NMC Committed to Nuclear Excellence	WRITTEN EXAMINATION COVERSHEET	

Trainee Name:		
Employee Number:	**Site:**	
Examination Number/Title: 57_05-ILC-RO-NRC-Written		
Training Program: Operations		
Course/Lesson Plan Number(s): Reactor Operator, 50007		
GRADE:		
Total Points Possible: 75	**PASS CRITERIA: ≥ 80%**	**Grade: _____/75=_____%**
Graded by:		**Date:**
Co-graded by (not required if Scantron graded):		**Date:**

EXAMINATION RULES

1. References may not be used during this examination, unless otherwise stated.
2. Read each question carefully before answering. If you have any questions or need clarification during the examination, contact the examination proctor.
3. Conversation with other trainees during the examination is prohibited.
4. Partial credit will not be considered, unless otherwise stated. Show **all** work and state **all** assumptions when partial credit may be given.
5. Rest room trips are limited and only one examinee at a time may leave.
6. For exams with time limits, you have _____ minutes to complete the examination.
7. Feedback on this exam may be documented on QF-1040-13, Exam Feedback Form. Contact Instructor to obtain a copy of the form.

EXAMINATION INTEGRITY STATEMENT

Cheating or compromising the exam will result in disciplinary actions up to and including termination.

"I acknowledge that I am aware of the Examination Rules stated above, Further, I have not given, received, or observed any aid or information regarding this examination prior to or during its administration that could compromise this examination."

Examinee's Signature: _____ Date: _____

REVIEW ACKNOWLEDGEMENT

"I acknowledge that the correct answers to the exam questions were indicated to me following the completion of the exam. I have had the opportunity to review the examination questions with the instructor to ensure my understanding.

Examinee's Signature: _____ Date: _____

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Training program: Operations **Examination Number/Title: 57_05-ILC-RO-NRC-Written**	**Course/lesson plan Number(s):** **Reactor Operator, 50007**

1 Point

1. The plant was operating at 93% thermal power when the following occurred:

   - 1P201A, A RECIRC PUMP, tripped
   - power has stabilized at approximately 60% thermal power

   What is the Tech. Spec. SAFETY LIMIT for MCPR in this condition?

   a. 1.10

   b. 1.12

   c. 1.40

   d. 1.70

1 Point

2. The following plant conditions exist:

   - A Loss of Offsite Power has occurred
   - Drywell pressure is 3.6 psig and rising slowly
   - The “A” and “B” Standby Diesel Generators (SBDG) have successfully reenergized the respective essential busses
   - A large lube oil leak on the “A” SBDG

   Based on the above conditions the Control Room Supervisor (CRS) directs you to secure the “A” SBDG. If possible, how can you secure the “A” SBDG, <u>other than</u> tripping the fuel racks locally?

   a. Tripping the fuel racks locally is the ONLY way to secure the “A” SBDG.

   b. At 1C-93, SBDG 1G-21 CONTROL PANEL, using the appropriate key, HS-3232A, DIESEL GEN 1G-31 LOCAL HAND SWITCH, can be taken to LOCKOUT/STOP to secure the “A” SBDG.

   c. At 1C08, HS-3231A, SWITCH, HAND, REMOTE, EDG/AG031, can be taken to STOP and held in that position for 5-10 seconds before returning to AUTO to secure the “A” SBDG.

   d. At 1C08, HS-3231A, SWITCH, HAND, REMOTE, EDG/AG031, can be taken to PULL TO LOCK to secure the “A” SBDG.

1 Point

3. Given the following conditions:

   - 1D20, 125 VDC DIVISION 2 DISTRIBUTION PANEL, is totally de-energized
   - All 4160 VAC Buses are aligned to the Start-up Transformer
   - An automatic reactor scram has been initiated, and ALL RODS are full in
   - EOP-1, “RPV Control”, has been entered to control RPV level
   - RPV pressure control is being maintained by the Turbine Bypass Valves
   - CRS has directed the crew to “Restore and maintain RPV level between +170 and +211 inches with one or more of the Preferred Injection Systems”

   Which ONE of the Preferred Injection Systems from EOP-1, Table 1A, from the list below is available for MANUAL injection into the RPV when <u>initiated from the Control Room</u>?

   a. LPCI injection using 1P-229B, B RHR PUMP

   b. Startup and injection of the RCIC System

   c. Core Spray injection using 1P-211B, B CORE SPRAY PUMP

   d. Startup and injection of the HPCI System

1 Point

4. The plant was operating at 35% thermal power when the following occurs:

   - 1450: 1C-83A (A-4), OUTLET HIGH TEMP, activated
     Main Generator Stator water cooling outlet temp is 80ºC
   - 1451: Main Generator Stator water cooling outlet temp is 83ºC
   - 1452: Main Generator Stator water cooling outlet temp is 86ºC
   - 1453: 1C-07A (B-5), BYPASS VALVE NO. 1 OPEN, activated
     Main Generator Stator water cooling outlet temp is 87ºC
   - 1455: Main Generator load is 25% and stable
     Reactor power is approximately 36% thermal power
     Bypass Valve #1 is 90% open
     Main Generator Stator water cooling outlet temp is 88ºC

   Which of the following statements is CORRECT?

   a. The Main Generator should still be running back.

   b. This event should have resulted in a Turbine Trip.

   c. The actions of this event have gone as designed.

   d. This event should have resulted in a trip of the Main Generator.

1 Point

5. The following occurred:

   - A reactor scram from 93% thermal power has occurred due to nuclear instrument failure
   - The Feed Pumps restored RPV level and tripped on a High RPV level signal
   - RPV level swelled 10 more inches due to heat up.
   - RPV level can be determined on the Flood-up range indicator on 1C04 in this plant condition

   Which other, if any, Control Room indicators are reliable to determine RPV level?

   a. The Flood-up indicator is the only indicator

   b. The Narrow Range GEMAC (LI-4559, LI-4560 & LI-4561) on 1C05

   c. The Wide Range Yarways (LI 4539 & LI-4540) on 1C05

   d. The Fuel Zone indicators (LI-4565B & LI-4565C) on 1C03

1 Point

6. **(Refer to AOP-915, Attachment 5 on the following page)**

Given the following conditions:

- 1230: Entered AOP 915, “Shutdown Outside the Control Room”
- 1230: Manually scrammed the reactor from 93% Thermal Power and a normal operating pressure of 1020 psig
- 1232: All rods were verified full in prior to evacuating the Control Room
- 1245: All Outboard MSIVs close during the transfer to 1C388
- 1250: Control has been transferred to 1C388, Remote Shutdown Panel
- 1300: Lowest set SRV started cycling between 1100 psig to 1040 psig
- 1300: Commenced a cooldown of the RPV using AOP-915, Attachment 5 “Instructions for Plotting Cooldown”

Without exceeding the Technical Specification Limiting Condition for Operation (LCO) for Cooldown Rate, attaining ___(1)___ psig at ___(2)___ will remove the most energy.

	Pressure	Time
a.	(1) 500	(2) 1330
b.	(1) 420	(2) 1330
c.	(1) 560	(2) 1400
d.	(1) 460	(2) 1400

1 Point

7. The plant is operating 93% thermal power in the middle of the summer. All systems are in their normal lineups with the exception of the “D” Well pump is tagged out of service.

   Of the following systems, which one **WILL NOT** be immediately affected or require operator action to stabilize if the “B” Well pump trips?

   a. The Offgas System
   b. The Control Building HVAC System
   c. The Reactor Building HVAC System
   d. The Instrument and Service Air System

1 Point

8. HPCI is running in the CST to CST mode.

   If the plant were to completely lose Instrument Air header pressure, HPCI air-operated valves fail…

   a. OPEN to allow HPCI operation independent of outside energy sources.

   b. AS-IS and are provided a back-up air supply from two accumulator tanks.

   c. CLOSED to allow HPCI to operate only in the RPV injection mode of operation.

   d. CLOSED EXCEPT CV-2315, HPCI CST TEST RETURN ISOLATION, has a back-up air supply.

1 Point

9. IPOI-8, “Outage and Refueling Operations”, lists system heat removal capacities based on the following assumptions:

   - RPV Temp 140°F
   - RHRSW Temp 74°F
   - RBCCW Temp 75°F
   - Feedwater Temp 90°F

   Of the Decay Heat Removal Systems listed below, which one has the **LEAST** Heat Rejection Capacity?

   a. Reactor Water Cleanup

   b. Feed and Bleed at 200 gpm

   c. Fuel Pool Cooling with one (1) pump in service

   d. Shutdown cooling with one (1) RHR pump and one (1) RHRSW pump in service

1 Point

10. A refueling outage is in progress.

    - The first fuel shuffle has been completed and technicians were performing in vessel inspections
    - There is continuous Health Physics coverage on the Refuel Floor
    - In this condition, 1Y11, DIVISION 1 INSTRUMENT AC, was lost
    - All four (4) Area Radiation Monitors (ARMs) on the Refuel Floor became deenergized

    Is area radiation monitoring equipment on the Refuel Floor REQUIRED or NOT REQUIRED in this plant condition?

    If NOT REQUIRED, what allows all Refuel Floor ARMs to be inoperable?

    If REQUIRED, what is the compensatory action?

    Area radiation monitoring equipment is...

    a. NOT REQUIRED when there is continuous Health Physics coverage.

    b. NOT REQUIRED when refueling operations are NOT in progress.

    c. REQUIRED. It will be necessary to install one (1) alternate monitor with an audible alarm.

    d. REQUIRED. It will be necessary to install two (2) alternate monitors with audible alarms.

1 Point

11. The plant was operating at 93% thermal power when a loss of Well Water occurred. Conditions are as follows:

    - An air purge of the Drywell is in progress
    - "A" SBGT is in operation to support Drywell air purge
    - Core flow has been reduced to 27 Mlbs/hr, and a plant shutdown has commenced

    Which of the following equipment becoming INOPERATIVE would prevent continuing the air purge of the Drywell?

    a. RIS-4131A, A FUEL POOL EXHAUST RAD MONITOR
    b. 1V-SGT-001B, "B" SBGT train
    c. 1C-219A, A CONTAINMENT H2-O2 MONITOR
    d. 1C-333/334, OFFGAS STACK ACCIDENT/NORMAL RANGE KAMAN SKIDS

1 Point

12. **(Refer to the picture on the following page of LR/PR-4563/64 & LRS-4559/60, REACTOR PRESSURE / REACTOR WATER LEVEL RECORDER)**

The plant was at 93% thermal power when a transient occurred. Interpret the picture of LR/PR-4563/64 & LRS-4559/60, REACTOR PRESSURE / REACTOR WATER LEVEL RECORDER, to diagnose the details of the transient. **Note: the chart paper was advanced approximately two inches to allow viewing of the trends.**

The plant underwent a transient that contained which set of the following?

a. 1 SRV Opens, Reactor Scram, Pressure controlled by open SRV

b. Group 1 Isolation, Reactor Scram, Pressure control by SRVs operating in LLS mode

c. Turbine Trip, Reactor Scram, Pressure control by BPVs operating in Pressure Set mode

d. Manual Reactor Scram, Pressure control by RCIC

1 Point

13. There was a grid disturbance and the plant suffered a LOOP:

    - 1G-21 and 1G-31, Standby Diesel Generators, are carrying 1A3 and 1A4
    - RHR is running in Torus Cooling mode with B and D RHR Pumps and B RHRSW pump
    - A RHR system flow is 0 gpm
    - B RHR system flow is 7000 gpm
    - B RHRSW system flow is 2600 gpm

    Which of the following would be allowable to raise the rate of heat rejection from the Torus?

    a. Start 1P-22D, D RHRSW PUMP.

    b. Start an additional River Water Supply pump.

    c. Throttle open MO-1934, TORUS COOLING/TEST valve.

    d. Throttle open MO-1947, B RHR HX SERVICE WATER OUTLET valve.

1 Point

14. As a result of a transient the following conditions exist:

    - An Emergency Depressurization was performed
    - Drywell Temperature and Reactor Pressure are in the hatched “Action is required” area of Graph 1, “RPV Saturation Temperature” of the EOP

    Which one of the following describes the relationship between INDICATED RPV water level on the Fuel Zone and GEMAC instruments, and ACTUAL RPV water level?

    All of the instruments...

    a. read lower than ACTUAL.

    b. read higher than ACTUAL.

    c. EXCEPT the Fuel Zones read lower than ACTUAL.

    d. EXCEPT the Fuel Zones read higher than ACTUAL.

1 Point

15. The “Torus Level Control Leg” of EOP 2 directs the operators to maintain Torus level above 7.1 feet, and if it can’t be, the reactor shall be scrammed.

    The bases of this is to prevent…

    a. over pressurizing the Torus with HPCI running.

    b. over pressurizing the Torus with an SRVs open.

    c. a loss of Torus level indication by maintaining the lower level instrument tap adequately submerged.

    d. a loss of the pressure suppression function of the Torus by maintaining the Drywell-to-Torus downcomers adequately submerged.

1 Point

16. A transient is in progress and EOP-1, “RPV Control” and ALC, “Alternate Level Control”, are entered. “Emergency Depressurization” (ED) has been initiated due to the inability to maintain level with high pressure systems.

    Which of the following RPV injection line-ups / level indications would be appropriate in this situation to maintain adequate core cooling?

    a. One CS pump injecting at 2000 gpm, RPV level at -30 inches.

    b. Two CS pumps injecting at 3100 gpm each, RPV level at -42 inches.

    c. One CS pump injecting at 3100 gpm, one RHR pump injecting at 4000 gpm, and RPV level at -36 inches and steady.

    d. One CS pump injecting at 3100 gpm, three RHR pumps injecting at 14,400 gpm, and RPV level at -42 inches and steady.

1 Point

17. The plant tripped from 93% thermal power. The following conditions exist:

    - There has been a complete LOSS OF RPS caused by a fire in 1Y30, RPS 120VAC DISTRIBUTION PANEL
    - On panel 1C05, Full Core Display, all the individual HCU blue scram indicating lights are ON
    - 25 control rods are at position 16, all others are full in
    - Annunciator 1C05B (C-1), SCRAM DISCHARGE VOLUME HI LEVEL TRIP, activated moments after the scram was inserted
    - SDV Vent and Drain Valves are CLOSED

    Which of the following RIPs will be effective for the given conditions?

    a. RIP-101.3, “Vent the Scram Air Header”

    b. RIP-102.1, “Repeated Manual Scram”

    c. RIP-103.1, “Individual Scram Test Switches”

    d. RIP-103.3, “Manually Drive Control Rods”

1 Point

18. Given the following conditions:

- Battery Room Exhaust Fans are lined up with 1V-EF-30A&C in ON-AUTO and 1V-EF-30B in OFF-AUTO
- EOP-4, “Radioactivity Release Control” was entered
- Annunciator 1C26A (C-2), CONTROL BLDG INTAKE AIR RAD MON RM-6101A TROUBLE, activated

Battery Room Exhaust Fans _____(1)_____ would be running to support maintaining the Control Room at a _____(2)_____ pressure.

a. (1) 1V-EF-30A, 1V-EF-30B, & 1V-EF-30C
   (2) NEGATIVE

b. (1) 1V-EF-30A and 1V-EF-30C
   (2) NEGATIVE

c. (1) 1V-EF-30A
   (2) POSITIVE

d. (1) 1V-EF-30B
   (2) POSITIVE

1 Point

19. Conditions are as follows:

- AOP-915, “Shutdown Outside the Control Room”, has been entered due to a fire in the control room
- Operators have been directed to “Establish Switchgear Ventilation Control” per AOP-915, Tab 8
- There are two fans that must be started to accomplish this task

Where are the handswitches for those fans located?

a. The Battery Room Corridor

b. The 1A3 switchgear room

c. The 1A4 Switchgear room

d. 1C-388 Remote Shutdown Panel

1 Point

20. The plant was operating at steady state 93% thermal power when:

- Annunciator 1C07B (B-2), TURBINE HI VIBRATION, activated
- Bearing #3 vibration was 7.5 mils and rising at a rate of 1 mil per minute
- The crew entered AOP-693, “Main Turbine/EHC Failures”, “Turbine Vibration” section

Per AOP-693, in the current condition, the Main Turbine will be tripped…

a. immediately after exceeding 8 mils.

b. immediately after exceeding 10 mils.

c. 2 minutes after exceeding 10 mils or immediately if 14 mils is exceeded.

d. 15 minutes after exceeding 10 mils or immediately if 12 mils is exceeded.

1 Point

21. Which of the following is the basis for the automatic Main Steam Isolation Valve (MSIV) closure when a Main Condenser High Backpressure transient occurs while operating at 93% thermal power?

    The MSIVs are designed to automatically close at 19” Hg Abs to prevent …

    a. over pressurizing the Main Condenser.

    b. over pressurizing the Low Pressure Turbine Exhaust Hoods.

    c. damaging the turbine final stages due to aerodynamic buffeting.

    d. High exhaust hood temperatures and moisture caused erosion of the last stage buckets.

1 Point

22. What is the reason Reactor pressure is lowered as low as practical and verified to be ≤120 psig prior to placing RHR Shutdown Cooling in service?

    Pressure is lowered to…

    a. ensure design net positive suction head available to the RHR Pumps 1P-229A/B/C/D by providing lower temperature water.

    b. not exceed the differential temperature limitation of the RHR Heat Exchangers 1E-201A/B tube to shell interface.

    c. minimize the potential for an isolation of the Shutdown Cooling suction header valves (MO-1908/MO-1909) from spurious pressure spikes.

    d. avoid exceeding the Reactor Pressure Vessel cooldown rate administrative or Technical Specification limits.

1 Point

23. Complete the following statement on the bases for the Recirc pump runback.

The __(1)__ Recirc runback _____(2)_____.

a. (1) 20%
(2) prevents cavitation of the jet pumps

b. (1) 20%
(2) prevents damage to the Recirc pump thrust bearing due to increased axial thrust when the Recirc Pump Discharge Bypass Valve is CLOSED

c. (1) 45%
(2) ensures the 170” scram on RVP level will not occur from rated full power.

d. (1) 45%
(2) minimizes the amount of time the remaining Reactor Feed Pump is operated at run-out conditions.

1 Point

24. The Main Plant Well Water Supply Header has developed a major leak. Well Water Total Flow to the Reactor Building has lowered from 1580 gpm to 200 gpm.

    Of the following sets of alarms & indications, which one set by itself is a Tech. Spec. Limiting Condition of Operation (LCO) entry condition?

    a. 1C26A (B-5), “A” CHILLER 1V-CH-1A TROUBLE, annunciator activated
       The NSPEO reports ”A” Chiller Fast Unloaded

    b. 1C25A (B-3), DRYWELL COOLING LOOP “A” CRD AREA HI TEMP, annunciator activated
       Plant Process Computer point SPDS006 “AVG DRYWELL AIR TEMP (AVG OF 8) reads 138°F rising slowly

    c. 1C05B (B-1), PRIMARY CONTAINMENT HI/LO PRESSURE, annunciator activated
       PI-4398A, “NR DRYWELL PRESSURE” reads 1.55 psig and steady

    d. 1C24A (A-2), “A” SBGT RUNNING, annunciator activated
       ”A” SBGT running to vent the Drywell per AOP-408, “Well Water System Abnormal Operation”

1 Point

25. The plant had been running for 240 days with several Control Rod Drive Mechanisms (CRDMs) operating with high temperature alarms activated.

    During an ATWS situation, which of the following CRDM failures by itself may be attributed to this lack of cooling?

    a. Collet Finger Spring relaxation preventing Collet Fingers from engaging
    b. Position Indicator Probe expansion creating binding with Index tube
    c. Insert Line Ball Check Valve expanding and not repositioning
    d. Drive Piston Seals degradation

1 Point

26. What is the basis for the isolation of secondary containment ventilation due to a Fuel Pool Exhaust high radiation?

    a. Ensures any release from the Rad Waste building is treated and monitored.

    b. Prevents the release of unfiltered radioactivity, and provides an elevated release point.

    c. Maintains the dose to an individual within the Power Block to less than 1.2 Rem TEDE for the first 4 hours of the Design Bases Accident.

    d. Provides a Reactor Building atmosphere that is recirculated by normal ventilation systems during the Refuel Floor Design Bases Accident.

1 Point

27. Main Plant Exhaust Plenum pressure is rising.

    Which of the following will AUTOMATICALLY initiate to provide the indicated protective function?

    a. The Main Plant Exhaust Fans sequentially SHIFT to High Speed to prevent collapsing the Main Plant Exhaust Plenum.

    b. The Reactor Building Exhaust Fans START to prevent Refuel Floor blow out panels from lifting.

    c. The Reactor Building Supply fans TRIP to prevent over pressurizing Secondary Containment.

    d. SBGT STARTS to draw at least a -.25 inch WG in the Reactor building.

1 Point

28. **(Refer to current 1C03 conditions provided on the next page.)**

The plant has experienced a LOCA.

- Torus cooling is maximized
- Containment Sprays cannot be established
- The Low Pressure Coolant Injection (LPCI) mode of RHR is **NOT** required for adequate core cooling
- LPCI Loop Select has selected the "B" Loop of RHR
- The CRS has directed an Emergency Depressurization (ED), which is in progress
- As RPV pressure lowers, the operator at panel 1C-03 takes some actions on the vertical section of 1C-03, but **NO ACTIONS** yet on the benchboard section

Evaluate the 1C-03 vertical board conditions provided. Based on these conditions what is the expected:

1) status of MO-1904, "B" LPCI OUTBOARD INJECT VALVE

2) status of LPCI injection flow AT THIS TIME

3) response or action of MO-1904

a. 1) MO-1904 would be CLOSED
   2) LPCI would **NOT** be injecting
   3) MO-1904 would **NOT** automatically open

b. 1) MO-1904 would be OPEN
   2) LPCI would **NOT** be injecting
   3) If an operator closed MO-1904 it would **NOT** automatically re-open

c. 1) MO-1904 would be OPEN
   2) LPCI would be injecting
   3) If an operator closed MO-1904 it would automatically re-open

d. 1) MO-1904 would be OPEN
   2) LPCI would be injecting
   3) If an operator closed MO-1904 it would **NOT** automatically re-open

1 Point

29. 1P-99B, B ESW pump, is running to support Bromine Injection. Annunciator 1C06A (C-2), “B” ESW PUMP 1P-99B TRIP OR LO DISCHARGE PRESSURE, activates and 1P-99B indicates tripped.

    Which of the following operations would need to be secured and why? (Consider each operation individually, not occurring at the same time.)

    a. 1V-CH-001B, B CONTROL BUILDING CHILLER, running in a normal line-up.
       Impending trip of the B Chiller on high discharge pressure due to a loss of condenser cooling.

    b. HPCI system running CST to CST for pressure control after a reactor scram.
       Loss of cooling to HPCI lube oil cooler.

    c. 1P-211B, B CORE SPRAY PUMP running for STP 3.5.1-01, “Core Spray System Operability Test.”
       Loss of cooling for the B Core spray pump seal cooler.

    d. RHR running in Shutdown Cooling mode with 1P-229B, B RHR PUMP, and 1P-229D, D RHR PUMP injecting in B side.
       Loss of cooling to 1P-229B and 1P-229D pumps seal coolers.

1 Point

30. With HPCI in standby readiness, what is the power supply to the HPCI Flow Controller?

    The HPCI Flow controller uses 120 VAC from…

    a. a 250 VDC inverter.

    b. a 125 VDC inverter.

    c. Instrument AC.

    d. Uninterruptible power supply.

1 Point

31. Which combination of MCCs, if de-energized, would prevent the operation of BOTH of the Core Spray Systems Inboard Injection Valves from the control room?

    a. 1B32 / 1B42

    b. 1B33 / 1B45

    c. 1B34 / 1B44

    d. 1B35 / 1B43

1 Point

32. **(Refer to the picture on the following page of Standby Liquid Control System 1C-05 indications.)**

Which of the following operations would be consistent with the indications provided?

a. One SBLC pump was started locally.

b. Only one SBLC pump was selected to start from 1C05.

c. The SBLC system was started from 1C05 and is injecting, but one pump has lost power.

d. The SBLC system was started from 1C05, it injected, and when it was secured, only one pump stopped.

1 Point

33. Given the following conditions:

- A turbine trip from 93% thermal power caused a reactor scram
- RPV level lowered to 110″ during the initial transient but has been restored to the normal operating band for two minutes.
- The scram has **NOT** been reset.

Both Backup Scram valves are _____(1)_____ and _____(2)_____.

a. (1) energized (2) venting

b. (1) deenergized (2) venting

c. (1) energized (2) NOT venting

d. (1) deenergized (2) NOT venting

1 Point

34. The plant is nearing the end of a refueling outage with the following conditions:

- The “C” IRM detector drive has been replaced
- No IRMs are bypassed
- All IRMs are inserted and operable
- All IRMs are reading 2/40 on Range 1
- The CRS has given you post testing for “C” IRM Detector Drive, which requires the detector to be fully withdrawn and then fully inserted
- The SRM/IRM Drive Panel is ON and IRM”C” is selected

With the current conditions if you were to DEPRESS AND HOLD the DRIVE OUT pushbutton on the SRM/IRM Drive Control Panel the “C” IRM would…

a. NOT drive out.

b. drive out until the OUT light came on.

c. drive out until the Rod Block activated.

d. drive out until the INOP light for “C” IRM came on.

1 Point

35. Which of the following plant electrical systems supplies power to the detector and electronic trip units of the Source Range Monitoring (SRM) System?

    a. 24 VDC station batteries

    b. 125 VDC station batteries

    c. 120 VAC Instrument AC

    d. 120 VAC Reactor Protection System

1 Point

36. The plant is operating at 93% thermal power.

- "A" & "F" APRMs are bypassed
- One "D" level LPRM assigned to the "F" APRM fails upscale

Which of the following describes the affect of this failure on the value of computer point C179, NSSS1 CORE THERMAL POWER (MWTH)?

a. "F" APRM reading will increase causing C179 to INCREASE.

b. "F" APRM reading will increase, however, since it is bypassed C179 will REMAIN THE SAME.

c. LPRMs do NOT input into the Reactor Heat Balance Equation and therefore C179 will REMAIN THE SAME.

d. "F" APRM readings will decrease because the "D" Level LPRM upscale reading is automatically rejected causing C179 to DECREASE.

1 Point

37. The plant was operating at 93% thermal power when a FEED LINE BREAK occurred.

- A manual reactor scram was inserted and ALL RODS are verified FULL-IN.
- RPV level is 110” and steady.
- 1A1 and 1A2 open circuit transferred to 1X3, Start-up transformer.
- The NSPEO reported that the leak was on the RPV side of MO-4442, RX FEEDWATER LOOP B INLET STOP CHECK.
- Based on the report from the NSPEO, the control room operators closed MO-4442 in an attempt to isolate the B Feedwater header.
- The NSPEO reports that the leak has slowed but is still in progress.

Which of the following systems could be supplying the leak?

a. HPCI

b. RCIC

c. RWCU

d. 1P-1A, “A” RFP

1 Point

38. The plant was operating at 93% thermal power with HPCI tagged out for corrective maintenance.

A transient occurred which resulted in a total loss of feedwater and an unisolable RWCU leak OUTSIDE the Drywell.

Assuming no operator action, which one of the following describes the response of the ADS system to depressurize the reactor and allow injection?

a. As soon as any low pressure ECCS pump breaker is CLOSED
AND
reactor water level reaches low-low-low, the ADS valves will open.

b. With any ECCS pump breaker CLOSED
AND
two minutes after reactor water level reaches low-low-low level, the ADS valves will open.

c. As soon as any low pressure ECCS pump reaches normal discharge pressure
AND
reactor water level reaches low-low-low, the ADS valves will open.

d. With any low pressure ECCS pump at normal discharge pressure
AND
two minutes after reactor water level reaches low-low-low level, the ADS valves will open.

1 Point

39. The plant is operating at 93% thermal power when RIM-7606A, REACTOR BUILDING VENT SHAFT RAD MONITOR, fails causing a complete PCIS Group 3 isolation on the “A” side.

    How many of the following units are isolated, and what is the MINIMUM number of keys required to restore all monitors to service?

    - 1C218A Primary Containment H2O2 Analyzer
    - 1C218B Primary Containment H2O2 Analyzer
    - 1C219A Primary Containment Rad Monitoring Panel
    - 1C219B Primary Containment Rad Monitoring Panel

    a. 2 isolated
       2 keys

    b. 2 isolated
       4 keys

    c. 4 isolated
       2 keys

    d. 4 isolated
       4 keys

1 Point

40. Which of the following describes how power is provided to the solenoids on the Safety Relief Valves (SRVs)?

    a. ADS SRV solenoids can only be supplied by Division 1 125 VDC power and LLS SRV solenoids can only be supplied by Division 2 125 VDC power.

    b. LLS SRV solenoids can only be supplied by Division 1 125 VDC power and ADS SRV solenoids can only be supplied by Division 2 125 VDC power.

    c. Division 1 SRV solenoids can only be supplied by Division 1 125 VDC power and Division 2 SRV solenoids can only be supplied by Division 2 125 VDC power.

    d. All SRV solenoids can be supplied by either division of 125 VDC.

1 Point

41. The plant is in Mode 5 with the cavity flooded to 340” and the RPV Head removed.

    The loss of which of the following will effect the ACCURATE INDICATION of RPV water level?

    a. CRD system

    b. Instrument Air

    c. “A” FEEDWATER INVERTER

    d. 1Y23, UNITERUPTABLE AC POWER

1 Point

42. **(Refer to the picture on the following page of FIC-5828A, INLET AIR FLOW CONTROLLER)**

1V-SGT-001A, “A” SBGT TRAIN, has been started per OI-170, “Standby Gas Treatment System”, Section 5.2, “Manual Initiation of the SBGT System Using Test Pushbuttons” to support a Troubleshooting Instruction Form (TIF) that allows the System Engineer to observe system valve response.

The TIF directs the operator to adjust system flow, so the operator has dialed the thumbwheel on FIC-5828A, INLET AIR FLOW CONTROLLER, down in AUTO to observe current system flow

1) What action can the operator take to raise “A” SBGT flow rate?

2) And how will this action affect the “A” SBGT train operation?

a. 1) Open AV-7604U, REFUEL POOL TO SBGT INLET VALVE.
   2) Flow indication will go up and valve position will throttle closed.

b. 1) Dial the thumbwheel (setpoint) FIC-5828A, INLET AIR FLOW CONTROLLER, up in AUTO.
   2) Flow indication will go up and valve position will throttle closed.

c. 1) Direct the Second Assistant to secure 1V-EF-13A/B, AIR EJECTOR ROOM EXHAUST FANS, at Panel 1C-140.
   2) Flow indication will go up and valve position will remain unchanged.

d. 1) Start a second 1V-EF-18A/B, OFFGAS STACK FAN, at Panel 1C-24.
   2) Flow indication will go up and valve position will remain unchanged.

1 Point

43. The plant was operating at 50% thermal power when 1C08A (A-2), BUS 1A1 LOCKOUT TRIP OR LOSS OF VOLTAGE, annunciator activates.

    Which of the following would cause bus 1A1 to be LOCKED OUT?

    a. 1A1 Bus voltage at 832 VAC

    b. 1X2, AUXILIARY TRANSFORMER, secondary ground

    c. 1D11 Ckt 5, 1A1 CONTROL POWER, tripped

    d. 1X3, START-UP TRANSFORMER, secondary output voltage <65% of rated voltage

1 Point

44. Given the following:

- Uninterruptible AC (UPS) is being powered from 1Y2, INSTRUMENT AC TRANSFORMER
- 1D45, UPS AC INVERTER, is energized and in a normal line up
- 1Y4, UPS AC REGULATING TRANSFORMER, is energized and in a normal line up
- An operator has been sent to restore UPS to the preferred power supply

Which of the following alarms could be expected simultaneously with 1C08A (A-8), UNINTERUPTABLE AC 1Y23 UNDERVOLTAGE OR INVERTER TROUBLE? (There is no failure in the system operation.)

a. 1C03C (D-3), CST A/B LO LEVEL HPCI/RCIC SUCTION TRANSFER INITIATE

b. 1C04B (A-9), RWCU PUMP LOW FLOW

c. 1C04A (C-5), “A” RECIRC MG SCOOP TUBE LOCK

d. 1C23 (D-4), WELL WATER CONTROLLER(S) SIGNAL LOSS

1 Point

45. Are any PUMP MOTORS in the Turbine Building powered by 250 VDC? If yes, how many are there?

    a. There are NO 250 VDC pump motors in the Turbine Building.

    b. There is a total of one (1) 250 VDC pump motor in the Turbine Building.

    c. There are a total of two (2) 250 VDC pump motors in the Turbine Building.

    d. There are a total of three (3) 250 VDC pump motors in the Turbine Building.

1 Point

46. The plant is preparing for a startup.

- STP 3.8.1-06, “Standby Diesel Generator Operability Test (Fast Start)”, is in progress for 1G-31, “A” SBDG
- The next step of the STP is “When the synchroscope is at the 12 o’clock position, momentarily place the 4KV BREAKER 1A311 A DIESEL GENERATOR 1G-31 control switch in CLOSE”
- BEFORE 1A311 is taken to CLOSE, 1C08A (A-5), 1A3 BUS LOCKOUT, activates

Which of the following is the correct action for the Diesel and 1A3 for this situation?

a. Shutdown 1G-31 to prevent overheating.

b. Return 1G-31 to Standby Readiness because 1G-31 tripped on the 1A3 Lockout.

c. Restore 1A3 BUS TRANSFER SWITCH to AUTO to allow 1A3 to automatically reenergize.

d. Continue with the STP and close 1A311, 4KV BREAKER 1A311 A DIESEL GENERATOR 1G-31, to restore power to 1A3.

1 Point

47. **(Refer to the picture on the following page for the following question.)**

What is a function of the compressor pictured on the next page?

This compressor provides …

a. a BACKUP source of Instrument Air to the T-Ring Seal on CV-4301, OUTBOARD TORUS VENT ISOLATION VALVE.

b. A BACKUP source of Instrument Air to the air operator on CV-4371A, CONTAINMENT NITROGEN SUPPLY ISOLATION.

c. the NORMAL source of Instrument Air to the “A” Standby Gas Treatment Train Fan 1V-EF-15A flow control vanes.

d. the NORMAL source of Instrument Air to LE-2901, INTAKE STRUCTURE RIVER WATER LEVEL DETECTOR.

1 Point

48. How many Liquid Process Radiation Monitors are installed for the Residual Heat Removal Service Water (RHRSW) and Emergency Service Water (ESW) systems and what points do they monitor?

    a. One (1) Process Radiation Monitor
    It monitors the combined RHRSW/ESW return flow to the Cooling Towers.

    b. Two (2) Process Radiation Monitors
    One monitors the combined RHRSW/ESW return flow to the Cooling Towers.
    One monitors the combined RHRSW/ESW return flow to the Discharge Canal.

    c. Three (3) Process Radiation Monitors
    One monitors RHRSW return flow to the Cooling Towers.
    One monitors ESW return flow to the Cooling Towers.
    One monitors the combined RHRSW/ESW return flow to the Discharge Canal.

    d. Four (4) Process Radiation Monitors
    One monitors RHRSW return flow to the Cooling Towers.
    One monitors RHRSW return flow to the Discharge Canal.
    One monitors ESW return flow to the Cooling Towers.
    One monitors ESW return flow to the Discharge Canal.

1 Point

49. The plant was scrammed from 93% thermal power. The following conditions now exist:

- Not all control rods inserted and ATWS was entered via EOP-1, “RPV Control”
- Reactor thermal power is currently 6%
- Torus water temp is 130°F and rising
- RPV pressure is 1000 psig and being controlled by LLS
- The CRS directs you to inject SBLC

The bases of injecting with SBLC before exceeding the Boron Injection Initiation Temperature (BIIT) curve in this plant condition is to ensure…

a. sufficient boron is injected to mitigate the effects of cooldown of the reactor coolant on reactivity.

b. Hot Shutdown Boron Weight is injected before Torus temperature exceeds the Heat Capacity Limit curve.

c. boron injection is started prior to reaching the Torus temperature that requires the reactor to be manually scrammed.

d. the least amount of soluble boron is injected to maintain the reactor shutdown under all conditions before Torus temperature exceeds the Heat Capacity Limit Curve.

1 Point

50. **(Refer to the picture on the following page of 1C03, RCIC section)**

The operating crew is responding to a plant transient. The 1C05 operator has manually started RCIC in the CST to CST mode.

While acknowledging annunciators, the BOP operator notices that RCIC is pumping at 400 gpm and that annunciator 1C04C (B-6), RCIC VACUUM TANK LO LEVEL, is alarming. He then observes the control panel indications provided.

Which of the following actions, if any, will be necessary?

a. The BOP operator will have to stop 1P-227, GLAND SEAL VACUUM PUMP.

b. The BOP operator will have to start 1P-228, RCIC CONDENSER CONDENSATE PUMP.

c. The BOP operator will have to open MO-2426, RCIC CONDENSER/LUBE OIL COOLER SUPPLY.

d. No actions will be necessary because RCIC continues to operate satisfactorily.

1 Point

51. Per OI-183.1 “Automatic Depressurization System”, which of the following is the recommended way to MANUALLY operate the SRVs?

    a. Alternate all six SRVs to avoid overheating of any one SRV pilot assembly.

    b. Alternate all six SRVs to avoid overheating any localized areas of the Torus.

    c. Operate one SRV for the entire process to restrict the thermal stresses to one tailpipe.

    d. Operate one SRV for the entire process to achieve a more predictable rate in the rise of Torus water temperature.

1 Point

52. The plant is operating at 93% thermal power with the following conditions:

- 1K90A in LEAD, 1K90B in LAG, 1K90C in LAG-LAG
- 1XR2 deenergized due to an insulator failure
- 1BR91/1BR92 failed to crosstie due to a failure of Instrument Air Bus AUTO TRANSFER control circuit
- 1BR91/1BR92 will be MANUALLY crosstied
- 1BR9-200, 1BR92 SUPPLY BREAKER, has been manually opened

Which of the following correctly describes the impact of manually closing 1BR9-300, 1BR91/1BR92 CROSSTIE, on 1K90B?

a. 1K90B will remain idle and return to standby readiness.

b. 1K90B must be selected to Lag-Lag prior to this cross-connect so it will NOT automatically start.

c. 1K90B will automatically start and run unloaded until it automatically shuts down after approximately 20 minutes.

d. 1K90B will automatically start and run unloaded until it is manually secured by depressing the RESET-START pushbutton.

1 Point

53. The plant is operating at 35% thermal power with 1P-4A, “A” CIRC WATER PUMP and “A” Cooling Tower in operation.

    Which of the following conditions would cause 1P-4A to trip?

    a. Circ Water Pit level lowering to 13 ft

    b. Losing 1Y11, Instrument AC Division 1

    c. Losing 1Y23, 120 VAC Uninterruptible power supply

    d. Closing MO-4208, HP CONDENSER 1E-7B SOUTH WATER BOX OUTLET

1 Point

54. During a reactor startup, a single notch rod withdrawal is initiated. The following indications are observed at 1C05:

    - ROD IN light momentarily illuminates followed by the ROD OUT light illuminating then the SETTLE light illuminating. The ROD OUT light de-energizes followed by the SETTLE light de-energizing.
    - Drive water flow indicated approximately 4 gpm when the ROD IN light was illuminated then dropped to approximately 2 gpm when the ROD OUT light illuminated.
    - Drive water differential pressure went from initially indicating 260 psid to 200 psid during the rod out portion of the rod movement, then stabilized at 260 psid approximately 1 minute after the rod movement was completed

    Are these indications correct for the above stated task?

    a. These are the expected indications during a rod withdrawal.

    b. These are abnormal indications since the ROD IN light would NOT illuminate during a rod withdrawal.

    c. These are abnormal indications due to the drive water flow being too low during the ROD OUT portion of the sequence.

    d. These are abnormal indications due to the drive water differential pressure fluctuation during the rod movement.

1 Point

55. **(Refer to the picture on the following page of the Rod Worth Minimizer.)**

A reactor shutdown is in progress with the following conditions:

- Control rod density is at 40%
- Control rod 02-19 information:
  - rod sequence step 16
  - Insert limit of 00 and a Withdrawal limit of 12
  - at position 12
  - next control rod to be Inserted
- Control rod 10-11 information:
  - rod sequence step 15
  - Insert limit of 00 and a Withdrawal limit of 12
  - at position 12

If Control rod 10-11 was selected, which RWM Operator Display would be accurate?

a. Figure A

b. Figure B

c. Figure C

d. Figure D

1 Point

56. Which ordered list below is the correct configuration to describe the electrical power supply 1P-201A, A REACTOR RECIRCULATION PUMP?

    a. Non-Essential Bus 1A1, Drive Motor, Generator, RPT Breaker 1A501, RPT Breaker 1A601, 1P-201A Recirc Pump Motor

    b. Non-Essential Bus 1A1, RPT Breaker 1A501, RPT Breaker 1A601, Drive Motor, Generator, 1P-201A Recirc Pump Motor

    c. Essential Bus 1A3, RPT Breaker 1A501, RPT Breaker 1A601, Drive Motor, Generator, 1P-201A Recirc Pump Motor

    d. Essential Bus 1A3, Drive Motor, Generator, RPT Breaker 1A501, RPT Breaker 1A601, 1P-201A Recirc Pump Motor

1 Point

57. Per OI-261, “Reactor Water Cleanup System”, which operator action is allowed to control RWCU system pressure?

    a. Throttle open MO-2723, CLEANUP DEMIN BYPASS, when the Filter/Demins are in service.

    b. Throttle closed MO-2740, RWCU RETURN HEADER OUTBOARD ISOLATION, when Reactor pressure is low.

    c. Throttle open MO-2727, DRAIN FLOW ORIFICE BYPASS, when the Reactor is at normal operating pressure.

    d. Throttle closed MO-2701, OUTBD CLEANUP SUCTION ISOL, when un-isolating to limit high differential flow.

1 Point

58. **(Refer to the pictures on the following page)**

A TIP trace was being performed for only channel C-7 at the request of the Reactor Engineer. While the TIP traverse was in progress, a spurious PCIS Group 2 Isolation signal has initiated, and the CRS has directed the operators to verify that the isolation is complete.

Which of the indications are consistent with a COMPLETE Group 2 isolation of the TIP system PCIS isolation valves?

a. A

b. B

c. C

d. D

1 Point

59. **(Refer to the picture on the following page of Channel A RBM)**

The reactor was at 70% core thermal power with a control rod sequence exchange in progress with the following conditions:

- Control rod 22-19 was known to be in a high power region of the core
- APRMs “B” and “C” are bypassed
- No anticipated alarms were briefed
- Control rod 22-19 was being withdrawn from position 00 to position 12 using single notch withdrawal

When the operators withdrew control rod 22-19 from position 8 to position 10 the following actions occurred:

- Annunciator 1C05B (A-6), ROD OUT BLOCK, activated
- Annunciator 1C05B (B-6), RBM UPSCALE OR INOP, activated
- The Reactor Engineer confirmed that the proper withdrawal sequence was being used and the correct rod was withdrawn
- The OFFICIAL 3D CASE showed expected values for all thermal limits
- Channel “A” Rod Block Monitor (RBM) indications provided on the next page

Based on these indications, what action(s) will be needed in regards to the “A” RBM in order to continue the sequence exchange?

a. Select another rod and then re-select rod 22-19

b. Bypass the “A” RBM and write a Work Request Card

c. Unbypass “C” APRM

d. Re-insert rod 22-19 until 1C05B (B-6), RBM UPSCALE OR INOP, clears

1 Point

60. A plant startup is in progress and conditions have been met for placing the Moisture Separator Reheater (MSR) 2nd Stage Reheat in service.

    At 1C105, MSR AUTO LOADING PANEL, TIC-1097A and B, LOW LOAD VALVE CONTROLLERS, are in MANUAL.

    In accordance with OI-646, “Extraction Steam System”, what is the applicable heat-up rate limit for the MSR 2nd Stage Reheater tubes in this situation?

    a. 50°F/hour (25°F /30 min)

    b. 80°F/hour (20°F/15 min)

    c. 100°F/hour (25°F/15 min)

    d. 125°F/hour

1 Point

61. **(Refer to the drawing of EHC logic on the following page)**

The plant is at 93% thermal power.

Using the schematic provided, identify how the SIGNAL VALUES at the points marked “A” and “B” would change if one Safety Relief Valve were to FAIL OPEN in this situation.

a. Signal Value “A” Lower
   Signal Value “B” Lower

b. Signal Value “A” Lower
   Signal Value “B” Higher

c. Signal Value “A” Higher
   Signal Value “B” Lower

d. Signal Value “A” Higher
   Signal Value “B” Higher

1 Point

62. **(Refer to the Estimated Capabilities curve on the following page)**

The Main Generator is operating with the following parameters:

- 600 MWE
- 0 MVARS
- Generator H_2 Pressure is 45 psig
- All Main Generator controls are in a normal line up

The maximum LEADING MVARS that could be picked up are ____(1)____, however if H_2 Pressure were to lower to 30 psig then the maximum LEADING MVARS would be _____(2)_____.

a. (1) 115 MVARs
   (2) 20 MVARs

b. (1) 105 MVARs
   (2) 105 MVARs

c. (1) 250 MVARs
   (2) 170 MVARs

d. (1) 290 MVARs
   (2) 170 MVARs

1 Point

63. **(Refer to the picture on the following page)**

The plant is steady state, operating at 37% thermal power with three (3) Condensate Filter Demineralizer beds in service. There are no evolutions in progress.

What is **WRONG** with operating in the configuration as shown in the picture?

a. MO-1708, Condensate Filter Demineralizer (Filter Demin) Bypass Valve should be CLOSED.

b. MO-1546, LP Feedwater Heater Bypass Isolation (LP Heater 3, 4, 5 Bypass) Valve should be throttled OPEN.

c. MO-1631, Feedwater Start-Up Isolation (Start-Up Feed Reg. Isolation) Valve should be OPEN.

d. MO-1636, Feedwater Heater 1E-6A Outlet To Reactor ("B" Feedline Block) Valve should be CLOSED.

1 Point

64. The plant is operating at 70% thermal power with two Reactor Feed Pumps in operation.

In this lineup, one of the Feed Reg valves starts to fail closed.

- RPV level is LOWERING
- Final Feedwater Temperature has NOT CHANGED YET
- The associated Feed Pump Recirc Valve has NOT OPENED YET

Which of the following correctly describes the effect of this malfunction on Core Inlet Subcooling for this short period of time?

a. There will be NO EFFECT on Core Inlet Subcooling until Final Feedwater Temperature starts to change.

b. There will be NO EFFECT on Core Inlet Subcooling until the associated Feed Pump Recirc Valve comes OPEN.

c. There is LESS Core Inlet Subcooling at this time because there is less Feed flow to the RPV.

d. There is MORE Core Inlet Subcooling at this time because RPV is already lower.

1 Point

65. **(Refer to the picture on the following page for initial conditions)**

The plant was operating at 93% thermal power with the selected Offgas system parameters shown on the following page.

Some time later the following occurred:

- 1C-34 (C-3), OFFGAS JET COMPRESSOR LO STEAM FLOW, activated
- NSPEO reports Jet Compressor Motive Steam Flow is 3950 lbm/hr
- NSPEO reports Jet Compressor Motive Steam Pressure is 265 psig

Predict the effects on the following HWC and Offgas flows for these conditions:

1) (HWC) FIC-8920, OFFGAS O_2 FLOW CONTROLLER
2) (Offgas) FR-1374, SJAE FLOW TO OFFGAS (Channel 1, Red Pen)

a. 1) 3 scfm and steady
   2) 32.8 scfm

b. 1) <3 scfm and ramping down
   2) 0 scfm

c. 1) 0 scfm
   2) 32.8 scfm

d. 1) 0 scfm
   2) 0 scfm

1 Point

66. There is a reactor start up in progress with the reactor near criticality. The NSOE's relief enters the Control Room for turnover.

    Is the NSOE allowed to perform a shift turnover without higher authorization?

    If YES, correctly identify the governing procedure for such a turnover.

    If NO, correctly identify who must authorize the NSOE to perform the shift turnover.

    a. Yes; The Bargaining Unit Contract directs union workers to turnover after 12 hours.

    b. Yes; ACP 101.4, "Overtime Limits and Requirements", directs station employees to turnover after 12 hours.

    c. No; The off-going and on-coming Shift Supervision determines when the plant or watchstation are stable enough for shift turnover.

    d. No; The off-going NSOE determines when the plant is stable enough for shift turnover.

1 Point

67. Per ACP 110.1, “Conduct of Operations”, in which of the following in-plant scenarios shall the associated Annunciator(s) be reported to the Control Room operators and relayed to the CRS as an UNEXPECTED alarm(s)?

    a. 1C80 (C-1 through C-5), FILTER DEMINERALIZER 1T-13(A-E) LOW FLOW, activates immediately following a reactor scram from 93% power

    b. 1C417 (B-4), SULFITE SOLUTION TANK LEVEL LOW, activates 2 hours into the Circ Water Chlorination procedure

    c. 1C136 (B-2), LOW FLOW “B”, activates while taking the “B” Fuel Pool Demineralizer Bed from FILTER to HOLD

    d. 1C94 (A-1), ENGINE OVERSPEED, annunciator activates after tripping the fuel racks to roll 1G-21, B SBDG, when returning it to standby readiness

1 Point

68. In accordance with OI-416, “RHR Service Water”, which of the following parameters is used to declare a RHRSW subsystem INOPERABLE as conditions degrade due to bio-fouling?

    During bio-fouling problems, an RHRSW subsystem is declared INOPERABLE based on …

    a. whether or not 1S-90A/B, RHRSW STRAINERS, auto backwash feature is operating.

    b. a high ΔP reading across 1S-90A/B, RHRSW STRAINERS.

    c. whether or not 1S-90A/B, RHRSW STRAINERS, Bypass Valve is closed.

    d. a high ΔP reading across 1E-201A/B, RHR HEAT EXCHANGER.

1 Point

69. Instrument Techs are going to perform a Surveillance Test Procedure (STP). They will need the assistance of the following operators:

- A Control Room Operator to acknowledge annunciators and computer alarm points
- An In-Plant operator to open a valve to connect a test gage to the system
- A Senior Reactor Operator from the Work Control Center to serve as the Test Conductor

The Instrument Techs have read the briefing material and Special Precautions and signed on the STP Authorization Sheet.

Is this adequate? If not, identify who else is required to read the briefing material and Special Precautions and sign on the STP Authorization Sheet.

a. This is adequate. The Instrument Techs are responsible for this STP.

b. The Test Conductor and the In-Plant Operator must also be briefed and sign on the STP.

c. The Test Conductor and the Control Room Operator must also be briefed and sign on the STP.

d. The Control Room Operator and the In-Plant Operator must also be briefed and sign on the STP.

1 Point

70. The initial plant conditions are as follows:

- Refueling is in progress with the Reactor Refueling Cavity filled
- The Fuel Pool Gates are removed
- "B" RHR Loop is a normal Shutdown Cooling lineup
- Fuel Pool Cooling is in service with one Demineralizer at 450 gpm
- The Control Rod Drive (CRD) system is in service at 40 gpm to support control rod movement
- The Reactor Water Cleanup (RWCU) system is in service and draining to Radwaste at 40 gpm
- The Main Condenser and Condensate Storage Tanks are available

In this condition a protective relay fails causing an isolation of RWCU, which causes the Skimmer Surge Tank level to begin to rise.

Do the operators who are supporting refueling have another method of stabilizing refueling water inventory from the Control Room WITHOUT securing CRD?

If yes, identify the method.

If no, identify how inventory can be stabilized from outside the Control Room.

a. Yes; Control Room Operators can drain from RHR by verifying that Radwaste is lined up and opening MO-1936 and MO-1937, RHR DRAIN TO RADWASTE ISOLATION valves.

b. Yes; Control Room Operators can drain from the Main Steam System by opening MO-4423 and MO-4424, MAIN STEAM LINE DRAIN valves, and draining through MO-1043, MSL HEADER DRAINS BYPASS, to the Main Condenser.

c. No; but in-plant operators can drain from the Fuel Pool Cooling System by lining up to either the CSTs or the Waste Surge Tank and opening MO-3425, FUEL POOL DRAIN.

d. No; but in-plant operators can drain from the Fuel Pool Cooling System by clearing the Section Tag and reopening V-34-49, REACTOR SEAL CAVITY & FUEL POOL GATE DRAIN LINE ISOLATION valve, (in the RB 3rd Floor Cage) to drain to the Reactor Building Equipment Drain Sump.

1 Point

71. Which of the following is **NOT** an example of SOURCE TERM REDUCTION as defined by ACP-1411.1, “The ALARA Emphasis Program”?

    a. The Scram Discharge Volume was wrapped with lead blankets.

    b. The area around the CRD Discharge Filter was decontaminated.

    c. The floor drain of the CRD Repair Room was flushed to remove a hot spot.

    d. The stellite rollers on the control rods were replaced to reduce cobalt in the reactor coolant system.

1 Point

72. An area is posted “Locked High Radiation Area” when radiation levels are GREATER THAN _____(1)_____. An area is posted “Highly Contaminated Area” when contamination levels are GREATER THAN _____(2)_____.

a. (1) 500 Rads
   (2) 20 dpm/100 cm^2 Alpha

b. (1) 1000 mR/Hr
   (2) 1000 dpm/100 cm^2 Beta-Gamma

c. (1) 1000 mR/Hr
   (2) 1000 dpm/100 cm^2 Alpha

d. (1) 500 Rads
   (2) 50,000 dpm/100 cm^2 Beta-Gamma

1 Point

73. To place the Reactor Core in a low energy state, reduce RPV temperature, and maintain RPV water level above the top of active fuel to prevent Fuel Cladding temperature from exceeding $1500^{O}F$, is the bases for which EOP?

    a. EOP 1

    b. EOP 2

    c. EOP 3

    d. EOP 4

1 Point

74. The plant was operating at 93% thermal power when:

- The Torus developed an unisolable leak
- EOP-1, “RPV Control”, was entered due to RPV level lowering below 170″ just after the scram
- RPV level has since been restored to 190″
- RPV pressure is 920 psig and being controlled by EHC Pressure Set

As the Balance of Plant operator you overhear the CRS request permission to transition to Emergency Depressurization (ED) because Torus water level continues to lower.

1) Would it be appropriate to recommend SEP 307, “Rapid Depressurization with Bypass Valves”, in anticipation of ED for this particular transient?

2) If only one SRV could be opened during the ED, would it be appropriate to recommend SEP 307 as an Alternate Depressurization System after ED was attempted?

a. 1) APPROPRIATE before ED
   2) APPROPRIATE after ED

b. 1) APPROPRIATE before ED
   2) **NOT** APPROPRIATE after ED

c. 1) **NOT** APPROPRIATE before ED
   2) APPROPRIATE after ED

d. 1) **NOT** APPROPRIATE before ED
   2) **NOT** APPROPRIATE after ED

1 Point

75. During transient conditions, after the CRS has announced entry into AOPs or EOPs, operators are then allowed to announce “only those significant alarms needed to implement those procedures”.

Given the following postulated scenario:

- The RHR System was placed in the Shutdown Cooling mode
- Head vents are open
- Shortly after that, a Group 4 Isolation occurred due to lowering RPV level
- The CRS announced entry into AOP 149, “Loss of Decay Heat Removal”
- CRS assigned you to panel 1C05
- Several annunciators are alarming
- You can see a rapidly flashing annunciator on 1C14, EOP ANNUNCIATORS panel
- The annunciator window has a WHITE lens but you are too far away to read the wording on the annunciator window

Could the 1C14 Annunciator is be a “significant alarm”?

a. No; all significant annunciators have either a blue or red lens.

b. No; all annunciators on this panel are associated with manual installation of EOP Defeats.

c. Yes; the annunciator could be a high area WATER LEVEL EOP-3 entry condition.

d. Yes; the annunciator could be a high area TEMPERATURE EOP-3 entry condition.

Figure for Question # 6

ATTACHMENT 5

INSTRUCTIONS FOR PLOTTING COOLDOWN

1. Read RPV pressure at 1C388 to the nearest 20 psig increment on PI-4564.
2. Find the corresponding saturation temperature in the table below.
3. Record on Attachment 6 the saturation pressure, temperature and elapsed time since cooldown was initiated.

Table of RPV Pressure Versus Saturation Temperature

psig	Temp (°F)	psig	Temp (°F)	psig	Temp (°F)
1100	558	680	502	280	415
1080	556	660	499	260	409
1060	553	640	495	240	402
1040	551	620	492	220	395
1020	549	600	488	200	387
1000	546	580	485	180	380
980	542	560	481	160	371
960	541	540	477	140	361
940	539	520	474	120	350
920	536	500	470	100	338
900	534	480	466	80	324
880	531	460	461	60	307
860	528	440	457	40	287
840	526	420	452	20	259
820	523	400	448	0	212
800	520	380	443		
780	517	360	438		
760	514	340	431		
740	511	320	427		
720	508	300	421		
700	505				

Figure for Question # 12

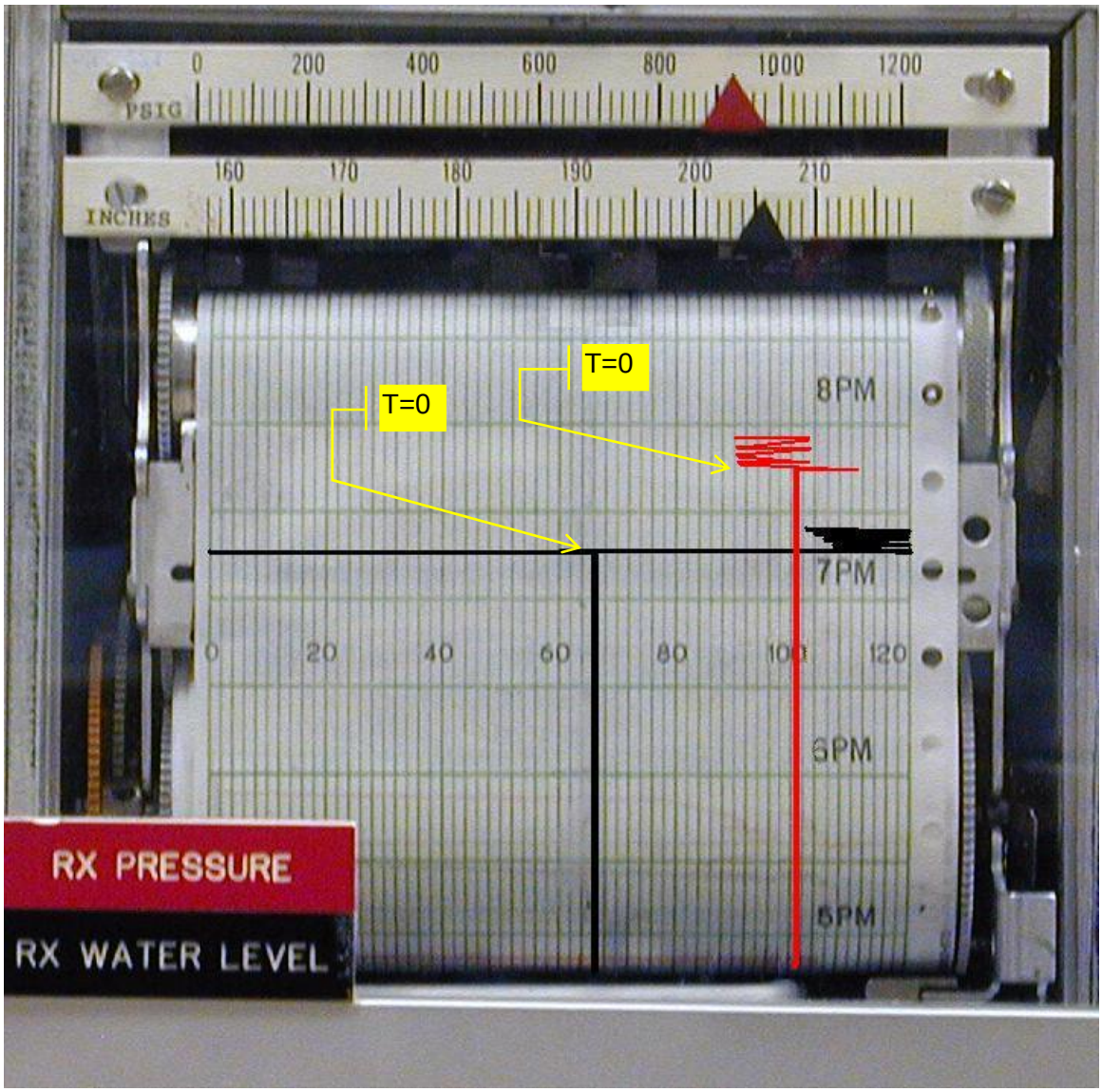


Figure for Question # 63

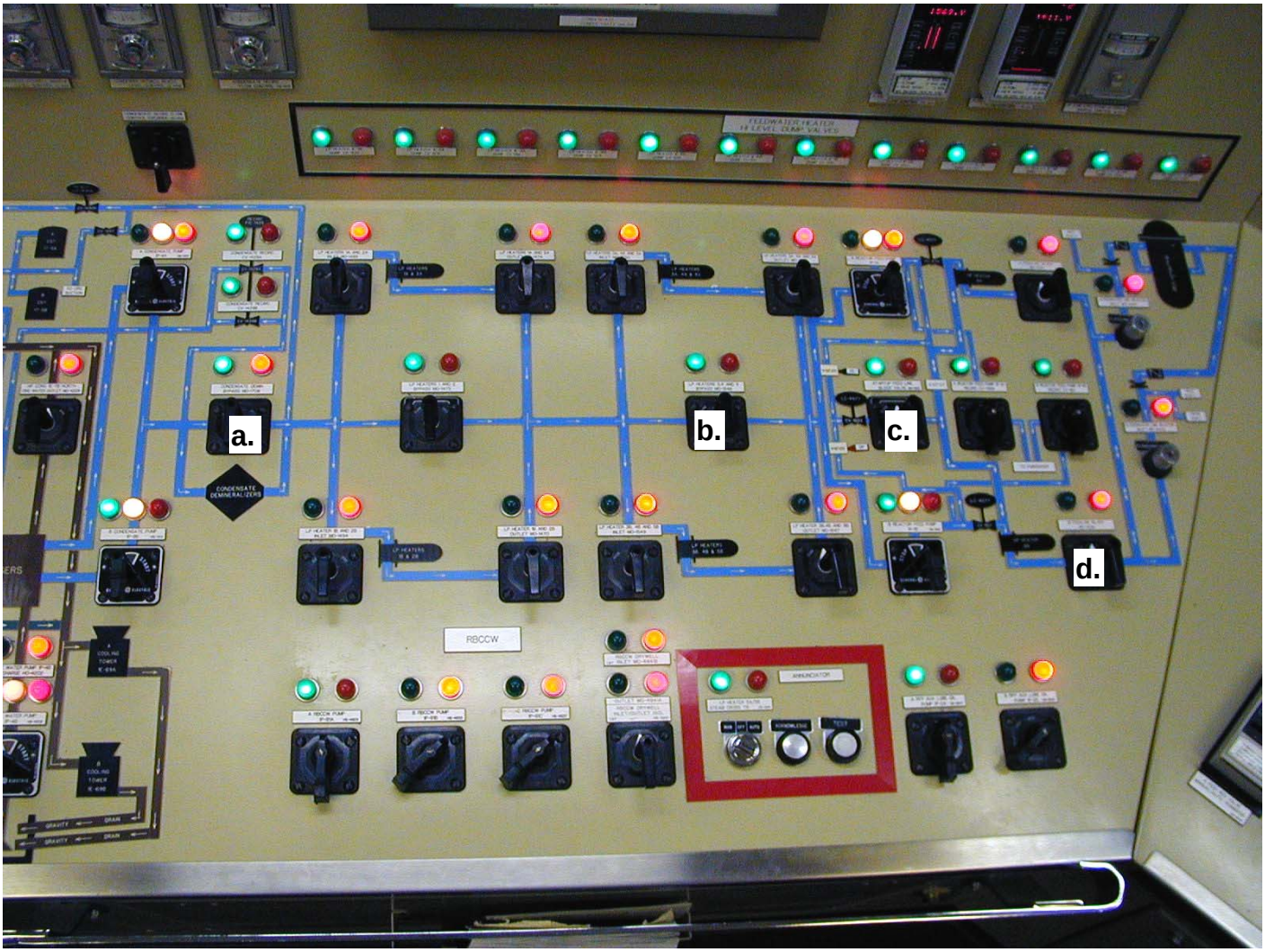
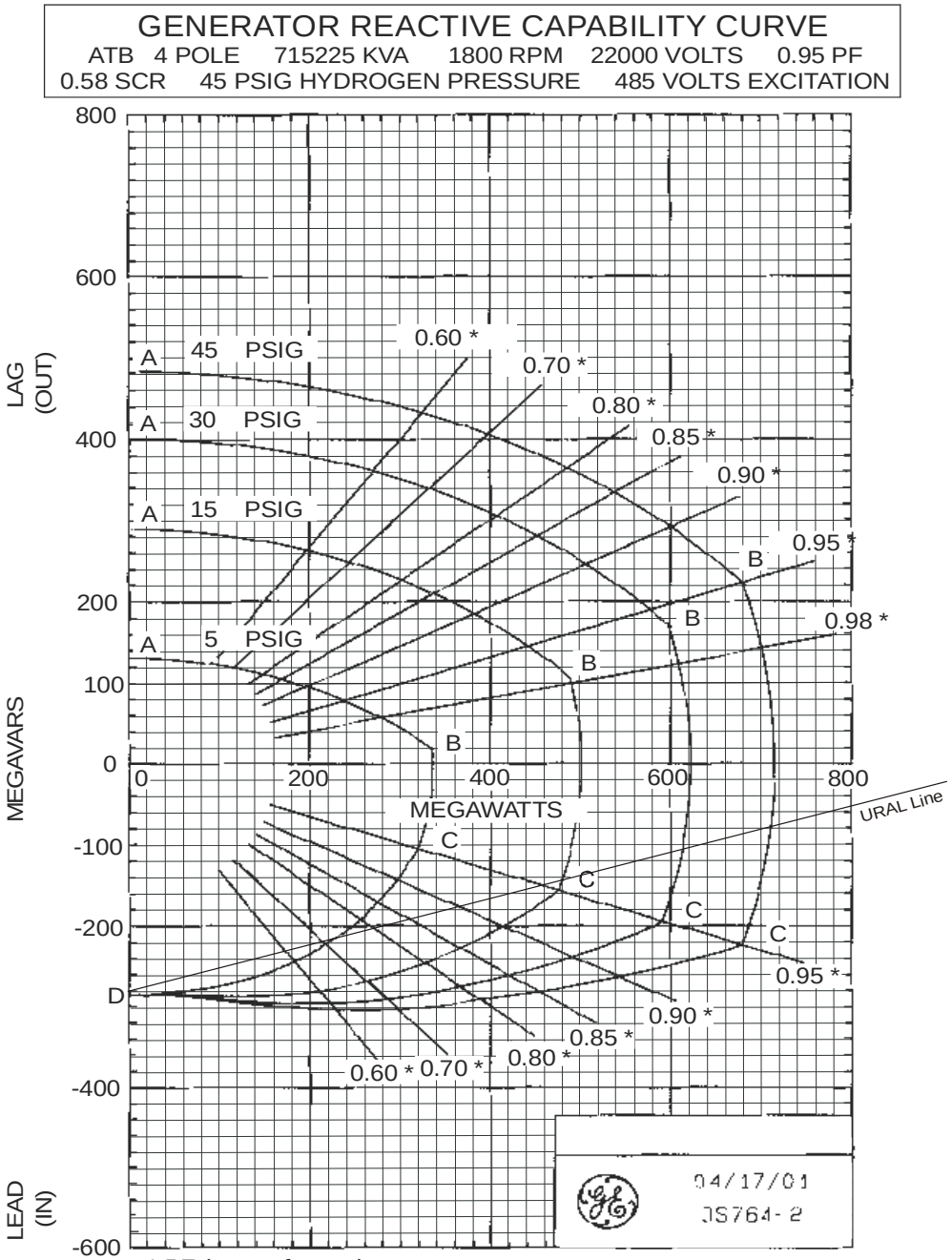


Figure for Question # 62

APPENDIX 1
ESTIMATED CAPABILITY CURVES



* PF (power factors)
CURVE AB LIMITED BY FIELD HEATING
CURVE BC LIMITED BY ARMATURE HEATING
CURVE CD LIMITED BY ARMATURE CORE END HEATING

Figure for Question # 61

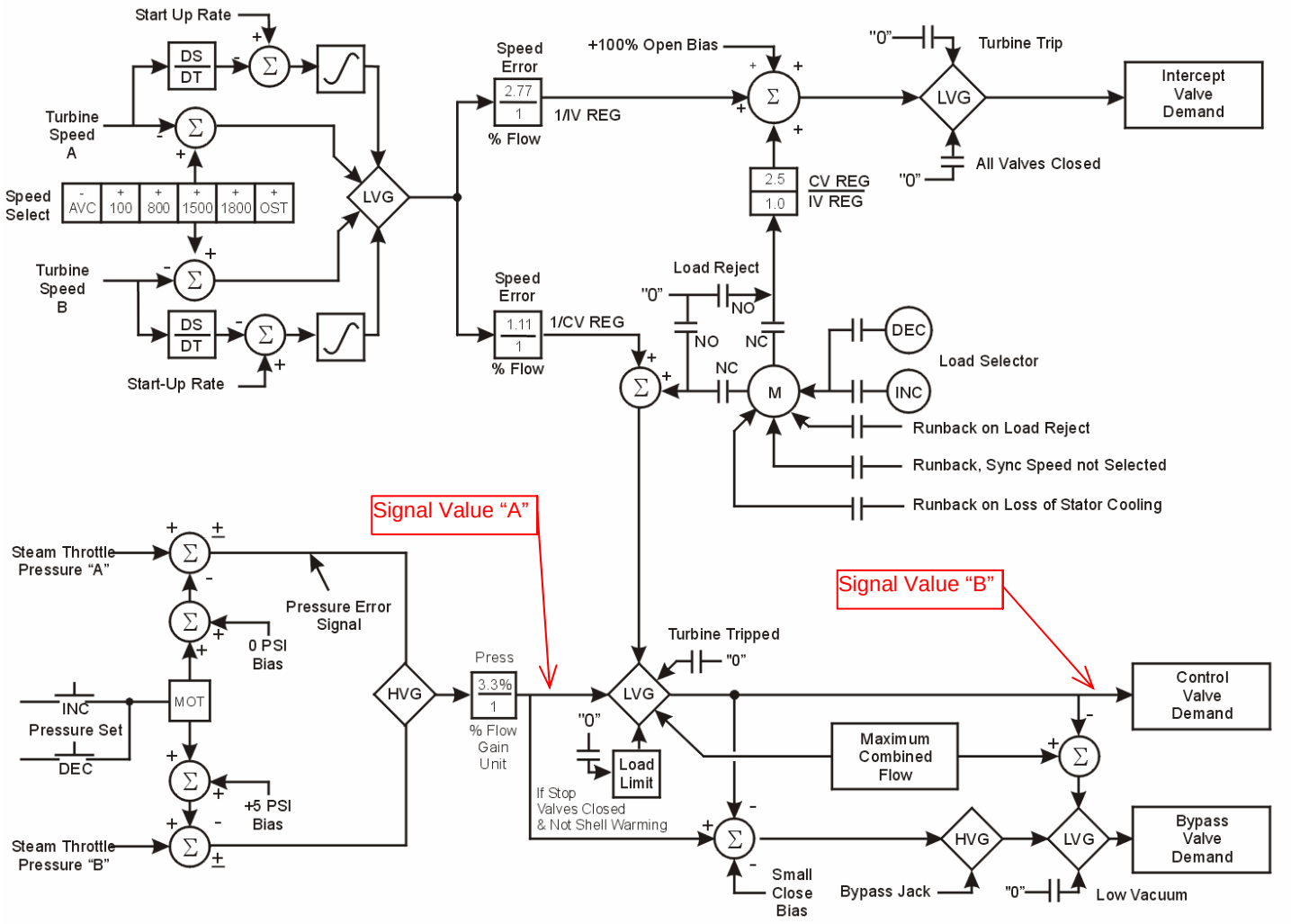


Figure for Question # 59

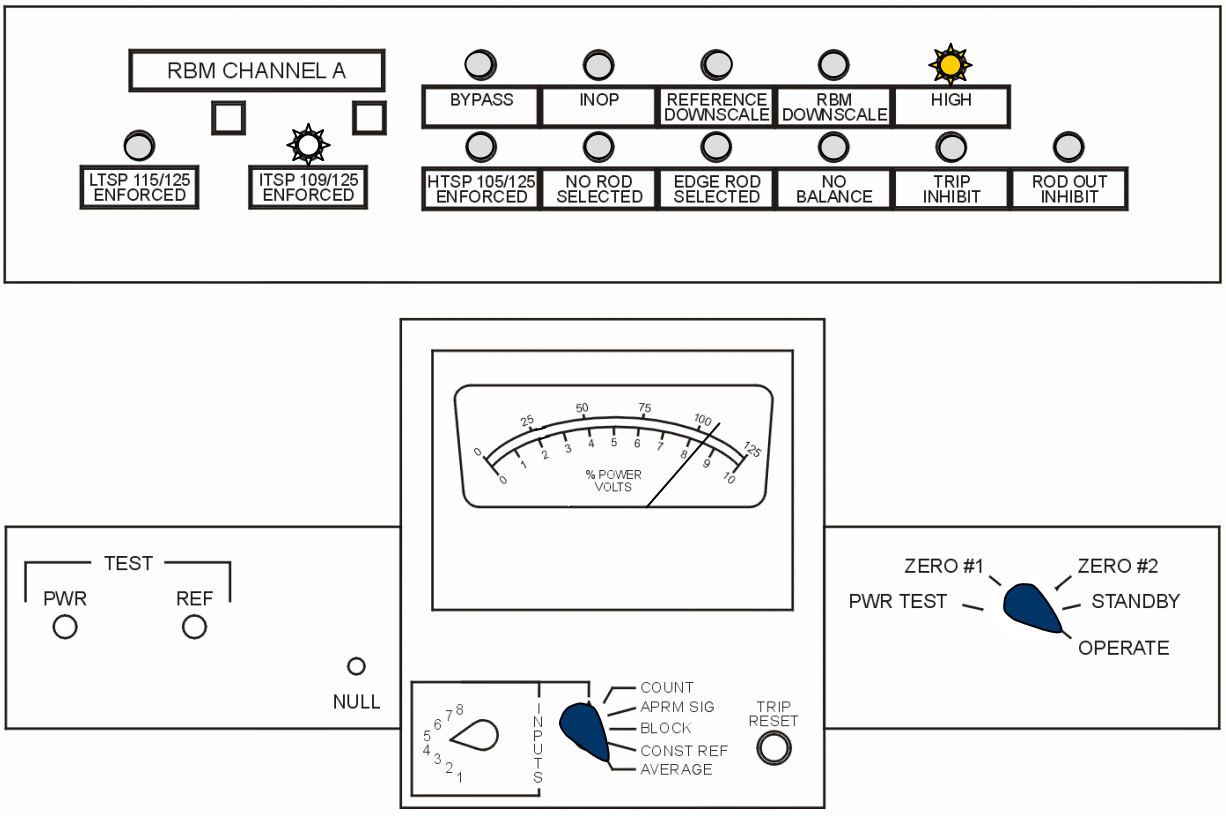


Figure A ZIC-4574C TIP CHANNEL 'C' DRIVE CONTROL UNIT

Figure B Channel 'C' Valve Control

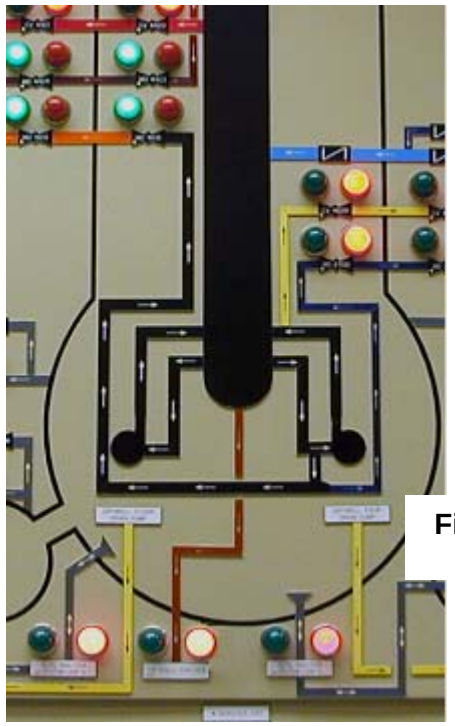


Figure C PCIS MIMIC

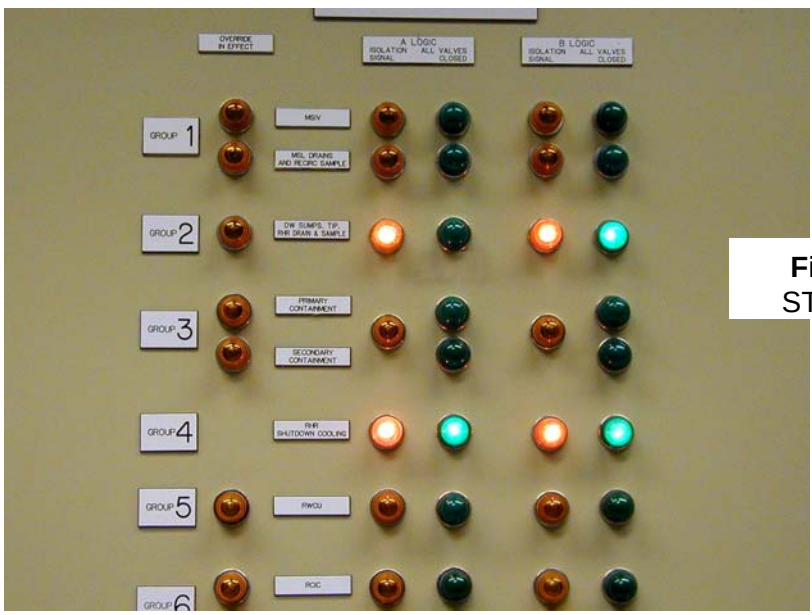


Figure D PCIS STATUS BOARD

Figure for Question # 55

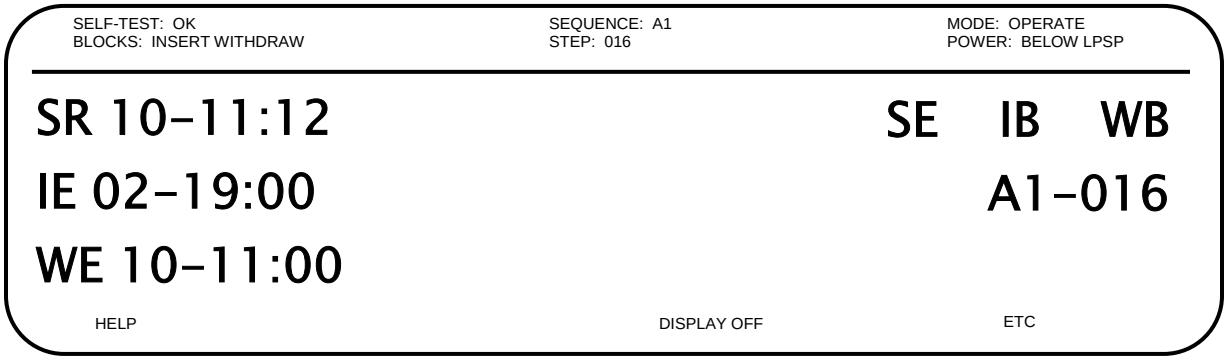


Figure A ↑

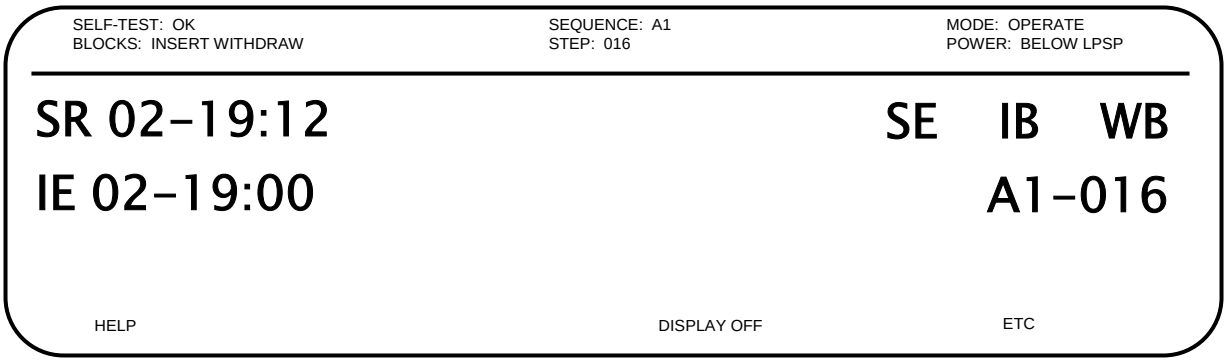


Figure B ↑

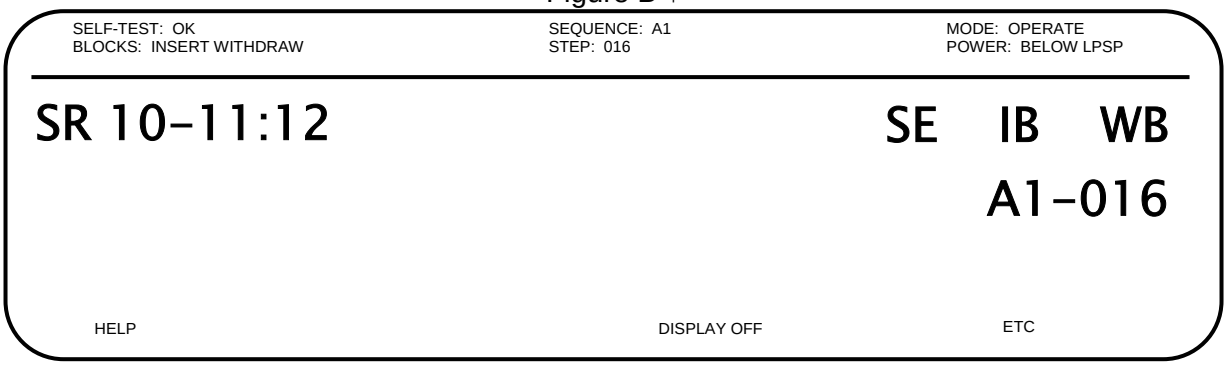


Figure C ↑

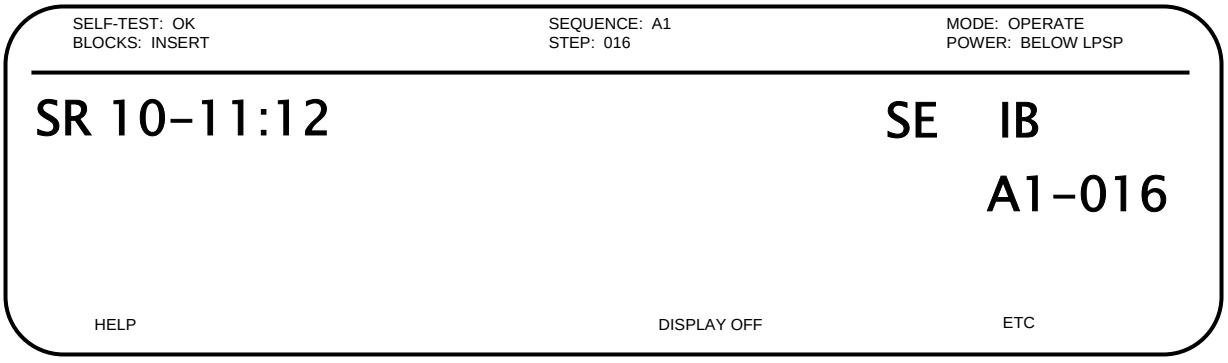


Figure D ↑

Figure for Question # 50

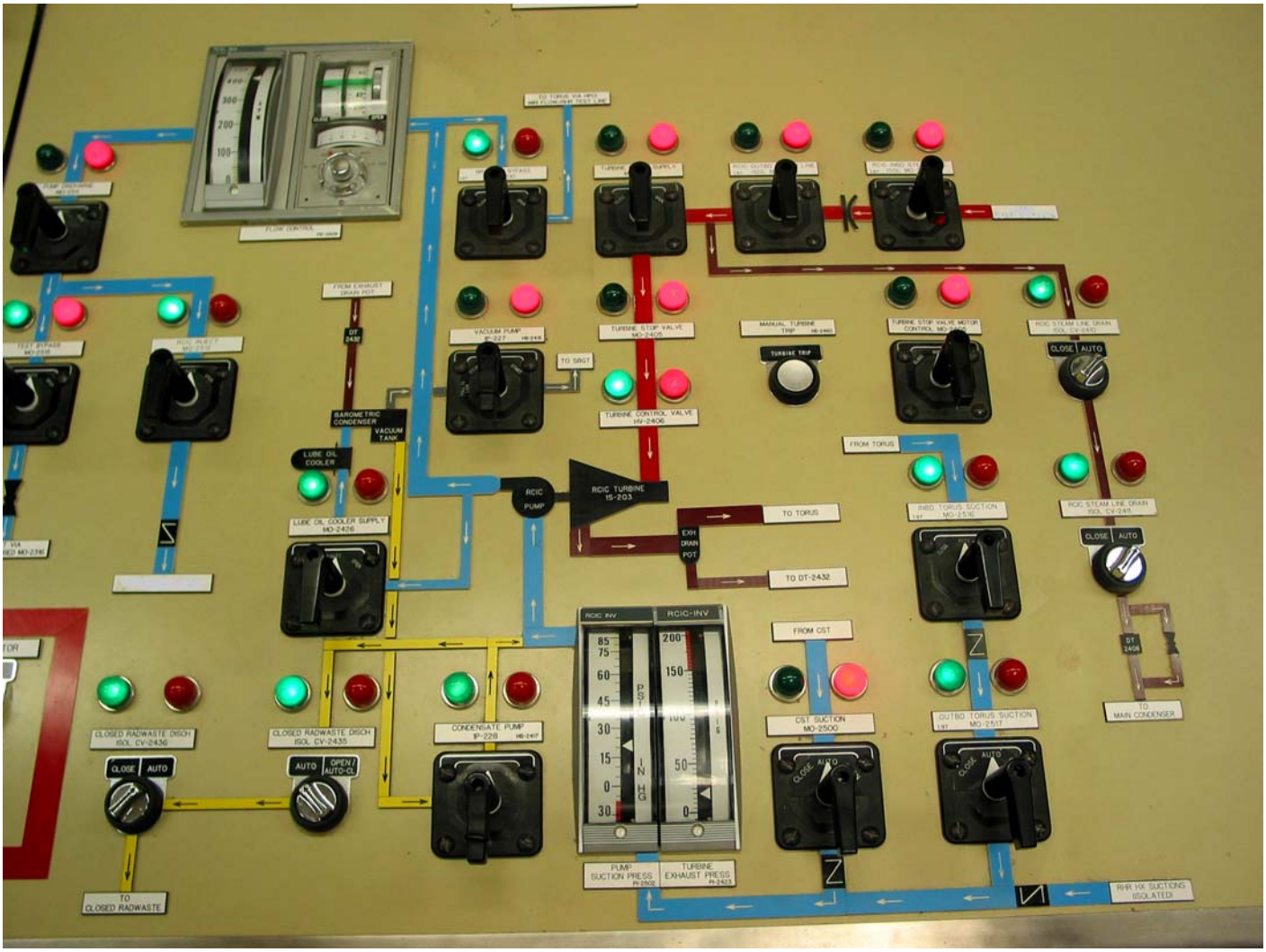


Figure for Question # 47

Figure for Question # 42

Figure for Question # 32

Figure for Question # 28

Figure for Question # 65

Facility: DAEC Date of Exam: 01/31/2005

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.3	Knowledge of shift turnover practices. (CFR: 41.10 / 45.13)	3.0	1		
	2.1.8	Ability to coordinate personnel activities outside the control room. (CFR: 45.5 / 45.12 / 45.13)	3.8	1		
	2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications. (CFR: 43.2 / 43.3 / 45.3)	3.4	1		
	2.1.					
	2.1.					
	2.1.					
	Subtotal			3		
2. Equipment Control	2.2.12	Knowledge of surveillance procedures. (CFR: 41.10 / 45.13)	3.0	1		
	2.2.30	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area / communication with fuel storage facility / systems operated from control room in support of fueling operations / and supporting instrumentation. (CFR: 45.12)	3.5	1		
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	Subtotal			2		
3. Radiation Control	2.3.2	Knowledge of facility ALARA program. (CFR: 41.12 / 43.4 / 45.9 / 45.10)	2.5	1		
	2.3.4	Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized. (CFR: 43.4 / 45.10)	2.5	1		
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.18	Knowledge of the specific bases for EOPs. (CFR: 41.10 / 45.13)	2.7	1		
	2.4.16	Knowledge of EOP implementation hierarchy and coordination with other support procedures. (CFR: 41.10 / 43.5 / 45.13)	3.0	1		
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 43.5 / 45.3 / 45.12)	3.3	1		
	2.4.					

	2.4.					
	2.4.					
	Subtotal			3		
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO Tier 1 Group 1	Question 12 295025 EA2.06	Emergency High Reactor Pressure was combined with "ability to determine and/or interpret the following as they apply to High Reactor Pressure: Reactor water level". A Search of industry questions showed that some plants must pressure compensate for water level indicators. Operators at DAEC do not adjust RPV level for high reactor pressure. Randomly selected another EA2, **EA2.01,** Reactor Pressure as a replacement.
RO Tier 1 Group 1	Question 13 295026 EK2.02	Emergency High Torus Water Temperature was combined with Knowledge of interrelations with Torus Spray. Normally, initiation of Torus Spray at DAEC is not dependent on Torus Water Temperature. NPSH limits might apply if Torus very hot, >190°. An SRO might be asked to interpret the NPSH EOP curves, but this is not a major EOP breakpoint suitable for ROs. Randomly selected another EK2, **EK2.01,** as a replacement.
RO Tier 1 Group 1	Question 16 295031 2.4.49	Reactor Low Level (Emergency) was combined with generic ability to perform immediate actions without procedures. The resulting question conflicted with the Low Level (Abnormal) question in T1G2. Also, at the emergency/EOP stage of this transient, there would be no immediate operator actions. Randomly selected another Generic, **2.1.32**, Ability to apply system limits and precautions**,** as a replacement.
RO Tier 1 Group 2	Question 19 600000 AA1.08	Plant Fire on site was combined with the knowledge of fire fighting equipment used on each class of fire. Resulting questions had low discriminatory value. Randomly selected another AA1, **AA1.05**, as a replacement.
RO Tier 1 Group 2	Question 24 295012 2.1.28	Abnormal High Drywell Temperature was combined with system generic "knowledge of the purpose and function of major system components and controls". Since a High Drywell temperature event does not have components or controls, it would not be possible to write a question about their purpose and function. Randomly selected another Generic, **2.1.33,** as a replacement.
RO Tier 1 Group 2	Question 27 295035 EK3.01	Secondary Containment high DP was combined with "Knowledge of the reasons for the following responses as they apply to Secondary Containment high DP: Blow out panel operation." Any question that addressed the reason for blowout panels would always have the answer of "preventing overpressure", making this combination too easy. Selected the only other 295035 EK3, **EK3.02** as a replacement.

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO Tier 2 Group 1	Question 29 205000 K6.03	Shutdown Cooling was combined with knowledge of the effect of a loss or malfunction of Recirculation System. Topic was too closely related to SRO 295001 Loss of forced circulation with 2.4.9 Knowledge of low power implications in an accident. Randomly selected K6.04, Reactor water level, as a replacement, but that K/A would still have the same problem. Randomly selected another K6 topic **K6.05**, Component Cooling Water, as a replacement.
RO Tier 2 Group 1	Question 32 211000 A3.04	SBLC was combined with the ability to monitor reactor power which is read on panel 1C05 right next to SBLC control and which obviously goes down when SBLC is initiated. A question to this combination would be too easy. The clincher was that we could not find any industry bank questions on this combination. Randomly selected another A3 topic **A3.07**, Lights and alarms, as a replacement.
RO Tier 2 Group 1	Question 34/35 215003 (IRM) K2.01 and 215004 (SRM) K2.01	K2.01, Knowledge of power supply to channel/detectors, was randomly selected for both IRM and SRM. The answer in both cases is 24 VDC, which is too similar. IRM has only one K2 topic and SRM has only one K2 topic with an importance rating of ≥2.5. Randomly selected **215003 (IRM)** and then randomly selected **A4.01** for that system.
RO Tier 2 Group 1	Question 34 215003 (IRM) A4.01	IRM system was combined with the "ability to manually operate and/or monitor in the control room: IRM recorder Indication." A question to this combination would be too easy. The recorders are frequently read at 1C05. Any question that used IRM indication in response to range switches positioning or reactivity changes would match up better with another K/A. Randomly selected another A4 topic, **A4.06,** Detector Drives, as a replacement.
RO Tier 2 Group 1	Question 51 239002 A1.01	SRV system was combined with "ability to predict and/or monitor changes in parameters associated with operating the SRV controls including: Tail Pipe Temperatures". This ability would also be measured during a planned simulator normal evolution. Randomly selected another A1 topic, **A1.08**, Torus water temperature, as a replacement.
RO Tier 2 Group 1	Question 52 300000 K6.04	Instrument Air was combined with the knowledge of the effect of a loss or malfunction of a service air refusal valve. DAEC has no air system valve by this name. DAEC does have a valve that isolates the Service Air Header first as pressure lowers during abnormal conditions. Closing it would have no effect on Instrument Air during normal operations. Randomly selected another K6 topic, **K6.03**, Temperature Indicators, as a replacement.
RO Tier 2 Group 1	Question 52 300000 K6.03	Instrument Air was combined with the knowledge of the effect of a loss or malfunction of Temperature Indicators. A Loss of a temperature indictor could not have an effect other than loss of the ability to read that temperature. This would result in a question that was too easy. Randomly selected another K6 topic, **K6.12**, Breakers, relays and disconnects, as a replacement.
RO Tier 2 Group 2	Question 60 239001 A4.08	Main and Reheat Steam was combined with the ability to operate or monitor Reactor Level, which is already the topic in 295031(T1G1), 295009 (T1G2) and 259002 (T2G1). Randomly selected another A4 topic, **A4.10** Reactor Power as a replacement. This would result in a question that was too easy. Randomly selected another A4 topic, **A4.05** System Temperature as a replacement.
RO Tier 3	Question 73 2.4.1	Knowledge of EOP entry conditions and immediate action steps was in conflict with several SRO questions. In addition, DAEC EOPs have no immediate operator actions and a memory level question on EOP entry conditions would be too easy.

Tier / Group	Randomly Selected K/A	Reason for Rejection
		Randomly selected another Generic 2.4 topic, **2.4.18**, Knowledge of specific bases for EOPs as a replacement.

Tier / Group	Randomly Selected K/A	Reason for Rejection
SRO Tier 1 Group 1	Question 3 295006 2.4.49	Reactor SCRAM was combined with Ability to perform immediate actions without reference to procedures. This Generic K/A had already been selected with 295031 (RPV Low Water Level) on the RO exam. The two questions would be too similar. Randomly selected another Generic, **2.1.7,** as a replacement.
SRO Tier 1 Group 1	Question 4 295019 AA2.01	Partial or complete loss of instrument air was randomly selected. This Evolution must also be selected for the RO exam in Tier 1. In Tier 2 Group 1, some systems must be selected more than once. On the RO exam, System 300000, Instrument Air was one such system. Therefore, on the SRO exam, randomly selected **295030 EA2.03** in its place rather than have four questions on Instrument Air or loss of Instrument Air.
SRO Tier 1 Group 1	Question 5 295025 2.4.16	System Generic 2.4.16 "Knowledge of EOP implementation hierarchy and coordination with other support procedures" was also selected for the RO exam in Tier 3. To avoid duplication, randomly selected generic **2.1.14** in its place.
SRO Tier 1 Group 2	Question 8 295008 2.1.14	2.1.14 is a System Generic K/A (System status that requires notification of plant personnel) that was also selected for System 218000 (ADS) in Tier 2 and Event 295025 in Tier 1. To avoid duplication, randomly selected generic **2.1.32** as a replacement.
SRO Tier 1 Group 2	Question 9 295035 2.1.32	295035 High Secondary Containment Differential Pressure was also selected in Tier 1 Group 2 on the RO exam. Questions would conflict. Randomly selected **295017** from a field of T1G2 Evolutions that were not previously selected on RO exam. 2.1.32 remained as the Generic topic.
SRO Tier 2 Group 1	Question 12 215003 A2.03	Ability to predict impact of a Stuck Detector (2.03) on IRMs and use procedures to correct. DAEC has no procedures for a stuck detector. (Checked ARPs, OIs, and System Descriptions) A stuck detector would read higher or lower than normal but those are covered by other K/As. All other A.2 topics for IRMs would conflict with a scenario segment for an upscale/inoperable IRM. Randomly selected another T2 G1 System, HPCI **206000**, and randomly selected another A.2 topic, **A2.09**, on low CST level.
SRO Tier 2 Group 1	Question 15 262002 2.4.30	Uninterruptible AC was combined with the Knowledge of system events that should be reported to outside agencies. A loss of UPS was used as the bases for SRO T1G1 295006 so another question on this topic would conflict. Randomly Selected System **215005**, APRM/LPRM, as a replacement. 2.4.30 remained as the Generic topic.
SRO Tier 3	Question 22 2.2.33	2.2.33 "Knowledge of control rod programming" could not be converted into a relevant SRO level question. Programming at DAEC is performed by the Reactor Engineers who load the program into the Rod Worth Minimizer. All questions must therefore be "systems" questions about the RWM bases, procedure, or hardware. Randomly selected Generic **2.2.21** "Knowledge of pre and post maintenance operability requirements" as a replacement.
SRO Tier 3	Question 23 2.3.2	2.3.2 "Knowledge of ALARA" was randomly selected first for the RO exam. Randomly selected **2.3.3** "Knowledge of SRO responsibilities for Auxiliary systems outside of control room" as a replacement for the SRO Exam
SRO Tier 3	Question 24 2.3.6	2.3.6 "Knowledge of requirements for reviewing and approving release permits." This activity is not relevant to the DAEC. The Radwaste Liquid Release line at DAEC has been isolated for more than 25 years. Randomly selected **2.3.9**, "Knowledge of the process for performing a containment purge" as a replacement for the SRO Exam.

Amended Outline		
Tier / Group	Randomly Selected K/A	Reason for Rejection
RO Tier 3	Question 72 2.3.11	Ability to control radiation releases was initially selected. There are a limited number of RO tasks that fit this topic and all were used in other questions or JPMs on either the RO or SRO exams : RO Q# 18 295038, SRO Q#9 295017, SRO Q# 24 2.3.9, RO Q# 26 295034, RO Q# 27 295035, JPM 272000-03. From a field of Radiation Control (2.3) topics that were not already selected, randomly selected **2.3.4** "Knowledge of radiation exposure limits and contamination control…" as a replacement.