M02)

Question History: DIABLO CANYON 12-07

K/A match: Requires the applicant to monitor MCB indications and determine the proper SGFP GOV valve positions on a SGFP trip.

SRO justification: N/A

39. 059AK2.01 039

Unit 2 is operating at 100% power when a SG tube leak occurs.

Which one of the following completes the statement below?

When R-23A, SGBD HX OUTLET, alarms, it will cause _____, to automatically close.

- A. HV-7614A/B/C, 2A/B/C SGBD ISO
- B✓ FCV-1152, SGB INLET STOP VALVE
- C. RCV-023B, SGBD DISCH TO ENVIRONMENT
- D. HV-7697A/B, 7698A/B and 7699A/B, 2A/B/C SGBD ISO

FH1

Automatic Actions:

R23A :(Steam Generator Blowdown Processing) closes 2-BD-FCV-1152 S/G Blowdown Heat Exchanger Discharge Valve.

R-23A is in the SGBD line after FCV-1152 but before the SGBD Surge tank. R-23B is after the surge tank and is the last rad monitor and isolation signal before an accidental release would make it to the environment. R-23 A and B are often confused on the functions and locations. Two other sets of valves isolate SGBD due to other conditions, such as High Penetration room pressure and AFW autostart. All of these valves complete the same function but for different reasons.

Distracter analysis

- A. Incorrect. See B. Plausible since these valves will isolate SG Blowdown (SGBD) and automatically close on an AFW autostart. The applicant could believe they also close on a high radiation signal.
- B. Correct. R-23A automatically closes FCV-1152. FCV-1152 also closes on SGBD high ST level, High pressure in the SGBD system and High flow.
- C. Incorrect. See B. Plausible since R-23B automatically closes RCV-23B and the applicant could confuse which radiation monitor closes which valve. RCV-023B will isolate SGBD to the environment and is downstream of FCV-1152.
- D. Incorrect. See B. Plausible since these valves are two series isolation valves located inside the containment on each line from the steam generator. The air-operated isolation valves (7697A/B, 7698A/B, 7699A/B) automatically close when high pressure (0.28-0.33 psig) is sensed in any room outside the containment where the blowdown piping, upstream of the heat exchanger, is located. Since these valves isolate on High pressure in the PPRs, they could be confused with closing signals for FCV-1152.

K/A: 059AK2.01 Accidental Liquid Radwaste Release - Knowledge of the interrelations between the Accidental Liquid Radwaste Release and the following: Radioactive-liquid monitors

Importance Rating: 2.7 2.8

Technical Reference: FNP-2-ARP-1.6, FH1 - RMS HI-RAD, Ver 70

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Radiation Monitoring System to include those items in Table 4- Remote and Local Indications and Controls (OPS-40305A02).

Question History: FNP 06

K/A match: In this scenario, a **SG tube leak results in an accidental liquid radwaste release. The applicant is required to know the interrelations between R-23A and the SGBD system that will terminate the accidental liquid radwaste release.**

SRO justification: N/A

Unit 1 is operating at 33% power and the following conditions exist:

- 1A and 1B Condensate pumps are running.
- 1C Condensate pump is in OFF with a CAUTION TAG that says, "EMERGENCY USE ONLY."
- 1A SGFP is running.

Subsequently, the 1B Condensate pump trips and the following conditions are observed:

KB4, SGFP SUCTION PRESS LOW, comes into alarm and the operating crew observes the following on PR4039, SGFP SUCT PRESS:

<u>Time</u>				
<u>0 sec</u>	<u>10 sec</u>	<u>20 sec</u>	<u>30 sec</u>	<u>40 sec</u>
300 psig	275 psig	265 psig	270 psig	285 psig

At time 20 seconds, the 1C condensate pump was started.

Which one of the following completes the statements below?

At time 30 seconds, the 1A SGFP (1) be tripped.

The operating crew is required to (2).

- A. 1) will NOT
2) rapidly reduce Turbine load using AOP-17.1, Rapid Turbine Power Reduction
- B✓ 1) will NOT
2) check SGFP suction pressure stabilizes
- C. 1) WILL
2) trip the Reactor and enter EEP-0.0, Reactor Trip or Safety Injection.
- D. 1) WILL
2) trip the Main Turbine and enter AOP-3.0, Turbine Trip Below P-9 Setpoint.

Not a true 2+2 question to improve the plausibility of the distracters.

KB4 comes into alarm at 300 psig.

At 275 psig decreasing on 2/3 pressure switches (PS625, PS626, PS627),

1. The standby condensate pump will start after 10 sec delay. (63IP relay)
2. The SGFP(s) will trip after 30 sec. delay (63IPX relay).

AOP-13

6.1 Check SGFP suction pressure stabilizes above 275 psig.

6.1.2 RNO:

IF suction pressure still falling, THEN reduce turbine load rapidly using FNP-1-AOP-17.1, RAPID TURBINE POWER REDUCTION.

Distracter analysis

- A. Incorrect. First part is correct (See B.1).
- Second part is incorrect (See B.2). Plausible since this is the action to take if the SGFP suction does NOT stabilize (6.1.2 RNO).
- B. Correct. First part is correct. The SGFP's will trip 30 seconds after suction pressure falls below 275 psig which would be at 40 seconds in this scenario.
- Second part is correct. This is the correct action per AOP-13 step 6.1 since suction pressure is rising and within the band to keep the SGFP from tripping at time 40 sec
- C. Incorrect. First part is incorrect (See B.1) Plausible if the applicant confuses the condensate pump autostart setpoint with the SGFP trip. The standby condensate pump, if in AUTO, would start 10 seconds after SGFP suction pressure falls below 275 psig.
OR plausible if the applicant thought that when the low pressure alarm comes in the SGFP would trip 30 sec later.
- Second part is incorrect (See B.2) Plausible since this is the correct response if the SGFP tripped.
- D. Incorrect. First part is incorrect (See C.1).
- Second part is incorrect (See B.2) Plausible since power is less than 35% (P-9) and tripping the turbine would stop most of the steam flow from the SG. This was the correct actions to take until 2 years ago when the station decided the most conservative action would be to trip the reactor if power is >5% power

K/A: **059G2.2.44** Main Feedwater System - Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.

Importance Rating: 4.2 4.4

Technical Reference: FNP-1-AOP-13, Condensate and Feedwater Malfunction, Ver 33

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing AOP-13, Loss of Main Feedwater. (OPS-52520M06).

Question History: NEW

K/A match: This question requires the applicant to **interpret the SGFP suction pressure to verify the status of the MFW system (SGFP is not tripped). Also, understand how operator actions, starting the 1C cond pump, and directives (AOP-13.0) affect the plant status which is to check that the suction pressure is rising and not reduce power or trip the reactor.**

SRO justification: N/A

Unit 1 is in Mode 3 with the following conditions:

- 1A MDAFW pump was started per UOP-1.2, Startup of Unit From Cold Shutdown to Hot Standby.
- There are no other AFW pumps running.
- All SG NR levels are 65%.

Subsequently, power is lost to the 1A Startup Transformer.

Which one of the following completes the statements below?

The TDAFW Pump (1) be running.

Total design AFW flow rate will be approximately (2) gpm.

	<u>(1)</u>	<u>(2)</u>
A✓	will NOT	350
B.	will NOT	700
C.	WILL	700
D.	WILL	1050

Not a true 2+2 question to improve distracter plausibility.

The applicant has to evaluate how the loss of the 1A Startup transformer (SUT) affects the TDAFW and MDAFW pumps auto starts. Since the 1A SUT powers the 1A bus and the 1B SUT powers the 1B and 1C busses, only the 1A bus is lost. The opposite is true on Unit 2 so the applicant has to recall how each unit is configured.

Secondly, the applicant has to recall how the loss of power affects the MDAFW pumps. The 1B MDAFWP is unaffected since the 1G bus did not lose power as it is powered from 1B SUT. The 1A MDAFW pump did lose power and will be sequenced on the bus when the DG starts and the LOSP sequencer runs.

Thirdly, once the applicant determines which AFW pumps are running, then they will have to recall design flow rates for each (350 gpm for the MDAFW and 700 gpm for the TDAFW pump) to determine total approximate flow.

Distracter analysis

- A. Correct. First part is correct. FSD-A181010 - 3.9.2.3 - The TDAFW pump shall start by opening the steam supply valves to the turbine drive **on a loss of power signal**, low-low water level signals from two out of three level transmitters or any two out of three steam generators, or an AMSAC signal. The loss of power signal comes from the loss of power to 2 of 3 RCP busses (1A, 1B and 1C). **Since ONLY the 1A bus loses power, the TDAFW pump does**

not start.)

Second part is correct. The 1A MDAFWP pump will autostart and the FCV's will open fully providing ~350 gpm design flow.

B. Incorrect.

First part is correct (See A.1).

Second part is incorrect (See A.2). Plausible if the applicant incorrectly thinks an LOSP has occurred which would start 2 MDAFWP's and provide approx 700 gpm flow.

C. Incorrect.

First part is incorrect (See A.1). Plausible if the applicant confuses the Startup transformer alignment with Unit 2. The TDAFW pump on Unit 2 would start under these conditions.

Second part is incorrect (See A.2). Plausible if the applicant doesn't recall that the MDAFWP receives an auto start signal during an LOSP. This would make this a logical connection to the first part and a correct answer if the applicant thought that only the TDAFW pump started.

D. Incorrect.

First part is incorrect (See C.1).

Second part is incorrect (See A.2). Plausible since this is the design flow for one MDAFW pump and the TDAFW pump and a logical connection to the first part if the applicant thought that the TDAFW pump started.

K/A: **061A3.01** Auxiliary / Emergency Feedwater (AFW) System - Ability to monitor automatic operation of the AFW, including: AFW startup and flows

Importance Rating: 4.2 4.2

Technical Reference: FSD-A181010, Auxiliary Feedwater System, Ver 25
FSD-A181007, Reactor Protection, Ver 18
U166235, Primary Coolant Trip Signals, Ver 2
A506250, U1 Load List, Ver 74

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the AFW System to include the components found on Figure 2, Auxiliary Feedwater System, Figure 3, TDAFWP Steam Supply, and Figure 4, Air Supply to TDAFWP Steam Admission Valves (OPS-40201D02).

NAME AND IDENTIFY the Bus power supplies (Off-site sources and Emergency source-to- Load), for those electrical components associated with the AFW System to include those items in Table 3- Power Supplies (OPS-40201D04).

SELECT AND ASSESS the AFW System instrument/equipment response expected when performing auxiliary feedwater evolutions including (OPS-52102H05):
[...]
The Failed Condition
[...]
Associated Trip Setpoint(s)
[...]

Question History: NEW

K/A match: The applicant is required to **evaluate the loss of power and determine which AFW pump auto starts (monitor startup) and the resultant flow (monitor flow).**

SRO justification: N/A

Unit 1 was operating at 100% power when a Reactor Trip occurred and the following conditions exist:

- ESP-0.1, Reactor Trip Response, has just been entered.
- Pressurizer level is 12% and slowly lowering.
- SG NR levels are 40% and slowly rising.
- Tavg is 534°F and slowly lowering.
- RCS pressure is 2050 psig and slowly lowering.

Which one of the following actions will be performed FIRST as required by ESP-0.1 to address the cooldown?

- A✓ Minimize total AFW flow.
- B. Emergency borate the RCS.
- C. Close all MSIVs and MSIV Bypass Valves.
- D. Manually initiate SI and return to EEP-0.0, Reactor Trip or Safety Injection.

ESP-0.1 -

Step 1.1 RNO:

IF RCS temperature less than 547°F and falling, THEN perform the following. IF NOT, THEN proceed to RNO Step 1.2.

Step 1.1.4 RNO:

IF cooldown continues, THEN minimize total AFW flow.

Distracter analysis

- A. Correct Step 1.1.4 RNO of ESP-0.1 has the operator minimize AFW to stop the cooldown.
- B. Incorrect. See A. Plausible since this is an action in ESP-0.1 if Tavg falls below 525°F. This action is at step 4 and would not be required since Tavg is >525°F. The applicant could confuse this temperature limit to emergency borate with P-12, 543°F Lo-Lo Tavg.
- C. Incorrect. See A. This is done AFTER AFW flow is reduced at step 1.1.5 . Plausible since this would address the cooldown. Also there are a number of steps completed before the AFW flow is addressed that equates to steam in the TB reduced, and stm dumps checked.
- D. Incorrect. See A. Plausible because the Pzr level meets the SI reinitiation criteria (13%) for a number of other Emergency procedures (such as ESP-1.1) and the applicant could confuse it with the correct Pzr level SI initiation criteria of ESP-0.1 foldout page of 4%.

K/A: **061K5.01** Auxiliary / Emergency Feedwater (AFW) System - Knowledge of the operational implications of the following concepts as they apply to the AFW: Relationship between AFW flow and RCS heat transfer

Importance Rating: 3.6 3.9

Technical Reference: ESP-0.1, Reactor Trip Response, Ver 32.

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing ESP-0.1, Reactor Trip Response. (OPS-52531B06)

Question History: INDIAN POINT 07

K/A match: The applicant is required to know that in order **to stop the excessive RCS cooldown (operational implication), they must know that reducing AFW flow will reduce the heat transfer rate of the RCS.**

SRO justification: N/A

Unit 2 is operating at 100% power. The following conditions exist:

- SGBD is on service.
- #1 WMT release is in progress.
- The service water pond level has dropped to 179 feet, 10 inches.

Which one of the following combinations predicts the plant response to the change in pond level?

- A✓ 1) SW Dilution Flow on FR-4107, SW DILUTION FLOW, will lower;
2) RCV-023B, SGBD DISCH TO ENVIRONMENT, will automatically close.
- B. 1) SW Dilution Flow on FR-4107, SW DILUTION FLOW, will lower;
2) RCV-018, WMT DISCH TO ENVIRONMENT, will automatically close.
- C. 1) SW Pressure on PI-3001A & B, SW TO CCW HX HDR PRESS, will lower;
2) PCV-562 and 563, TRN B (A) DILUTION BYPASS PCV, will fully open.
- D. 1) SW Pressure on PI-3001A & B, SW TO CCW HX HDR PRESS, will lower;
2) MOV-538 and 539, SW B (A) HDR EMERG RECIRC TO POND, will fully open.

Not a true 2+2 to improve distracter plausibility.

SOP-16.1

4.5 Defeating the Low SW Dilution Flow Trip of N2G24RCV023B

NOTES

- At low dilution flow below 14,500 GPM SGBD will isolate [...]

AOP-31

2. At a pond level of 180 ft 0 in the following sequence of events occurs

- SW A(B) HDR EMERG RECIRC TO POND valves on both units will open.
- SW HDR NORMAL DISCH ISO A(B) TRN valves on both units will close.
- SW TO WET PIT EAST(WEST) HDR ISO valves will open.
- SW TO POND EAST(WEST) HDR ISO will partially close to divert approximately 50% of the SW recirculation flow to the wet pit.

Ran on desk top simulator and Discharge pressure ROSE ~1.5 psig

Distracter analysis

- A. Correct First part is correct. When the pond level drops to 180 ft 0 in, the SW the SW system changes valve alignments such that the emergency recircs to the pond open and the discharges from each train closes which lowers the dilution flow as seen on FR-4107.

Second part is correct. The dilution line flow drops to less than 14,500 gpm (goes to 0 gpm), which in turn causes the auto-closure of RCV-023B, terminating this Release path. See D200013 for line up.

B. Incorrect. First part is correct (See A.1)

Second part is incorrect (See A.2). RCV-018 does not have a low dilution line auto closure. Plausible since RCV-023B is also a radioactive release point isolation and will close on both High Radiation and Low Flow so the applicant could think it also closed on low flow.

C. Incorrect. First part is incorrect (See A.1). SW discharge pressure is virtually unchanged due to the lineup. When run on desk top simulator, pressure ROSE ~1.5 psig. Plausible since the SW header will operate on RECIRC back to the POND, the applicant may believe this would cause a lowered backpressure on SW header which would translate into a higher flow but at a lower pressure (Centrifugal pump curves).

Second part is incorrect (See A.2). Since SW discharge pressure is virtually unaffected then these valves will NOT fully open because discharge pressure is less than 110 psig. Plausible if the applicant believes that the system "DILUTION BYPASS" valves open to ensure a minimum dilution flow is maintained for Radioactive releases.

D. Incorrect. First part is incorrect (See C.1).

Second part is correct. These valves open on a low level in the SW pond but will not lower pressure.

K/A: 062AA1.07	Loss of Nuclear Service Water - Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water (SWS): Flow rates to the components and systems that are serviced by the SWS; interactions among the components
Importance Rating:	2.9 3.0
Technical Reference:	FNP-2-SOP-16.1, SG Blowdown Processing System, Ver 43.2 FNP-0-AOP-31, Loss of Service water Pond, Ver 12 FNP-2-SOP-24, Service Water System, Ver 73 FSD-A181001, Service Water System, Ver 61 D-200013, Sh 8, Service Water System, Ver 36
References provided:	None
Learning Objective:	<p>DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Service Water System components and equipment, to include the following (OPS-40101B07):</p> <p>[...]</p> <ul style="list-style-type: none"> • Automatic actuation including setpoint (example SI, Phase A, LOSP) • Protective isolations such as high flow, low pressure, low level including setpoint • Protective interlocks <p>[...]</p>
Question History:	FNP 12. The bank was checked and this question is the only one that meets this K/A. We have spent hours developing this question and have encountered difficulty in the final product due to our system design.
K/A match:	Requires the applicant to know what they are expecting to see (monitor) on the MCB (PI-3001 and FR4107) and what will occur due to the flow to other system components (interactions among the components) . The candidate will have to know what happens to the SW system on low pond level (loss of SW) and then the effects of the new valve line up on system pressure and flow to other system components (ie. RCV-18 and 23B and PCV-562 and MOV-538).
SRO justification:	N/A

44. 062K3.01 044

The following conditions exist on Unit 2:

- DG02-2, 2G 4160 V bus tie to 2L 4160 V bus, has tripped opened.

Which one of the following completes the statement below?

The ____ has lost Service Water cooling.

- A. 2C Instrument Air Compressor
- B✓ 2C Reactor Coolant Pump Motor Air Cooler
- C. 2C Component Cooling Water Heat Exchanger
- D. Steam Generator Blowdown Heat Exchanger

AOP-10:

Step 15. Minimize SW loads in affected train.

15.2 For '**A**' train affected minimize 'A' TRAIN SW LOADS as required.

15.2.1 **Secure SGBD** using FNP-2-SOP-16.1, STEAM GENERATOR BLOWDOWN PROCESSING SYSTEM.

15.2.2 Close SW to blowdown and BTRS heat exchangers valve.

SW TO BLDN HX & BTRS CHLRS

Q2P16MOV3149 - closed

15.3 For '**B**' train affected minimize B TRAIN SW LOADS, as required.

15.3.1 **Close SW to RCP motor air coolers.**

SW TO RCP

MTR AIR CLRS

Q2P16MOV3135 - closed

U2 Load List:

2L 4160V bus is the power supply to the B Train SW pumps. When that power supply is lost, All B Train SW pumps will be lost and cooling to B Train components are affected.

Distracter analysis

- | | |
|---------------|---|
| A. Incorrect. | See B. Plausible since the 2C designation could make the applicant believe this is a 'B' train component. All instrument air compressors are normally supplied from a common SW header, which is fed from both trains of SW. |
| B. Correct. | ALL RCP motor air coolers are supplied from "B" Train SW. |
| C. Incorrect. | See B. 2C CCW Heat Exchanger is supplied from "A" Train SW. Plausible since 2C is an A Train component and 2A is B Train component and this is a common mistake made for these components. |
| D. Incorrect. | See B. The SGBD Heat Exchanger is supplied only from "A" Train SW. Plausible since this and the RCPs each are supplied from different trains and a common mistake made by students as to which train supplies which components. |

K/A: **062K3.01** A.C. Electrical Distribution - Knowledge of the effect that a loss or malfunction of the ac distribution system will have on the following: Major system loads

Importance Rating: 3.5 3.9

Technical Reference: FNP-2-AOP-10, Loss of Service Water, Ver 18
A-351199, Unit 2 Load List, Ver 61.

References provided: None

Learning Objective: RELATE AND DESCRIBE the effect(s) on the Service Water System for a loss of an AC or DC bus, or a malfunction of the Instrument Air System (OPS-40101B06).

Question History: FNP EXAM BANK

K/A match: **The 2L 4160V bus has been lost due to a malfunction and the effect is the loss of cooling to various major systems loads. The applicant will have to know which SW pumps have lost power and then equate that to which major system load has lost cooling.**

SRO justification: N/A

Unit 1 has experienced a Reactor trip with the following conditions:

- A Loss of All AC has occurred.
- ECP-0.0, Loss of All AC Power, is in progress.

Which one of the following completes the statements below?

The 1B Aux Building DC bus voltage will (1).

Per ECP-0.0, there may not be enough DC capacity to start a DG and sequence needed loads if power is not restored to the 125V DC battery chargers on each train within a MINIMUM of (2).

- A✓ 1) drop slowly at first; then later drop rapidly as the battery nears exhaustion
2) 30 min
- B. 1) drop slowly at first; then later drop rapidly as the battery nears exhaustion
2) 90 min
- C. 1) drop at a constant, linear rate the entire time the battery discharges
2) 30 min
- D. 1) drop at a constant, linear rate the entire time the battery discharges
2) 90 min

DOE Fundamentals Handbook Vol 2 of 4, Jun 1992 (This is a reference for lesson plan OPS-30501D, Batteries.) - During Battery discharge, voltage will slowly drop until the battery approaches exhaustion. As the battery approaches exhaustion, voltage will decrease exponentially until exhaustion.

ECP-0.0 Caution prior to Step 5:

IF power is not restored to the 125 V DC battery chargers on each train within 30 minutes, THEN there may not be enough DC capacity to start a DG and sequence needed loads.

Distracter analysis:

A. Correct. First part is correct. The battery voltage will drop slowly then at an exponential rate towards the end of discharge per the graph in the references.

Second part is correct. Per the Note, 30 minutes is the minimum time in which the battery charger must be restored to ensure the DG can start and sequences loads.

B. Incorrect. First part is correct (See A.1).

Second part is incorrect (See A.1). Plausible since the design capacity of the Aux building battery is 2 hours. 90 minutes would give a 30 minute buffer so the applicant could confuse the 30 minutes in the note with "30 minutes left" of the 2 hour design battery capacity.

C. Incorrect. First part is incorrect (See A.1). Plausible if the applicant is not familiar with battery discharge characteristics.

Second part is correct (See A.2).

D. Incorrect. First part is incorrect (See C.1).

Second part is incorrect (See B.2).

K/A: **063A1.01** D.C. Electrical Distribution - Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: Battery capacity as it is affected by discharge rate

Importance Rating: 2.5 3.3

Technical Reference: FNP-1-ECP-0.0, Loss of All AC Power, Ver 26.
DOE Fundamentals Handbook Vol 2 of 4, Jun 1992

References provided: None

Learning Objective: STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with (1) ECP-0.0, Loss of All AC Power; [...] P-0.2, Loss of All AC Power Recovery, With SI Required. (OPS-52532A03)

Question History: MOD FNP11/12 NRC exam

K/A match: Requires the applicant to **predict the change in battery voltage (parameters) as the battery is discharged (capacity versus discharge rate)** during a Loss of All AC event. In addition, knowledge of the time expected to restore the battery charger (30 mins) to prevent the LOSS of DC POWER, which equates to the time limit (how long can we operate this way) that the battery capacity is affected.

SRO justification: N/A

A loss of all AC power has occurred on Unit 1 and the following conditions exist:

- VA2, 1B DG GEN FAULT TRIP, has come into alarm.
- The crew has completed the step in ECP-0.0, Loss Of All AC Power, to verify breakers for major loads OPEN.
- A Safety Injection occurs on Unit 1 at this time.

Which one of the following completes the statements below?

The 2C DG will be started from the EPB in (1) using the START pushbutton.

All ESF loads will (2).

- A. 1) Mode 2
2) automatically start
- B. 1) Mode 2
2) have to be manually aligned
- C. 1) Mode 1
2) automatically start
- D✓ 1) Mode 1
2) have to be manually aligned

ECP-0.0

5.2.1 RNO Perform 2C DG SBO start as follows.

5.2.1.1 RNO Verify 2C DG MODE SELECTOR switch in MODE 1.

Note before Step 5.2.1.5 -

NOTE: The LOSP sequencer should run when output breaker closes, if no SI signal is present. If an SI signal is present, neither sequencer will run and SI loads must be started manually.

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible since all other DGs would be started in Mode 2 in ECP-0.0.
- Second part is incorrect (See D.1). Plausible since the ESF sequencer would run if it were the 1-2A or 1B DG that was started. The operation of the 2C DG in this scenario is complicated and easily confused.
- B. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2)
- C. Incorrect. First part is correct (See D.1)
- Second part incorrect (See A.2)
- D. Correct. First part is correct. Step 5.2.1.1 RNO of ECP-0.0 starts the 2C DG in Mode 1.
- Second part is correct. The note before step 5.2.1.5 RNO of ECP-0.0 states that under the conditions in the stem, the SI sequencer will NOT run and ESF loads must be manually aligned.

K/A: **064K3.02** Emergency Diesel Generators (ED/G) - Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following ESFAS controlled or actuated systems.

Importance Rating: 4.2 4.4

Technical Reference: FNP-1-ECP-0.0, Loss of All AC Power, Ver 26

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing (1) ECP-0.0, Loss of All AC Power; [...] (OPS-52532A06)

ANALYZE plant conditions and DETERMINE if actuation or reset of any Engineered Safety Features Actuation Signal (ESFAS) is necessary. (OPS-52532A05)

Question History: FNP 07

K/A match: This requires the applicant to **know what effect a 1B DG malfunction has on the ESFAS system in that ESF loads must be manually aligned.**

SRO justification: N/A

Unit 1 is operating at 100% power with the following conditions:

- A problem with 1B DG starting air system has occurred.
- The B Air receiver has been tagged out.

Which one of the following completes the statement below?

A MINIMUM of (1) psig must be available in the remaining air receiver to ensure five (5) start attempts are available.

1B DG's required minimum time to reach rated speed and voltage is (2) seconds after receiving an emergency start signal.

	<u>(1)</u>	<u>(2)</u>
A.	200	7
B.	200	12
C.	350	7
D✓	350	12

FSD - A181005:

2.1.2 - The DGS shall be capable of achieving > 3952 V and > 57 Hz within 12 seconds after receipt of an engine start signal

Tech Specs Bases: 3.8.3 - With both starting air receiver pressures on a DG < 350 psig for the 4075 kW DGs or < 200 psig for DG 1C, sufficient capacity for five successive DG start attempts does not exist.

ANSWER / DISTRACTOR ANALYSIS

- A. Incorrect. First part is incorrect (See D.1). Plausible if candidate thinks that the 1B DG is a "little DG" (Fairbanks Morse) instead of a "Big DG" (Colt Peilstick) which would make this a correct answer.
- Second part is incorrect (See D.2). Plausible if the candidate confuses the required time to reach 115 RPM for the Fail to Start DG trip with the time to achieve rated voltage and speed. 7 seconds is not a subset of 12 seconds. 12 seconds is the requirement which implies a maximum and any time > 7 seconds but \leq 12 seconds would be acceptable also.
- B. Incorrect. First part is incorrect (A.1).
- Second part is correct (See D.2).
- C. Incorrect. First part is correct (See D.1).
- Second part is incorrect (See A.2).
- D. Correct. First part is correct. The 1B DG is required to have one air receiver >350 psig to have 5 start attempts available.
- Second part is correct. The DGS shall be capable of achieving > 3952 V and > 57 Hz within 12 seconds after receipt of an engine start signal

K/A: **064K6.07** Emergency Diesel Generators (ED/G) - Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Air receivers

Importance Rating: 2.7 2.9

Technical Reference: FSD-A181005, Diesel Generator, Ver 44
FNP Tech Specs Bases, Amendment No. 58

References provided: None

Learning Objective: RECALL AND APPLY the LCO and APPLICABILITY for Technical Specifications (TS) or TRM requirements, and the REQUIRED ACTIONS for 1 HR or less TS or TRM requirements, and the relevant portions of BASES that DEFINE the OPERABILITY and APPLICABILITY of the LCO associated with the Diesel Generator and Auxiliaries System components and attendant equipment alignment, to include the following (OPS-52102101):

[...]
3.8.3, Diesel Fuel Oil, Lube Oil, Starting Air

Question History: NEW

K/A match: Requires the applicant to know how a **malfunction of the DG air start receivers affect the operation of the ED/G system.**

SRO justification: N/A

Unit 1 was operating at 100% power when the following occurred:

- A complete loss of instrument air caused an automatic Reactor Trip.

The following conditions exist:

- All AFW pumps are running.
- All SG NR Levels are 25% and rising.
- The Shift Supervisor has directed AFW flow to be reduced.

Per AOP-6.0, Loss of Instrument Air, which one of the following methods below will be successful in reducing AFW flow?

Valve nomenclature:

- HV-3228A / B / C, TDAFWP TO 1A/1B/1C SG
- MOV-3764A / D / F, MDAFWP TO 1A/1B/1C SG ISO
- MOV-3350A / B / C, AFW TO 1A/1B/1C SG STOP VLV

- A. Place BOTH MDAFW pump MCB hand switches in the STOP position and release them.
- B. Throttle HV-3228A / B / C on the MCB.
- C✓ Close MOV-3764A / D / F on the BOP.
- D. Close MOV-3350A / B / C on the MCB.

AOP-6

Step 8. Maintain SG narrow range levels between 35-69%.

8.1 RNO WHEN required to limit SG level rise,
THEN perform the following:.

a) Alternately cycle closed and open one
MDAFWP isolation valve to each SG.

MDAFWP TO 1A SG ISO,
Q1N23MOV3764A(E)

MDAFWP TO 1B SG ISO,
Q1N23MOV3764B(D)

MDAFWP TO 1C SG ISO,
Q1N23MOV3764C(F)

b) STOP/START MDAFWPs as required.

1A MDAFWP

1B MDAFWP

Distracter analysis

- A. Incorrect. See C. Plausible since this is a method per AOP-6 step 8.1 RNO but since SG NR Level is less than 28%, the MDAFW pumps cannot be stopped due to the auto-start signal. The applicant may not recall the MDAFW pump start logic and believe the pumps can be stopped.
- B. Incorrect. See C. Plausible if the applicant believes that the air receiver that keeps the TDAFW pump steam admission valves open is also used to control the TDAFW pump FCVs.
- C. Correct. Of the available choices, this is the only method to control AFW flow per AOP-6. Step 8 of AOP-6 also directs the use of the MDAFW and TDAFW FCV's locally but these are not an available choice due to the loss of air
- D. Incorrect. See C. Plausible since these valves are not addressed in AOP-6.0 and do not have power supplied during full power ops. Plausible since these valves are used in AOP-4.0 on loss of RCP flow to stop AFW flow and could be used to stop flow to all SGs if power was supplied to the MOV.

K/A: 065AG2.4.11 Loss of Instrument Air - Knowledge of abnormal condition procedures.

Importance Rating: 4.0 4.2

Technical Reference: FNP-1-AOP-6.0, Loss Of Instrument Air, Ver 40

References provided: None

Learning Objective: ANALYZE plant conditions and DETERMINE the successful completion of any step in AOP-6.0, Loss of Instrument Air. (OPS-52520F07)

Question History: FNP EXAM BANK

K/A match: Applicant must know what equipment is directed to be used by AOP-6 to control the cooldown rate.

SRO justification: N/A

There is a fire in the Control Room and the following conditions exist for Unit 1:

- FNP-1-AOP-28.2, Fire In The Control Room, has been entered.

Which one of the following completes the statements below?

During the conduct of AOP-28.2, the Diesel Generators are required to be placed in (1) and the output breakers (2) automatically close when the DGs are started after a Loss of Offsite Power.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | MODE 3 | WILL |
| B. | MODE 3 | will NOT |
| C. | MODE 4 | WILL |
| D✓ | MODE 4 | will NOT |

AOP-28.2

Step 6.3.1 - Dispatch personnel to the diesel building to perform ATTACHMENT 18, PLACING DIESEL GENERATORS IN LOCAL CONTROL.

Attachment, 18 Step 1 - PLACE 1B DIESEL IN MODE 4.

Attachment 21, Note prior to Step 1.10 - Diesel generator and diesel generator output breaker must be controlled locally (155' DG BLDG) while diesel generator is in MODE 4.

Distracter analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible if the applicant assumes that the most reliable condition of the DGs in this scenario would be in Mode 3 as in AOP-49.2, Complete Loss of Service Water.
- Second part is incorrect (See C.2). Plausible because this would be the correct answer if the DG was required to be in Mode 1 per AOP-28.2. Once the DG's are no longer in MODE 1 (MODE 2, 3 or 4), applicants can have difficulty recalling how the output breaker responds on a DG start for an LOSP)
- B. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2). This is a logical connection to the first part if the applicant improperly believes that control power to the DG output breakers is removed as part of shifting local control of the Main Control Room operated equipment to the HSDP. The RCP breakers are tripped locally and have control power removed per AOP-28.2.
- C. Incorrect. First part is correct (See D.1).
- Second part is incorrect (See C.2). Plausible if the applicant failed to recall that the DG output breaker will NOT automatically close when started in Mode 4 after a loss of power.
- D. Correct. First part is correct. Step 6.3.1 requires the DGs to be placed in MODE 4.
- Second part is correct. While in MODE 4, the DG output breaker will NOT automatically close.

K/A: **068AK2.07** Control Room Evacuation - Knowledge of the interrelations between the Control Room Evacuation and the following: ED/G.

Importance Rating: 3.3 3.4

Technical Reference: FNP-1-AOP-28.2, Fire In The Control Room, Ver 28

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing AOP-28.1, Fire or Inadvertent Fire Protection System Actuation in the Cable Spreading Room, and AOP-28.2, Fire in the Control Room. (OPS-52521C06)

Question History: NEW

K/A match: Requires the applicant to know the **interrelation of the DG mode of operation to a control room evacuation.**

SRO justification: N/A

Unit 1 is operating at 100% power with the following conditions:

- The 1A Waste Gas Compressor is running and aligned to #7 WGDT.
- R-13, WGC SUCT, alarms.

Subsequently, the #7 WGDT relief valve lifts and fails to reseal.

Which one of the following completes the statements below?

R-22, VENT STACK GAS, (1) trend up.

#7 WGDT relief valve (2) be manually isolated.

	<u>(1)</u>	<u>(2)</u>
A✓	WILL	CANNOT
B.	WILL	CAN
C.	will NOT	CANNOT
D.	will NOT	CAN

D-175045 SH 1: Shows R-22 located in the vent stack.

D175042 SH 6, Shows that the #7 WGDT relief discharges to the vent stack and has no manual isolations.

Distracter analysis

A. Correct. First part is correct. #7 WGDT relief valve discharges to the vent stack and would cause R-22 to trend up since the 1A Waste Gas Compressor is aligned to it and the compressor suction has a high rad alarm.

Second part is correct. There is no manual isolations for the #7 WGDT relief valve.

B. Incorrect. First part is correct (See A.1).

Second part is incorrect (See A.2). Plausible since some systems have isolation valves upstream of their relief valves such as LP Feedwater heaters (See 170116 SH 1 in reference material).

C. Incorrect. First part is incorrect (See B.1). Plausible because WGDT 1 through 6 relieve to #8 WGDT and the applicant could think that #7 also relieved to #8 WGDT.

Second part is correct (See A.2).

D. Incorrect. First part is incorrect (See C.1).

Second part is incorrect (See B.2).

K/A: **071K3.05** Waste Gas Disposal System (WGDS) - Knowledge of the effect that a loss or malfunction of the Waste Gas Disposal System will have on the following: ARM and PRM systems

Importance Rating: 3.2 3.2

Technical Reference: D175045, Unit 1 HVAC - P&ID SFP Vent Sys, Sheet 1, Ver 22.0
D175042, Unit1 Waste Processing System, Sheet 6, Ver 33.0

References provided: None

Learning Objective: DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Radiation Monitoring System components and equipment, to include the following (OPS-40305A07):
[...]
• Automatic actuation
• Protective isolations
• Protective interlocks
• Actions needed to mitigate the consequence of the abnormality

Question History: NEW

K/A match: Requires the applicant to **know the effect on R-22 (PRMS) when WGD #7 relieves to the vent stack (malfunction of the WG system resulting in relief lifting).**

SRO justification: N/A

Unit 1 is operating at 100% when the following condition occurs:

- R-19, SGBD SAMPLE, fails HIGH.

Which one of the following completes the statements below?

(1) valves will automatically close.

Per SOP-45.0, Radiation Monitoring System, the actions required to allow the Shift Chemist to obtain a sample of the SGs is to (2) .

- A. 1) HV-3328, HV-3329 AND HV-3330, STEAM GEN 1A/1B/1C SAMPLE ISO,
2) pull the INSTRUMENT power fuses for R-19
- B✓ 1) HV-3328, HV-3329 AND HV-3330, STEAM GEN 1A/1B/1C SAMPLE ISO,
2) place R-19 Operations Selector Switch to the RESET position
- C. 1) HV-3179A, 3180A, AND 3181A, STEAM GEN 1A/1B/1C LOWER BLOWDOWN,
2) pull the INSTRUMENT power fuses for R-19
- D. 1) HV-3179A, 3180A, AND 3181A, STEAM GEN 1A/1B/1C LOWER BLOWDOWN,
2) place R-19 Operations Selector Switch to the RESET position

ARP-1.6, FH1 - R-19 isolates HV-3328, 3329 and 3330.

SOP-45

4.4 Obtaining a Steam Generator Sample with R-19 in Alarm or Inoperable:

4.4.1 Notify Health Physics and Chemistry that R-19 will be inoperable during the time required to obtain a sample

4.4.2 IF in alarm, THEN place the switch for R-19 to the Reset position.

4.4.3 Open the Steam Generator Blowdown sample valves listed below as necessary to obtain a Steam Generator sample:

Q1P15HV3328 1A Steam Generator Blowdown sample valve

Q1P15HV3329 1B Steam Generator Blowdown sample valve

Q1P15HV3330 1C Steam Generator Blowdown sample valve

Distracter analysis

A. Incorrect. First part is correct (See B.1).

Second part is incorrect (See B.2). Plausible since this is the procedure directed action for a monitor in saturation, but not to allow the chemist to sample the SG.

B. Correct. First part is correct. R-19 failing in the "High Radiation" condition shuts HV-3328, 3329, and 3330.

Second part is correct. Per SOP-45, the Rad monitor switch must be taken to reset to allow SGBD sample valves to be opened.

C. Incorrect. First part is incorrect (See B.1). Plausible if the applicant doesn't recall that R-19 will isolate HV-3328, 3329, and 3330. They may believe that R-19 closes HV-3179A, 3180A, and 3181A which are immediately upstream of the correct valves and closed by the AFW pump start signal and on High Penetration Room DIFFERENTIAL Pressure.

Second part is incorrect (See A.2).

D. Incorrect. First part is incorrect (See C.1).

Second part is correct (See B.2).

NOUN NAME for HV-3179A, 3180A, AND 3181A, 1A/1B/1C SG LOWER BLOWDOWN SAMPLE ISO came from ARP BK1.

K/A: 073A2.02	Process Radiation Monitoring (PRM) System - Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Detector failure
Importance Rating:	2.7 3.2
Technical Reference:	FNP-1-ARP-1.6, FH1, RMS HI RAD, Ver 70 FNP-1-SOP-45, Radiation Monitoring System, Ver 46.2
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Radiation Monitoring System components and equipment, to include the following (OPS-40305A07): [...] <ul style="list-style-type: none"> • Automatic actuation • Protective isolations • Protective interlocks • Actions needed to mitigate the consequence of the abnormality
Question History:	MOD FNP 07
K/A match:	The applicant is required to know the impact on the SG sample system due to R-19 failing high (Desktop simulator shows a level amp failure - high will alarm R-19) and that SOP-45 provides procedural guidance to sample the SGs under this condition.
SRO justification:	N/A

52. 073G2.2.42 052

Unit 1 is operating at 100% power.

Which one of the following meets the **MINIMUM** reactor coolant leakage detection system(s) that must be in operation and OPERABLE to prevent entering a REQUIRED ACTION STATEMENT of Tech Spec 3.4.15, RCS Leakage Detection Instrumentation?

- R-11 - CTMT PARTICULATE
- R-12 - CTMT GAS
- Containment Air Cooler Condensate Level Monitoring System (CACCLMS)

A. R-11 ONLY

B. R-11 AND R-12

C. The CACCLMS ONLY

D. R-12 AND the CACCLMS

Technical Specifications:

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

LCO 3.4.15 The following RCS leakage detection instrumentation shall be OPERABLE:

- a. One containment atmosphere particulate radioactivity monitor; and
- b. One containment air cooler condensate level monitor or one containment atmosphere gaseous radioactivity monitor.

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

SOP-45

R-11 is the containment atmosphere particulate radioactivity monitor and R-12 is the containment atmosphere gaseous radioactivity monitor.

Distracter analysis

- | | |
|---------------|--|
| A. Incorrect. | See B. Plausible if the applicant recalls that RE-67 grab samples are required by this tech spec when R-12 and the CACCLMS are OOS but does NOT to prevent entry into a Required Action Statement (RAS). The applicant may believe that RE-67 is an acceptable substitute for R-12 to prevent LCO entry. |
| B. Correct. | Per TS - 3.4.15 this is the correct combination. |
| C. Incorrect. | See B. Plausible if the applicant thought that grab samples from RE-67 could provide the R-11 function. Grab samples are part of this Tech Spec. |
| D. Incorrect. | See B. Plausible if the applicant confused R-12 with R-11. This is a common misconception. |

K/A: **073G2.2.42** Process Radiation Monitoring (PRM) System - Ability to recognize system parameters that are entry-level conditions for Technical Specifications.

Importance Rating: 3.9 4.6

Technical Reference: Technical Specifications, Ver 190.
FNP-1-SOP-45, Radiation Monitoring System, Ver 46.2

References provided: None

Learning Objective: Given a set of Plant Conditions ASSESS those conditions and DETERMINE the ability of plant equipment and structures to meet their intended, designated function (OPS-52302A06)

Question History: FNP 05

K/A match: Requires the applicant to know **which RCS leakage detection systems (Process Radiation Monitors) that are required to meet Technical Specifications.**

SRO justification: N/A

Unit 1 has been operating at 100% power and the Gross Failed Fuel Detector (GFFD) has been steady at 2000 cpm during the entire fuel cycle.

At 1000:

- FG5, GFFD SYS TRBL, has just come into alarm.

At 1015:

- A Reactor Trip and Safety Injection occurs.

Which one of the following completes the statements below?

The **minimum** GFFD reading that would cause FG5 to come into alarm is (1) above background.

At 1020, flow through the GFFD (2) be isolated.

- | | <u>(1)</u> | <u>(2)</u> |
|----|-------------------------|------------|
| A. | 1 X 10 ⁴ cpm | will NOT |
| B✓ | 1 X 10 ⁴ cpm | WILL |
| C. | 1 X 10 ⁵ cpm | will NOT |
| D. | 1 X 10 ⁵ cpm | WILL |

FG5 setpoint 1×10^4 cpm ABOVE background.

D175009- Sheet 1 - SV-3333 and SV-3765 close on a T signal (Phase A) which will actuate on a Safety Injection.

Distracter analysis

- A. Incorrect. First part is correct (See B.1)
- Second part is incorrect (See B.2). Plausible since the RHR to GFFD detector valves do not close on a T signal. In Mode 1, the GFFD will be lined up the RCS not RHR.
- B. Correct. First part is correct. 1×10^4 cpm > background will cause the alarm.
- Second part is correct. On a safety injection, a Phase A is generated isolating the GFFD from the RCS. In Mode 1, the GFFD is aligned to the RCS.
- C. Incorrect. First part is incorrect (See B.1). Plausible since this is the setpoint in AOP-32 to reduce power by 25%. The applicant could confuse the two numbers.
- Second part is incorrect (See A.2).
- D. Incorrect. First part is incorrect (See C.1).
- Second part is correct (See B.2).

K/A: **076AA1.04** High Reactor Coolant Activity - Ability to operate and / or monitor the following as they apply to the High Reactor Coolant Activity: Failed fuel-monitoring equipment.

Importance Rating: 3.2 3.4

Technical Reference: FNP-1-ARP-1.6, FG5 GFFD SYS TRBL, Ver 70
D175009, SH 1, Sampling System, Ver 32

References provided: None

Learning Objective: RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Gross Failed Fuel Detector, to include the components found on Figure 2, GFFD Failed Fuel Detector System, and Figure 3, Sampling Assembly Flow Diagram (OPS-52106E02).

Question History: FNP 08

K/A match: Requires the applicant to be able to **monitor the failed fuel monitoring equipment and determine the minimum level at which the GFFD system trouble alarm actuates which directs the operators to AOP-32, Reactor Coolant High Activity.**

SRO justification: N/A

Unit 1 is stable in Mode 3 following a Reactor Trip when the following conditions occur:

- Power has been lost to 4160V AC buses G, J, and L.

Which one of the following lists the valves that the OATC can close from the MCB to isolate a Service Water rupture in the Turbine Building?

Q1P16V514, SW TO TURB BLDG ISO B TRN
Q1P16V515, SW TO TURB BLDG ISO A TRN
Q1P16V516, SW TO TURB BLDG ISO A TRN
Q1P16V517, SW TO TURB BLDG ISO B TRN

- A. MOVs 514 and 517
- B. MOVs 514 and 516
- C✓ MOVs 515 and 517
- D. MOVs 515 and 516

Electrically:

1N MCC (A Train) - V515 and V517
1T MCC (B Train) - **V514 and V516**

Mechanically:

A Train - V515 and V516
B Train - V514 and V517

Distracter analysis

- A. Incorrect. See B. Plausible since the 4 SW to Turbine Building Isolation valves are powered from and mechanically aligned to different trains and the applicant could easily confuse which valve is powered by which train and which valve is in which mechanical train.
- B. Incorrect. See A.
- C. Correct. Both of these valves are powered from A train power and in opposite trains mechanically (See Above).
- D. Incorrect. See A.

K/A: **076K2.08** Service Water System (SWS) - Knowledge of bus power supplies to the following: ESF-actuated MOVs

Importance Rating: 3.1* 3.1*

Technical Reference: A506250, Unit 1 Electrical Load List, Ver 74.0
D-170119, SH 2, Service Water, Ver 47

References provided: None

Learning Objective: NAME AND IDENTIFY the Bus power supplies, for those electrical components associated with the Service Water System, to include those items in Table 7- Power Supplies (OPS-40101B04).

Question History: FNP 08

K/A match: Applicant is required to **know the bus power supplies to Service Water ESF actuated MOVs.**

SRO justification: N/A

55. 076K4.03 055

Unit 1 is operating at 100% power with the following conditions:

- 1A Containment Cooler is isolated per SOP-12.1, Containment Air Cooling System.
- The following valves are closed with power available:
 - MOV-3019A, SW TO 1A CTMT CLR AND CTMT FPS
 - MOV-3441A, SW FROM 1A CTMT CLR
 - MOV-3024A, EMERG SW FROM 1A CTMT CLR
- MOV-3023A, 1A CTMT CLR SW DISCH, is OPEN.

Subsequently, a steam break occurs and containment pressure rises to 5 psig.

Which one of the following completes the statement below?

1A Containment Cooler service water flow will be _____.

- A. 0 gpm
- B. approximately 600 gpm
- C. approximately 800 gpm
- D✓ approximately 2000 gpm

FSD-A-181013: Post-accident, the containment coolers provide for long-term containment heat removal. **Following a safety injection signal** and depending upon the availability of offsite power, the containment coolers are restarted on low speed (A loss of off site power (LOSP) would result in one fan from each train being started). Each cooler is nominally operated at a low speed generating 40,000 cfm with a service water **flow rate of approximately 2000 gpm**. During post-accident operation, each cooler provides approximately 80×10^6 Btu/hr of cooling capacity

Distracter analysis

- A. Incorrect. See D. Plausible since the applicant may know that an MOV in the service water supply/return to each cooler will not open on an SI (MOV-3023A) and improperly think that it is MOV-3441A and therefore there would be no flow.
- B. Incorrect. See D. Plausible since this is the minimum design flow per tech spec bases. The applicant may not be able to recall the proper SW flow.
- C. Incorrect. See D. Plausible since this is the normal flow through the 1A containment cooler. The applicant may not be able to recall the proper SW flow
- D. Correct. This is the post accident flow through the 1A containment cooler.

K/A: **076K4.03** Service Water System (SWS) - Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following: **Automatic opening features associated with SWS isolation valves to CCW heat exchangers**

Importance Rating: 2.9* 3.4*

Technical Reference: FSD-A181013, Containment Ventilation System, Ver 14

References provided: None

Learning Objective: DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Service Water System components and equipment, to include the following (OPS-40101B07):
[...]
Automatic actuation including setpoint (example SI, Phase A, LO SP)

Question History: FNP 07

K/A match: Requires the applicant to know the **Containment Cooler Isolation valves open by design on a safety injection and what the resultant SW flow to the coolers for accident conditions will be.** 10/24/12 - Per discussion with Chief Examiner, using SWS Turbine Building Isolation closure was acceptable due to FNP plant design. **Since the SW to TB MOVs were being addressed in a different KA and since this was an auto opening,** Service Water to the Containment Coolers have automatic opening features and more closely fit the K/A based on FNP design.

SRO justification: N/A

Unit 1 is at 100% power with the following conditions:

- 1B DG is running for STP-80.1, Diesel Generator 1B Operability Test.
- The 1B DG is currently loaded to 1 MW.
- DG01, 1B S/U XFMR TO 1G 4160 V BUS, breaker is CLOSED.

Subsequently, the following occurs:

- WE2, 1F, 4KV BUS OV-OR-UV OR LOSS OF DC, and VE2, 1G, 4KV BUS OV-OR-UV OR LOSS OF DC, come into alarm.
- 1F and 1G 4160V bus voltages are reading 3825 volts.
- The crew has entered AOP-5.2, Degraded Grid.

Per AOP-5.2, which one of the following completes the statements below?

The 1B DG (1).

The reason for the above action is (2).

- A✓ 1) is required to be secured and aligned for AUTO START
- 2) because this places the 1B DG is in the most reliable condition
- B. 1) is required to be secured and aligned for AUTO START
- 2) because the LOSP Sequencer will not run LOSP loads if DG01 opens with 1B DG output breaker aligned to 1G 4160V bus
- C. 1) load is required to be raised to FULL LOAD and DG01 opened
- 2) to ensure adequate voltage for safety related equipment
- D. 1) load is required to be raised to FULL LOAD and DG01 opened
- 2) to prevent extended low load operation which would result in the buildup of combustion products in the engine exhausts

Not a true 2+2 question for improved plausibility.

AOP-5.2:

CAUTION: Diesel generators are in the most reliable condition when secured and aligned for auto start. The intent of step 4 is to secure any diesel generators which are running and not required.

**4 Verify All Emergency Diesel Generators -
ALIGNED FOR AUTO START using:
FNP-0-SOP-38.0, DIESEL
GENERATORS**

Distracter analysis

- A. Correct. First part is correct. Step 4 of AOP-5.2 requires any DG not required to be running to be secured and aligned for auto start.
- Second part is correct. Diesel generators are in the most reliable condition when secured and aligned for auto start.
- B. Incorrect. First part is correct (See A.1).
- Second part is incorrect (See A.2). Plausible because this used to be correct until recently a design change was implemented to install a Test Trip Override Switch. This modification causes the DG output breaker to trip open during testing if the normal supply breaker to 1G 4160V bus opens. Once the DG output breaker trips open, the LOSP Sequencer will function properly to re-close the DG output breaker and sequence on LOSP loads. This modification makes this reason incorrect.
- C. Incorrect. First part is incorrect (See A.1). Plausible if the applicant thought that since the grid is degraded, operation of the DG is required to continuously maintain power to the ESF busses.
- Second part is incorrect (See A.2). Plausible since it would be a high priority to maintain adequate voltage to safety related equipment in order to prevent damage to the equipment due to high current.
- D. Incorrect. First part is incorrect (See C.1).
- Second part is incorrect (See A.2). Plausible because the normal operation procedure (FNP-0-SOP-38.0, 2.2.8) has a precaution that the DGs should be loaded to full load for at least 1 hour each time they are started to reduce the possibility of an exhaust fire. However, under these conditions, the DGs are required to be secured and aligned for auto start.

K/A: **077AK3.02**

Generator Voltage and Electric Grid Disturbances - Knowledge of the **reasons** for the following responses as they apply to Generator Voltage and Electric Grid Disturbances: **Actions contained in abnormal operating procedure for voltage and grid disturbances.**

Importance Rating: 3.6 3.9

Technical Reference: FNP-1-AOP-5.2, Degraded Grid, Ver 15

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing [...] and AOP-5.2, Degraded Grid. (OPS-52521N06)

Question History: VNP 10

K/A match: Applicant is required to know the **actions contained in AOP-5.2 during a grid disturbance** for DGs that are running and the reason for that action.

SRO justification: N/A

The following conditions exist on Unit 1:

- A rupture in the Instrument Air system has occurred.
- Instrument Air header pressure is 65 psig and lowering slowly.

Which one of the following completes the statements below?

V-902, AIR DRYER AUTO BYP, will be (1) .

V-904, NON-ESSENTIAL IA HDR AUTO ISO, will be (2) .

	<u>(1)</u>	<u>(2)</u>
A. ✓	OPEN	OPEN
B.	OPEN	CLOSED
C.	CLOSED	OPEN
D.	CLOSED	CLOSED

KD2

AUTOMATIC ACTION

3. Pressure downstream of inst air dryers, bypasses dryers (V902) at 70 psig.

4. Pressure downstream of inst air dryers, isolates inst air to service bldg (V904) at 55 psig.

Distracter analysis

- A. Correct. First part is correct. V-902 opens at 70 psig.
Second part is correct. V-904 closes at 55 psig.
- B. Incorrect First part is correct (See A.1).
Second part is incorrect (See A.2). Plausible since there are numerous setpoints for alarms and automatic valve repositionings in the air system and they are easily confused.
- C. Incorrect. First part is incorrect (See A.1). Plausible since there are numerous setpoints for alarms and automatic valve repositionings in the air system and they are easily confused.
Second part is correct (See A.2)
- D. Incorrect. First part is incorrect (See C.1).
Second part is incorrect (See B.2).

K/A: **078K1.01** Instrument Air System - Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: Sensor air

Importance Rating: 2.8* 2.7*

Technical Reference: FNP-1-ARP-1.10, KD2, IA PRESS LO Ver 70.2

References provided: None

Learning Objective: DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Compressed Air System components and equipment, to include the following (OPS-40204D07):

[...]
Automatic actuation including setpoints for selective isolation on decreasing header pressure.
[...]

Question History: FNP 04

K/A match: Requires the applicant to **know the cause and effect relationship between the sensed air header pressure and the automatic operation of isolation valve V-904 and bypass valve 902.**

SRO justification: N/A

The following plant conditions exist on Unit 1:

- The Reactor has been tripped due to loss of Instrument Air.
- The operating crew is performing the actions of ESP-0.1, Reactor Trip Response.
- SG Atmospheric Relief Valves (ARVs) are aligned per SOP-62.0, Emergency Air System.

Subsequently, the operator applies 18 psig to the valve actuator for PCV-3371A, 1A MS ATMOS REL VLV.

Which one of the following completes the statements below?

PCV-3371A (1) open.

If PCV-3371A were fully open, (2).

A. 1) IS

2) a High Steam Flow - Lo Lo Tavg Main Steam Isolation may occur

B. 1) IS

2) Technical Specification cooldown limits may be exceeded

C. 1) is NOT

2) a High Steam Flow - Lo Lo Tavg Main Steam Isolation may occur

D✓ 1) is NOT

2) Technical Specification cooldown limits may be exceeded

This question is not a true 2 + 2 to improve plausibility of distracters.

SOP-62.0

Caution after step 4:

Atmospheric relief valves will start to open at 24 ± 2 psig and will be full open at 45 psig. IF the atmospheric relief is full open, THEN Tech Spec cooldown limits may be exceeded.

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible if the applicant is not familiar with the actuation pressure of the ARV's.
- Second part is incorrect (See D.2). Plausible since a caution exists in numerous procedures that excessive opening of the **STEAM DUMPS** will cause this isolation of the MSIV's. Hi Steam Flow Lo Lo Tavg is 1 of 2 flow instruments on 2 of 3 steam lines.
- This isolation closes the MSIV's and not the ARV's. The applicant could think that this isolation in fact does close the ARV's to prevent exceeding a technical specification cooldown.
- B. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2).
- C. Incorrect. First part is correct (See D.1).
- Second part is incorrect (See A.2).
- D. Correct. First part is correct. The ARV will not open until at least 22 psig of air is applied.
- Second part is correct. Per the caution of SOP-62, a fully open ARV may cause tech spec limits to be exceeded.

K/A: 079G2.4.34	Station Air System - Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	
Importance Rating:	4.2	4.1
Technical Reference:	FNP-1-SOP-62.0, Emergency Air System, Ver 23	
References provided:	None	
Learning Objective:	<p>DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Main and Reheat Steam System components and equipment, to include the following (OPS-40201A07):</p> <p>[...]</p> <ul style="list-style-type: none"> • Abnormal and Emergency Control Methods • Automatic actuation including setpoint (example SI, Phase A, Phase B, MSLIAS, LO SP, SG level) • Protective isolations such as high flow, low pressure, low level including setpoint <p>[...]</p>	
Question History:	MOD FNP 05	
K/A match:	Requires the applicant to know the operational effects of local operator actions to control the SG ARV's. The operator must use the Emergency Air system locally to control ARV position due to the loss of the Station Air system.	
SRO justification:	N/A	

59. 103K4.06 059

Unit 1 has experienced a large break LOCA and the following conditions exist:

- PT-953, CTMT PRESS has reached the PHASE B setpoint.

Which one of the following completes the statement below?

A MINIMUM of (1) OR (2) PHASE B CTMT ISO CS ACTUATION handswitch(es) is(are) required to actuate a Phase B isolation.

- A. 1) 1 additional Containment pressure channel reaching 16.2 psig
2) TWO
- B. 1) 2 additional Containment pressure channels reaching 16.2 psig
2) ONE
- C✓ 1) 1 additional Containment pressure channel reaching 27 psig
2) TWO
- D. 1) 2 additional Containment pressure channels reaching 27 psig
2) ONE

Not a true 2 + 2 for plausibility.

FSD-A181007 2.7.1

Phase B isolation is initiated by containment pressure High-3 (27 psig) on 2 of 4 b/s or by manual actuation (using 2/4 Containment Phase B Isolation/Containment Spray Actuation handswitches).

Distracter analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible since this is the correct number of channels but the wrong setpoint. 16.2 psig is HI-2 main steam line isolation and NOT HI-3 Phase B isolation.
- Second part is correct (See C.2).
- B. Incorrect. First part is incorrect (See C.1). Plausible since there are 4 bistables and the applicant could reason that 3 of 4 are required to actuate Phase B. Additionally, the setpoint is incorrect as discussed in A.1.
- Second part is incorrect (See C.2). Plausible since Phase A and SI only require 1 handswitch to actuate. The applicant may confuse them.
- C. Correct. First part is correct. Per the FSD, High-3 Containment Isolation Phase B coincidence is 2 of 4 bistables.
- Second part is correct. Per the FSD, 2 handswitches are required to actuate Phase B Containment Isolation.
- D. Incorrect. First part is incorrect (See C.1). Plausible since there are 4 bistables and the applicant could reason that 3 of 4 are required to actuate Phase B. Permissives such as P-8 and P-9 require 2 of 4 to enable and 3 of 4 to disable. There are many coincidences in the reactor protection system and they are easily confused.
- Second part incorrect (See B.2)

K/A: **103K4.06** Containment System - Knowledge of containment system design feature(s) and/or interlock(s) which provide for the following: Containment isolation system

Importance Rating: 3.1 3.7

Technical Reference: FSD-A181007, Reactor Protection System, Ver 18

References provided: NONE

Learning Objective: SELECT AND ASSESS the following instrument/equipment response expected when performing Containment Structure and Isolation System evolutions including the fail condition, alarms, and trip setpoints (OPS-52102A05):

- PT-950, PT-953

Question History: VOGTLE 02 - Changed to containment phase B isolation to meet K/A vs ctmt spray actuation.

K/A match: Requires the applicant to have **knowledge of the design feature of the Phase B Containment Isolation System** in that 2 of 4 bistables or 2 of 2 handswitches are required for actuation.

SRO justification: N/A

The electronic log is malfunctioning. The control room has shifted to manual logs and the following entries have been made:

- 1000 Q1E21V061A, HHSI to 1C RCS loop CL iso, as left position; 1.5 turns OPEN.
- 1012 Started 1B CCW Pump.

At 1030:

- The OATC recognizes that an error was made on the 1000 log entry.
- Q1E21V061A should have been logged as throttled to 1.25 turns OPEN.

Per SOP-0.11, Watch Station Tours and Operator Logs, the OATC is required to correct the 1000 log entry by which one of the following methods?

- A. • Circle the incorrect entry in red.
 - Enter the correct information next to the incorrect information and record the date and initial.
- B. • Circle the incorrect entry in red.
 - At 1030 make a log entry with the correct information and designate it as a LATE ENTRY.
- C✓ • Draw a single line through the incorrect entry.
 - Enter the correct information next to the incorrect information and record the date and initial.
- D. • Draw a single line through the incorrect entry.
 - At 1030 make a log entry with the correct information and designate it as a LATE ENTRY.

SOP- 0.11 Pg 13

IF an error is made when recording hand written entries, THEN a single line will be drawn through the incorrect entries AND the correct entries recorded. The person making the correction must initial AND date the change.

Distracter analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible because NMP-OS)007-001, Conduct of Operations Standards and Expectations, Step 6.13.2.3 requires out of specification reading in manual logs to be circled. The applicant could confuse these requirements.
- Second part is correct (See C.2).
- B. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (See C.2). Plausible since the correct data would be placed in the log. The SOP-0.11 uses a LATE ENTRY to add additional information to the log and NOT to correct errors.
- C. Correct. First Part is correct. IF an error is made when recording hand written entries, THEN a single line will be drawn through the incorrect entries AND the correct entries recorded. The person making the correction must initial AND date the change.
- Second part is correct. The person making the correction must initial AND date the change.
- D. Incorrect. First Part is correct (See C.1).
- Second part is incorrect (See B.2).

K/A: **G2.1.18** Ability to make accurate, clear, and concise logs, records, status boards, and reports.

Importance Rating: 3.6 3.8

Technical Reference: FNP-0-SOP-0.11, Watch Station Tours and Operator Logs, Ver 26.4
NMP-OS-007-001, Conduct of Operations Standards and Expectations, Ver 13

References provided: None

Learning Objective: Identify the required entries into the Plant Operator's Logbook and the position with overall responsibility for maintenance of the Reactor Operator's Logbook. (OPS52303O01)

Question History: NEW

K/A match: Applicant is required to have the **ability to correct log errors to ensure the operator logs are accurate, clear, and concise.**

SRO justification: N/A

Both Units are operating at 100% power with the following conditions:

- A non-licensed Fire Protection Administrator who is qualified as a Shift Communicator is on shift.

Which one of the following completes the statements below?

Per EIP-0.0, Emergency Organization, a **minimum** of (1) licensed Plant Operators is required to staff the shift.

The **maximum** number of hours that a Plant Operator may work in any 24 hour period is (2) per NMP-AD-016-003, Scheduling and Calculating Work Hours.

	<u>(1)</u>	<u>(2)</u>
A.	3	12
B✓	3	16
C.	4	12
D.	4	16

EIP-0.0 Table 1 requires:

1 OATC per Unit - Total of 2

1 UO Shared - Total of 1

Shift Communicator (Least affected UO) - 1

NMP-AD016-003

6.1.1 The following work hour **ceiling** limits apply to covered individuals regardless of unit status:

- No more than 16 work hours in any 24-hour period
- No more than 26 work hours in any 48-hour period
- No more than 72 work hours in any 7-day/168-hour period

Distracter analysis

- A. Incorrect. First part is correct (See B.2).
- Second part is incorrect (See B.2). Plausible since this is the normal number of hours work and the applicant could not be able to recall the correct limit.
- B. Correct. First part is correct. Per EIP-0.0, 3 Licensed operators are required to man the shift since a shift communicator is also on shift.
- Second part is correct. The following work hour **ceiling** limits apply to covered individuals regardless of unit status:
- No more than 16 work hours in any 24-hour period
- C. Incorrect. First part is incorrect (See B.2). Plausible since without a non-licensed shift communicator, this would be a correct answer.
- Second part is incorrect (See A.2).
- D. Incorrect. First part is incorrect (See C.2).
- Second part is correct (See B.2).

K/A: **G2.1.5** Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.

Importance Rating: 2.9* 3.9

Technical Reference: FNP-0-EIP-0.0, Emergency Organization, Ver 29
NMP-AD-016-003, Scheduling and Calculating Work Hours, Ver 5

References provided: None

Learning Objective: Given the plant mode for each unit, STATE AND EXPLAIN the minimum manning requirements for manning one or both units (OPS40502H04).

Question History: NEW

K/A match: Requires the applicant to have the **ability to determine minimum crew manning as well as maximum hours that the operator may work**. Since this question asks for the reactor operator position it is deemed to be an RO question and since an RO objective exists for this knowledge requirement.

SRO justification: N/A

Unit 1 is operating at 100% power when the following occurs:

- STP-4.1, 1A Charging Pump Quarterly Inservice Test, is in progress.
- 1A Charging pump failed to start when the handswitch was taken to START.

Which one of the following are the required actions per SOP-0.0, General Instructions to Operations Personnel?

- A. Obtain Shift Manager's permission, THEN take the handswitch to START a second time.
- B. Take the handswitch to START a second time, THEN write a Condition Report to document the action.
- C✓ Write a condition report documenting the event and contact Maintenance.
- D. The System Operator will rackout and perform a visual inspection of the circuit breaker and write a condition report.

SOP-0.0

15.1.3. For handswitches on the MCB, EPB, BOP, and HSDP, if the associated component fails to actuate (pump—start, valve—move in open or closed direction, et cetera) when operating a handswitch, a second actuation may NOT be attempted until the cause can be thoroughly investigated.

15.2.4 IF a breaker has malfunctioned (i.e., failed to close, open, trip, or charge when expected) contact appropriate Maintenance personnel for involvement in troubleshooting prior to attempting restoration efforts. [...]

Distracter analysis

- A. Incorrect. See C. Plausible since this is correct when backing up ESF equipment actuation on the third, fourth attempt etc per step 15.1.5 of SOP-0.0.
- B. Incorrect. See C. Plausible since this is correct when backing up ESF equipment actuation per step 15.1.4 and 15.1.5 of SOP-0.0.
- C. Correct. A second attempt is not allowed under normal operating conditions.
- D. Incorrect. See C. Per SOP-0.0, Step 15.2.4, racking out a circuit breaker that has malfunctioned is NOT allowed. Plausible since all breaker malfunctions are investigated by the Systems Operators (without racking the breaker out) and the applicant could think that a visual inspection of a racked out breaker is appropriate before calling maintenance.

K/A: **G2.2.20** Knowledge of the process for managing troubleshooting activities.

Importance Rating: 2.6 3.8

Technical Reference: FNP-0-SOP-0.0, General Instructions to Operations Personnel, Ver 152.2

References provided: None

Learning Objective: Using plant procedures, describe the work control process and associated program interfaces, including Toolpouch Work (for example, tagging, radiation protection, foreign material exclusion, fire protection, and industrial safety). (OPS-40502N09).

Question History: NEW

K/A match: **The applicant is required to know what actions are required to support troubleshooting activities for a circuit breaker that failed to close. The actions are the same regardless of if the applicant assumes the breaker failed to shut or the handswitch failed to actuate.**

SRO justification: N/A

Per Tech Specs Bases 3.3.1, Reactor Trip System (RTS) Instrumentation, what is the basis of the Pressurizer Water Level - High Reactor trip?

- A✓ Protects the pressurizer safety valves against water relief.
- B. Provides the primary protection for preventing RCS over pressurization.
- C. Protects against loss of pressure control due to spray nozzle being submerged.
- D. Provides protection against exceeding containment design pressure in the event of a LOCA.

3.3.1 Bases

9. Pressurizer Water Level - High:

The Pressurizer Water Level—High trip Function provides a backup signal for the Pressurizer Pressure—High trip and also **provides protection against water relief through the pressurizer safety and power-operated relief valves (PORV)**. These valves are designed to pass steam in order to achieve their design energy removal rate, but are also qualified for limited water relief following specific transients. A reactor trip (Pressurizer Pressure — High) is actuated prior to the pressurizer becoming water solid.

Distracter analysis

- A. Correct. Per Tech Specs bases 3.3.1. the Pressurizer Pressure—High trip and also provides protection against water relief through the pressurizer safety and power-operated relief valves (PORV).
- B. Incorrect. See B. Plausible because this is the bases for the High Pressure Reactor Trip. Przr High Level trip is the BACKUP for the High Pressure trip.
- C. Incorrect. See B. Plausible if the applicant believes that the spray nozzle will be covered at 92% Pressurizer level. This is not correct.
- D. Incorrect. See B. Plausible if the applicant assumes that the additional water in the RCS will cause a pressure rise that exceeds the containment design pressure.

K/A: **G2.2.25** Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Importance Rating: 3.2 4.2

Technical Reference: Technical Specifications Bases, Ver 58
Core Operating Limit Report, Unit 1 Cycle 25, Ver 1

References provided: None

Learning Objective: **RECALL AND APPLY** the LCO and APPLICABILITY for Technical Specifications (TS) or TRM requirements, and the REQUIRED ACTIONS for 1 HR or less TS or TRM requirements, and the relevant portions of BASES that DEFINE the OPERABILITY and APPLICABILITY of the LCO associated with the Reactor Protection System (RPS) , to include the following (OPS-52201110):

3.3.1 Reactor Trip System (RTS) Instrumentation

Question History: FNP EXAM BANK

K/A match: Requires the applicant to know the **bases for Tech Spec 3.3.1, Reactor Trip System (RTS) Instrumentation - Pressurizer Water Level - High.**

SRO justification: N/A

Unit 1 is in Mode 6 for a refueling outage.

- Two Plant Operators are required to enter a room that is posted as a **Locked High Radiation Area (LHRA)** to perform work.

Which one of the following completes the statements below?

The radiation level at which this posting is required is (1).

The LHRA key is obtained from (2).

- A. 1) > 100 mrem/hr
2) Health Physics Supervision
- B. 1) > 100 mrem/hr
2) the Shift Support Supervisor (SSS)
- C✓ 1) > 1000 mrem/hr
2) Health Physics Supervision
- D. 1) > 1000 mrem/hr
2) the Shift Support Supervisor (SSS)

RCP-0

5.2.5.1 A LHRA means an area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 1 Rem/hr at 30 centimeters (11.81 inches or ~ 12 inches) from the radiation source or 30 centimeters from any surface that the radiation penetrates.

RCP-0.1 APP A:

2.1 Maintain Individual Locked High Radiation Area keys under the control of HP Supervision.

Distracter analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible because this is the limit for a high radiation area and the applicant could confuse the two limits.
- Second part is correct (See C.2).
- B. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (See C.2). Plausible since a LHRA Master Key is locked within a key storage cabinet located in the Control Room. The key is available for issue by the OPS Shift Supervisor to support mitigation activities associated with an NMP-EP-110 Emergency.
- Additionally, the SSS issues numerous keys to personnel during plant operation and the applicant could assume this is one of them.
- C. Correct. First Part is correct. 1000 mrem/hr is a Locked HRA.
- Second part is correct. Individual Locked High Radiation Area keys are maintained under the control of HP Supervision.
- D. Incorrect. First part is correct (See C.1).
- Second part is incorrect (See B.2). This would be a correct answer if a declared emergency were in progress and emergency actions were required. The Shift Supervisor could issue a key from the SSS office.

K/A: **G2.3.12** Knowledge of **radiological safety principles** pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Importance Rating: 3.2 3.7

Technical Reference: FNP-0-RCP-0, General Guidance and Special Instructions to Health Physics Personnel, Ver 68
FNP-0-RCP-0.1, Key Control Program and Health Physics Guidance for Control of High Radiation areas, Locked High Radiation Areas, and very High Radiation Areas, Ver 18

References provided: None

Learning Objective: List four types of areas posted based on radiation levels and the radiation levels/distances that require them to be posted (OPS30401A22)

Question History: MOD SUMMER 11

K/A match: Requires the applicant to **know the radiological safety principle (value at which the locked high radiation is posted) and the requirements to enter a locked high radiation area.**

SRO justification: N/A

Which one of the following completes the statements below for entry into the Dry Cask Storage Radiation Controlled Area (RCA)?

Per AP-42, Access Control, the operator (1) required to log in on the normal Auxiliary Building Access Control System (ACS) terminal prior to entering the Dry Cask Storage Area RCA.

Upon exiting from the Dry Cask RCA, the operator is required to perform a 2 minute frisk and also use the (2).

- A. 1) IS
2) Primary Access Point (PAP) exit portal monitors
- B✓ 1) IS
2) Auxiliary Building RCA exit portal monitors
- C. 1) is NOT
2) Primary Access Point (PAP) exit portal monitors
- D. 1) is NOT
2) Auxiliary Building RCA exit portal monitors

AP-42 rev 49.2:

6.0 ENTRY INTO RCAS

6.2 Radiation workers authorized entry into any RCA will ensure they have on their person, personnel monitoring device(s) assigned to them by Health Physics (Dosimetry), that being their dosimetry badge, and a self-issued digital alarming dosimeter prior to entry into that RCA.

6.3 Entry into any RCA requires a Radiation Work Permit and issued personnel dosimetry. Routine access to the main RCA will be through the hallway adjacent to the Health Physics Office.

6.3.4 Prior to entering any RCA, each individual is responsible for ensuring that they meet the requirements of the RWP under which they are entering.

6.3.5 Prior to entry into any RCA each worker will either log in on ACS terminal or log in using an alternate method which will be determined by Health Physics (e.g., manually logging personnel into and out of the RCA).

6.3.6 Upon exit from the RCA each worker will log out at a ACS terminal except as noted below.

6.3.7 Personnel who are required to enter other RCA's **where no ACS terminal exist**

(e.g. outside RCA's, temporary RCA's in Turbine Building, etc.), **will either be required to use the normal Auxiliary Building ACS terminal** or if available, a terminal which is more convenient to the outside RCA. This may require individuals to transit back and forth while logged inside a RCA.

6.3.8 Health Physics will implement an alternate method of control when the ACS is inoperable.

6.4 Entry into the LLRB and other RCAs outside the Protected Area:

6.4.1 Personnel with Vital Area access will log into the RCA per step 6.3.

6.4.2 Upon completion of radiation work, personnel must either return to the HP Office, log out per step 6.3 and check out via the Auxiliary Building RCA exit portal monitor, leaving digital dosimeters at appropriate locations (e.g., at the RCA exit) and other personnel monitoring devices as directed in step 6.2 or they must log out and be monitored as directed by Health Physics.

*** Per the sign on the Dry Cask Storage Area access, frisking is required upon exit from that RCA.**

Distracter analysis

- | | |
|---------------|--|
| A. Incorrect. | First part is correct (See B.1).

Second part is incorrect (See B.2). Plausible if the applicant assumes they can use the Primary Access Point (PAP) portal monitors since everyone who leaves the protected area passes through them. |
| B. Correct | First part is correct. Per step 6.3.5, the worker will use the Aux Building ACS terminal.

Second part is correct. Per step 6.4.2, personnel must log out of the RCA and use the Aux Bldg exit portal monitor. |
| C. Incorrect. | First part is incorrect (See B.1). Plausible if the applicant believes that since they are not entering the Aux building RCA, the ACS terminal entry is not required.

Second part is incorrect (See A.2). |
| D. Incorrect. | First part is incorrect (See C.1).

Second part is correct (See B.2). |

K/A: **2.3.13** Knowledge of radiological **safety procedures** pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Importance Rating: 3.4 3.8

Technical Reference: FNP-0-AP-42, Access Control, Ver 49.2

References provided: None

Learning Objective: Outline the requirements and process for entry into an RCA (OPS40502M03).

Question History: NEW

K/A match: Requires the applicant to **know the radiological safety procedure requirements (in this case AP-42, access control) to enter and exit an out building classified as a radiation controlled area.**

SRO justification: N/A

Which one of the following completes the statement below?

An employee who is a fully documented radiation worker and DOES NOT declare her pregnancy has an annual FNP Administrative TEDE limit of _____ .

- A. 450 mRem
- B. 500 mRem
- C✓ 2000 mRem
- D. 5000 mRem

HP manual Step 4.1.3.3

Any employee who discloses that she is or may be pregnant will complete the election form (DOS Form 931 in FNP-0-DOS-2) to accept or decline a prenatal radiation exposure limit of 500 mrem (0.5 rem) for the embryo or fetus for the term of the pregnancy as recommended in 10CFR20.1208.

FNP Admin Annual Dose Guidelines -

Fully documented radiation worker - 2000 mRem per year.

Distracter analysis

- A. Incorrect. See C. Plausible since the is the Admin limit for the woman during the term of the pregnancy of a declared pregnant woman.
- B. Incorrect. See C. Plausible since this is the Federal Limit for the Embryo for the term of the pregnancy.
- C. Correct. Since the woman has not declared her pregnancy, her admin exposure limit is 2000 mRem.
- D. Incorrect. See C. Plausible because this is the federal annual limit for and undeclared pregnancy.

K/A: **G2.3.4** Knowledge of radiation exposure limits under normal or emergency conditions.

Importance Rating: 3.2 3.7

Technical Reference: FNP-0-M-001, SNC FNP Health Physics Manual, Ver 18

References provided: None

Learning Objective: List FNP Admin Limits for various categories of dose (OPS30401A20).

Question History: NEW

K/A match: Requires the applicant to **know the normal exposure limits** for an un-declared pregnant woman.

SRO justification: N/A

Unit 1 is performing the actions of EEP-3.0, Steam Generator Tube Rupture, due to a tube rupture in the 1B SG.

- The 1B SG Narrow range level is 36% and rising.

Which one of the following completes the statements below?

The 1B SG narrow range level (1) adequate to begin the initial RCS cooldown.

The operational implication of having sufficient level in the 1B SG prior to the cooldown is to (2).

A. 1) is NOT

2) ensure a secondary side heat sink

B. 1) is NOT

2) prevent SG depressurization during the RCS cooldown

C. 1) IS

2) ensure a secondary side heat sink

D✓ 1) IS

2) prevent SG depressurization during the RCS cooldown

EEP-3 Note prior to Step 4

[CA] Maintaining ruptured SG(s) narrow range level greater than 31%{48%} prevents SG depressurization during RCS cooldown.

FNP-0-EEB-3.0 version 2

ERG Step Text: *Check Ruptured SG(s) Level*

Purpose: 1. To reduce feed flow to the ruptured steam generators to minimize the potential for steam generator overflow.

2. **To establish and maintain a water level in the ruptured steam generators above the top of the U-tubes in order to promote thermal stratification to prevent ruptured steam generator depressurization.**

Basis:

It is also important to maintain the water level in the ruptured steam generator above the top of the U-tubes. When the primary system is cooled in subsequent steps, the steam generator tubes in the ruptured steam generator will approach the temperature of the reactor coolant, particularly if reactor coolant pumps continue to run. If the steam space in the ruptured steam generator expands to contact these colder tubes, condensation will occur which would decrease the ruptured steam generator pressure. As previously demonstrated (see Step 3), this would reduce the reactor coolant subcooling margin and/or increase primary-to secondary leakage, possibly delaying SI termination or causing SI reinitiation. Consequently, the water level must be maintained above the top of the tubes to insulate the steam space. **In addition to insulating the steam space, this ensures a secondary side heat sink in the event that no intact steam generator is available** and also provides protection against misdiagnosis of the ruptured steam generator due to an imbalance of feed flow.

Distracter analysis

- A. Incorrect. First part in incorrect (See D.1). Plausible since the applicant may apply adverse numbers of 48% which would make this part correct.
- Second part in incorrect (See D.2). Plausible since this is another reason for having sufficient level in the ruptured SG ONLY if there are NO intact SGs available. This is not the case in this question.
- B. Incorrect. First part in incorrect (See A.1).
- Second part is correct (See D.1).
- C. Incorrect. First part in correct (See D.1).
- Second part in incorrect (See A.2).
- D. Correct. First part in correct. Ruptured SGWL must be > 31%.
- Second part is correct. Prevents SG depressurization during RCS cooldown.

K/A: **G2.4.20** Knowledge of the operational implications of EOP warnings, cautions, and notes.

Importance Rating: 3.8 4.3

Technical Reference: FNP-1-EEP-3, Steam Generator Tube Rupture, Ver 27
FNP-0-EEB-3.0, Specific Background Document for FNP-1/2 EEP-3, Ver 2

References provided: None

Learning Objective: STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with EEP-3, Steam Generator Tube Rupture. (OPS-52530D03).

Question History: MOD FNP EXAM BANK

K/A match: Requires the applicant to **know the operational implications of not meeting the Note and Caution of EEP-3 by having the improper SG water level prior to RCS cooldown during a tube rupture event.**

SRO justification: N/A

68. G2.4.23 068

FRP-Z.1, Response to High Containment Pressure, has the following caution:

IF ECP-1.1, Loss of Emergency Coolant Recirculation, is in effect, THEN Containment Spray should be operated as directed in ECP-1.1.

Which one of the following describes the bases for giving priority to ECP-1.1?

ECP-1.1 directs the operation of the Containment Spray (CS) pumps to ensure _____.

- A✓ RWST level is conserved
- B. adequate NPSH for the RHR pumps is available
- C. the maximum available Containment heat removal systems are running
- D. automatic swapover of the CS pumps to the Containment sump is prevented

FRP-Z.1 Caution prior to step 3

IF FNP-1-ECP-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, is in effect, THEN containment spray should be operated as directed in FNP-1-ECP-1.1.

FRB-Z.1 Step 3 Basis

Guideline ECA-1.1 uses a less restrictive criteria, which permits reduced spray pump operation depending on RWST level, containment pressure and number of emergency fan coolers operating. The less restrictive criteria for containment spray operation is used in guideline ECA-1.1 since recirculation flow to the RCS is not available and it is very important to **conserve RWST water**, if possible, by stopping containment spray pumps

Distracter analysis

- A. Correct. Per above basis statement: The less restrictive criteria for containment spray operation is used in guideline ECA-1.1 since recirculation flow to the RCS is not available and it is very important to conserve RWST water, if possible, by stopping containment spray pumps
- B. Incorrect. See A. Plausible since ECP-1.1 is Loss of Emergency Coolant Recirculation and the applicant may think that ECP-1.1 operates the spray pumps to maximize sump level to allow the RHR pumps to get a proper suction for alignment to sump recirculation.
- C. Incorrect. See A. Plausible since this is the goal of FRP-Z.1 and the applicant could confuse the two procedures.
- D. Incorrect. See A. Plausible since there is an auto swap over for RHR sump suction valves but not for Containment Spray pumps. The applicant could confuse these and think that ECP-1.1's mitigation addressed this issue.

K/A: G2.4.23 Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.

Importance Rating: 3.4 4.4

Technical Reference: FNP-1-FRP-Z.1, Response to High Containment Pressure, Ver 15
FNP-0-FRB-Z.1, Specific Background Document for FNP-1/2-FRP-Z.1, Ver 1

References provided: None

Learning Objective: STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with (1) FRP-Z.1, Response to High Containment Pressure; [...]. (OPS-52533M03)

Question History: FNP 08

K/A match: Requires the applicant to **know the basis for operating the Containment Spray pumps per ECP-1.1 versus FRP-Z.1 (prioritizing emergency procedure implementation during emergency operations).**

SRO justification: N/A

Unit 1 is operating at 100% power and the following conditions exist:

- #1 Waste Monitor Tank (WMT) release is in progress.
- The Unit 1 Rad Side SO is at the RCA exit preparing to enter the portal monitors.

Subsequently, the plant emergency alarms sounds and an announcement is made declaring a Site Area Emergency.

Which one of the following completes the statements below?

The Rad Side SO will go to the designated assembly area (1).

The designated assembly area for the Rad Side SO is the (2).

- A. 1) after securing the #1 WMT release
2) Operations Support Center (OSC)
- B. 1) after securing the #1 WMT release
2) Control Room
- C. 1) immediately
2) Operations Support Center (OSC)
- D✓ 1) immediately
2) Control Room

EIP-0.0

4.4.5 System Operators (2), plant operations.

- Assigned assembly area is the Control Room.

4.4.6 Other System Operators (as required by Technical Specifications), plant operations.

- Assigned assembly area is the Control Room.

EIP-10

4.10 During outages and normal Monday through Friday day shifts, individuals NOT described in section 4.1 thru 4.8 above will report to their assembly area as follows:

[...]

OPS Group on shift or qualified for a Shift position, and NOT in Training - Control Room

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible since this would stop a release to the environment. However, the release is monitored and will stop if R-18 alarms and the pump will trip on low level which would render the system safe.
- Second part is incorrect (See D.2). Plausible since this is an assembly area per procedure and the applicant may not recall the proper assembly areas for on shift staff. The OSC is extremely close to the Control Room and where all other personnel assemble. Prior to the new protected area, onshift staffing did assemble in the OSC so this was a normal assembly location for on shift OPS personnel in the recent past.
- B. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2).
- C. Incorrect. First part is correct (See D.1).
- Second part is incorrect (See A.2).
- D. Correct. First part is correct. NMP-EP-111-001 (pg 17) page announcement has a section to give directions to personnel out in the field if the intent is to allow them to remain in the field. The stem does not indicate that this specific direction is given so the SO will immediately go to his/her assembly area.
- Second part is correct. The control room is the proper assembly area per EIP-0.0 and EIP-10.

K/A: **G2.4.29** Knowledge of the emergency plan.

Importance Rating: 3.1 4.4

Technical Reference: NMP-EP-111-001, Emergency Notification Network Communicator Instructions - Farley, Ver 3.2
FNP-0-EIP-0.0, Emergency Organization, Ver 29

References provided: None

Learning Objective: IDENTIFY AND EXPLAIN the actions to be taken by an individual following an evacuation announcement (OPS40501B04).

Question History: NEW

K/A match: Require the applicant to have **knowledge of an individual's responsibilities when the Emergency Plan** is activated.

SRO justification: N/A

The crew has transitioned to ECP-1.2, LOCA Outside Containment.

- Step 2 of ECP-1.2 is in progress and the first flow path has been isolated.

The following conditions exist:

- Aux Building radiation levels are rising slowly.
- Safety Injection flow is stable.
- Aux Building sump levels are rising slowly.
- PI-402 and 403, RCS 1C/1A LOOP RCS NR PRESS, are rising.

Which one of the following completes the statements below per ECP-1.2?

The first flow path that was isolated was (1) injection.

The intersystem LOCA (2) been isolated.

- | | <u>(1)</u> | <u>(2)</u> |
|----|--------------|------------|
| A. | RCP seal | HAS |
| B. | RCP seal | has NOT |
| C✓ | RHR cold leg | HAS |
| D. | RHR cold leg | has NOT |

ECP-1.2

Step 2: Try to identify and isolate break.

2.1 Isolate A train RHR cold leg injection path.

2.2 Check RCS pressure - RISING.

2.5 Isolate B train RHR cold leg injection path.

2.6 Check RCS pressure - RISING.

Distracter analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible since this is isolated during ECP-1.2 but not first.
- Second part is correct (See C.2).
- B. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (See C.2). Plausible if the applicant does not recall which parameter is used to check leak isolation. Aux building sump levels and radiation levels could cause the applicant to believe that the leak is not isolated. Once the leak was isolated, sump levels could continue to rise as well as radiation levels as the isolated piping drains.
- C. Correct. First part is correct. Per step 2 of ECP-1.2, LHSI (RHR cold leg injection) is isolated first.
- Second part is correct. Per ECP-1.2, RCS pressure rising is the parameter monitored for verifying the leak is isolated.
- D. Incorrect. First part is incorrect (See A.1).
- Second part is incorrect (See B.2).

K/A: **W/E04EA1.1** LOCA Outside Containment - Ability to operate and / or monitor **Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features** as they apply to the (LOCA Outside Containment)

Importance Rating: 4.0 4.0

Technical Reference: FNP-1-ECP-1.2, LOCA Outside Containment, Ver 8

References provided: NONE

Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing ECP-1.2, LOCA Outside Containment. (OPS-52532E06)

ANALYZE plant conditions and DETERMINE the successful completion of any step in ECP-1.2, LOCA Outside Containment. (OPS-52532E07)

Question History: NEW

K/A match: Requires the applicant to know which **components are operated and** be able to determine from listed instrumentation (**monitor**) **if the leak has stopped during the leak isolation phase of ECP-1.2, LOCA Outside of Containment.**

SRO justification: N/A

Unit 1 was operating at 100% power when a Reactor Trip and SI occurred due to a steam line break in containment. The following conditions exist:

- The operating crew is performing the actions of EEP-2.0, Faulted Steam Generator Isolation.
- The maximum total AFW flow rate that can be achieved is 350 GPM.
- Containment pressure is 6 psig and falling.
- SG Narrow range levels are:
 - 1A - Off Scale Low
 - 1B - 32% and decreasing slowly
 - 1C - 34% and decreasing slowly

Which one of the following completes the statement below?

Secondary heat sink (1) adequate because (2).

A. 1) IS

2) 1B and 1C SG levels are sufficient

B✓ 1) is NOT

2) Neither SG levels nor AFW flow capability is sufficient

C. 1) IS

2) AFW flow capability is sufficient

D. 1) is NOT

2) 1B and 1C SG levels are sufficient but AFW flow capability is NOT sufficient

CSF-0/0.3 Heat Sink: To have adequate heat sink -

SG Narrow Range levels in at least ONE SG greater than 31%{48%}

OR

Total AFW to all SG's > 395 gpm

Distracter analysis

- A. Incorrect. See B. Plausible if the applicant does not recognize that adverse numbers apply in this scenario then this would be correct.
- B. Correct. One SG NR level must be >48% OR AFW flow must be >395 gpm to satisfy the heat sink criteria.
- C. Incorrect. See B. Plausible if the applicant does not recall the minimum AFW flow required to meet heat sink and confuses it with 350 gpm which is the design flow rate of one AFW pump.
- D. Incorrect. See B. Plausible if the applicant believes that BOTH AFW flow and SG NR levels are required to meet heat sink and does not recognize that adverse numbers apply in this scenario.

K/A: **W/E05EG2.4.2** Loss of Secondary Heat Sink - Knowledge of **system set points**, interlocks and automatic actions **associated with EOP entry conditions**.

Importance Rating: 4.5 4.6

Technical Reference: FNP-1-CSF-0, Critical Safety Function Status Trees, Ver 17

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if entry into (1) FRP-H.1, Response to Loss of Secondary Heat Sink; [...] is required. (OPS-52533F02)

Question History: MOD FNP EXAM BANK

K/A match: Requires the applicant to know the **setpoints of CSF-0** and recognize that heat sink does not exist and the **setpoints which are met for entry into FRP-H.1, Response to Loss of Secondary Heat Sink**.

SRO justification: N/A

Unit 2 has experienced a large steam break inside containment and the following conditions exist:

- 1A SG Wide Range level indicates 0%.
- AFW flow to 1B and 1C SG is currently 500 gpm.
- FRP-P.1, Response To Imminent Pressurized Thermal Shock, has been entered on a RED Path.
- RCS cold leg temperature continues to decrease slowly.
- RCS pressure is 1500 psig and stable.

Which one of the following completes the statements below concerning the mitigation strategy of FRP-P.1?

The RCS cooldown must (1).

An RCS pressure reduction (2) required.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | continue | is NOT |
| B. | continue | IS |
| C. | be stopped | is NOT |
| D✓ | be stopped | IS |

FRP-P.1:

Step 3: Check cold leg temperature
STABLE OR RISING.

3. [CA] Stop the cooldown.

Step 18: Reduce RCS pressure.

FRB-P.1

Step 3: [...] It is important to terminate, if possible, any cooldown in progress to limit the extent of possible vessel damage due to excessive thermal stresses. [...]

Step 18: The RCS pressure reduction is intended to decrease pressure stress on the vessel wall as much as possible. [...]

Distracter analysis

- A. Incorrect. First part is incorrect (See D.1). Plausible since a cooldown will be performed after the 1 hour soak but the overall strategy of FRP-P.1 is to stop the cooldown.
- Second part is incorrect (See D.1). Plausible since FRP-P.1 requires the RCS pressure stable for the soak and the applicant could confuse this with current conditions in the stem.
- B. Incorrect. First part is incorrect (See A.1).
- Second part is correct (See D.2).
- C. Incorrect. First part is correct (See D.2).
- Second part is incorrect (See A.2)
- D. Correct. First part is correct. Per the background document - [...] It is important to terminate, if possible, any cooldown in progress to limit the extent of possible vessel damage due to excessive thermal stresses.
- Second part is correct. Per the background document - The RCS pressure reduction is intended to decrease pressure stress on the vessel wall as much as possible.

K/A: **W/E08EG2.4.6** Pressurized Thermal Shock - Knowledge of EOP mitigation strategies.

Importance Rating: 3.7 4.7

Technical Reference: FNP-2-FRP-P.1, Response to Imminent Pressurized Thermal Shock Conditions, Ver 23
FNP-0-FRB-P.1, Specific Background Document For FNP1/2-FRP-P.1, Ver 2

References provided: NONE

Learning Objective: STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with (1) FRP-P.1, Response to Imminent Pressurized Thermal Shock Condition; [...] (OPS-52533K03)

EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing (1) FRP-P.1, Response to Imminent Pressurized Thermal Shock Condition; [...] (OPS-52533K06).

Question History: FNP 08

K/A match: Requires the applicant to **know the mitigation strategy of FRP-P.1, Response to Imminent Pressurized Thermal Shock Conditions, and select the appropriate actions to take under the given conditions.**

SRO justification: N/A

A Dual Unit LOSP with a LOCA on Unit 1 has occurred and the following conditions exist:

- EEP-1.0, Loss of Reactor or Secondary Coolant, is in progress.

At 1000:

- WA2, 1-2A DG GEN FAULT TRIP, comes into alarm.

At 1015:

- The following alarms are received:
 - CF3, 1A OR 1B RHR PUMP OVERLOAD TRIP
 - CH2, RWST LVL A TRN LO
 - CH3, RWST LVL B TRN LO

Which one of the following states:

- 1) the status of Unit 1 emergency recirculation capability
and
 - 2) the action(s) that the applicable procedure(s) direct?
- A. 1) One train ONLY of emergency recirculation capability has been lost.
2) Transfer to Cold Leg **AND** Containment Spray recirculation at this time.
- B. 1) One train ONLY of emergency recirculation capability has been lost.
2) Transfer to Cold Leg recirculation ONLY.
- C✓ 1) Both trains of emergency recirculation capability have been lost.
2) Minimize HHSI flow to the minimum required to remove decay heat while attempting to restore at least one train of emergency recirculation.
- D. 1) Both trains of emergency recirculation capability have been lost.
2) Secure HHSI pumps while attempting to restore at least one train of emergency recirculation.

This is not a true 2+2 question to improve distracter plausibility.

EEP-1:

13.1 Verify cold leg recirculation capability - AVAILABLE.

13.1 IF cold leg recirculation capability can NOT be verified, THEN go to FNP-2-ECP-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

13.1.1 Train A equipment available:

- **2A RHR Pump**
- CTMT SUMP TO 2A RHR PUMP

Q2E11MOV8811A
- CTMT SUMP TO 2A RHR PUMP
Q2E11MOV8812A
- 2A RHR HX TO CHG PUMP
SUCTION Q2E11MOV8706A
- CCW TO 2A RHR HX
Q2P17MOV3185A
OR

13.1.2 Train B equipment
available:

- **2B RHR Pump**
- CTMT SUMP TO 2B RHR PUMP
Q2E11MOV8811B
- CTMT SUMP TO 2B RHR PUMP
Q2E11MOV8812B
- 2B RHR HX TO CHG PUMP
SUCTION Q2E11MOV8706B
- CCW TO 2B RHR HX
Q2P17MOV3185B

ECP-1.1

Purpose - This procedure provides actions to restore emergency coolant recirculation capability, to delay depletion of the RWST by adding makeup and reducing outflow, and to depressurize the RCS to minimize break flow.

Distracter Analysis

- A. Incorrect. First part is incorrect (See C.1). Plausible if the applicant doesn't recognize that the DG trip results in the loss of the 1A RHR pump.
- Second part is incorrect (See C.2). Plausible if the applicant thinks that one train of recirc capability is available because this would be partially correct. The containment spray is not transferred to sump recirc until the RWST is less than 4.5 ft. The applicant could be unfamiliar with the procedure and believe that both cold leg and containment spray are required to be transferred to sump recirc when RWST is at 12.5 ft.
- B. Incorrect. First part is incorrect (See A.1)
- Second part is incorrect (See C.2). Plausible since this would be the correct answer if recirc capability existed.
- C. Correct. First part is correct. Since neither RHR pumps are available so there is no recirculation capability.
- Second part is correct. This is the correct strategy for ECP-1.1.
- D. Incorrect. First part is correct (See C.1).

Second part is correct (See C.2). Plausible if the applicant recognizes that recirculation capability is lost but incorrectly believes that CH2 and CH3 being in alarm indicates that the RWST is less than 4.5 ft which would make this the correct answer per step 34 of ECP-1.1.

K/A: W/E11EK2.1 Loss of Emergency Coolant Recirculation - Knowledge of the interrelations between the (Loss of Emergency Coolant Recirculation) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Importance Rating: 3.6 3.9

Technical Reference: FNP-1-EEP-1.0, Loss of Reactor or Secondary Coolant, Ver 31.
FNP-1-ECP-1.1, Loss of Emergency Coolant Recirculation, Ver 30

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if entry into (1) ECP-1.1, Loss of Emergency Coolant Recirculation; and/or (2) ECP-1.3, Loss of Emergency Coolant Recirculation, Caused by Sump Blockage is required. (OPS-52532D02)

Question History: FNP 10

K/A match: Applicant is required to **know the interrelation between failure modes of the RHR pumps and the Loss of Emergency Coolant Recirculation procedure.**

SRO justification: N/A

74. W/E12EK1.1 074

The crew is responding to a Steam Line Break on Unit 1.

- Due to equipment failures, ECP-2.1, Uncontrolled Depressurization of All Steam Generators, has been entered.
- All SG Narrow Range levels are 25% and lowering.

Which one of the following completes the statement below?

Per ECP-2.1, AFW flow will be adjusted to (1) .

- A. 0 gpm to **each** SG to prevent excessive cooldown
- B✓ at least 20 gpm to **each** SG to prevent dryout of the SGs
- C. at least 20 gpm **total** AFW flow to minimize thermal stress to the SGs
- D. at least 395 gpm **total** AFW flow to maintain adequate heat sink

ECP-2.1

Step 4: [CA] Maintain at least 20 gpm AFW flow to SGs with narrow range level less than 31%{48%}.

ECB-2.1

Basis: If feed flow to a SG is isolated and the SG is allowed to dry out, subsequent reinitiation of feed flow to the SG could create significant thermal stress conditions on SG components. Maintaining a minimum verifiable feed flow to the SG allows the components to remain in a "wet" condition, thereby minimizing any thermal shock effects if feed flow is increased.

Distracter Analysis

- A. Incorrect. See B. Plausible because stopping AFW flow would deplete the water inventory and stop the cooldown. This is the strategy of EEP-2.0, to stop all feed flow to the SG and allow it to blow down. This is not allowed by this procedure and would result in a loss of heat sink.
- B. Correct. Per ECP-2.1, the operator is required to maintain at least 20 gpm AFW flow to SGs with narrow range level less than 31%{48%} to prevent dryout of the SGs.
- C. Incorrect. See B. Plausible if the applicant confuses AFW to EACH versus Total AFW flow. If this were 20 gpm to EACH SG it would be a correct answer.
- D. Incorrect. See B. Plausible since this meets the Heat Sink Critical Safety Function Status Tree. FRP-H.1, Response to Loss of Secondary Heat Sink, has a caution that says the following: This procedure should not be performed if total AFW flow is less than 395 gpm due to operator action.

K/A: **W/E12EK1.1** Uncontrolled Depressurization of all Steam Generators - Knowledge of the **operational implications** of the following concepts as they apply to the (Uncontrolled Depressurization of all Steam Generators): Components:, **capacity, and function** of emergency systems.

Importance Rating: 3.4 3.8

Technical Reference: FNP1-ECP-2.1, Uncontrolled Depressurization of All Steam Generators, Ver 24
FNP-0-ECB-2.1, Specific Background Document for FNP-1/2-ECP-2.1, Ver 1

References provided: None

Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing ECP-2.1, Uncontrolled Depressurization of All SGs. (OPS-52532F06)

Question History: NEW

K/A match: Requires the applicant to know the AFW flow rate for ECP-2.1 and the **operational implication of lowering AFW flow** (AFW is an emergency system) to 20 gpm (reducing pump capacity) during an Uncontrolled Depressurization of all Steam Generators. Each flow rate has a different operational implication to improve plausibility.

SRO justification: N/A

75. W/E15EA1.3 075

Which one of the following is the **first** Major Action Category in FRP-Z.2, Response To Containment Flooding, and reason for this in accordance with the background document?

- A✓ Identify unexpected sources of water in the sump since flooding could damage critical plant equipment.
- B. Evaluate the ECCS system status to determine a strategy to transition to simultaneous cold and hot leg recirculation.
- C. Have chemistry evaluate sump level, chemistry, and activity level to determine a strategy to transfer excess water out of containment.
- D. Notify the TSC of sump chemistry, and activity level to determine potential changes in the planned transition to simultaneous cold and hot leg recirculation.

FRP-Z.2

Step 1: Try to identify source of water into sump.

- Check indications for components supplied with service water.
- Check indications for components supplied with CCW.
- Check indication of Reactor Makeup Water Storage Tank level.
- Check indication of Demineralized Water Storage Tank level.

FRB-Z.2 Background:

Step 1 Basis: This step instructs the operator to try to identify the unexpected source of the water in the containment sump. Containment flooding is a concern since critical plant components necessary for plant recovery may be damaged and rendered inoperable.

Distracter analysis

- A. Correct. Step 1 of FRP-Z.2 directs evaluating potential sources of flooding. The background document states - This step instructs the operator to try to identify the unexpected source of the water in the containment sump. Containment flooding is a concern since critical plant components necessary for plant recovery may be damaged and rendered inoperable.
- B. Incorrect. See A. Plausible since the ECCS system does enter containment and the applicant may improperly think that this is a source of flooding. If the ECCS system were damaged, then determining a strategy for going on to simultaneous cold and hot leg recirculation would be a plausible reason for this step. There is no step to evaluate ECCS as a source of flooding as it is designed to put water into the recirculation sump via the RCS break.
- C. Incorrect. See A. Plausible since this is Step 2 and the basis for this step in FRP-Z.2. The applicant may not be familiar with the procedure and believe that this is the first step.
- D. Incorrect. See A. Plausible since Step 3 does have the TSC evaluate sump chemistry, and activity level but not for this reason.

K/A: **W/E15EA1.3** Containment Flooding - Ability to operate and / or monitor the following as they apply to the (Containment Flooding): Desired operating results during abnormal and emergency situations.

Importance Rating: 2.8 3.0

Technical Reference: FNP-1-FRP-Z.2, Response To Containment Flooding, Ver 6
FNP-0-FRB-Z.2, Specific Background Document for
FNP-1/2-FRP-Z.2, Ver 1

References provided: None

Learning Objective: STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with [...] ; (2) FRP-Z.2, Response to Containment Flooding; [...]. (OPS-52533M03)

Question History: SUMMER 11

K/A match: Requires to applicant to **monitor containment sump flooding sources and recognize the undesired operating results of not isolating flooding.**

SRO justification: N/A

ANSWER KEY REPORT
for ILT-36 SRO NRC Exam Test Form: 0

			Answers
#	ID	Points	0
1	001AA2.01 1	1.00	C
2	003A3.05 2	1.00	C
3	004K3.08 3	1.00	C
4	005A2.02 4	1.00	B
5	006K5.06 5	1.00	B
6	006K6.18 6	1.00	B
7	007EA2.06 7	1.00	C
8	007K5.02 8	1.00	B
9	008AK1.01 9	1.00	D
10	008K2.02 10	1.00	D
11	009EK2.03 11	1.00	C
12	010A2.01 12	1.00	B
13	011EK2.02 13	1.00	D
14	011K2.02 14	1.00	C
15	012A4.06 15	1.00	A
16	013G2.1.19 16	1.00	A
	013G2.1.19 P 16		
17	014K5.01 17	1.00	D
18	015/17AA2.02 18	1.00	A
19	017K6.01 19	1.00	D
20	022A1.03 20	1.00	B
21	022AK1.04 21	1.00	A
22	022K4.03 22	1.00	A
23	025AA1.01 23	1.00	D
24	026AG2.4.50 24	1.00	D
25	026K2.01 25	1.00	C
26	029A1.02 26	1.00	A
27	033K4.05 27	1.00	C
28	035A2.01 28	1.00	B
29	036AG2.1.7 29	1.00	D
30	037AK1.01 30	1.00	C
31	038EK3.02 31	1.00	C
32	039K1.09 32	1.00	A
33	045K1.19 33	1.00	B
34	051AK3.01 34	1.00	A
35	054AA2.05 35	1.00	C
36	055A3.03 36	1.00	C
37	056AK3.02 37	1.00	A
38	059A4.01 38	1.00	A
39	059AK2.01 39	1.00	B
40	059G2.2.44 40	1.00	B
41	061A3.01 41	1.00	A
42	061K5.01 42	1.00	A
43	062AA1.07 43	1.00	A
44	062K3.01 44	1.00	B
45	063A1.01 45	1.00	A
46	064K3.02 46	1.00	D
47	064K6.07 47	1.00	D

ANSWER KEY REPORT
for ILT-36 SRO NRC Exam Test Form: 0

			Answers
#	ID	Points	0
48	065AG2.4.11 48	1.00	C
49	068AK2.07 49	1.00	D
50	071K3.05 50	1.00	A
51	073A2.02 51	1.00	B
52	073G2.2.42 52	1.00	B
53	076AA1.04 53	1.00	B
54	076K2.08 54	1.00	C
55	076K4.03 55	1.00	D
56	077AK3.02 56	1.00	A
57	078K1.01 57	1.00	A
58	079G2.4.34 58	1.00	D
59	103K4.06 59	1.00	C
60	G2.1.18 60	1.00	C
61	G2.1.5 61	1.00	B
62	G2.2.20 62	1.00	C
63	G2.2.25 63	1.00	A
64	G2.3.12 64	1.00	C
65	G2.3.13 65	1.00	B
66	G2.3.4 66	1.00	C
67	G2.4.20 67	1.00	D
68	G2.4.23 68	1.00	A
69	G2.4.29 69	1.00	D
70	W/E04EA1.1 70	1.00	C
71	W/E05EG2.4.2 71	1.00	B
72	W/E08EG2.4.6 72	1.00	D
73	W/E11EK2.1 73	1.00	C
74	W/E12EK1.1 74	1.00	B
75	W/E15EA1.3 75	1.00	A
SECTION 1 (75 items)		75.00	
76	001A2.17 76	1.00	C
77	004A2.02 77	1.00	A
78	006G2.2.22 78	1.00	B
79	008AG2.2.22 79	1.00	A
80	024AA2.04 80	1.00	B
81	028G2.1.1 81	1.00	B
82	029EA2.04 82	1.00	D
83	051AG2.1.7 83	1.00	A
84	054AA2.01 84	1.00	C
85	055EG2.2.12 85	1.00	D
86	058AA2.02 86	1.00	B
87	059A2.12 87	1.00	C
88	064G2.2.44 88	1.00	B
89	071G2.2.25 89	1.00	D
90	073A2.01 90	1.00	A
91	077AG2.4.31 91	1.00	C
92	G2.1.20 92	1.00	D

ANSWER KEY REPORT
for ILT-36 SRO NRC Exam Test Form: 0

				Answers
#	ID	Points	0	
93	G2.1.37 93	1.00	A	
94	G2.2.21 94	1.00	B	
95	G2.2.23 95	1.00	A	
96	G2.3.14 96	1.00	D	
97	G2.3.6 97	1.00	C	
98	G2.4.6 98	1.00	D	
99	WE02EA2.1 99	1.00	C	
100	WE06EG2.1.27 100	1.00	B	
SECTION BREAK (25 items)		25.00		