

**Final Submittal**  
**BRUNSWICK EXAM**  
**50-2003-301**  
**50-325 & 50-324**

**FEBRUARY 10 - 14 & 19, 2003**

1. Reactor Operator Written Examination

# ANSWER KEY REPORT

for FINAL RO Test Brunswick 2003-301 Test Form: 0

#	ID	Answers
1	201001K1.01 1	C
2	201002A3.03 1	A
3	201002K3.01 1	A
4	201002K402 1	A
5	201003A2.09 1	D
6	201003K3.01 1	B
7	201006G2.2.12 1	C
8	202001A1.07 1	C
9	202002K4.06 1	D
10	203000A1.04 1	A
11	204000K1.06 1	A
12	204000K5.04 1	A
13	205000A3.01 1	B
14	206000K5.08 1	A
15	209001K2.03 1	C
16	211000A3.08 1	D
17	212000G2.1.27 1	B
18	212000K6.04 1	C
19	214000K4.01 1	D
20	215001A2.01 1	D
21	215002K6.04 1	C
22	215003A4.07 1	B
23	215004 G2.2.1 1	C
24	215005A4.06 1	D
25	216000K2.01 1	A
26	217000G2.1.28 1	A
27	217000K1.01 1	A
28	218000A4.02 1	A
29	219000A2.03 1	A
30	223001K4.03 1	C
31	223002A3.02 1	C
32	223002K1.07 1	C
33	230000A2.15 1	B
34	233000K2.02 1	C
35	239001K3.16 1	C
36	239002A1.01 1	<del>D</del> C <i>per 2/25/03 per court resolutions</i>
37	239002K6.05 1	B
38	241000K6.05 1	C
39	245000A4.10 1	D
40	256000K2.01 1	C
41	259001A2.07 1	B
42	261000K3.04 1	B
43	261000K4.01 1	B
44	262001A4.05 1	A
45	263000K2.01 1	D
46	264000K4.05 1	D

**ANSWER KEY REPORT**  
for FINAL RO Test Brunswick 2003-301 Test Form: 0

#	ID	Answers
47	264000K5.06 1	B
48	268000A1.01 1	B
49	271000A3.02 1	B
50	272000K1.02 1	D
51	295001AK2.02 1	D
52	295002AK2.08 1	D
53	295002AK3.02 1	B
54	295003AK1.02 1	B
55	295004AA2.02 1	A
56	295005AA1.05 1	D
57	295006AA2.06 1	B
58	295007AK3.06 1	C
59	295008AK3.04 1	C
60	295009AK1.05 2	A
61	295010AA1.01 2	A
62	295012AA1.02 1	C
63	295013AK1.03 1	D
64	295014AK2.03 1	A
65	295015AK1.02 1	C
66	295016AK3.01 1	C
67	295017G2.1.2 1	A
68	295019AA1.01 1	C
69	295020AA2.06 1	C
70	295021AK2.01 1	C
71	295022G2.1.30 1	B
72	295023AA2.02 1	C
73	295024EK3.01 1	A
74	295025EA1.02 1	B
75	295025G2.1.20 1	B
76	295026EK2.04 1	C
77	295028EK1.01 1	C
78	295030EA1.05 1	C
79	295031G2.1.1 1	D
80	295032EK3.01 1	C
81	295033G2.3.2 1	C
82	295034EK1.02 1	D
83	295035EK1.01 1	B
84	295037EK2.05 1	A
85	300000K3.02 1	C
86	500000EA2.01 1	C
87	600000AA2.02 1	D
88	GEN 2.1.1 1	C
89	GEN 2.1.10 2	A
90	GEN 2.1.28 1	C
91	GEN 2.2.12 1	A
92	GEN 2.2.13 1	B

*§ A 1704 2/25/03 per comment resolutions*

**ANSWER KEY REPORT**  
for FINAL RO Test Brunswick 2003-301 Test Form: 0

#	ID	Answers
93	GEN 2.2.3 1	D
94	GEN 2.3.1 1	C
95	GEN 2.3.11 1	C
96	GEN 2.4.1 1	B
97	GEN 2.4.11 1	A
98	GEN 2.4.18 1	A
99	GEN 2.4.2 1	B
100	GEN 2.4.3 1	A
<b>SECTION 1 ( 100 items)</b>		<b>100.00</b>

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

**Applicant Information**

Name:	Region: II
Date: 02/19/03	Facility/Unit: Brunswick
License Level: RO	Reactor Type: 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. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected six hours after the examination starts.

**Applicant Certification**

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

\_\_\_\_\_  
Applicant's Signature

**Results**

Examination Value: \_\_\_\_\_ Points

Applicant's Score: \_\_\_\_\_ Points

Applicant's Grade: \_\_\_\_\_ Percent

1. Which ONE of the following is the normal supply to the suction of the CRD pumps?
- A. Condensate System upstream of the deepbed demineralizers.
  - B. CST from the same line that supplies the HPCI system.
  - C. Condensate System downstream of the deepbed demineralizers.
  - D. CST from the same line that supplies the Core Spray systems.

2.

During a reactor startup, Control Rod 34-39 is selected to be NOTCHED OUT from Position 10 to Position 12. The RWM Withdraw Limit is Position 16.

After initiating ROD OUT NOTCH Sequence, the Operator observes:

Full Core Display white select light for Control Rod 34-39 is OFF.  
4-Rod Display indicates Control Rod 34-39 STOPPING at Position 14.  
Control Rod Select Matrix Backlighting is UNCHANGED  
Rod Drift alarm is sealed in

Which ONE of the following has occurred?

- A. The RMCS Timer has failed.
- B. The RPIS Reed Switch at Position 12 has failed.
- C. UPS supply breaker to rod select power has tripped.
- D. RWM is enforcing a Withdraw Block.

3.

Which ONE of the following is the result of a total loss of 28 VDC from 120 VAC Vital UPS to Unit 1?

- A. Normal control rod movement is unavailable.
- B. Automatic Depressurization System (ADS) will not actuate automatically.
- C. The High Pressure Coolant Injection System will not actuate automatically.
- D. All SRM's and IRM's would be inoperable.

4.

Which ONE of the following describes the conditions under which the "Rod Select Permissive" light is illuminated?

- A. REFUEL only and indicates all control rods are fully inserted; rod select power is Off or rod select power is On with no rod selected.
- B. REFUEL only and indicates all control rods are fully inserted except for the selected rod; rod select power is On with only one rod selected.
- C. SHUTDOWN or REFUEL and indicates all control rods are fully inserted; rod select power is Off or rod select power is On with no rod selected.
- D. SHUTDOWN or REFUEL and indicates all control rods are fully inserted except for the selected rod; rod select power is On with only one rod selected.

5.

Unit 2 is in Mode 2 starting up after a refueling outage. The following conditions exist at this time:

Reactor water level	normal band
Reactor power	Range 8 on all IRM's
Reactor pressure	700 psig
Reactor temperature	505 °F
2B CRD Pump	Out-of-service

Alarm *APP A-05 3-1, CRD PUMP 2A LO SUCT PRESS* annunciates and the 2A CRD Pump has tripped. The operator is unable to restart the 2A CRD pump.

Which ONE of the following indicates the action that should be taken per *0AOP-02.0, Control Rod Malfunction/Misposition* if unable to move control rods?

- A. Monitor CRD temperatures and expedite repairs of the 2B CRD Pump so that it can be started.
- B. Insert a manual scram if any control rod starts to drift.
- C. Trip both Recirc Pumps due to loss of seal purge.
- D. Insert a manual scram immediately.

6.

Unit 1 is at 90% RTP and a central control rod needs to be withdrawn from position 00 to position 24. While withdrawing the control rod it becomes uncoupled and remains at position 00.

Which ONE of the following conditions should alert the operator that the control rod is uncoupled?

- A. The operator receives a "CONTROL ROD UNCOUPLED" annunciator.
- B. Reactor power is not increasing on the LPRM bar graphs displayed on the Rod Block Monitors.
- C. The control rod withdraw time will be noticeably faster while withdrawing the control rod.
- D. The operator will receive a "ROD OVERTRAVEL." annunciator.

7.

Which ONE of the following describes the plant conditions required to perform the Rod Worth Minimizer Operability surveillance prior to startup?

- A. Mode Switch in REFUEL with reactor in Mode 4.
- B. Mode Switch in REFUEL with reactor in Mode 2.
- C. Mode Switch in START/HOT STBY with reactor in Mode 2.
- D. Mode Switch in START/HOT STBY with reactor in Mode 4.

8.

Unit Two was 95% power when annunciator A-07 2-2, REACTOR WATER LEVEL HIGH/LOW, alarmed. Feed pump "B" Flow Controller is in manual following erratic operation in automatic. Plant conditions are:

Reactor power	83% lowering
Reactor water level	+180 inches rising
<del>Reactor Feed Pump</del> Feedwater Flow A	5.3 Mlbs/hr
<del>Feedwater Flow B</del> <del>Reactor Feed Pump</del>	0.9 Mlbs/hr
Recirc Pump A Speed	63% lowering
Recirc Pump B Speed	70% lowering
Core Flow	59 Mlbs/hr lowering

Which ONE of the following describe the actions that should be taken?

- A. Lock the scoop tube for the 'A' Recirc pump; monitor for Thermal Hydraulic Instabilities.
- B. Lock the scoop tubes of both recirc pumps and then monitor for Thermal Hydraulic Instabilities.
- C. After level is restored, adjust recirc pump potentiometers to match demand and speed, and reset runback.
- D. Take manual control of recirc pump speeds and ensure that a mismatch of greater than 10% does not occur.

Change made with approval of George Hopper  
11/19/03

9.

Unit Two (2) is in Mode 1, in an active LCO for Recirculation Pump 2A out of service. Preparations are in progress to restart Recirculation Pump 2A per *OP-02, Reactor Recirculation System Operating Procedure*. The following data is recorded within 30 minutes of the planned start of Recirculation Pump 2A:

Reactor pressure	985 psig
Bottom head drain temp	410°F
Recirc loop A temp	486°F
Recirc loop B temp	522°F
Recirc loop B flow	25,800 gpm

Which ONE of the following is correct concerning the restart of Recirculation Pump 2A?

- A. It may continue, all requirements are met.
- B. It may NOT continue, the Delta T between the operating and the idle loop is excessive.
- C. It may NOT continue, the Delta T between the coolant in the dome and bottom head is excessive.
- D. It may NOT continue, the operating Recirc loop flow rate is excessive.

10.

Unit 2 was at 100% RTP when a small break LOCA concurrent with a loss of all high pressure makeup capability to the reactor occurred. The Reactor is being depressurized using the SRVs due to level not being able to be maintained above TAF. All RHR and Core Spray pumps have started as required with normal indications. Reactor pressure is approximately 400 psig at this time.

Concerning the "A" RHR system only, which ONE of the following describes the expected system parameters and configuration?

- A. Both LPCI "A" injection valves OPEN, "A" system flow indicates 0 gpm, "A" and "C" RHR Pump discharge pressures are approximately 200 psig.
- B. Both LPCI injection valves CLOSED, "A" system flow indicates 0 gpm, "A" and "C" RHR Pump discharge pressures are approximately 200 psig.
- C. Both LPCI "A" injection valves OPEN, "A" system flow indicates 12,000 gpm, "A" and "C" Pump discharge pressures are approximately 400 psig.
- D. Both LPCI "A" injection valves CLOSED, "A" system flow indicates 2300 gpm, "A" and "C" RHR Pump discharge pressures are approximately 200 psig.

11.

Following a reactor scram the Reactor operator attempts to place the RWCU in the reject mode of operation to aid in level control. Following the valve manipulation you note that: valve G31-F004 has closed, and the inboard isolation valve G31-F001 is opened and you have lost condenser vacuum.

Which ONE of the following could have caused the above?

- A. BOTH the Reject to Condenser Valve, F034 AND the Reject to Radwaste Valve, G31-F035 were opened simultaneously and there was a non-regenerative heat exchanger high temperature signal.
- B. BOTH the Reject to Condenser Valve, F034 AND the Reject to Radwaste Valve, G31-F035 were closed simultaneously and there was a non-regenerative heat exchanger high temperature signal.
- C. BOTH the Reject to Condenser Valve, F034 AND the Reject to Radwaste Valve, G31-F035 were opened simultaneously and there was a Local SLC pump start signal.
- D. BOTH the Reject to Condenser Valve, F034 AND the Reject to Radwaste Valve, G31-F035 were closed simultaneously and there was a Local SLC pump start signal.

12.

Unit 2 is at 10% power with RWCU filter demin in service and RWCU reject flow in progress.

Which ONE of the following is correct concerning the PPC heat balance if Process Computer Point B074, RWCU Inlet Flow, is NOT available?

The PPC heat balance will be:

- A. up to 3 CMWT lower than actual reactor power because computer points only get input from RWCU filter demin flow.
- B. up to 6 CMWT lower than actual reactor power because computer points only get input from RWCU temperature.
- C. up to 3 CMWT higher than actual reactor power because computer points only get input from RWCU filter demin flow.
- D. up to 6 CMWT higher than actual reactor power because computer points only get input from RWCU temperature.

13.

Unit 2 is in Mode 3 in the process of shutting down for a refueling outage. The following conditions are present at this time:

Reactor water level	190 inches
Reactor pressure	75 psig
Reactor coolant temperature	265°F
Shutdown cooling	In service on A Loop (B Loop in stby)

A break occurs in the Drywell which causes Drywell pressure to increase to 4.5 psig and Drywell temperature to increase to 235°F. All automatic actions occur as designed.

Which ONE of the following describes the automatic operation of the RHR System for these conditions?

A loop RHR:

- A. realigns for injection after one Shutdown Cooling suction valve closes; B loop RHR aligns for injection immediately; Both loops inject at full flow.
- B. remains aligned in Shutdown Cooling; B loop RHR aligns for injection immediately; B loop RHR injects at full flow.
- C. isolates Shutdown Cooling suction path with LPCI injection valve reopening after going closed; B loop RHR aligns for injection immediately; B loop RHR injects at full flow.
- D. realigns for injection after one Shutdown Cooling suction valve closes; B loop RHR remains in stby; A loop RHR injects at full flow.

14.

Which ONE of the following components prevents water from being forced up the HPCI exhaust line as the suppression pool pressurizes during a LOCA?

- A. HPCI exhaust line vacuum breakers.
- B. HPCI exhaust line T-quencher.
- C. HPCI exhaust isolation valve.
- D. HPCI exhaust drain pot.

15.

With Unit 1 operating at rated conditions and Unit 2 at 75% power, Unit 2 annunciator A3 2-6, CORE SPRAY SYS 2 LOGIC PWR FAILURE, is received. Investigation reveals a tripped circuit breaker in Panel 4B which powers CORE SPRAY SYS 2 LOGIC.

Which ONE of the following describes the effect this has on a subsequent Unit 2 LOCA initiation?

- A. DIV II Emergency diesel generators will not auto start.
- B. DIV II Non Interruptible RNA isolation valve will not isolate and DIV II N2 BU isolation valve will not open.
- C. Drywell coolers B and C will not trip.
- D. DIV II RHR pumps will not auto start.

16.

Which ONE of the following contains a correct list of indications that are used to verify the Standby Liquid Control System is operating properly once the system has been initiated? (Not necessarily all the indications)

- A. Squib valve loss of continuity alarm annunciated, storage tank level decreasing, discharge pressure slightly lower than reactor pressure.
- B. Red light indicating pump is running, reactor water level will increase, squib valve status lights are illuminated.
- C. Storage tank level decreasing, RWCU suction valve G31-F004 opens, squib valve status lights are extinguished.
- D. Indicated SLC pump discharge pressure will increase to greater than reactor pressure, squib valve status lights are extinguished, RWCU suction valve G31-F004 closes.

17.

Which ONE of the following is a purpose of the Unit Two (2) Reactor Protection System?

- A. To prevent premature actuation of Emergency Core Cooling Systems.
- B. To maintain the ability to insert selected control rods when rapid power reduction is required by specific abnormal procedures.
- C. To monitor critical parameters when the Unit is in Mode 1, 2 or 3 so that Cold Shutdown can be obtained.
- D. To monitor critical parameters at all times to initiate a reactor SCRAM and initiate Emergency Core Cooling System when the nuclear process barrier is threatened.

18.

Unit two is operating at 100% power when there is a loss of 125 VDC distribution panel 4B on the Unit 2 Reactor Protection System.

Which ONE of the following describes the direct effect of this loss on the RPS?

- A. All ARI valves fail open, venting the scram air header.
- B. Outboard ARI valves fail open, venting the scram air header through the inboard ARI bypass check valves.
- C. Both backup scram valves remain as is, scram air header remains pressurized.
- D. Upstream backup scram valve fails open, venting the scram air header through the downstream backup scram valves bypass check valve.

19.

Which ONE of the following explains why a "ROD DRIFT" alarm is received after moving a control rod using the "EMERGENCY IN" switch?

- A. "EMERGENCY IN" bypasses the Rod Position Indication System.
- B. The sequence timer is bypassed causing an insert and withdraw signal at the same time.
- C. The rod is at an even reed switch and none of the selected relay busses are energized (insert, withdraw or settle).
- D. The rod is at an odd reed switch and none of the selected relay busses are energized (insert, withdraw or settle).

20.

The following conditions exist on Unit 1:

Rx power	100%
Rx level	190"
Drywell pressure	0.6 psig
Rx pressure	1005 psig

The reactor engineer has selected TIP Probe 'A' for a core flux trace and the probe is currently traversing into the core. Suddenly, both reactor feed pumps trip causing water level to lower below 150".

Which ONE of the following describes how the TIP probe will respond to these conditions?

- A. Stops at its current position due to the drive motor deenergizing on a reactor scram and turbine trip signal.
- B. Retracts in slow speed until it reaches the indexer where it is left for eight hours to decay.
- C. Continues to traverse into the core until it reaches core top where it will stop.
- D. Retracts in fast speed until it reaches the in-shield position where it will stop.

21.

The Unit 1 operator is in the process of performing the weekly control rod exercise surveillance. A central control rod has been selected but prior to moving the rod APRM 1 fails downscale. After verifying all other APRM's are OPERABLE then APRM 1 is bypassed.

Which ONE of the following describes the status of Rod Block Monitor A and B?

- A. Rod Block Monitor A is bypassed; Rod Block Monitor B is in service.
- B. Rod Block Monitor A is in service; Rod Block Monitor B is bypassed.
- C. Rod Block Monitor A and B are both in service.
- D. Rod Block Monitor A and B are both bypassed.

22.

Unit 1 is commencing a startup with all SRM's fully inserted and reading approximately  $3 \times 10^5$  cps. The IRM's are reading the following:

IRM A	20 on Range 1	IRM E	21 on Range 1
IRM B	28 on Range 1	IRM F	19 on Range 1
IRM C	21 on Range 2	IRM G	23 on Range 2
IRM D	25 on Range 1	IRM H	20 on Range 1

The operator takes the Range Switch for IRM B to Range 3 and the Downscale light comes on but no other alarms occur.

Which ONE of the following describes the OPERABILITY of IRM B?

- A. IRM B is still OPERABLE because no other alarms should have occurred for this condition.
- B. IRM B is INOPERABLE because a rod block should have been initiated.
- C. IRM B is still OPERABLE because the power level is too low for accurate indication.
- D. IRM B is INOPERABLE because it is reading significantly higher than the other IRM's.

23.

Unit 1 is in the process of performing *OGP-01, Prestartup Checklist step 6.2.9, Source Range Monitor Checks*.

Which ONE of the following describes the minimum requirements for the SRM's?

- A. Ensure at least 2 SRM channels are OPERABLE and indicate  $\geq 5$  cps.
- B. Ensure at least 2 SRM channels are OPERABLE and indicate  $\geq 10$  cps.
- C. Ensure at least 3 SRM channels are OPERABLE and indicate  $\geq 5$  cps.
- D. Ensure at least 3 SRM channels are OPERABLE and indicate  $\geq 10$  cps.

24.

Unit 1 is in Mode 2 with the Mode Switch in START/HOT STBY. Annunciator *APP A-05 2-2, ROD OUT BLOCK*, is in alarm. APRM readings are as follows:

APRM 1	13%
APRM 2	Downscale
APRM 3	15%
APRM 4	14%

Which ONE of the following describes the effect on the plant for these conditions and the reason for the response?

- A. A scram should have occurred due to APRM 2 being Downscale and APRM 3 at the Upscale Trip setpoint.
- B. A 1/2 scram should have occurred on RPS Channel A due to APRM 3 at the Upscale Trip setpoint.
- C. A 1/2 scram should have occurred on RPS Channel B due to APRM 2 being downscale.
- D. The ROD OUT BLOCK alarm is the only expected actuation due to the position of the Mode Switch.

25.

If the Topaz Inverter in Analog Trip Cabinet XU-68 (RPS B-2) had an open circuit and failed, then which ONE of the following should occur?

- A. There will be no interruption of power to cabinet XU-68 as the power supply in XU-67 (RPS B-1) will provide power to both cabinets.
- B. There will be no interruption of power to cabinet XU-68 as there is a second Topaz Inverter in panel XU-68 that is in parallel with the Topaz Inverter that failed.
- C. All associated instruments will lose power generating a trip signal. There will be a 1/2 scram and Group 1 PCIS as well as valve actuation for PCIS Groups 2, 6 and 8.
- D. All associated instruments will lose power but will not generate any trip signals. The plant will continue to operate, but Tech Specs should be addressed for each instrument.

26.

Which ONE of the following is correct concerning the RCIC Steam Supply Inboard Isolation Valve (E51-F007)?

- A. AC powered due to less likely to spark during operation and more reliable in a hostile environment.
- B. DC powered due to less likely to spark during operation and more reliable in a hostile environment.
- C. Cannot be powered from an Alternate Safe Shutdown Feeder since the valve is normally in the Open position.
- D. May be throttled closed or open if isolation signal is not present to slowly warm the RCIC steam line.

27.

Unit 2 is operating at 80% RTP. The RCIC system is in standby with a suction from the CST. The quarterly HPCI flow rate test is in progress and is taking longer than expected. Torus level has reached -24" and preparations are being made to pump the torus down to normal level within the 2 hour Tech Spec time limit.

Which ONE of the following describes the effect high Torus level had on RCIC?

- A. No effect since the RCIC suction valves do not transfer on high torus level.
- B. The Torus suction valves (F029 & F031) received an open signal and once both valves were full open then the CST suction valve (F010) received a closed signal.
- C. The Torus suction valves (F029 & F031) received an open signal at the same time the CST suction valve (F010) received a closed signal.
- D. The CST suction valve (F010) received a closed signal and when it was full closed then the Torus suction valves (F029 & F031) received an open signal.

28.

Unit Two just entered a shutdown LCO due to HPCI and RCIC being inop, when a Loss of Off-site Power occurs. EDGs 3 and 4 fail to start. Unit One buses E1 and E2 remain energized throughout the event. Pressure is being maintained 800 - 1000 psig using SRVs. Level has been below 45 inches for 5 minutes and is currently +25 on the N026's.

Assuming ADS was NOT inhibited, which ONE of the following describes how ADS would respond to #4 EDG starting?

7 ADS valves would auto open \_\_\_\_\_ seconds after the diesel tied to E4.

- A. 10
- B. 15
- C. 83
- D. 93

29.

Unit Two is in RHR/LPCI suppression pool cooling mode with an elevated suppression pool temperature of 180 °F. The VITAL Service Water Header supply valve was inadvertently closed. The valve was manually opened 10 minutes later.

Which ONE of the following occurred before the valve was reopened?

- A. ONLY RHR Pump Seal temperatures increased.
- B. ONLY RHR SW Pump Motor temperatures increased.
- C. BOTH RHR Pump Seal temperatures and RHR SW Pump Motor temperatures increased.
- D. NEITHER RHR Pump Seal temperatures NOR RHR SW Pump Motor temperatures all have increased.

30.

Unit 1 has experienced a small LOCA with the following conditions present:

Drywell pressure	4.5 psig
Drywell temperature	201 °F
Reactor water level	145 inches
Reactor Bldg Exhaust Rad	8 mR/hr

Per the EOP's the CAC Div I and CAC Div II AC and DC Isolation (Soft) Override switches have been initiated to allow sampling of containment parameters. The RHR Process Sampling valves (E11-F079A,B and F080A,B) have been opened to allow for sampling.

If reactor water level was to increase to 180 inches and then drop back down to 145 inches, which ONE of the following indicates the status of the RHR Process Sampling valves?

- A. All valves would remain open due to the Override switches being actuated.
- B. The Inboard valves would close and the Outboard valves would remain open.
- C. All valves would close when reactor vessel level dropped below 166 inches.
- D. The Inboard valves would remain open and the Outboard valves would close.

31.

An Instrument Tech mistakenly throttles the bypass valves on an MSIV's hydraulic dash pot.

Which ONE of the following describes the effect of this manipulation?

It will result in a change in:

- A. closing torque.
- B. packing leakage.
- C. closing time.
- D. closing setpoint.

32.

U-2 RCIC System is running with the following conditions present 10 minutes after the event:

Reactor Water Level	-38 inches
Drywell Pressure	+1.5 psig
Suppression Chamber Ambient Temp.	170°F
RCIC Steam Line pressure	900 psig
RCIC Room Ambient Temp	100°F and rising slowly

An operator has been sent to the RCIC room and reports that there is a small steam leak on the line upstream of the Trip and Throttle valve. The Shift Supervisor orders the Reactor Operator to manually isolate RCIC.

Which ONE of the following describes the effect on RCIC when the manual isolation pushbutton is depressed?

- A. Inboard and Outboard Steam Supply Isolation valves F007 and F008 close and the RCIC turbine trips.
- B. Inboard Steam Supply Isolation valve F007 closes and the RCIC turbine trips.
- C. Outboard Steam Supply Isolation valve F008 closes and the RCIC turbine trips.
- D. No effect on RCIC since the system should already be isolated.

33.

Unit 2 has experienced a large LOCA with the following conditions present:

Reactor Pressure	10 psig
Drywell pressure	25 psig steady
Torus pressure	24 psig steady
Drywell Temperature	275 °F steady
Reactor water level	-30 inches

The Unit Supervisor has ordered Torus and Drywell sprays to be initiated.

Which ONE of the following describes the minimum actions necessary per *OEOP-01-SEP-02, Drywell Spray Procedure*, to initiate Drywell sprays after verifying Recirc Pumps and Drywell Coolers are off?

Verify or start an RHR pump and:

- A. Place 2/3 Core Height LPCI Initiation Override switch E11-CS-S18 to the "Manual Overrd" position. Open Drywell Spray **Inbd** Isol Valve, E11-F021, then throttle Drywell Spray **Outbd** Isol Valve, E11-F016.
- B. Place Containment Spray Valve Control switch E11-CS-S17 to the "Manual" position. Open Drywell Spray **Inbd** Isol Valve, E11-F021, then throttle Drywell Spray **Outbd** Isol Valve, E11-F016.
- C. Place Containment Spray Valve Control switch E11-CS-S17 to the "Manual" position. Open Drywell Spray **Outbd** Isol Valve, E11-F016, then throttle open Drywell Spray **Inbd** Isol Valve, E11-F021.
- D. Place Containment Spray Valve Control switch E11-CS-S17 to the "Manual" position and the 2/3 Core Height LPCI Initiation Override switch E11-CS-S18 to the "Manual Overrd" position. Open Drywell Spray **Inbd** Isol Valve, E11-F021, then throttle Drywell Spray **Outbd** Isol Valve, E11-F016.

34.

Unit 1 is on Shutdown Cooling using RHR Loop 1B. I&C Techs are working on the RPS logic power supply. During the repair work the Techs cause an inadvertent loss of Division II 125/250 VDC electrical distribution.

Which ONE of the following describes the effect of this loss of Shutdown Cooling?

- A. Group 8 outboard SDC suction valve remains OPEN. LPCI injection valves will fail CLOSED.
- B. Group 8 outboard SDC suction valve and LPCI injection valves will fail CLOSED.
- C. Group 8 outboard SDC suction valve remains OPEN. LPCI injection valves remain OPEN.
- D. Group 8 outboard SDC suction valve fails CLOSED. LPCI injection valves remain OPEN.

35.

Unit 1 was operating at 100%, when a loss of EHC caused a turbine trip without bypass valves. SRVs operated as required, and pressure crested at 1142 psig.

Disregarding the setpoint drift tolerance, which ONE of the following indicates how many SRVs opened in response to the pressure transient?

- A. 4
- B. 7
- C. 8
- D. 11

36.

During an overpressure transient, an operator has opened an SRV to control pressure. RPV pressure is 1005 psig.

Which ONE of the following is the expected tail pipe temperature for the SRV that is open, as indicated on ERFIS?

- A. 212 °F
- B. 300 °F
- C. 350 °F
- D. 545 °F

37.

During normal power operation of Unit 1, SRV F013H lifted.

Which ONE of the following describes the consequences of SRV F013H tailpipe vacuum breaker (F037H) failing open prior to the SRV actuation?

- A. Steam will discharge directly to the suppression pool airspace.
- B. Steam will discharge directly to the drywell.
- C. Water from the suppression chamber will draw into the SRV tailpipe following actuation.
- D. A redundant vacuum breaker will open with no operational consequences.

38.

Unit 2 is holding load at 75% Reactor Power when the operator receives the "Turbine Vacuum Low" alarm.

Which ONE of the following describes the expected sequence of actions as condenser vacuum continues to decrease from 24.7" Hg Vac (alarm setpoint) to 0" Hg Vac?

- A. 1st - Main Turbine trips.  
2nd - Main Turbine Bypass Valves close.  
3rd - MSIV's close.
- B. 1st - MSIV's close.  
2nd - Main Turbine trips.  
3rd - Main Turbine Bypass Valves close.
- C. 1st - Main Turbine trips.  
2nd - MSIV's close.  
3rd - Main Turbine Bypass Valves close.
- D. 1st - Main Turbine Bypass Valves close.  
2nd - MSIV's close.  
3rd - Main Turbine trips.

39.

Assume the Unit 2 Main Generator is operating with the following conditions:

- 800 MWe
- 400 MVARs out
- 60 psig Hydrogen Pressure

To facilitate an on-line adjustment to the Hydrogen Sealing system the Hydrogen pressure is lowered to 48 psig.

Which ONE of the following describes the effect on the Main Generator?

- A. Main Generator operation will be unaffected.
- B. Main Generator armature will begin to overheat.
- C. Main Generator armature core end will begin to overheat.
- D. Main Generator field windings will begin to overheat.

40.

Unit One and Unit Two are operating at 100% power. The following annunciators are received on Unit One.

UA-13 3-9 SAT Fault Pressure  
UA-13 1-9 SAT Lockout

Which ONE of the following describes which Condensate Transfer Pump(s) will have power?

- A. Unit One only.
- B. Unit Two only.
- C. Both Unit One and Unit Two.
- D. Neither Unit One nor Unit Two.

41.

Unit One is at 100% power with Feedwater level control (FWLC) in 3 ELEM and the Reactor Water Level Select Switch in LEVEL A (N004A).

Which ONE of the following describes how the DFWLC system will respond to the B level instrument (N004B) failing high?

- A. Transfer to 1 ELEMENT and utilize the C level instrument (N004C) for level control.
- B. Remain in 3 ELEMENT control and continue utilizing the A level instrument (N004A) for level control.
- C. Transfer to 1 ELEMENT control and continue utilizing the A level instrument (N004A) for level control.
- D. Remain in 3 ELEMENT and utilize the C level instrument (N004C) for level control.

42.

Which ONE of the following describes the effect that a loss of SBGT would have on the RCIC and HPCI systems?

- A. There would be no effect since the SBGT system is not connected to HPCI or RCIC.
- B. Both the RCIC Barometric Condenser and the HPCI Vacuum Pump Discharge line would be effected.
- C. Only the RCIC Barometric Condenser would be effected.
- D. Only the HPCI Vacuum Pump Discharge line would be effected.

43.

Standby Gas Treatment control switches on Unit One are aligned as follows:

Train A is in the STBY position.

Train B in the PREF B position.

Emergency Bus E1 is de-energized due to a bus fault.

Which ONE of the following describes how the Standby Gas Treatment system will respond?

- A. SBGT A will IMMEDIATELY start.
- B. SBGT B will IMMEDIATELY start.
- C. SBGT A will start following a 10 second time delay.
- D. SBGT B will start following a 10 second time delay.

44.

Unit One is operating at 100% and the following annunciators are received:

GEN LOSS OF EXC (UA-13 3-1)

VOLT BALANCE RELAY A OPERATION (UA-23 6-6)

GENERATOR AUTO TRIP TO MANUAL (UA-13 1-4)

Which ONE of the following describes the plant response to these conditions?

- A. The generator remains on line and the voltage regulator will maintain generator field voltage constant.
- B. A generator lockout is received with a turbine trip. Four EDGs AUTO start and a reactor scram occurs.
- C. The generator remains on line. The voltage regulator will maintain generator terminal voltage constant.
- D. A generator lockout is received with a turbine trip. No EDGs AUTO start and a reactor scram occurs.

45.

Which ONE of the following is the power supply to the Outboard MSIV's DC solenoids on Unit One (1)?

- A. Div 1 Switchboard 21A.
- B. Div 2 Switchboard 22B.
- C. Div 1 Switchboard 1A.
- D. Div 2 Switchboard 1B.

46.

During an ATWS on Unit Two (2), RPV level is being controlled at Top of Active Fuel (TAF).

Actions to terminate and prevent RHR injection have been completed. A fault on Bus 2C results in LOSS of Bus E4.

Which ONE of the following describe the RHR pump response as DG4 re-energizes bus E4?

- A. RHR pumps 2B and 2D both remain overridden off.
- B. RHR pumps 2B and 2D both restart 10 seconds later.
- C. RHR pump 2D restarts 10 seconds later, RHR pump 2B remains off.
- D. RHR pump 2B restarts 10 seconds later, RHR pump 2D remains off.

47.

Unit 2 experiences a Loss of Off-Site Power (LOOP) with EDG #4 under clearance.

Which ONE of the following describes how the Nuclear Service Water (NSW) and Conventional Service Water (CSW) pumps will respond as EDG #3 output breaker closes and energizes bus E3?

- A. NSW pump 2A and CSW pump 2A start immediately.
- B. NSW pump 2A starts immediately and CSW pump 2A does not start.
- C. NSW pump 2A and CSW pump 2A start after a 5 second time delay.
- D. NSW pump 2A starts after a 5 second time delay and CSW pump 2A does not start.

48.

During a radwaste discharge to the Unit One weir, a Radwaste Effluent RAD Hi Hi alarm annunciates. Which one of the following describe the actions, if any, that must be taken if you desire to close both Unit's Radwaste Discharge valves (D12-V27A and D12-V27B) and the Radwaste Flow Control valve (G16-FCV-189)?

- A. Valves D12-V27A, D12-V27B, and G16-FCV-189 must be closed manually, no auto signal.
- B. Valves D12-V27A and D12-V27B receive a close signal. Valve FCV-189 must be manually closed, no auto signal.
- C. Valve FCV-189 receives a close signal. D12-V27A and D12-V27B must be manually closed, no auto signal.
- D. No actions required, all three valves receive a close signal.

49.

The following indications are noted by the operator regarding the Off-Gas System:

Off-Gas flows	increasing
Off-Gas filter Dp's	increasing
Recombiner temperature	increasing
Oxygen concentration	increasing
Hydrogen concentration	decreasing

Which ONE of the following describes the probable cause for these conditions and the consequence of Off-Gas flow increasing above 150 scfm?

- A. Fuel element failure is the problem; The Off-Gas flow will be routed to the filter train and cause filter radiation levels to increase.
- B. Air intrusion is the problem; The Off-Gas flow will go directly to the Main Stack causing Main Stack Effluent Radioactivity to increase.
- C. Low Recombiner temperature is the problem; The Off-Gas flow will be routed to the filter train and cause filter radiation levels to increase.
- D. Charcoal Adsorber bed high Dp is the problem; The Off-Gas flow will go directly to the Main Stack causing Main Stack Effluent Radioactivity to increase.

50.

During Unit One operation at 100% power, the control operator is performing OPT-04.1.7, Main Condenser Air Ejector Radiation Monitor Functional Test. The backpanel operator places the "A" Steam Jet Air Ejector (SJAE) rad monitor NUMAC drawer (D12-RM-K601A) "INOP/OPER" keylock switch to the "INOP" position.

Which one of the following is the expected plant response?

- A. AOG bypass valve, HCV-102, immediately closes ONLY.
- B. AOG bypass valve, HCV-102, immediately closes AND main condenser vacuum begins to degrade.
- C. PROCESS OFFGAS RAD MONITOR DOWNSCALE/INOP alarm is received and the process offgas timer initiates.
- D. PROCESS OFFGAS RAD MONITOR DOWNSCALE/INOP alarm is received and the process offgas timer does NOT initiate.

51.

Unit 2 is in single loop operation at 45% RTP. Preparations are being made to restart the idle Recirculation Pump. The Control Operator reduces the operating Recirc Pump speed so that core flow is less than 40% rated core flow prior to starting the idle Recirc Pump.

Which ONE of the following describes the affect on the plant if this condition is maintained for an extended period of time?

- A. The operating recirc pump seals may be damaged due to operating at the lower pump speed.
- B. Thermal hydraulic instabilities may develop due to the increased natural circulation at the lower core flow.
- C. The bottom head temperature will increase due to increased natural circulation at the lower core flow.
- D. The idle loop temperature may decrease such that the 50 °F differential temperature limit between the operating loop and idle loop is exceeded.

52.

The reactor is at 30% power. Which ONE of the following describes the impact on continued plant operation during a complete loss of the Conventional Service Water system?

- A. The plant should commence a shutdown immediately due to loss of cooling water to all of the ECCS Room coolers.
- B. The plant should commence a shutdown immediately due to loss of cooling to the RBCCW Heat Exchangers.
- C. The plant should reduce power as necessary to maintain equipment operating that is supplied by TBCCW.
- D. The reactor must be scrammed due to imminent loss of condenser vacuum.

53.

Which ONE of the following describes why the Main Turbine automatically trips on lowering condenser vacuum?

- A. Lowering condenser vacuum decreases the NPSH to the condensate pumps and the turbine is tripped to prevent a loss of feedwater to the reactor due to the Condensate pumps tripping on low suction pressure.
- B. Lowering condenser vacuum reduces the amount of energy that can be removed from steam entering the turbine which causes increased dynamic loading on the last stage blades and increases turbine vibration.
- C. The turbine is tripped on lowering condenser vacuum to prevent a steam leak into Secondary Containment due to a positive pressure occurring within the condenser and rupturing the turbine casing overpressure discs.
- D. The turbine is tripped on lowering condenser vacuum to prevent damage to the turbine shaft due to increased torque from trying to push the steam through the turbine.

54.

A LOCA has occurred on Unit 1 which requires the E1 Emergency Bus to be supplied by Diesel Generator #1.

Which ONE of the following describes the sequence of events that prevents the Diesel Generator from being overloaded?

- A. Bus E1 load shed occurs and then the following pumps start in the given order at 5 second intervals: RHR pump 1C, Core Spray pump 1A, NSW pump 1A.
- B. Bus E1 load shed occurs and then the following pumps start in the given order at 5 second intervals: NSW pump 1A, RHR pump 1C, Core Spray pump 1A.
- C. Bus E1 sheds all loads except RHR pump 1C and then the following pumps start in the given order at 5 second intervals: Core Spray pump 1A and NSW pump 1A.
- D. Bus E1 sheds all loads except Core Spray pump 1A and then the following pumps start in the given order at 5 second intervals: RHR pump 1C and NSW pump 1A.

55.

The following conditions exist on Unit 1:

- HPCI system will not auto initiate, HPCI flow controller indication is lost.
- B logic is lost for the ADS system.
- RCIC will not trip on Hi water level and the inboard isolation logic is lost.
- Core Spray Loop A will not auto initiate.
- Inboard MSIV DC solenoids de-energize.

Which ONE of the following 125 VDC Distribution Panels was lost?

- A. 3A.
- B. 11A.
- C. 1XDA.
- D. 1XDB.

56.

Unit 2 was operating at 100% RTP when the reactor scrammed due to a turbine trip.

In addition to the Turbine Stop Valves closing, which ONE of the following correctly describes the remaining turbine valve response?

- A. Turbine Control Valves - Closed  
Intercept Valves - Closed  
Intermediate Stop Valves - Open  
Bypass Valves - One or more may be open depending on throttle pressure
- B. Turbine Control Valves - Open  
Intercept Valves - Closed  
Intermediate Stop Valves - Closed  
Bypass Valves - All open initially; throttle closed to control Rx pressure.
- C. Turbine Control Valves - Closed  
Intercept Valves - Open  
Intermediate Stop Valves - Closed  
Bypass Valves - One or more may be open depending on throttle pressure
- D. Turbine Control Valves - Closed  
Intercept Valves - Closed  
Intermediate Stop Valves - Closed  
Bypass Valves - All open initially; throttle closed to control Rx pressure.

57.

Unit 2 is in Mode 1 with the following conditions present:

Reactor Power	34% RTP
Reactor Pressure	1050 psig
Reactor Water Level	168 inches
MSIV A and B	94% open
Turbine Control Valve Fast Closure	500 psig (Disk dump oil pressure)

Which ONE of the above conditions should have resulted in a full Reactor Scram?

- A. Reactor Pressure of 1050 psig.
- B. Turbine Control Valve Fast Closure disk dump oil pressure of 500 psig.
- C. MSIV A and B not full open.
- D. Reactor Water Level of 168 inches.

58.

Unit 2 is operating at 80% power when INBOARD MSIV B21-F022A fails closed.

Which ONE of the following describes the effect on Reactor Pressure and Pressure Averaging Manifold (PAM) Pressure after conditions stabilized, relative to the 80% power?

- A. Reactor pressure would have increased, and PAM Pressure would have increased.
- B. Reactor pressure would have remained the same, and PAM Pressure would have increased.
- C. Reactor pressure would have increased, and PAM Pressure would have remained the same.
- D. Reactor pressure would have remained the same, and PAM Pressure would have remained the same.

59.

Which ONE of the following is the reason the Reactor Feed Pumps are required by Technical Specifications to automatically trip on high reactor water level?

- A. Tripping the feedwater pumps prevents vessel level from exceeding the high level trip setpoints for HPCI and RCIC only, so that they remain available if necessary.
- B. Tripping the feedwater pumps prevent damage to the feedwater pump turbines by limiting water addition to the vessel.
- C. Tripping the feedwater pump turbines limits further vessel level increase thereby terminating the overfeed event.
- D. Tripping the feedwater pump turbines limits further vessel level increase and is the only means of preventing water from entering the main turbine.

60.

Which ONE of the following is the basis for lowering RPV water level during an ATWS condition?

- A. Reduces reactor power by reducing the natural circulation driving head.
- B. Reduces steam generation rate which reduces the moderator temperature.
- C. Prevents thermal stratification which prevents localized power peaks.
- D. Reduces reactor pressure which allows more injection from low pressure systems.

61.

The following conditions exist on Unit 1:

Drywell pressure	2.0 psig
Drywell temperature	180 °F
Reactor water level	+55 inches
Reactor pressure	400 psig
Drywell Cooler Override Switch position	NORMAL

Which ONE of the following describes the condition of the Drywell Cooler fans?

- A. All cooling fans are tripped.
- B. Div I cooling fans tripped, Div II cooling fans running.
- C. Div I cooling fans running, Div II cooling fans tripped.
- D. All cooling fans running.

62.

Following a reactor scram, drywell temperature is 225 °F. Which ONE of the following describes the position of the MIN/MAX control switch on Panel XU-3 for the Drywell Lower Vent dampers, the reason it is in that position, and the actual damper position?

Assume NO operator actions:

- A. MIN position so that the Reactor Building Closed Cooling Water system is not overloaded. Dampers will actually be in the MIN position.
- B. MAX position to minimize DP between the torus and the drywell. Dampers will actually be in the MIN position.
- C. MIN position to prevent extreme temperature excursions in the upper drywell regions during normal operation. Dampers will actually be in the MAX position.
- D. MAX position to maximize drywell cooling AND to distribute the air flow in all portions of the drywell evenly. Dampers will actually be in the MAX position.

63.

Unit 1 has been operating at 75% RTP with a leaking Safety/Relief valve (the valve is still OPERABLE). This has caused the local Suppression Pool temperature in the area around the T-quencher to reach 111°F. The average Suppression Pool temperature is steady at 93°F.

Which ONE of the following describes the effect, if any, on continued plant operation?

- A. The Tech Spec limit for Suppression Pool average temperature has been exceeded. Average temperature must be lowered to  $\leq 90$  °F within 24 hours.
- B. No TS limit has been exceeded. However, Supression Pool Cooling **MUST** be placed in service to restore the T-quencher to  $\leq 110$  °F.
- C. The Suppression Pool temperature Tech Spec limit of 110 °F has been exceeded. The reactor must be scrammed immediately.
- D. No TS limit has been exceeded.

64.

Which ONE of the following describes the Abnormal Operating Occurances (Plant Transients) which increase fuel temperature?

- A. Recirc Flow Control Failure-Increasing Flow, Loss of Feedwater Heating, Inadvertent start of HPCI.
- B. Loss of Shutdown Cooling, Loss of Condenser Vacuum, Recirc Flow Control Failure-Decreasing Flow.
- C. Loss of Feedwater Heating, Trip of one Recirc Pump, Startup of idle Recirc Pump.
- D. Recirc Flow Control Failure-Increasing Flow, Loss of Condenser Vacuum, Turbine Trip with Bypass Valves available.

65.

Which ONE of the following describes the reason a cooldown is NOT initiated prior to the Cold Shutdown Boron Weight (CSBW) being injected during an ATWS condition?

- A. The cooldown will cause an increase in reactor power which will require more boron to be injected to maintain the reactor in an analyzed condition.
- B. Initiating a cooldown while injecting boron is an uncontrolled reactivity manipulation and it will prevent the boron from being uniformly mixed.
- C. Core reactivity response is unpredictable in a partially borated core and subsequent EOP steps may not provide the correct actions for such conditions.
- D. Cooldown is not allowed at this time to ensure that low pressure injection systems cannot inject into the vessel and add positive reactivity.

66.

A chlorine tank car rupture has made the Control Room inaccessible. If possible, prior to leaving the Control Room the Control Operator inserts a manual Scram per *0AOP-32.0, PLANT SHUTDOWN FROM OUTSIDE CONTROL ROOM*.

Which ONE of the following describes why the procedure also has steps to Scram the reactor by de-energizing the RPS EPA's?

- A. The Technical Requirements Manual requires the capability to Scram the reactor from outside the Control Room.
- B. The Technical Specifications require that Reactor Scram capability from outside the Control Room be maintained.
- C. The FSAR requires the ability for prompt hot shutdown of the reactor from locations outside the Control Room.
- D. The capability for prompt hot shutdown of the reactor from outside the Control Room is not required but is a safe operating practice.

67.

Fuel bundles are being moved in the Unit 1 Fuel Pool when alarm *UA-03 3-5, PROCESS RX BLDG. VENT RAD HI-HI* is received followed by a report that an irradiated fuel assembly has been dropped and damaged. The Control Operator notes that the Reactor Building ventilation failed to isolate on Unit 1 and manual actions to close the isolation valves have been unsuccessful. Radiation levels at the site boundary have started to increase.

Which ONE of the following is an **immediate** operator action for these conditions per 0AOP-05.0, Radioactive Spills, High Radiation, High Airborne Activity?

- A. Ensure the Control Room Emergency Ventilation System (CREVS) is in operation.
- B. Notify E&RC to perform surveys, post the area and control access to the affected area.
- C. Evacuate unnecessary personnel from the affected area.
- D. Stop all fuel movements.

68.

The Unit 2 Reactor Instrument Air Non-Interruptible/Pneumatic Nitrogen Supply (RNA/PNS) header pressure has dropped to 70 psig.

Which ONE of the following describes the effect this will have on the Inboard MSIV's?

- A. The Inboard MSIV's will not be affected due to the Backup Nitrogen valves SV-5481 and SV-5482 opening.
- B. The Inboard MSIV's should not be affected due to the accumulators associated with the valve operators.
- C. The Inboard MSIV's may start drifting closed due to a sustained low header pressure.
- D. The Inboard MSIV's will close immediately after RNA/PNS header pressure drops below 80 psig.

69.

A partial Group 2 isolation has just occurred on Unit 2.

Which ONE of the following conditions initiated the isolation?

- A. Drywell pressure at 1.5 psig.
- B. Reference leg leaks that lower reference leg pressure for Reactor Vessel Water Level LL#1 transmitters, *LT-N017C-1* and *LT-N017D-1*.
- C. A variable leg leak that lowers variable leg pressure for Reactor Vessel Water Level LL#1 transmitters, *LT-N017A-1* and *LT-N017B-1*.
- D. Drywell temperature at 155 °F.

70.

Unit 1 is in Mode 4 with Shutdown Cooling established with the A Loop of RHR. Both Recirc Pumps are out of service at this time. A spurious signal has caused a Group 8 isolation which cannot be reset. Reactor vessel water level has been raised to +210".

Which ONE of the following describes the the most accurate method for determining if a Mode Change has occurred under these conditions?

- A. Verifying that the bottom head temperature is less than 212 °F ensures the Unit has not entered Mode 3.
- B. Verifying that the recirc loop suction temperatures are less than 212 °F ensures the Unit has not entered Mode 3.
- C. Verifying an increasing trend in reactor pressure has not been established ensures the Unit has not entered Mode 3.
- D. Verifying reactor vessel level has been raised to > 200" ensures natural circulation has been established and the Unit has not entered Mode 3.

71.

The Unit 1 Control Operator is walking down his panels when he notices that the CRD Flow Control Valve controller, C11-FC-R600 has failed such that the demand is 0 gpm. Flow Control Valve C11-F002A was in automatic at 60 gpm prior to the failure.

Which ONE of the following describes how Flow Control Valve C11-F002A can be controlled under these conditions?

- A. The Flow Control Valve will continue to operate at 60 gpm due to the local controller taking over control automatically.
- B. The Flow Control Valve will close until local controller C11-FK-D009A is taken to manual and adjusted as necessary.
- C. The Flow Control Valve will fully open until local controller C11-FK-D009A is taken to manual and adjusted as necessary.
- D. The Flow Control Valve will close and cannot be operated until controller C11-FC-R600 is repaired.

72.

Unit 2 is in Mode 5 with the fuel pool gates removed. Fuel Handlers are verifying the Refueling Interlocks after maintenance on the refuel bridge. 2A Core Spray pump is running for a flow rate surveillance when the operator inadvertently opens the Core Spray Injection Valve F005B. (Assume F004B is open)

Which ONE of the following describes the effect on the plant under these conditions?

- A. Fuel Pool water level will fill the skimmer surge tanks and cause the Fuel Pool Cooling Pumps to trip on high level.
- B. Reactor cavity water will drain to Radwaste through adjustable weirs located around the cavity walls.
- C. Fuel Pool water level will overflow into the Reactor Building Ventilation system.
- D. Fuel Pool water level will rise to the high level alarm setpoint at which time the Fuel Pool Cooling Pumps will trip.

73.

Which ONE of the following describes why Drywell Sprays are not initiated until Suppression Chamber pressure reaches 11.5 psig?

- A. This ensures that Suppression Chamber sprays are attempted before operation of Drywell sprays.
- B. This ensures that 100% of the non-condensibles are in the Suppression Chamber.
- C. This prevents opening of the Suppression Chamber to Drywell vacuum breakers when sprays are initiated.
- D. This prevents opening of the Reactor Building to Suppression Chamber vacuum breakers when Drywell sprays are initiated in a 100% steam atmosphere.

74.

Unit 1 was operating at 80% RTP when a loss of feedwater heating occurred.

Which ONE of the following describes the effect on the main turbine controls provided no operator action is taken?

PAM (Throttle) Pressure will \_\_\_\_\_ and send a signal to the Control Valves to \_\_\_\_\_.

- A. increase, close
- B. increase, open
- C. decrease, close
- D. decrease, open

75.

Unit 2 is operating at 75% RTP when alarm *APP A-05 3-5, REACTOR VESS HI PRESS* is received. After verifying that pressure peaked at 1065 psig you note that "C" Main Steam Line Flow indicates downscale. No other abnormal indications exist.

Which ONE of the following describes the next action that should be taken for this condition?

- A. Close the MSIV's associated with the blocked steam line.
- B. Immediately SCRAM the reactor.
- C. Reduce reactor pressure to 1030 psig.
- D. Initiate a WR/JO for the Main Steam Line Flow indicator.

76.

Unit 2 is operating at 100% RTP. The HPCI system is currently running for an OPERABILTY flow test after maintenance has been performed. The Control Operator notes that Suppression Pool temperature is 96 °F.

Which ONE of the following indicates the event status and the color code displayed by the Safety System Parameter Display System (SPDS) with regards to the Suppression Pool temperature?

Event Status = \_\_\_\_\_; Color Code = \_\_\_\_\_

- A. Safe; Green.
- B. Caution; Yellow.
- C. Alarm; Red.
- D. Inactive; Cyan.

77.

Unit 2 was operating at 100% RTP when a LOCA occurred. Water level is being maintained above TAF with the HPCI system. The following conditions exist in the Drywell:

Drywell pressure	8.0 psig
Suppression Chamber pressure	7.5 psig
Drywell temperature	275 °F
Reactor pressure	700 psig
Suppression Chamber sprays	in progress

Which ONE of the following describes the effect on the indicated water level?

Assume the fuel zone level instrument reference leg piping height is longer than the variable leg piping height in the Drywell.

- A. Level indication will be reading lower than actual water level due to the reference leg having more water in it.
- B. Level indication will be reading lower than actual water level due to Drywell temperature being above 212 °F.
- C. Level indication will be reading higher than actual water level due to Drywell temperature being above 212 °F.
- D. Level indication will still read accurate level since the high Drywell temperature affects both the reference and variable legs equally.

78.

Unit 2 has developed an unisolable leak on the ECCS Suction header. Suppression Pool level continues to lower.

Which ONE of the following corresponds to the minimum level at which the HPCI System must be isolated irrespective of adequate core cooling?

- A. -2 feet and 7 inches
- B. -5 feet and 6 inches
- C. -6 feet and 5 inches
- D. -9.0 feet

79.

Unit 2 experienced a scram due to the loss of the Reactor Feedwater Pumps. Reactor water level initially dropped to +90 inches and has been restored to +150 inches and increasing slowly. The following conditions are present at this time:

HPCI system	currently injecting
RCIC system	in Standby alignment
Secondary Containment	isolated
SBGT system	operating normally
Group 2	isolated
Group 3	RWCU system in operation
Group 6	isolated
Group 8	isolated

Which ONE of the following describes the actions that should be taken at this time?

- A. Continue to monitor HPCI operation and restore reactor water level to the normal band. RCIC operation is not required.
- B. Start RCIC manually and then secure HPCI. Increase reactor water level to the normal operating band. All required PCIS Group isolations have occurred.
- C. Reset the Group 2 isolation immediately to prevent high drywell pressure and continue to monitor HPCI while restoring reactor water level to the normal band.
- D. Isolate the RWCU System, start RCIC manually, if possible, and continue to monitor reactor water level to ensure the normal operating band is obtained.

80.

Secondary Containment Control Procedure, EOP-03-SCCP, requires Emergency Depressurization if 2 or more areas exceed the Maximum Safe Operating Temperature and a primary system is discharging reactor coolant into secondary containment.

Which ONE of the following statements explain the reason for this action?

- A. The rise in secondary containment parameters indicate a wide-spread problem which may pose a potential threat to secondary containment integrity or preclude personnel access required for the safe operation of the plant.
- B. The rise in secondary containment parameters indicate substantial degradation of the primary system and may lead to fuel failure if the leaks are not isolated.
- C. The rise in secondary containment parameters indicate a wide-spread problem which may pose a direct and immediate threat to secondary containment integrity or equipment located in secondary containment.
- D. The rise in secondary containment parameters indicate substantial degradation of the primary system and emergency depressurization effectively isolates the leak.

81.

Unit 1 has just entered Mode 4 for a refueling outage. A set of TIP traces were run approximately 24 hours ago for the Nuclear Engineer. You note that a clearance for the TIP system has not been performed as required by *OE&RC 0040, Administrative Controls for High Radiation Areas, Locked High Radiation Areas and Very High Radiation Areas*.

Which ONE of the following is required prior to entering the TIP room?

- A. RC Supervision can waive this prerequisite after reviewing the scope of the work.
- B. The Operations Shift Superintendent can waive this prerequisite due to the impact on the outage.
- C. The TIP system must be under clearance prior to entering the TIP room.
- D. The TIP room cannot be entered for 48 hours since entry into the room is prohibited for 72 hours after TIP traces being performed.

82.

Unit 1 is operating at 100% RTP when a high radiation condition occurs in the Reactor Building. The following conditions exist in the Reactor Building:

Reactor Building Supply and Exhaust Fans	tripped
Both SBGT trains	running
Reactor Building vent isolation dampers (BFIVs)	open
Reactor Building Dp	zero

Which ONE of the following describes the impact on the plant due to the above conditions?

- A. An elevated release of radioactivity from the main stack could occur.
- B. A release of radioactivity outside containment will NOT occur due to both SBGT trains running.
- C. A release of radioactivity outside containment will NOT occur since the Reactor Building Supply and Exhaust fans have tripped.
- D. A ground level release of radioactivity could occur.

83.

Unit 1 is in Mode 1 at 50% RTP. Unit 2 is in Mode 5 with preparations in progress to commence core offload. Secondary containment has experienced a high differential pressure and a blowout panel on Unit 2 has relieved the pressure. The panel will require 40 hours to be repaired and tested.

Which ONE of the following describes the impact to both units for this condition?

- A. Unit 1 must be in Mode 3 within 12 hours and in Mode 4 within 36 hours; Unit 2 cannot commence fuel movement until the blowout panel is repaired and tested.
- B. Unit 1 is unaffected by the blowout panel on Unit 2; Unit 2 cannot commence fuel movement until the blowout panel is repaired and tested.
- C. Unit 1 must be in Mode 3 within 20 hours; Unit 2 cannot commence fuel movement until the blowout panel is repaired and tested.
- D. Unit 1 must be in Mode 3 within 12 hours; Unit 2 can commence fuel movement for up to 8 hours at which time fuel movement must be stopped.

84.

Unit 2 has scrammed due to low reactor water level. Multiple control rods did not insert and the ATWS procedure is being directed by the Shift Supervisor. Current power level following the ATWS is 12% RTP. The Shift Supervisor has ordered the RO to insert control rods by increasing CRD cooling water differential pressure (dp).

Which ONE of the following describes how this action causes control rods to insert?

Increased cooling water dp:

- A. puts additional pressure on the underside of the CRDM drive pistons.
- B. puts additional pressure on the top of the CRDM drive pistons.
- C. causes driving flow to increase.
- D. causes driving flow to decrease.

85.

A loss of the Interruptible Instrument Air System has just occurred.

Which ONE of the following describe how the Reactor Feed Pump (RFP) recirculation valves and Startup Level Control Valve (SULCV) will be affected?

The RFP recirculation valves:

- A. and the SULCV fail open.
- B. and the SULCV fail closed.
- C. fail open and the SULCV fails closed.
- D. fail closed and the SULCV fails open.

86.

Unit 1 experienced a LOCA with the following conditions present:

Drywell pressure	8.5 psig
Drywell temperature	255 °F
Reactor water level	+100 inches
Hydrogen concentration	Unknown

No operator action has been taken up to this point.

Which ONE of the following describes the method for monitoring containment Hydrogen concentration in accordance with EOP-02-PCCP?

- A. Notify E&RC to coordinate with Chemistry to obtain containment atmosphere samples manually. Hydrogen monitors are isolated and cannot be overridden.
- B. Place CAC Div I/II AC ISOL OVRD switches, CS-4178 and CS-4179, to the Override position and re-open the CAM sample valves. Depress the "Sample Start" pushbutton.
- C. Place CAM Div I/II ISOL OVRD switches, CS-2986 and CS-3452, to the "ON" position. Place associated valve control switches to "close" and then to "open". Depress the "Sample Start" pushbutton.
- D. The containment is not required to be sampled for Hydrogen concentration unless reactor water level drops below Top of Active Fuel (TAF).

87.

Smoke has been detected in an area that causes the Control Room Ventilation System dampers to reposition.

Which ONE of the following describes the expected damper positions for this situation?

- A. Washroom exhaust damper closes; emergency recirc damper closes; normal makeup damper opens.
- B. Washroom exhaust damper opens; emergency recirc damper opens; normal makeup damper closes.
- C. Washroom exhaust damper opens; emergency recirc damper closes; normal makeup damper opens.
- D. Washroom exhaust damper closes; emergency recirc damper opens; normal makeup damper closes.

88.

If operating in the Scram Avoidance Region of the Flow Control Operational Map, which one of the following will reduce the likelihood of an instability event?

- A. Control rod withdrawal.
- B. Reducing recirculation flow.
- C. Increasing recirculation flow.
- D. Removing a feedwater heater string from service.

89.

Which ONE of the following changes in plant operating conditions will result in a higher MCPR operating limit as specified in the COLR?

- A. Operation at the end of cycle vs. the beginning of cycle.
- B. Operation at 90% power vs. 100% power for a given core flow.
- C. Operation at 100% core flow vs. 90% core flow for a given power.
- D. Setting the mechanical stop of the Reactor Recirculation Pumps to a lower setpoint.

90.

Which ONE of the following describes why the plant must be placed in HOT SHUTDOWN with an inoperable jet pump?

- A. There is an increased possibility of thermal hydraulic instabilities outside the defined region.
- B. An inoperable jet pump is sufficient reason to declare the recirculation loop inoperable.
- C. Blowdown area is increased or reflood capability eliminated in the event of a DBA.
- D. To prevent undue stress on the reactor vessel nozzles and in the bottom head region.

91.

You have been directed to perform OPT-12.6, Breaker Alignment Surveillance step 7.39, Outside Area - 125Volt DC Panel Interlock Check.

On distribution panel 7A you find the normal feeder breaker from the 125/250 Vdc 1A in the closed position. Which one of the following describes the reason you find the Alternate feeder breaker in the open position?

- A. The mechanical interlock is working properly.
- B. The mechanical interlock has been improperly installed on the breakers.
- C. The knife switch breaker is working properly.
- D. The knife switch breaker has been improperly installed on the breakers.

92.

You have been asked to place a boundary device tag on a butterfly valve. This valve is air operated, fails closed, and is primarily used for flow control. According to OPS-NGGC-1301, which one of the following describe the restrictions associated with using this valve for a tagging boundary?

- A. Cannot be used for a tagging boundary.
- B. Should be monitored for seat leakage.
- C. Should be monitored for drift.
- D. A mechanical positioning device or a gag is REQUIRED.

93.

Which one of the following is a feature of Unit 1 only?

- A. Select Rod Insert may be manually initiated by the operator at P603 by use of a single pushbutton.
- B. The fixed Scram point is setdown from 116% to 90%.
- C. The EOC-RPT is manually bypassed via administratively controlled key switches on P609 and P611.
- D. When not in "Run" an IRM upscale will provide an RPS trip. There is no APRM downscale RPS trip.

94.

A rupture has occurred on the end-bell (tube side) of a TBCCW heat exchanger.

Which ONE of the following color floor drain hubs should leakage be routed to?

- A. YELLOW
- B. BLACK
- C. GREEN
- D. RED

95.

Unit 2 is at 89% power when the Reactor Building Vent Exhaust Rad Monitor N010A fails upscale. Shortly after you override the CAC isolation due to the Rad Monitor N010A failing upscale, a Unit 1 Main Stack Rad Hi Hi signal initiates. Assuming all automatic actions occur, which one of the following describe how you would isolate the CAC system?

- A. All group 6 CAC valves would remain open, and would require manual closure.
- B. Only inboard group 6 CAC valves would close and the outboard valves would require manual closure.
- C. Only outboard group 6 CAC valves would close and the inboard would require manual closure.
- D. All group 6 CAC valves would automatically close.

96.

Following an incomplete Reactor scram, the operating crew is executing EOP-01-LPC, Level/Power Control. A decision step is reached asking "Is The Reactor Shutdown?".

Which one of the following conditions would satisfy the definition of "SHUTDOWN" as it applies to the Reactor?

- A. All operable APRMs are downscale.
- B. The Reactor is subcritical on range 6 of IRMs.
- C. The entire SLC tank has been injected to the Reactor.
- D. Hot Shutdown Boron Weight has been injected to the Reactor.

97.

A Unit 2 startup is in progress per GP-02. The reactor has been declared critical. The control operator is withdrawing control rods to achieve a stable positive period of 100 seconds.

Circuit Breaker #1 on Distribution Panel V10A trips resulting in a loss of power to the RPIS cabinet. The control operator should immediately do which one of the following?

- A. Stop any power changes in progress.
- B. Insert a manual reactor scram and enter EOP-01-RSP.
- C. Use the Process Computer to determine Control Rod position.
- D. Insert Control Rods to shutdown the Reactor by inserting 10 control rods past where it was declared critical.

98.

Emergency Operating Procedure guidance is provided to trip the reactor recirculation pumps during an ATWS condition.

Which ONE of the following is the basis for taking this action?

- A. To rapidly reduce reactor power and potentially reduce the amount of heat that would be added to the containment.
- B. To avoid the area of thermal hydraulic instability.
- C. To promote the dispersion of the boron from Standby Liquid Control System.
- D. To decrease reactor pressure which increases CRD drive differential pressure.

99.

During a Station Blackout on Unit One HPCI, RCIC and LPCI have all become unavailable for injection to the RPV. Plant conditions:

RPV water level	-55 inches (N036)
RPV pressure	300 psig
Drywell ref leg temp	315 °F
Injection sources	None available

Which one of the following describes the current RPV water level?

- A. Above the Minimum Steam Cooling Reactor Water Level, adequate core cooling is assured.
- B. Above the Minimum Zero-Injection Reactor Water Level, adequate core cooling is assured.
- C. Below the Minimum Steam Cooling Reactor Water Level, adequate core cooling is NOT assured.
- D. Below the Minimum Zero-Injection Reactor Water Level, adequate core cooling is NOT assured.

100.

Following a steam leak in the Unit Two Secondary Containment, a manual Reactor Scram has been inserted. Plant conditions:

RPV pressure	1000 psig
Drywell ref leg area temp	197 °F
Rx Bldg 50' temp	145 °F
Recirculation Pump	Running
RPV water level	+150" (N036/N037)
RPV water level	+170" (N026A/B)
RPV water level	+155" (N004A/B/C)
RPV water level	+160" (N027A/B)

RPV water level may be determined using which ONE of the following?

- A. N004A/B/C only.
- B. N004A/B/C and N026A/B only.
- C. N004A/B/C and N027A/B only.
- D. N004A/B/C and N036/N037 only.

Brunswick 2003 License Exam Answer Sheet Reactor Operator

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. A B C D  
2. A B C D  
3. A B C D  
4. A B C D  
5. A B C D  
6. A B C D  
7. A B C D  
8. A B C D  
9. A B C D  
10. A B C D  
11. A B C D  
12. A B C D  
13. A B C D  
14. A B C D  
15. A B C D  
16. A B C D  
17. A B C D  
18. A B C D  
19. A B C D  
20. A B C D  
21. A B C D  
22. A B C D  
23. A B C D  
24. A B C D  
25. A B C D

26. A B C D  
27. A B C D  
28. A B C D  
29. A B C D  
30. A B C D  
31. A B C D  
32. A B C D  
33. A B C D  
34. A B C D  
35. A B C D  
36. A B C D  
37. A B C D  
38. A B C D  
39. A B C D  
40. A B C D  
41. A B C D  
42. A B C D  
43. A B C D  
44. A B C D  
45. A B C D  
46. A B C D  
47. A B C D  
48. A B C D  
49. A B C D  
50. A B C D

51. A B C D  
52. A B C D  
53. A B C D  
54. A B C D  
55. A B C D  
56. A B C D  
57. A B C D  
58. A B C D  
59. A B C D  
60. A B C D  
61. A B C D  
62. A B C D  
63. A B C D  
64. A B C D  
65. A B C D  
66. A B C D  
67. A B C D  
68. A B C D  
69. A B C D  
70. A B C D  
71. A B C D  
72. A B C D  
73. A B C D  
74. A B C D  
75. A B C D

76. A B C D  
77. A B C D  
78. A B C D  
79. A B C D  
80. A B C D  
81. A B C D  
82. A B C D  
83. A B C D  
84. A B C D  
85. A B C D  
86. A B C D  
87. A B C D  
88. A B C D  
89. A B C D  
90. A B C D  
91. A B C D  
92. A B C D  
93. A B C D  
94. A B C D  
95. A B C D  
96. A B C D  
97. A B C D  
98. A B C D  
99. A B C D  
100. A B C D