

Final Submittal

**CRYSTAL RIVER AUGUST
EXAM 50-302/2003-301**

AUGUST 25 - 29, 2003

1. Senior Operator Written Examination

**U.S. Nuclear Regulatory Commission
Site-Specific
SRO Written Examination**

Applicant Information

Name:	Region: II
Date: 08/22/03	Facility/Unit: Crystal River
License Level: SRO	Reactor Type: B&W
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 overall, with a 70.00 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require an 80.00 percent to pass. You have eight hours to complete the combined examination, and three hours if you are only taking the SRO portion. Examination papers will be collected eight hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

Applicant's Signature

Results

RO / SRO-Only / Total Examination Values _____ / _____ / _____ Points

Applicant's Scores _____ / _____ / _____ Points

Applicant's Grade: _____ / _____ / _____ Percent

1. The following *initial* plant conditions exist at 100 EFPD:

NI-5	100%	Imbalance at 0
NI-6	100%	Rod Index of 292%
NI-7	100%	
NI-8	100%	

Fifteen minutes later the following conditions are observed:

NI-5	54%	Imbalance at -10
NI-6	50%	Rod Index of 250%
NI-7	50%	
NI-8	50%	

Which of the following is the most likely condition to cause these indications?

- A. Stuck rod.
- B. Dropped rod.
- C. Boration event in progress.
- D. Loss of one reactor coolant pump.

2. A crud burst has occurred. How could this impact the plant and what actions can be taken to help mitigate this problem?
- A. The makeup pre-filters and post-filters will absorb most of the contaminants and their radiation levels will increase. A hydrogen peroxide flush per OP-403H, Hydrogen Peroxide Addition, will help reduce radiation levels.
 - B. The makeup pre-filters and post-filters will absorb most of the contaminants and their radiation levels will increase. Decreasing letdown flow will help lower radiation levels in the purification loop.
 - C. The makeup demins and post-filters will absorb most of the contaminants and their radiation levels will increase. A hydrogen peroxide flush per OP-403H, Hydrogen Peroxide Addition, will help reduce radiation levels.
 - D. The makeup demins and post-filters will absorb most of the contaminants and their radiation levels will increase. Decreasing letdown flow will help lower radiation levels in the purification loop.

3. While operating at power RM-A6 is observed to be trending up. MUV-31 is taken to manual and the following data is gathered for evaluation.

Time 0900 Pzr Lvl - 220" MUT Lvl - 80"

Time 0902 Pzr Lvl - 216" MUT Lvl - 81"

The following data is provided:

Pressurizer level = 12.2 gal/inch MUT level = 30.8 gal/inch

Based on these indications, which of the following describes current RCS leakage and procedural/TS requirements? (disregard controlled bleedoff flow)

Conditions indicate RCS leakage:

- A. is less than 1 gpm; CP-152, Primary to Secondary Leakage Operating Guideline, will apply.
- B. is less than 1 gpm; SP-317, RCS Water Inventory Balance, will apply.
- C. is greater than 5 gpm but less than 10 gpm; TS entry is required because unidentified leakage is greater than 1 gpm.
- D. is greater than 5 gpm but less than 10 gpm; TS entry is *not* required because identified leakage is less than 10 gpm.

4. While the unit is operating at 100% the following sequence of events occurs:

- "SASS MISMATCH" annunciator alarms and does not clear.
- Investigation reveals the amber "MISMATCH" lamp to be lit on the PRESSURIZER LEVEL channel. All other lamps in that channel and all other "MISMATCH" lamps are off.
- Control board readings for PZR level are as follows:

LT1 222"

LT2 160"

LT3 227"

- All readings are stable.

Which of the following statements is correct concerning these conditions?

- A. The alarm is valid. SASS has functioned properly. No operator action is required.
- B. The alarm is valid, however, SASS should have transferred to LT1. The operator should select LT1 and issue a work request on LT3.
- C. The alarm is NOT valid. The operator should depress the "AUTO" pushbutton to return the channel to normal operation.
- D. The alarm is NOT valid. The operator should issue a work request on the SASS channel.

5. At 80% power maintenance testing determines that two channels of the control oil pressure for loss of MFW Pumps actuation are set at 52 psig. Which of the following Technical Specification actions are required?

Place:

- A. both channels in bypass in one hour.
- B. one channel in bypass in one hour and place the second channel in trip in one hour.
- C. one channel in bypass in one hour and restore one channel to operable status in 24 hours.
- D. one channel in trip in one hour and restore one channel to operable status in 72 hours.

6. The following plant conditions exist:

- TS required plant shutdown to Mode 4 is in progress due to a broken shaft on DHP-1A.
- RCS temperature is 285°F.
- RCP-1A and 1B are running.

While checking DHP-1B for start the PPO reports an oil spill around the motor and the oil bubbler empty.

Which of the following describes the appropriate action(s) to be taken?

- A. Remain in this mode until either DHP-1A or 1B are repaired.
- B. Remain in this mode and declare an Unusual Event based on the "Inability to reach required mode within ITS time limits".
- C. Continue to Mode 4, invoke 10CFR 50.54 X & Y, and remain in Mode 4 until either DHP-1A or 1B are repaired.
- D. Continue to Mode 5 since LCO 3.0.3 now applies due to the inoperability of both DH removal trains.

7. The following plant conditions exist:

- SW surge tank, SWT-1, is at 9 ft and lowering.
- "A" DC surge tank, DCT-1A, is at 9 ft and steady.
- "B" DC surge tank, DCT-1B, is at 9 ft and steady.
- Auxiliary Building sump is steady.
- Turbine Building sump is rising.

Which of the following could be the cause of the lowering level in SWT-1?

- A. A tube leak in the "B" letdown cooler, MUHE-1B.
- B. A crack in the SW supply piping near the CRDM filters.
- C. A crack in the suction header near the normal duty SW pump, SWP-1C.
- D. Improper valve alignment for cooling water to the "C" Makeup pump, MUP-1C.

8. The following plant conditions exist:

- The plant is at 55% reactor power.
- The ICS +24 volt DC bus has degraded to +18 volts.
- RPS high reactor coolant system pressure setpoint has been exceeded.

Assuming no operator actions what would be the plant's response to this situation?

- A. ATWS removes power from the safety rods and initiates EFIC.
- B. AMSAC trips the main turbine and initiates EFIC.
- C. DSS opens the "E" and "F" contacts to the safety rods.
- D. RPS trips the reactor due to the trip of both MFW pumps.

9. The plant is operating at 100% power. Fuel shuffle is in progress in the Spent Fuel Pool. Water level in the spent fuel pool is normal at 158.5 ft. The suction line to SFP-1A ruptures and cannot be isolated. Movement of spent fuel in the spent fuel pool:
- A. Must stop due to insufficient volume for cooling to maintain pool temperature less than 190° F.
 - B. May continue because adequate level will still be maintained for shielding requirements.
 - C. Must stop due to insufficient volume for iodine retention if a fuel handling accident were to occur.
 - D. May continue because level will not drop below the minimum Technical Specification value.

10. A step in EOP-5, Excessive Heat Transfer, states:

IF at any time, ES systems have,
OR should have actuated,
THEN ensure ES equipment is properly aligned.

- Details
1. Ensure applicable ES actuations:
HPI (1625 psig RCS PRESS)
LPI (500 psig RCS PRESS)
RBIC (4 psig RB PRESS)
RB Spray (30 psig RB PRESS)
 2. Bypass or reset ES actuations:
Auto
Manual
 3. Control ES systems as required.
[Rule 2, HPI Control]
[Rule 5, EDG Control]
 4. IF RBIC has actuated, AND adequate SCM exists,
THEN stop all RCPs: RCP-1A, 1B, 1C & 1D

What is the purpose of Detail #4?

Because it is not reasonable to expect the operating crews to be able to adequately evaluate the safety implications of: bypassing the ES actuation and

- A. restoring seal injection within 5 minutes.
- B. reopening the CBO valves within 5 minutes.
- C. reopening the SW cooling valves within 5 minutes.
- D. the effect on OTSG tube stresses in the isolated OTSG within 5 minutes.

11. A step in EOP-12, Station Blackout, states the following:

"Stop DC motors."

Partial details of this step have the Reactor Operator:

- Select MUP backup lube oil pumps (MUP-3A, B, C) to "Pull To Lock."
- Select MUP backup gear oil pumps (MUP-5A, B, C) to "Stop."

Which of the following describes why the DC motors should be stopped?

This is necessary for the 1E batteries to meet their:

- A. 2 hour coping requirement.
- B. 4 hour coping requirement.
- C. 8 hour coping requirement.
- D. 16 hour coping requirement.

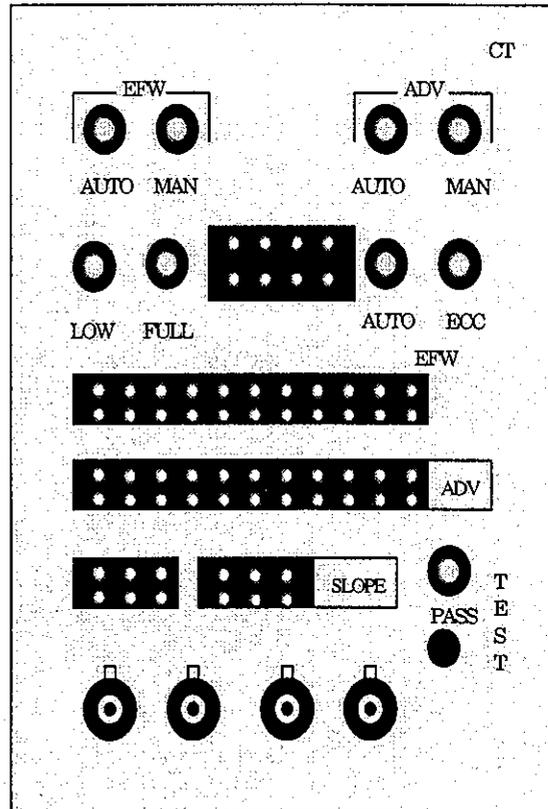
12. With the plant at 100% power a catastrophic failure of VBIT-1C rendered itself inoperable and caused both of the VBXSs that it feeds to fail "as is".

Which of the following describes the EOP/AP action(s), if any, that should be taken?

- A. AP-581, Loss of NNI-X, should be entered.
- B. AP-582, Loss of NNI-Y, should be entered.
- C. AP-430, Loss of Control Room Alarms, should be entered.
- D. Trip both MFW pumps and the reactor due to the loss of ICS power. EOP-2, Vital System Status Verification, and Rule 3, EFW Control, should be entered.

13.

With the plant at 35% power you notice the "EFW MAN" light flashing on the Emergency Feedwater Initiation and Control (EFIC) module shown. A few seconds later the "FULL" light starts to flash. Select the statement below which describes these indications and required action(s), if any, which should be taken.



- A. These indications are expected during low power operation. No additional actions are required.
- B. These lights are memory lights only. They will normally stay flashing until the test pushbutton in the lower right corner of this module is depressed. Maintenance should be contacted
- C. An EFIC actuation has occurred due to the loss of both MFWPs. Since the "EFW MAN" light was on prior to the actuation it should continue to flash. EOP-2, Vital System Status Verification, and EOP-13, Rule 3, EFW/AFW Control, should be entered.
- D. An EFIC actuation has occurred due to the loss of all RCPs. The "EFW MAN" light should have stopped flashing and the "EFW AUTO" should have started flashing. EOP-2, Vital System Status Verification, and EOP-13, Rule 3, EFW/AFW Control, should be entered.

14. Which of the following describes a condition that requires notification of *all* plant personnel?

- A. RM-A2 particulate monitor goes into high alarm.
- B. RM-A2 iodine monitor goes into high alarm.
- C. RM-A5 particulate monitor goes into high alarm.
- D. RM-A5 iodine monitor goes into high alarm.

15. Assume the "B" EDG is the sole power supply available to the "B" ES 4160V bus. Which of the following activities would produce the lowest diesel load that would cause the EDG's elapsed time meter (MCB) to start? (disregard starting currents)

AHF-17A/B	51 kW	DCP-1A/B	79 kW
AHF-18A/B	50 kW	EFP-1	698 kW
AHF-19A/B	18 kW	MUP-1A/B/C	694 kW
BSP-1A/B	222 kW	RWP-2A/B	554 kW
CHP-1A/B	19 kW	RWP-3A/B	198 kW
CHHE-1A/B	196 kW	SWP-1A/B	497 kW

- A. Initial EDG loading of 2440 kW. MUP-1C and its associated cooling water pumps are started.
- B. Initial EDG loading of 2850 kW. BSP-1B and its associated cooling water pumps are started.
- C. Initial EDG loading of 1800 kW. EFP-1 and its associated cooling water pumps are started.
- D. Initial EDG loading of 2920 kW. "B" train normal control complex cooling fans and chiller are started.

16. The following plant conditions exist:

- EOP-3, Inadequate Subcooling Margin, was entered following a LOCA.
- Reactor Coolant (RCS) pressure was 850 psig.
- EFP-2 is the only operating and the only available EFW/AFW pump.

Tincore temperature is currently 900° F and RCS pressure is 1000 psig. Which of the following methods would be used to maintain the OTSGs as a heat sink?

- A. Lower OTSG pressure to 200 psig using the Turbine Bypass valves (TBVs).
- B. Lower OTSG pressure to 380 psig using the Turbine Bypass valves (TBVs).
- C. Lower OTSG pressure to 200 psig using the Atmospheric Dump valves (ADVs).
- D. Lower OTSG pressure to 380 psig using the Atmospheric Dump valves (ADVs).

17. The plant has experienced a loss of NNI-X power which causes a spurious closure of MUV-49, letdown isolation valve. Pressurizer level is increasing due to the loss of letdown. Which of the following actions, by procedure, should be directed to decrease seal injection flow in order to slow down the increase in PZR level?

Direct the:

- A. PPO to manually reduce flow by throttling MUV-16, seal injection control valve.
- B. RO to reduce MUV-16 valve demand using the setpoint knob with the hand/auto station in auto.
- C. RO to reduce MUV-16 valve demand using the toggle switch with the hand/auto station in manual.
- D. PPO to isolate MUV-16 and use the manual bypass valve to allow continued seal injection.

18. After performance of a surveillance procedure on the "A" EDG the diesel is determined to be inoperable.

Which of the following actions should be taken to ensure troubleshooting activities will not render the redundant train inoperable?

- A. Electronically lock the doors to the "B" EDG so that only personnel approved by the Superintendent of Shift Operations will have access.
- B. Electronically lock the doors to the "B" ES 4160V switchgear room so that only personnel approved by the Superintendent of Shift Operations will have access.
- C. Perform an EOOS evaluation, change the "Plant Condition" color to red and have flyers produced.
- D. Post protected train signs and conduct a field walkdown of the appropriate opposite train equipment.

19. The following plant conditions exist:

- The plant is in a refueling outage and the reactor is defueled.
- One of the two available PPOs assigned to the Auxiliary Building slips and severely sprains his ankle while performing a walkdown of the Reactor Building.
- The PPO is contaminated and is escorted to the hospital by both available Health Physics technicians.

Which of the following describes the required minimum staffing for this situation?

- A. No action is required. Minimum staffing levels are still met.
- B. If it is two hours or less until shift turnover is scheduled to occur no action is required.
- C. Another PPO should be called in immediately and should arrive within two hours.
- D. Another HP technician should be called in immediately and should arrive within two hours.

20. The following plant conditions exist:

- Plant is at 100% power.
- RWP-2A tagged out for shaft alignment 12 hours ago.
- TS 3.7.9 was entered when RWP-2A was tagged out.
- The PPO has just reported the trip mechanism for the "B" EDG is broken.

Which of the following actions should be performed when "B" EDG is declared inoperable?

- A. Perform SR 3.8.1.1 within 1 hour, declare "A" EDG inoperable within 4 hours.
- B. Immediately declare both RWP-2A and 2B inoperable, enter LCO 3.0.3, be in Mode 3 within 7 hours, Mode 4 within 13 hours and Mode 5 within 37 hours.
- C. Perform SR 3.8.1.1 within 1 hour, declare RWP-2B inoperable within 4 hours, and determine the "A" EDG is not inoperable due to a common cause failure within 24 hours
- D. Perform SR 3.8.1.1 within 1 hour, declare all "B" train ES components inoperable within 4 hours, and determine the "A" EDG is not inoperable due to a common cause failure within 24 hours

21. During three RCP operation (RCP-1D secured) the following readings are recorded:

- RCS total flow	1.14 x 10 ⁸ lbm/hr			
- RCS T _{hot}	"A" loop	603° F	"B" Loop	603° F
- RCS pressure	"A" loop	2070 psig	"B" Loop	2090 psig

Based on the above conditions what action(s), if any, are required to be taken?

- A. No action required. All parameters are within limits for three RCP operation.
- B. The DNBR Safety Limit has been exceeded. Be in Mode 3 within one hour.
- C. One DNB parameter is not within limits. Restore the parameter to within limits in two hours.
- D. Two DNB parameters are not within limits. Restore the parameters to within limits in two hours.

22. Refueling is in progress with eight (8) fuel assemblies in the core. As the ninth assembly is being placed in the core the following NI readings are observed:

- NI-1 increases from a base count of 203 to 430 cps.
- NI-14 increases from a base count of 9.3×10^{-7} to 2.3×10^{-6} %.
- NI-2 and NI-15 are out-of-service.

Which of the following actions, if any, should be taken by the refueling supervisor?

- A. No action is required. This is an expected NI response.
- B. Once the assembly is placed in the core, reactor engineering should be contacted to perform a subcritical multiplication calculation.
- C. Cease insertion of the fuel assembly and submit a sample request for boron concentration of the reactor coolant system.
- D. Withdraw the fuel assembly, stop any other core alterations in progress, perform Co/Ci calculations, and obtain a boron analysis.

23. The following plant conditions exist:

- Plant is in Mode 5.
- The "A" DHR train is in service.
- SDT-1, Secondary Drain Tank, recirc is complete and ready for release.
- RWP-1 is running.
- RWV-150 is closed.
- CWP-1A and 1D are running.
- RM-L2/7 "Bypass" switch is selected to "Bypass".
- Minimum RW dilution flow rate is 11,800 gpm per the release permit.

Which of the following action(s), if any, must be taken before the release can be started?

- A. Adequate dilution flow exists. No further actions required.
- B. Adequate dilution flow exists as long as a minimum of two (2) CWPs remain in operation.
- C. Inadequate dilution flow exists. RWP-2A or 2B must be started prior to release.
- D. Inadequate dilution flow exists. RWP-3A or 3B must be started prior to release.

24. The plant has experienced a Rx trip and now no source of main, emergency or auxiliary feedwater is available. The crew has entered EOP-04, Inadequate Heat Transfer. Step 3.12 of EOP-04 states:

WHEN any of the following exist:

RCS pressure approaches the NDT limit
PORV opens automatically
RCS press > 2400 psig

THEN continue in this procedure.

Why are we required to wait to initiate HPI / PORV cooling when the RCS is in an Inadequate Heat Transfer condition?

- A. To allow the crew to wait for the appropriate amount of time to determine if Natural Circulation will develop.
- B. To prevent the plant from entering into a Pressurized Thermal Shock condition.
- C. To ensure the highest RCS level is being maintained once RCS inventory starts being lost.
- D. To allow for the natural decrease in the post trip decay heat level.

25. The following plant conditions exist:

- Rx tripped on low RCS pressure from 100% power.
- OTSG tube rupture on the 'A' OTSG (estimated at 250 gpm).
- HPI actuation on low RCS pressure.
- Main Steam Safety Valve on 'A' OTSG will not close.

Use only the above information to classify the event. (Do NOT use EC judgement)

- A. Unusual Event
- B. Alert
- C. Site Area Emergency
- D. General Emergency