

Final Submittal
(Blue Paper)

BRUNSWICK 2008-301
RETAKE

Reactor Operator Written Examination

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

Applicant Information

Name:

Date: 04/17/2008

Facility/Unit: Brunswick Units 1 & 2

Region: I II III IV

Reactor Type: W CE BW GE

Start Time:

Finish Time:

Instructions

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

Applicant Certification

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

Applicant's Signature

Results

Examination Value _____ Points

Applicant's Score _____ Points

Applicant's Grade _____ Percent

Brunswick NRC RO Exam April 2008

Name: _____

Date: 04/17/2008

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

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1. Which one of the following is the purpose of the two second timer in the RMCS malfunction circuitry?

The two second timer monitors operation of the RMCS during control rod:

- A. withdrawal only, and initiates a rod block if the timer times out.
- B. withdrawal only, and initiates a select block if the timer times out.
- C. insertion and withdrawal, and initiates a rod block if the timer times out.
- D. insertion and withdrawal, and initiates a select block if the timer times out.

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2. Recirculation MG Set 2B is operating with the following RTGB indications:

Percent speed	100%
Generator voltage	3.8 KV
Generator power	3.6 MW

The speed demand on Recirculation Pump 2B is lowered to achieve a percent speed of 50%. Which one of the following describes the affect this speed reduction has on Recirculation MG Set 2B generator voltage and generator power?

Generator voltage will be:

- A. 1.9 KV. Generator power will be 1.8 MW.
- B. 0.95 KV. Generator power will be 1.8 MW.
- C. 1.9 KV. Generator power will be 0.45 MW.
- D. 0.95 KV. Generator power will be 0.45 MW.

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3. Following a small line break in the drywell, ADS automatically initiates.

LPCI is the only available low pressure system.
Reactor pressure is 450 psig, lowering.

Which one of the following describes when reactor water level will begin to rise due to LPCI?

- A. Immediately.
- B. As soon as the LPCI injection valves open.
- C. When Reactor pressure drops to 300 psig.
- D. When Reactor pressure drops to 185 psig.

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4. Unit Two is in Mode 3 with RHR Loop 2B operating in shutdown cooling. RHR pump 2B and RHR Service Water pump 2B are running.

The following alarm and light indications are observed:

RHR Hi Drywell Pressure alarm is received
Div I RHR LPCI Initiation/Reset white light illuminates
Div II RHR LPCI Initiation/Reset white light illuminates

Based on the above conditions, how will the plant respond?

- A. Shutdown cooling isolates and RHR pump 2B trips.
- B. RHR Pump 2D auto starts but decay heat removal is lost.
- C. RHR Pump 2D auto starts and decay heat removal increases.
- D. RHR Pump 2D attempts to auto start then trips on no suction path.

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5. During performance of HPCI System Operability Testing on Unit Two per OPT-09.2, the following HPCI pump parameters are recorded:

Suction (stopped) pressure	6 psig
Suction (running) pressure	4 psig
Discharge pressure	335 psig
Flow rate	4550 GPM
Turbine speed	2490 RPM (using a portable speed indicator)
Vibration Position 4H	0.062 in/s peak
Vibration Position 4V	0.175 in/s peak
Vibration Position 9H	0.215 in/s peak
Vibration Position 9V	0.194 in/s peak
Vibration Position 10A	0.148 in/s peak
Vibration Position 10H	0.167 in/s peak
Vibration Position 10V	0.212 in/s peak

(Reference is provided)

Which one of the following is the status of HPCI per OPT-09.2 based on these readings?

- A. HPCI is operable and no additional action is required.
- B. HPCI is operable but testing frequency must be doubled.
- C. HPCI is inoperable and the pump must be immediately retested.
- D. HPCI is inoperable and shall not be returned to service until the cause is corrected.

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6. At 0200 operators observed the following plant conditions after a LOCA occurred on Unit One:

Reactor water level is 200"
Reactor pressure is 25 psig
Drywell pressure is 15 psig
Core Spray Pumps 1A is overridden off
Core Spray A injection valve (F005A) is open
Core Spray Pump 1B is running
Core Spray 1B injection valve is overridden closed

At 0205 a Loss Of Off-site Power occurred and all systems responded as expected.

Which one of the following describes how Core Spray is expected to respond following the LOOP?

- A. Core Spray Pumps A and B both remain off.
- B. Core Spray Pump B only auto starts and will inject to the reactor.
- C. Core Spray Pump B only auto starts but will not inject to the reactor.
- D. Core Spray Pumps A and B both auto start and will both inject to the reactor.

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7. Unit One is operating at rated power with DG2 under clearance. A total loss of off-site power results in a reactor scram signal but control rods fail to fully insert.

The SLC control switch has been placed to the Pump A/B Run position.

Which one of the following describes SLC response?

- A. SLC Pump A only starts, both squib valves fire.
- B. SLC Pump B only starts, both squib valves fire.
- C. SLC Pump A only starts, only squib valve A fires.
- D. SLC Pump B only starts, only squib valve B fires.

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8. During a plant shutdown per OGP-05, Unit Shutdown, a manual scram is inserted by depressing the Manual Scram Channel A and B push buttons. Sequence of events:

T=0 seconds Manual Scram push buttons are depressed

T=2 seconds Mode switch is placed to Shutdown

T=7 seconds Discharge Volume Hi Level Trip Bypass switch is placed to Bypass

Assuming the only auto scram signal present is SDV hi-hi level trip, which one of the following is the earliest time that the RPS circuitry will allow the scram to be reset?

- A. T=7 seconds.
- B. T=10 seconds.
- C. T=12 seconds.
- D. T=17 seconds.

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9. A control rod is notched out from position 02. The operator observes the 02 indication on the four rod display go out, come back on, and then go out again.

The operator then observes the 03 indication come on then go out. No additional rod position is displayed on the four rod display.

Which one of the following will RWM display as rod position (assume no additional operator action)?

- A. Position 02 in inverse video.
- B. FF with no inferred position.
- C. Position 04 in inverse video.
- D. FF with an inferred position of 04.

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10. A drywell entry is being made with the reactor at 10% power and rated pressure. TIPs are currently at the indexer position for decay following a TIP core scan.

Which one of the following TIP system manipulations is required by 00I-01.03, Non Routine Activities, Attachment 11, Drywell Entry Requirements, to reduce radiation levels in the drywell?

TIPs shall be relocated from the indexer position to the:

- A. core bottom limit with the TIP machine mode switch in Off.
- B. core bottom limit with the TIP machine mode switch in Manual.
- C. in-shield position with the TIP machine mode switch in Off.
- D. in-shield position with the TIP machine mode switch in Manual.

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11. Which one of the following is the power supply to APRM channel NUMACs?
- A. APRM channels 1-4 all receive 120 VAC power from both RPS Bus A and RPS Bus B.
 - B. APRM channels 1-4 all receive 120 VAC power from the Uninterruptible Power Supply system.
 - C. APRM channels 1 and 3 receive power from RPS Bus A, APRM channels 2 and 4 receive power from RPS Bus B.
 - D. APRM channels 1 and 3 receive power from Division I 24/48 VDC, APRM channels 2 and 4 receive power from Division II 24/48 VDC.

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12. During plant startup per OGP-02, Approach To Criticality And Pressurization Of The Reactor:

All IRMs are on Range 8.
IRM channel A is currently reading 10.

The operator places the Range switch for IRM channel A to the Range 9 position.

Which one of the following is the expected response to this manipulation?

- A. Rod block only.
- B. Rod block and full scram.
- C. Rod block and half scram.
- D. No rod block or scram signal.

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13. A reactor startup is in progress per OGP-02, Approach To Criticality And Pressurization Of The Reactor. The highest reading SRM has just reached 5×10^5 counts/second. Initial and current IRM recorder readings are as follows:

	<u>Initial reading</u>	<u>Current reading</u>
IRM channel A	7	16
IRM channel B	3	14
IRM channel C	7	13
IRM channel D	4	11
IRM channel E	5	15
IRM channel F	8	14
IRM channel G	6	11
IRM channel H	7	15

Per OGP-02, which one of the following RPS trip system(s), if any, has a sufficient number of operable IRM channels?

- A. Trip system A only.
- B. Trip system B only.
- C. Both trip system A and trip system B
- D. Neither trip system A nor trip system B.

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14. A reactor startup is in progress per OGP-02, Approach To Criticality And Pressurization Of The Reactor, the following plant conditions exist:

SRM channel A is bypassed due to a low voltage from its power supply
The reactor is critical on a 120 second period
All IRMs are on range 1

As the operator attempts to withdraw SRMs, SRM channel B detector is stuck and will not retract from the full in position.

Which one of the following describes the impact of this stuck detector as power rises and what operator action will mitigate the consequences of this failure?

Inability to withdraw this detector will result in a rod block when SRM channel B count rate reaches:

- A. 5×10^4 counts/second. Rods cannot be withdrawn until IRMs are ranged to Range 3 or above.
- B. 2×10^5 counts/second. Rods cannot be withdrawn until IRMs are ranged to Range 3 or above.
- C. 5×10^4 counts/second. Rods cannot be withdrawn until IRMs are ranged to Range 8 or above.
- D. 2×10^5 counts/second. Rods cannot be withdrawn until IRMs are ranged to Range 8 or above.

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15. Unit Two is operating at rated power. APRM channel 1 ODA indicates flow at 100%.

Which one of the following is the Simulated Thermal Power (flow biased) scram setpoint for APRM channel 1?

- A. 117.4%.
- B. 116.1%.
- C. 115.8%.
- D. 108.0%.

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16. RCIC is in standby. Which one of the following describes how RCIC speed will initially respond when a valid initiation signal is received?

RCIC turbine speed will begin to increase when:

- A. Steam supply valve (F045) begins to open, turbine speed is controlled by the ramp generator output.
- B. Turbine governor valve (V9) begins to open, turbine speed is controlled by the ramp generator output.
- C. Steam supply valve (F045) begins to open, turbine speed is controlled by the flow controller/signal converter output.
- D. Turbine governor valve (V9) begins to open, turbine speed is controlled by the flow controller/signal converter output.

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17. RCIC is running in the test mode per OPT-10.1.1, RCIC System Operability Test. The following indications are observed:

RCIC Suct Xfer CST Level Lo alarm seals in
CST level indicator on the RTGB indicates 3 feet

Which one of the following describes the final RCIC system status?

RCIC will:

- A. trip on low suction pressure.
- B. be running on minimum flow.
- C. be running and aligned from torus to CST.
- D. be running and aligned from CST to CST.

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18. Following a small line break in the Unit One drywell, plant conditions are:

Reactor water level has dropped below TAF
Reactor pressure is 900 psig

The operator is directed by 1EOP-01-RVCP, Reactor Vessel Control Procedure, to manually open ADS valves for emergency depressurization.

Which one of the following is the expected initial response of indicated reactor water level as ADS valves are opened and the reason for that response?

Indicated reactor water level will initially:

- A. rise due to void formation.
- B. lower due to void collapse.
- C. lower due to increased inventory loss.
- D. rise due to increased low pressure injection.

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19. Which one of the following describes the PCIS logic that will auto close Drywell Floor and Equipment Drain isolation valves?
- A. One out of two twice with both inboard and outboard valves closing from logic channels A1 or B1 and A2 or B2.
 - B. One out of two twice with both inboard and outboard valves closing from logic channels A1 or A2 and B1 or B2.
 - C. Two out of two once with inboard valves closing from logic channels A1 and B1 and outboard valves closing from logic channels A2 and B2.
 - D. Two out of two once with inboard valves closing from logic channels A2 and B2 and outboard valves closing from logic channels A1 and B1.

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20. Core reload is in progress per 0FH-11, Refueling. The initial loading of fuel bundles around each SRM centered 4-bundle cell was completed with all SRMs fully inserted and reading 50 counts/second.

During loading of additional fuel bundles, the following SRM readings were recorded:

<u>Bundles Loaded</u>	<u>SRM Counts</u>			
523	A - 100	B - 90	C - 150	D - 120
524	A - 120	B - 125	C - 200	D - 140
525	A - 150	B - 130	C - 260	D - 150
526	A - 190	B - 160	C - 280	D - 200

Per 0FH-11, which one of the following actions is correct?

- A. Fuel loading may continue with bundle 527.
- B. Fuel loading should be first suspended after bundle 526 was loaded.
- C. Fuel loading should have been first suspended after bundle 525 was loaded.
- D. Fuel loading should have been first suspended after bundle 524 was loaded.

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21. Which one of the following describes the power supply to the Unit Two SRV solenoids?

The normal supply to the Unit Two SRV solenoids is from 125 VDC distribution panel:

- A. 4A with a backup supply from 125 VDC distribution panel 4B.
- B. 4A with a backup supply from 125 VDC distribution panel 3A.
- C. 4B with a backup supply from 125 VDC distribution panel 4A.
- D. 4B with a backup supply from 125 VDC distribution panel 3B.

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22. During a Unit Two shutdown per OGP-05, Unit Shutdown, a reactor cooldown is being performed using Turbine Bypass Valves. Plant conditions are:

Reactor pressure is 100 psig
Bypass Valve Jack is at 20%
Low Condenser Vacuum Bypass switches are in Bypass
Main Turbine is tripped
Reactor Mode switch is in Shutdown

OGP-05 directs breaking condenser vacuum. Which one of the following describes how the Bypass Valves and the Bypass Valve Jack will respond as vacuum lowers to atmospheric pressure?

- A. Bypass Valves close when condenser vacuum lowers to 7" hg. The Bypass Valve Jack remains at 20%.
- B. Bypass Valves close when condenser vacuum lowers to 7" hg. The Bypass Valve Jack runs back to 0%.
- C. Bypass Valve closure on low vacuum is bypassed. The Bypass Valve Jack remains at 20% and Bypass Valves remain open.
- D. Bypass Valve closure on low vacuum is bypassed. The Bypass Valve Jack runs back to 0% which closes the Bypass Valves.

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23. Unit One is operating at 25% power during unit startup. The operating Reactor Feed Pump trips. The idling Reactor Feed Pump discharge valve fails to open and the reactor scrams.

HPCI and RCIC receive auto initiation signals but both fail to start. CRD flow is maximized and SLC is aligned for demin water injection and started per 1EOP-01-RVCP, Reactor Vessel Control Procedure. Reactor water level is restored to +170-200".

Which one of the following predicts Reactor Water Cleanup System status?

- A. Inboard Isolation Valve (F001) only auto closes.
- B. Outboard Isolation Valve (F004) only auto closes.
- C. Inboard and Outboard Isolation Valves both auto close, return valve (F042) remains open.
- D. Inboard and Outboard Isolation Valves both auto close, return valve (F042) auto closes.

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24. Unit Two is operating at rated power with the following Digital Feedwater Control System (DFCS) configuration:

Both Reactor Feed Pumps in Auto DFCS control
Three element control is selected
Level transmitter A is selected

Which one of the following would automatically remove the three element permissive and place DFCS in single element control?

- A. Level transmitter A fails downscale.
- B. Steam flow transmitter C fails downscale.
- C. Total feedwater flow drops to 25% of rated flow.
- D. One Reactor Feed Pump is transferred to manual control.

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25. Standby Gas Treatment (SBGT) train 2A has been manually started per 2OP-10, Standby Gas Treatment Operating Procedure, to support HPCI operability testing.

Which one of the following is the impact of starting this SBGT train on Reactor Building pressure and the reason for this response?

Reactor Building pressure will initially become:

- A. less negative and then return to the initial value due to the vortex dampers in Reactor Building Supply Fan inlets.
- B. less negative and then return to the initial value due to the vortex dampers in Reactor Building Exhaust Fan inlets.
- C. more negative and then return to the initial value due to the vortex dampers in Reactor Building Supply Fan inlets.
- D. more negative and then return to the initial value due to the vortex dampers in Reactor Building Exhaust Fan inlets.

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26. Unit One is operating at rated power. The load dispatcher has notified the control room that conditions exist where adequate voltage support cannot be provided by the grid. Electrical system status has been as follows for one minute:

Generator frequency	59.7 hertz
230 KV Bus 1A voltage	205 KV
230 KV Bus 1B voltage	205 KV
Emergency Bus E1 voltage	3690 volts
Emergency Bus E2 voltage	3685 volts

Which one of the following describes the impact of these conditions, and what operator action is required by 0AOP-22.0, Grid Instability, to mitigate the consequences of the degraded grid conditions?

- A. Main turbine blade damage may occur due to off frequency operation. Scram the reactor and trip the main turbine immediately.
- B. Main turbine blade damage may occur due to off frequency operation. Scram the reactor and trip the main turbine if frequency is 59.7 hertz for 4 additional minutes.
- C. Emergency bus loads may be damaged by degraded voltages. Open the Emergency Bus master/slave breakers and ensure diesel generators start and load.
- D. Emergency bus loads may be damaged by degraded voltages. Manually transfer Emergency Bus loads from normal feeder to diesel generator per 0OP-50.1, Diesel Generator Emergency Power System Operating Procedure.

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27. Following a loss of off-site power to both units, conditions are:

DG2 is running loaded

DG1, DG3, and DG4 are currently unavailable

Bus E4 is energized from Bus E2

Bus E2 to E4 cross-tie breakers' selector switches are in the SBO position

Which one of the following will cause the Bus E2 to Bus E4 cross-tie breakers to trip?

- A. DG2 low lube oil pressure.
- B. LOCA signal on either Unit One or Unit Two.
- C. DG4 becomes available and accelerates to rated speed and voltage.
- D. Bus E2 to E4 cross-tie breakers' selector switches are placed to Norm.

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28. The indications and status of the UPS system at the primary and standby inverters are as follows:

	<u>Primary Inverter</u>	<u>Standby Inverter</u>
Load on UPS light	Off	Off
Load on Inverter light	Off	On
Load on Alternate light	On	Off
Alt Source Failure light	Off	Off
Manual Bypass switch	Norm	Bypass Test

Which one of the following is the current status of UPS system loads?

- A. De-energized.
- B. Energized from the primary inverter.
- C. Energized from the standby inverter.
- D. Energized from the alternate source.

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29. The Unit Two Division II 125/250 VDC distribution system has just lost the 2B-1 battery and the 2B-2 battery charger.

Which one of the following describes the effect these losses have on the associated 125/250 VDC loads?

- A. All Division II 125/250 VDC loads are de-energized.
- B. All Division II 125/250 VDC loads remain energized.
- C. Only the Division II 125 VDC loads from 2B-1 are energized.
- D. Only the Division II 125 VDC loads from 2B-2 are energized.

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30. Unit One is operating at rated power when a loss of 125 VDC distribution panel 1B results in loss of the normal DC control power supply to Buses E2 and E6.

Which one of the following describes the effect this power loss will have on the ability of the breakers on Bus E2 and Bus E6 to trip on a fault overcurrent condition (Assuming no operator action)?

- A. Only the breakers on Bus E2 will trip.
- B. Only the breakers on Bus E6 will trip.
- C. Breakers on both Bus E2 and Bus E6 will trip.
- D. Breakers on both Bus E2 and Bus E6 will fail to trip.

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31. An operator is preparing to perform a control room manual transfer of Bus E1 from DG1 to normal feeder per OOP-50.1, Diesel Generator Emergency Power System Operating Procedure. DG1 is in Auto and loaded to 2800 KW.

Which one of the following describes the frequency adjustments required to perform this evolution per OOP-50.1?

Prior to selecting Control Room Manual Mode, the operator is directed to (1) frequency. The operator is then directed to adjust frequency to obtain synchroscope rotation slowly in the (2) direction prior to closing the Master/Slave breakers.

- A. 1 lower
2 slow
- B. 1 lower
2 fast
- C. 1 raise
2 slow
- D. 1 raise
2 fast

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32. Off-site power has been lost to Unit One. Electrical distribution status is:

DG1 is tripped on differential overcurrent
DG2 is running and tied to Bus E2
Bus E1 and Bus E5 are de-energized

The operator is performing 0AOP-36.1, Loss Of Any 4160V Buses Or 480V E-Buses.

Which one of the following describes if Bus E1 and/or Bus E5 is allowed to be re-energized per 0AOP-36.1 by cross-tie operation?

- A. Neither Bus E1 nor bus E5 can be re-energized by cross-tie operation.
- B. Bus E1 and Bus E5 can be re-energized by cross-tie of Bus E1 to Bus E2.
- C. Bus E1 and Bus E5 can be re-energized by cross-tie of Bus E1 to Bus E3.
- D. Bus E1 cannot be re-energized, Bus E5 can be re-energized by cross-tie to Bus E6.

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33. Which one of the following AOG stream conditions at the inlet of the Unit Two AOG Charcoal Adsorber Beds provides the the best conditions for adsorbtion of fission product gases by the charcoal per 2OP-33, Augmented Off Gas Charcoal Adsorber System Operating Procedure?
- A. Temperature of 65°F, dew point of 35°F.
 - B. Temperature of 65°F, dew point of 45°F.
 - C. Temperature of 110°F, dew point of 85°F.
 - D. Temperature of 110°F, dew point of 95°F.

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34. An operator performs the following actions in sequential order per OPT-04.1.1, Reactor Building Vent Exhaust Monitoring System Functional Test.

The operator places the mode switch for Reactor Building Ventilation Monitor A from Operate to Trip Test. The operator then adjusts the Trip Check Potentiometer to first the downscale, then the upscale hi, and then the upscale hi-hi setpoint.

Which one of the following describes when Secondary Containment will isolate and SGBT auto start during performance of this test?

- A. When the mode switch is placed from Operate to Trip Test.
- B. When the Trip Check Potentiometer is adjusted to the downscale setpoint.
- C. When the Trip Check Potentiometer is adjusted to the upscale hi setpoint.
- D. When the Trip Check Potentiometer is adjusted to the upscale hi-hi setpoint.

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35. While executing emergency operating procedures, the operator has restarted Reactor Building HVAC per OEOP-01-SEP-04, Reactor Building HVAC Restart Procedure.

Which one of the following conditions would result in the Reactor Building Supply and Exhaust Isolation Dampers closing?

- A. Reactor level lowers below LL2.
- B. Drywell pressure rises above 1.7 psig.
- C. Process Off-Gas Vent Pipe Rad Hi-Hi alarms.
- D. Reactor Building Vent Exhaust Temp Hi alarms.

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36. Which one of the following describes the design of the Reactor Building blowout panels?

The blowout panels are designed to relieve excess:

- A. internal pressure caused by a tornado in vicinity of the building.
- B. external pressure caused by a tornado in vicinity of the building.
- C. internal pressure caused by hurricane force winds in vicinity of the building.
- D. external pressure caused by hurricane force winds in vicinity of the building.

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37. Following the trip of Unit Two Reactor Recirculation pump 2B, the operator is cautioned by 2OP-02, Reactor Recirculation System Operating Procedure, and 2AOP-04.0, Low Core Flow, to maintain core flow above 30.8×10^6 lbs/hr (40% rated core flow).

Which one of the following is a reason for this caution?

Maintaining core flow above 30.8×10^6 lbs/hr will prevent:

- A. thermal binding of idle loop valves.
- B. excessive cooldown of the idle loop.
- C. reverse rotation of the idle loop pump.
- D. loss of bottom head temperature indication.

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38. Unit One is operating at 20% power. The main generator has been synchronized to the grid.

Debris in the intake canal begins to clog CWIP screens causing CWIP trips. The only CWIP currently running is CWIP 1C.

Which one of the following conditions requires a manual reactor scram per 0AOP-37.0, Low Condenser Vacuum, or 0AOP-37.1, Intake Structure Blockages?

- A. CW Screen C Diff-High or Stopped alarm is received.
- B. Exhaust Hood A and B Low Vacuum alarms are received.
- C. Condenser vacuum lowers to 22.4" causing a main turbine trip.
- D. Condensate temperature at the inlet to the CFDs rises to 160°F.

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39. Following a complete loss of off-site power to both units, DG3 is the only running DG. 0AOP-36.2, Station Blackout, is being performed and directs E-Bus cross-tie actions be completed within one hour.

Which one of the following is the reason why 0AOP-36.2 requires this action to be completed within one hour?

Restore power to operate:

- A. Control Building HVAC.
- B. drywell coolers on Unit One.
- C. battery chargers on Unit One.
- D. suppression pool cooling on Unit Two.

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40. The supply breaker to 125 VDC distribution panel 1B has tripped. The following alarms are received:

DG-2 Control Power Supply Lost
DG2/E2 ESS Loss Of Norm Power

Which one of the following is the status of DG2 and DG2/E2 ESS cabinet?

DG2 control power is:

- A. being supplied from DC panel 2B. DG2/E2 ESS cabinet power is being supplied from DC panel 2B.
- B. being supplied from DC panel 2B. DG2/E2 ESS cabinet power is being supplied from DC panel 4B.
- C. de-energized and must be aligned to DC panel 2B. DG2/E2 ESS cabinet power is being supplied from DC panel 2B.
- D. de-energized and must be aligned to DC panel 2B. DG2/E2 ESS cabinet power is being supplied from DC panel 4B.

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41. Unit One is operating at rated power with DG1 running loaded for a monthly load test. A fault trips the main generator primary lockout relay which causes a turbine trip and a reactor scram.

BOP Bus 1C fails to transfer on the generator lockout due to failure of the SAT supply breaker to close.

Which one of the following is the status of the Emergency Bus E1?

- A. Energized from DG1 with off-site power available.
- B. Energized from both DG1 and from off-site power.
- C. Energized from DG1 with off-site power unavailable.
- D. Energized from off-site power with DG1 running unloaded.

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42. Following a loss of UPS on Unit Two, a reactor scram occurs. The operator enters 2EOP-01-LPC due to the inability to determine control rod position and is directed to enter 0EOP-01-LEP-02, Alternate Control Rod Insertion.

Which one of the following describes the operator action to insert IRM and SRM detectors per 0EOP-01-LEP-02?

- A. Insert IRMs, then range IRMs to bring them on scale. When IRMs are on range 3 or below, then insert SRMs.
- B. Place all IRM range switches on range 10, then insert IRMs and SRMs, then range IRMs to bring bring them on scale.
- C. Ensure all IRM range switches are on range 3, then insert IRMs and SRMs, then range IRMs to bring bring them on scale.
- D. Insert IRMs, then range IRMs to bring them on scale. When IRMs indicate power is at or below the heating range, then insert SRMs

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43. Following a Group 1 isolation, RCIC has been placed in the pressure control mode of operation. Plant conditions are:

RCIC flow is 400 gpm

RCIC flow controller is in Auto with an output of 90%

RCIC Test Return valve (E51-F022) is throttled (dual red/green indication)

Reactor pressure is 990 psig and slowly rising

Which one of the following actions, if taken, would assist in lowering reactor pressure?

- A. Raise RCIC flow control setpoint or throttle open F022.
- B. Lower RCIC flow control setpoint or throttle open F022.
- C. Raise RCIC flow control setpoint or throttle closed F022.
- D. Lower RCIC flow control setpoint or throttle closed F022.

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44. Which one of the following systems used during plant shutdown from outside the control room per 0AOP-32.0, Plant Shutdown From Outside Control Room, has both flow indication and flow control capability at the Remote Shutdown Panel?
- A. CRD.
 - B. RCIC.
 - C. RHR Loop B.
 - D. RHR SW Loop B.

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45. Unit Two is operating at rated power when a header break on the CSW system occurs in the Service Water structure. The operator has entered 0AOP-19.0, Conventional Service Water Failure, inserted a manual scram and manually stopped all CSW pumps.

What additional action is required by 0AOP-19 and the reason this action is performed for the given conditions?

- A. Ensure CWIPs immediately auto trip to prevent damage to the motor bearings.
- B. Ensure CWIPs immediately auto trip to prevent flooding the Circ Water inlet pit.
- C. Place TBCCW Heat Exchanger 2C in service to provide cooling to Turbine Building loads from the Unit One CSW header.
- D. Place TBCCW Heat Exchanger 2C in service to provide cooling to Turbine Building loads from the Unit Two NSW header.

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46. Which one of the following describes how the loss of interruptible instrument air system pressure will effect Condensate Pump recirculation valves, Condensate Booster Pump recirculation valves, and the SJAE condensate recirculation valve (CO-FV-49)?

Condensate and Condensate Booster Pump recirculation valves fail:

- A. open, CO-FV-49 fails open.
- B. closed, CO-FV-49 fails open.
- C. open, CO-FV-49 fails closed.
- D. closed, CO-FV-49 fails closed.

BRUNSWICK NRC RO EXAM APRIL 2008

47. SBGT system controls are aligned as follows:

SBGT A is in Stby
SBGT B is in Pref

RPS MG set A trips. Which one of the following describes the response of SBGT?

- A. Only SBGT A auto starts.
- B. Only SBGT B auto starts.
- C. Both SBGT A and B auto start.
- D. Both SBGT A and B remain off.

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48. Unit One is in Mode 4 with RHR Loop B operating in shutdown cooling using RHR pump 1B.

An evolution is in progress to transfer RPS Bus B to the alternate power supply per 1OP-03, Reactor Protection System Operating Procedure.

Which one of the following actions of 1OP-03 will prevent a loss of RHR shutdown cooling?

Open the MCC power supply breaker(s) to:

- A. Inboard isolation valve (F009) only.
- B. Outboard isolation valve (F008) only.
- C. Inboard isolation valve (F009) and Loop B injection valve (F015B).
- D. Outboard isolation valve (F008) and Loop B injection valve (F015B).

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49. Unit Two is in Mode 5 with refueling in progress. The Area Rad Refuel Floor High alarm seals in.

A report is received from the refuel floor that a fuel bundle has been dropped in the fuel pool and the Continuous Air Monitor on the refuel floor is in alarm.

Per 0AOP-05.0, Radioactive Spills, High Radiation, and Airborne Activity, which one of the following actions is the operator required to perform?

- A. Only realign Reactor Building HVAC from refuel operation.
- B. Only ensure Secondary Containment auto isolates and SBGT auto starts.
- C. Manually start CREV, realign Reactor Building HVAC from refuel operation.
- D. Manually start CREV, manually isolate Secondary Containment and start SBGT.

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50. During an accident, plant conditions are:

Reactor pressure is 500 psig
Drywell pressure is 20 psig
Suppression chamber pressure is 19 psig
Suppression pool level is -3.5 feet
Suppression pool temperature is 160°F

(Reference is provided)

Which one of the following is the reason emergency depressurization is required?

- A. Steam exists in the suppression chamber air space.
- B. Prevent exceeding suppression chamber design temperature.
- C. Prevent exceeding suppression chamber boundary design load.
- D. Suppression chamber level is at the elevation of the downcomers.

BRUNSWICK NRC RO EXAM APRIL 2008

51. During an ATWS on Unit Two, plant conditions are:

One SRV is open
HPCI is injecting
Reactor pressure is 1000 psig
Suppression pool temperature is 162°F
Suppression pool level is -25 inches

(Reference provided)

Which one of the following actions is required by 2EOP-01-LPC, Level/Power Control procedure?

- A. Maintain HPCI injection and open seven ADS valves.
- B. Terminate HPCI injection to the reactor and then open seven ADS valves.
- C. Terminate HPCI injection and reduce reactor pressure, 100°F/hour cooldown rate may not be exceeded.
- D. Maintain HPCI injection and reduce reactor pressure, 100°F/hour cooldown rate may be exceeded.

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52. During a DBA LOCA on Unit Two, plant conditions are:

Reactor water level is at 2/3rd core height
One Core Spray pump injecting at 5500 gpm
One RHR Loop is available
Suppression pool temperature is 150°F

2EOP-01-RVCP, Reactor Vessel Control Procedure, directs operation of the available RHR Loop at a flow rate of 11,500 gpm with the heat exchanger bypass valve full closed and 8000 gpm RHR Service Water flow.

Which one of the following is the reason why this action is directed by 2EOP-01-RVCP?

- A. Restore adequate core cooling.
- B. Prevent exceeding primary containment design pressure.
- C. Prevent exceeding primary containment design temperature.
- D. Prevent exceeding NPSH limits for Core Spray and RHR pumps.

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53. During an accident, drywell average air temperature has reached 300°F. The operator is directed by 0EOP-02-PCCP, Primary Containment Control Procedure, to initiate drywell spray per 0EOP-01-SEP-02, Drywell Spray Procedure.

Which one of the following describes what action is required by 0EOP-02-PCCP and 0EOP-01-SEP-02 for drywell coolers and whether emergency depressurization is immediately required based on drywell average temperature of 300°F?

- A. Start all available drywell coolers. Emergency depressurization may not be delayed since drywell design temperature has been exceeded and containment integrity may be immediately challenged.
- B. Place all drywell coolers control switches to Off. Emergency depressurization may not be delayed since drywell design temperature has been exceeded and containment integrity may be immediately challenged.
- C. Start all available drywell coolers. Emergency depressurization may be delayed since it is not expected containment integrity will be immediately challenged and SRV qualification temperature has not been exceeded.
- D. Place all drywell coolers control switches to Off. Emergency depressurization may be delayed since it is not expected containment integrity will be immediately challenged and SRV qualification temperature has not been exceeded.

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54. During an accident, containment conditions are:

Drywell average temp	295°F, rising
Drywell pressure	10 psig
Suppr pool level	+22 inches
Suppr chamber pressure	9 psig

(Reference Provided)

Which one of the following describes if the requirements to initiate drywell spray are met per 0EOP-02-PCCP, Primary Containment Control Procedure, and 0EOP-01-SEP-02, Drywell Spray Procedure, and reason why?

- A. Yes, all spray requirements are met.
- B. No, suppression pool level is too high.
- C. No, Drywell Spray Initiation Limit is Unsafe.
- D. No, suppression chamber pressure is too low.

BRUNSWICK NRC RO EXAM APRIL 2008

55. Which one of the following describes when heat capacity of the suppression pool is FIRST lost solely due to lowering suppression pool level, and the required action if suppression pool level cannot be maintained above that value?

When suppression pool level drops below the elevation of the:

- A. downcomers, this requires emergency depressurization using ADS/SRVs.
- B. SRV T-Quenchers, this requires emergency depressurization using ADS/SRVs.
- C. downcomers, this requires alternate emergency depressurization to the condenser.
- D. SRV T-Quenchers, this requires alternate emergency depressurization to the condenser.

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56. During a low reactor water level emergency on Unit One, 1EOP-01-RVCP, Reactor Vessel Control Procedure, directs the operator to perform 0EOP-01-STCP, Steam Cooling Procedure.

Which one of the following describes the reason steam cooling is performed?

0EOP-01-STCP utilizes steam cooling heat transfer:

- A. with injection to maximize the time peak clad temperatures in the uncovered portion of the core do not exceed 1500°F.
- B. with injection to maximize the time peak clad temperatures in the uncovered portion of the core do not exceed 1800°F.
- C. without injection to maximize the time peak clad temperatures in the uncovered portion of the core do not exceed 1500°F.
- D. without injection to maximize the time peak clad temperatures in the uncovered portion of the core do not exceed 1800°F.

BRUNSWICK NRC RO EXAM APRIL 2008

57. Unit Two is operating at power when the following alarms/indications are observed:

Stm Leak Det Ambient Temp High alarm seals in

Stm Leak Det Δ Temp Hi alarm seals in

Mini steam tunnel temperature indicates 200°F and Max Norm (yellow) on ERFIS

Area Δ T indicates Max Normal (yellow) on ERFIS

Which one of the following describes how these conditions affect HPCI and RCIC?

- A. HPCI only will immediately isolate.
- B. RCIC only will immediately isolate.
- C. HPCI and RCIC will both immediately isolate.
- D. HPCI and RCIC will not isolate until temperatures reach Max Safe.

BRUNSWICK NRC RO EXAM APRIL 2008

58. Unit Two is in Mode 1. Reactor Building HVAC is lost and the following alarm seals in:

Rx Bldg Static Press Diff - Low (red alarm with blue bar)

Which one of the following is the significance of this alarm and its color scheme in accordance with 00I-01.08, Control Of Equipment And System Status?

- A. An AOP entry condition has been met.
- B. An EOP entry condition has been met.
- C. A Technical Specification/TRM/ODCM requirement is not met.
- D. A trip setpoint important to reactor safety has been exceeded.

BRUNSWICK NRC RO EXAM APRIL 2008

59. Unit One is operating at rated power when the following alarm is received:

South RHR Room Flood Level Hi

In accordance with the applicable APP, which one of the following requires the operator to lock out the sump pump and notify E&RC for sampling?

When the source of the leakage is from:

- A. Service Water.
- B. Fire Protection.
- C. the Suppression Pool.
- D. a primary system discharge.

BRUNSWICK NRC RO EXAM APRIL 2008

60. Unit Two was operating at rated power when a transient was initiated by a turbine trip without bypass valves. The reactor failed to scram. Indicated reactor pressure peaked at 1350 psig during the transient.

Reactor water level is currently being maintained between LL4 and TAF per the guidance of 2EOP-01-LPC, Level Power Control Procedure.

Which one of the following is correct concerning Technical Specification safety limits?

- A. No safety limits have been exceeded.
- B. Only the safety limit for reactor water level has been exceeded.
- C. Only the safety limit for reactor coolant system pressure has been exceeded.
- D. The safety limits for reactor water level and reactor coolant system pressure have both been exceeded.

BRUNSWICK NRC RO EXAM APRIL 2008

61. SJAE Radiation Monitor readings are rising. The following sequence occurs:

- At 0100, SJAE Rad Monitor Channel A reaches the High setpoint
- At 0101, SJAE Rad Monitor Channel B reaches the High setpoint
- At 0102, SJAE Rad Monitor Channel A reaches the Hi-Hi setpoint
- At 0103, SJAE Rad Monitor Channel B reaches the Hi-Hi setpoint

Which one of the following describes when the Rad Release plant display matrix on ERFIS changed from a Green Rad Release Normal display to a Yellow Rad Release Caution display, then from a Yellow Rad Release Caution to a Red Rad Release Alarm?

- A. Green to Yellow at 0100; Yellow to Red at 0101.
- B. Green to Yellow at 0100; Yellow to Red at 0102.
- C. Green to Yellow at 0101; Yellow to Red at 0102.
- D. Green to Yellow at 0101; Yellow to Red at 0103.

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62. Unit One is operating at rated power. The following alarms and indications are observed:

Air Compressor 1D Trip alarm seals in
Instrument Air Pressure Low alarm seals in
Service Air Pressure Low alarm seals in
Air Compressor 1B indicates running
Instrument Air Header pressure indicates 100 psig

The operator enters 0AOP-20.0, Pneumatic (Air/Nitrogen) System Failures, and verifies Air Compressor B has loaded.

Based on the above conditions, which one of the following is required to be verified as an automatic action(s) per 0AOP-20.0?

- A. Service Air Isolation Valves, SA-PV-706-1 & 2 have closed.
- B. Interruptible Air Isolation Valves IA-PV-722-1 & 2 have closed.
- C. Reactor Building Standby Air Compressors 1A and 1B have started.
- D. Service Air Dryer Bypass Pressure Control Valve SA-PV-5067 has opened.

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63. With Unit Two operating at rated power a temperature control valve failure causes loss of TBCCW cooling to the Reactor Recirculation MG Set 2A oil cooler.

Which one of the following describes how this loss of cooling will affect the MG Set?

A high oil temperature of:

- A. 190°F will trip the drive motor breaker and lock the scoop tube.
- B. 210°F will trip the drive motor breaker and lock the scoop tube.
- C. 190°F will lock the scoop tube. The drive motor breaker must be manually tripped.
- D. 210°F will lock the scoop tube. The drive motor breaker must be manually tripped.

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64. A fire has occurred in the Unit Two HPCI Room. What type of fire protection system is used in this room, and from what locations can this system be manually initiated?
- A. CO2. This system can be manually initiated from pull stations on the -17' elevation or the CO2 bottle storage area only.
 - B. Halon. This system can be manually initiated from pull stations on the -17' elevation or the Halon storage tank area only.
 - C. CO2. This system can be manually initiated from pull stations on the -17' elevation, the CO2 bottle storage area or the main control room fire panel.
 - D. Halon. This system can be manually initiated from pull stations on the -17' elevation, the Halon storage tank area or the main control room fire panel.

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65. Unit One is operating at full power. Normal Unit Trip and LOCA Load Shedding are enabled. Part time load shedding has not been implemented.

Which one of the following is designed to ensure Emergency Bus voltages remain within acceptable limits during a voltage transient caused by a generator trip?

Unit Trip Load Shedding is enabled for:

- A. Heater Drain Pumps and the selected Circulating Water Intake Pump only.
- B. Heater Drain Pumps, the standby Condensate Pump and the standby Condensate Booster Pump only.
- C. The selected Circulating Water Intake Pump, the standby Condensate Pump and the standby Condensate Booster Pump only.
- D. Heater Drain Pumps, the selected Circulating Water Intake Pump, the standby Condensate Pump and the standby Condensate Booster Pump.

BRUNSWICK NRC RO EXAM APRIL 2008

66. Unit One is at 20% power during plant shutdown. The shutdown plan is to perform a rapid shutdown from the current power level.

Excessive cooldown is of concern due to recent power history. The operator is performing Attachment 2 of OGP-05, Controlled Cooldown Guidance.

Which one of the following actions directed by OGP-05, Attachment 2, can be performed prior to inserting the manual scram to minimize cooldown?

- A. Raise reactor water level to 195 inches.
- B. Place the Startup Level Control Valve in service.
- C. Place Low Condenser Vacuum Bypass switches in Bypass.
- D. Secure both Steam Jet Air Ejectors and start Mechanical Vacuum Pumps.

BRUNSWICK NRC RO EXAM APRIL 2008

67. Unit One has experienced a Reactor Recirculation Pump trip. The operator has entered 1AOP-04.0, Low Core Flow. 1AOP-04.0 directs the operator to insert control rods to exit the scram avoidance region of the power to flow map.

The immediate power reduction instructions lists four control rods that are to be inserted from position 24 to position 18.

Which one of the following describes the applicable guidance of OPS-NGGC-1306, Reactivity Management Program?

OPS-NGGC-1306:

- A. allows the control rods to be continuously inserted to position 18.
- B. requires the control rods to be single notched the entire distance to position 18.
- C. allows the control rods to be continuously inserted to position 20, then notched to position 18.
- D. rod positioning guidance may be waived since an emergency condition exists.

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68. The following is the work history (excluding shift turnover time) of two Reactor Operators for the last 8 days:

	<u>RO #1</u>	<u>RO #2</u>
Day 1	0 hours	0 hours
Day 2	8 hours	8 hours
Day 3	10 hours	12 hours
Day 4	14 hours	12 hours
Day 5	8 hours	12 hours
Day 6	12 hours	0 hours
Day 7	12 hours	14 hours
Today	8 hours	10 hours

Per 0AP-001, BNP Administrative Controls, which operator(s), if either, may work for two additional hours without prior overtime approval?

- A. RO #1 only.
- B. RO #2 only.
- C. Either RO #1 or RO #2.
- D. Neither RO #1 nor RO #2.

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69. If a jet pump has been discovered to be inoperable, which one of the following describes the bases for Technical Specifications requiring a plant shutdown?
- A. Increase in blowdown flow during a DBA LOCA and the inability to reflood the reactor core to the TAF.
 - B. Decrease in blowdown flow during a DBA LOCA and the inability to reflood the reactor core to the TAF.
 - C. Increase in blowdown flow during a DBA LOCA and the inability to reflood the reactor core to two-thirds core height.
 - D. Decrease in blowdown flow during a DBA LOCA and the inability to reflood the reactor core to two-thirds core height.

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70. Per Technical Specification Table 1.1-1, Modes, which one of the following is required to transition the Unit from Mode 5 to Mode 4?

The Reactor Mode Switch must be in:

- A. Shutdown and all reactor head bolts are fully tensioned.
- B. Shutdown and the first reactor head bolt is fully tensioned.
- C. either Shutdown or Refuel and all reactor head bolts are fully tensioned.
- D. either Shutdown or Refuel and the first reactor head bolt is fully tensioned.

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71. Unit Two is in Mode 1.

The 0800 drywell leakage calculations were:

0.3 gpm floor drain leakage

1.9 gpm equipment drain leakage

These readings have been constant for several days.

At 1200 the operator is performing the CO DSR.

The 1200 difference in integrator readings are:

Drywell floor drain is 580 gallons

Drywell equipment drain is 460 gallons

Which one of the following is correct concerning requirements of LCO 3.4.4, Reactor Coolant System Operational Leakage?

- A. Leakage limits are met.
- B. Total leakage is greater than the 25 gpm limit.
- C. Unidentified leakage is greater than the 5 gpm limit.
- D. Unidentified leakage has increased by more than the 2 gpm limit in the last 24 hours.

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72. Which one of the following describes the purpose of the installed Drywell High Range area radiation monitors?

These instruments are used to provide:

- A. compliance with LCO 3.4.5, RCS Leakage Detection Instrumentation.
- B. an entry condition into 0EOP-04-RRCP, Radioactivity Release Control Procedure.
- C. a method to estimate the extent of severe core damage during accident conditions.
- D. an entry condition into 0AOP-05.0, Radioactive Spills, High Radiation, and Airborne Activity.

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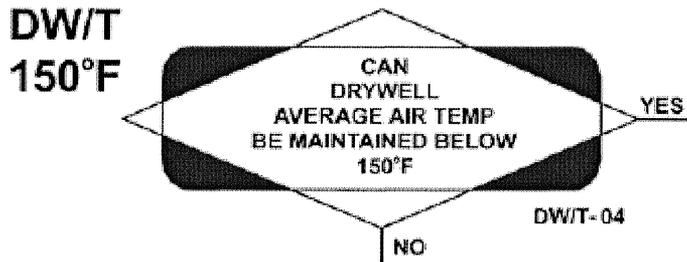
73. A new employee received 2.25 rem non-Progress Energy dose for the current year before becoming a Progress Energy employee.

The individual has since received 0.25 rem Progress Energy dose for the current year.

Which one of the following is the maximum additional dose the individual may receive for the remainder of the year without exceeding the annual administrative dose limits of DOS-NGGC-0004, Administrative Dose Limits?

- A. 0.25 rem.
- B. 1.50 rem.
- C. 1.75 rem.
- D. 2.50 rem.

74. After entering the Primary Containment Control Procedure, the following step is reached.



Drywell average air temperature is currently 145°F, and rising. Which one of the following is correct per the EOP Users Guide?

- A. You must wait until drywell average air temperature reaches 150°F to answer this question no. If the status of this step later changes you must return to this step and take the required action.
- B. You may answer this question no prior to drywell average air temperature actually reaching 150°F. If the status of this step later changes you must return to this step and take the required action.
- C. You must wait until drywell average air temperature reaches 150°F to answer this question no. If the status of this step later changes you are not required to return to this step and take the required action.
- D. You may answer this question no prior to drywell average air temperature actually reaching 150°F. If the status of this step later changes you are not required to return this step and take the required action.

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75. During a Unit One Station Blackout, the operator is executing 0AOP-36.2, Station Blackout, 1EOP-01-RVCP, Reactor Vessel Control procedure, and 0EOP-02-PCCP, Primary Containment Control Procedure.

1EOP-01-RVCP directs a cooldown not to exceed 100°F/hour, while 0AOP-36.2 directs a cooldown at a rate >100°F/hour.

Which one of the following is the cooldown rate the operator should perform on Unit One, and the reason that cooldown rate is appropriate?

- A. $\leq 100^\circ\text{F}/\text{hour}$. The actions directed by an EOP will always override actions directed by an AOP.
- B. $\leq 100^\circ\text{F}/\text{hour}$. Exceeding the Technical Specification cooldown rate limit can only be authorized by the EOP.
- C. $> 100^\circ\text{F}/\text{hour}$. This action is required during Station Blackout to prevent exceeding drywell design temperature.
- D. $> 100^\circ\text{F}/\text{hour}$. This action is required during Station Blackout to prevent exceeding suppression pool heat capacity.

5.0 SPECIAL TOOLS AND EQUIPMENT

- 5.4 Digitach, Lazertach, or equivalent portable speed indicator. If used, then record the following information:

ID No. _____
Cal date _____
Cal due date _____

- 5.5 Suitable test gauges may be used to obtain data in place of any installed instrument (ESR 01-00418 addressed problems with E41-TR-R605). If used, then record the following information:

ID No. _____
Range of instrument _____
Cal date _____
Cal due date _____
Parameter being measured _____

- 5.6 Tubing, valves, and fittings to install test gauges (as required).

- 5.7 Vent and drain rig.

6.0 ACCEPTANCE CRITERIA

This test may be considered satisfactory when the following criteria are met:

6.1 Pump Tests

R17

- 6.1.1 The HPCI pump develops a flow rate of greater than or equal to 4250 gpm with a pump discharge pressure of greater than or equal to 1110 psig when reactor pressure is between 945 psig and 1045 psig.
- 6.1.2 The pump test data shall be compared to the allowable ranges identified in Test Information Attachment 2.
- 6.1.3 If deviations fall within the ALERT RANGE of Attachment 2, then the frequency of testing shall be doubled until the cause of the deviation is determined and corrected and either the existing reference values reverified or a new set of reference values established per OMa-1988, Paragraph 6.1.

6.0 ACCEPTANCE CRITERIA

- 6.1.4 If the deviations fall within the REQUIRED ACTION RANGE of Attachment 2, then the pump shall be declared inoperable and **NOT** returned to service until the condition has been corrected.
- 6.1.5 When completed test results show deviations outside the allowable ACCEPTANCE VALUE, the instruments involved may be recalibrated and the test rerun. However, this shall **NOT** preclude declaring the pump inoperable as required.

6.2 Check Valve Testing

- 6.2.1 Valve exercising to the full open position shall be satisfied by demonstrating the ability to pass maximum accident condition flow. Flow rates less than maximum accident flow are considered a partial exercise test.
- 6.2.2 Valve exercising to the closed position shall be considered satisfactory by demonstrating the ability to establish a differential pressure across the valve seat or by opening an upstream drain connection and verifying the absence of flow pressurized with pressure on the downstream side.

6.3 Leak Tightness

- 6.3.1 Identified leakage is recorded on Attachment 4, Leak Identification Data Sheet, and a Work Request (WR) is initiated for any leakage with the exception of packing and gasket leakage less than 5 drops per minute (dpm). The WR shall state that identified leakage is required to be corrected or minimized as required by TS 5.5.2.
- 6.3.2 For 'through-wall' or 'through-weld' leakage, a Nuclear Condition Report (NCR) is initiated to assess structural integrity of the affected component.

R31

- 6.3.3 The following applicable actions are taken when the combined leakage total (AST Combined Leakage Log value plus leakage from components shown in the shaded areas of Attachment 7) is greater than 0 gpm:
 - 1. If the combined leakage is determined to be less than or equal to 1 gallon per minute (gpm), the normal work management process (PRI 3) for correcting leakage is implemented.

6.0 ACCEPTANCE CRITERIA

R31

2. If the combined leakage is determined to be greater than 1 gpm and less than or equal to 20 gpm, the initiated WR should be identified as PRI 2 to expedite corrective actions to eliminate or reduce identified leakage as soon as plant conditions allow.
3. If the combined leakage is greater than 20 gpm, the initiated WR should be identified as PRI 2 to expedite corrective actions to eliminate or reduce identified leakage as soon as plant conditions allow. A Nuclear Condition Report (NCR) is initiated to have Engineering assess the impact to the AST (10CFR50.67) analysis.

6.4 Response Time Determination

- 6.4.1 HPCI response time determination is performed at a frequency of at least once per 24 months. The HPCI system response time calculated will be less than or equal to 60 seconds.

ATTACHMENT 2
Page 1 of 4
HPCI Pump Data Sheet

Unit 1

Discharge pressure - suction pressure (running) = delta P (dP)

_____ - _____ = _____

Lubricant level normal _____

- NOTES:**
1. Pump vibration is measured at the test point marked on the pump for the correct bearing number and direction as indicated by the Test Position number as follows:
 - the number indicates the bearing number from Attachment 6
 - for direction, A = Axial, H = Horizontal, V = Vertical
 2. The magnetic holder is to be used with the accelerometer probe for all vibration readings.

UNIT 1 HPCI PUMP TEST DATA

TEST PARAMETER	ACTUAL VALUE	REFERENCE VALUE	ACCEPTABLE VALUE	ALERT RANGE		REQUIRED ACTION RANGE	
				LOW	HIGH	LOW	HIGH
Suction Press. (Stopped) psig		N/A	≥ 4	N/A	N/A	< 4	N/A
Suction Press. (Running) psig		N/A	N/A	N/A	N/A	N/A	N/A
Discharge Press. psig		N/A	N/A	N/A	N/A	N/A	N/A
Pump DP psid		375	337.5 to 412.5	N/A	N/A	< 337.5	> 412.5
Flow Rate gpm		4500	N/A	N/A	N/A	N/A	N/A
Turbine Speed rpm		2500	2485 to 2515*	N/A	N/A	N/A	N/A
Vibration-vel(in/s) peak Position 4 H		0.136	0 to 0.325	N/A	> 0.325 to 0.700	N/A	> 0.700
Vibration-vel(in/s) peak Position 4 V		0.280	0 to 0.325	N/A	> 0.325 to 0.700	N/A	> 0.700
Vibration-vel(in/s) peak Position 9 H		0.114	0 to 0.285	N/A	> 0.285 to 0.684	N/A	> 0.684
Vibration-vel(in/s) peak Position 9 V		0.124	0 to 0.310	N/A	> 0.310 to 0.700	N/A	> 0.700
Vibration-vel(in/s) peak Position 10 A		0.138	0 to 0.325	N/A	> 0.325 to 0.700	N/A	> 0.700
Vibration-vel(in/s) peak Position 10 H		0.202	0 to 0.325	N/A	> 0.325 to 0.700	N/A	> 0.700
Vibration-vel(in/s) peak Position 10 V		0.269	0 to 0.325	N/A	> 0.325 to 0.700	N/A	> 0.700

* Range given in Acceptable Value only applicable when using a portable speed indicator.

ATTACHMENT 2
Page 2 of 4
HPCI Pump Data Sheet

Unit 1

Performed by: _____
Signature Date Time

IST Group: _____
Signature Date Time

CORRECTIVE ACTION

1. Any required corrective action shall be performed in accordance with Section 6.0, Acceptance Criteria.

ATTACHMENT 2
Page 3 of 4
HPCI Pump Data Sheet

Unit 2

Discharge pressure - suction pressure (running) = delta P (dP)

_____ - _____ = _____

Lubricant level normal _____

- NOTES:**
1. Pump vibration is measured at the test point marked on the pump for the correct bearing number and direction as indicated by the Test Position number as follows:
 - the number indicates the bearing number from Attachment 6
 - for direction, A = Axial, H = Horizontal, V = Vertical
 2. The magnetic holder is to be used with the accelerometer probe for all vibration readings.

UNIT 2 HPCI PUMP TEST DATA

TEST PARAMETER	ACTUAL VALUE	REFERENCE VALUE	ACCEPTABLE VALUE	ALERT RANGE		REQUIRED ACTION RANGE	
				LOW	HIGH	LOW	HIGH
Suction Press. (Stopped) psig		N/A	≥ 4	N/A	N/A	< 4	N/A
Suction Press. (Running) psig		N/A	N/A	N/A	N/A	N/A	N/A
Discharge Press. psig		N/A	N/A	N/A	N/A	N/A	N/A
Pump DP psid		367	330.3 to 403.7	N/A	N/A	< 330.3	> 403.7
Flow Rate gpm		4550	N/A	N/A	N/A	N/A	N/A
Turbine Speed rpm		2500	2485 to 2515*	N/A	N/A	N/A	N/A
Vibration-vel(in/s) peak Position 4 H		0.056	0 to 0.140	N/A	> 0.140 to 0.336	N/A	> 0.336
Vibration-vel(in/s) peak Position 4 V		0.163	0 to 0.325	N/A	> 0.325 to 0.700	N/A	> 0.700
Vibration-vel(in/s) peak Position 9 H		0.087	0 to 0.217	N/A	> 0.217 to 0.522	N/A	> 0.522
Vibration-vel(in/s) peak Position 9 V		0.080	0 to 0.200	N/A	> 0.200 to 0.480	N/A	> 0.480
Vibration-vel(in/s) peak Position 10 A		0.108	0 to 0.270	N/A	> 0.270 to 0.648	N/A	> 0.648
Vibration-vel(in/s) peak Position 10 H		0.131	0 to 0.325	N/A	> 0.325 to 0.700	N/A	> 0.700
Vibration-vel(in/s) peak Position 10 V		0.100	0 to 0.250	N/A	> 0.250 to 0.600	N/A	> 0.600

* Range given in Acceptable Value only applicable when using a portable speed indicator.

ATTACHMENT 2
Page 4 of 4
HPCI Pump Data Sheet

Unit 2

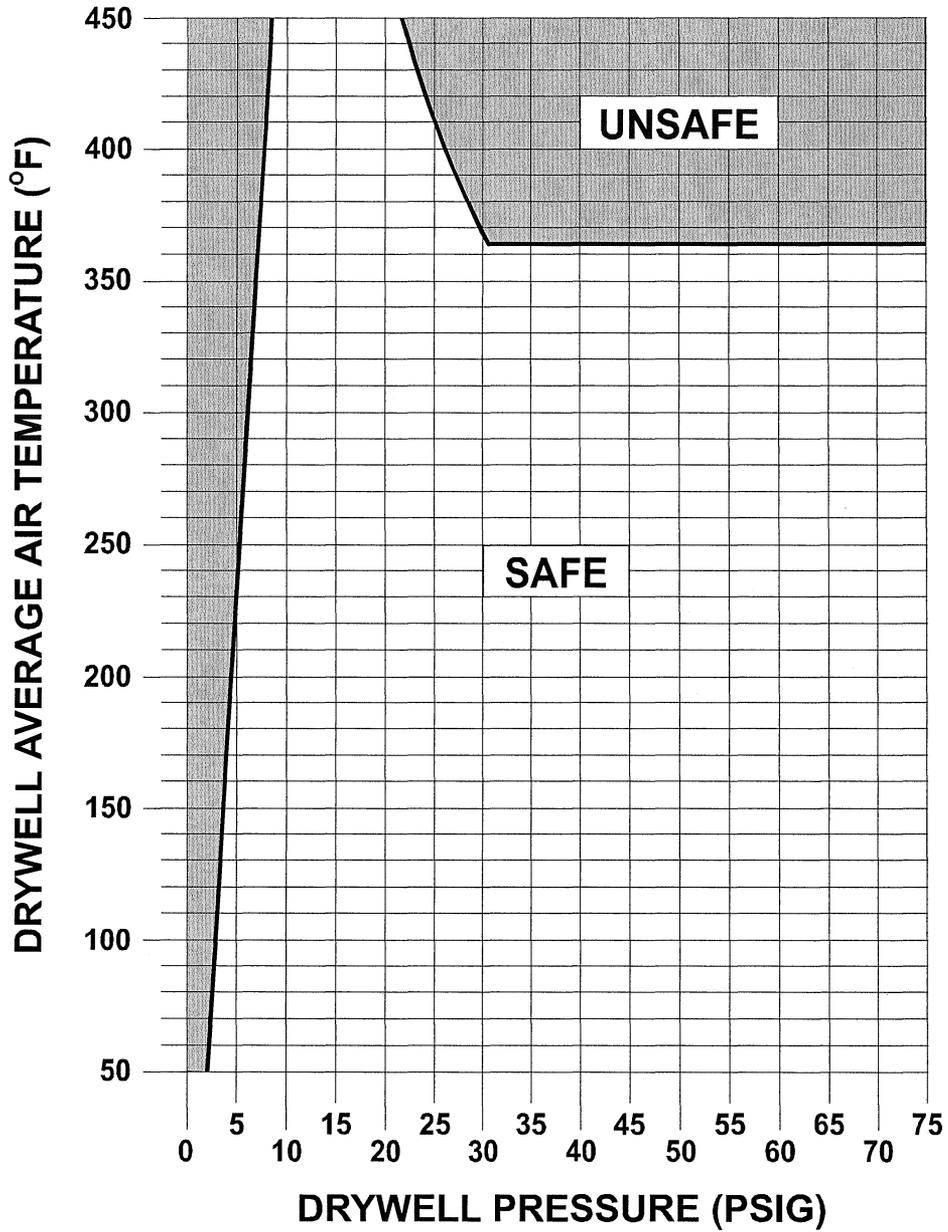
Performed by: _____
Signature Date Time

IST Group: _____
Signature Date Time

CORRECTIVE ACTION

1. Any required corrective action shall be performed in accordance with Section 6.0, Acceptance Criteria.

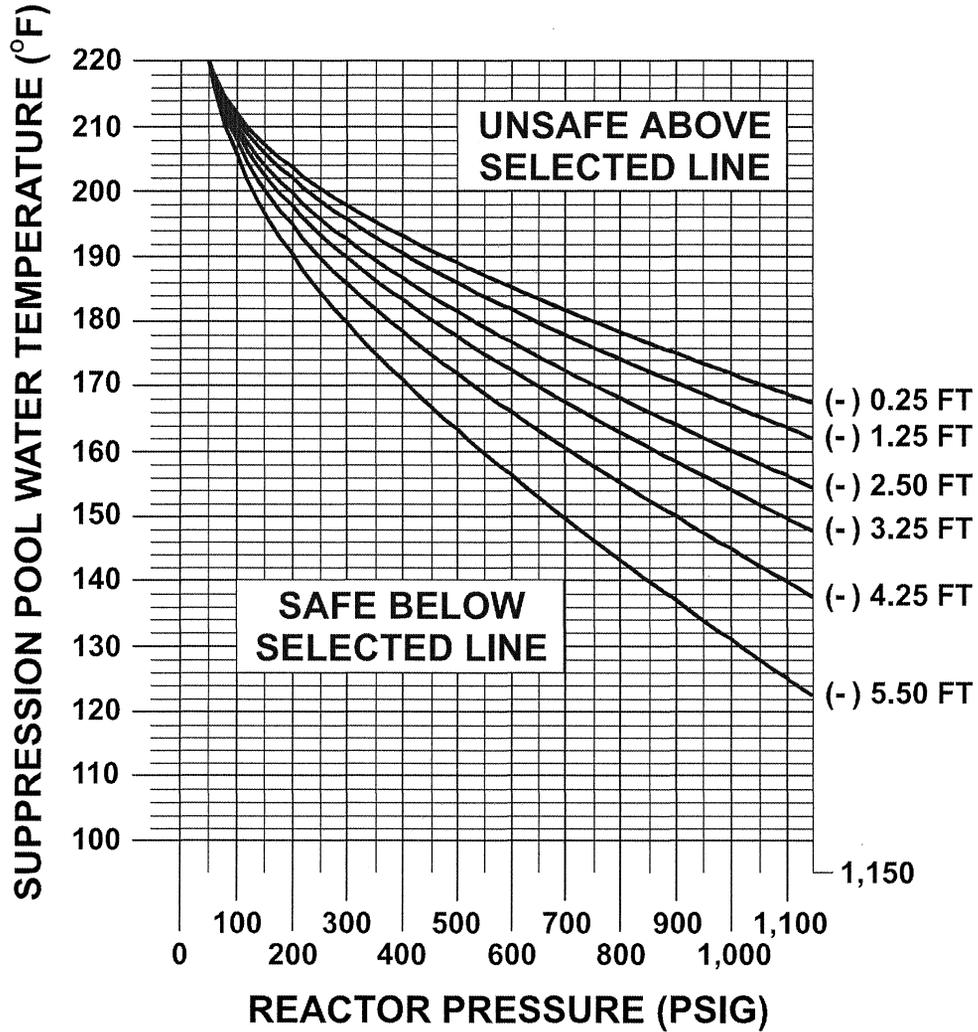
Drywell Spray Initiation Limit



DRYWELL AVERAGE AIR TEMPERATURE MAY BE DETERMINED USING ATTACHMENT 4.

FIGURE 3

Heat Capacity Temperature Limit



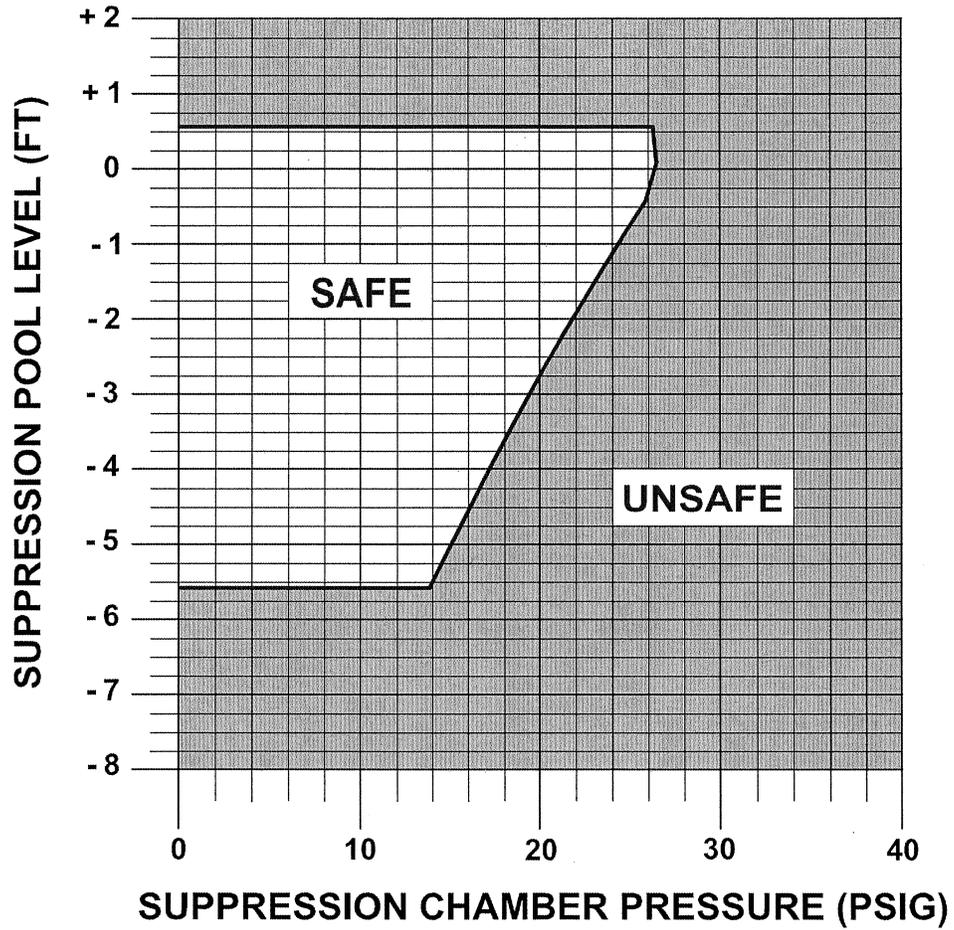
SUPPRESSION POOL WATER TEMPERATURE IS DETERMINED BY:

- CAC-TR-4426-1A, POINT WTR AVG OR
- CAC-TR-4426-2A, POINT WTR AVG OR
- COMPUTER POINT G050 OR
- COMPUTER POINT G051 OR
- CAC-TY-4426-1 OR
- CAC-TY-4426-2

SELECT GRAPH LINE IMMEDIATELY BELOW SUPPRESSION POOL WATER LEVEL AS THE LIMIT.

FIGURE 7

Pressure Suppression Pressure



ANSWER KEY REPORT
for Brunswick NRC RO Exam April 2008 Test Form: 0

#	ID	Points	Type	0	Answers
1	201002 2.1.28 1	1.00	MCS	B	
2	202002A103 1	1.00	MCS	C	
3	203000A305 1	1.00	MCS	D	
4	205000A303 1	1.00	MCS	B	
5	206000 2.1.25 1	1.00	MCS	A	
6	209001K601 1	1.00	MCS	D	
7	211000K603 1	1.00	MCS	C	
8	212000K408 1	1.00	MCS	B	
9	214000K501 1	1.00	MCS	D	
10	215001A101 1	1.00	MCS	C	
11	215002K203 1	1.00	MCS	A	
12	215003A104 1	1.00	MCS	A	
13	215003A407 1	1.00	MCS	D	
14	215004A203 1	1.00	MCS	D	
15	215005K407 1	1.00	MCS	C	
16	217000A302 1	1.00	MCS	A	
17	217000A411 1	1.00	MCS	B	
18	218000A105 1	1.00	MCS	A	
19	223002K114 1	1.00	MCS	C	
20	234000A103 1	1.00	MCS	C	
21	239002K201 1	1.00	MCS	C	
22	241000A406 1	1.00	MCS	A	
23	259001K304 1	1.00	MCS	C	
24	259002K102 1	1.00	MCS	B	
25	261000A104 1	1.00	MCS	C	
26	262001A211 1	1.00	MCS	C	
27	262001K402 1	1.00	MCS	A	
28	262002A301 1	1.00	MCS	D	
29	263000K102 1	1.00	MCS	B	
30	263000K302 1	1.00	MCS	B	
31	264000A404 1	1.00	MCS	C	
32	264000K302 1	1.00	MCS	D	
33	271000K508 1	1.00	MCS	A	
34	272000A406 1	1.00	MCS	A	
35	288000K402 1	1.00	MCS	D	
36	290001K402 1	1.00	MCS	A	
37	295001K303 1	1.00	MCS	B	
38	295002K103 1	1.00	MCS	D	
39	295003K301 1	1.00	MCS	C	
40	295004A204 1	1.00	MCS	D	
41	295005A208 1	1.00	MCS	D	
42	295006A105 1	1.00	MCS	A	
43	295007A103 1	1.00	MCS	C	
44	295016K201 1	1.00	MCS	B	
45	295018K305 1	1.00	MCS	C	
46	295019K207 1	1.00	MCS	A	

ANSWER KEY REPORT
for Brunswick NRC RO Exam April 2008 Test Form: 0

Answers				
#	ID	Points	Type	0
47	295020K211 1	1.00	MCS	B
48	295021A102 1	1.00	MCS	D
49	295023A203 1	1.00	MCS	D
50	295024K304 1	1.00	MCS	A
51	295025A203 1	1.00	MCS	B
52	295026K101 1	1.00	MCS	D
53	295028K202 1	1.00	MCS	D
54	295029A201 1	1.00	MCS	B
55	295030K103 1	1.00	MCS	A
56	295031K304 1	1.00	MCS	D
57	295032K206 1	1.00	MCS	A
58	295035 2.4.31 1	1.00	MCS	B
59	295036 2.4.50 1	1.00	MCS	A
60	295037 2.2.22 1	1.00	MCS	D
61	295038K208 1	1.00	MCS	B
62	300000K102 1	1.00	MCS	A
63	400000K301 1	1.00	MCS	B
64	600000A108 1	1.00	MCS	A
65	700000 2.1.28 1	1.00	MCS	B
66	GEN 2.1.23 1	1.00	MCS	A
67	GEN 2.1.39 1	1.00	MCS	B
68	GEN 2.1.5 1	1.00	MCS	D
69	GEN 2.2.25 1	1.00	MCS	C
70	GEN 2.2.35 1	1.00	MCS	A
71	GEN 2.2.37 1	1.00	MCS	D
72	GEN 2.3.15 1	1.00	MCS	C
73	GEN 2.3.4 1	1.00	MCS	B
74	GEN 2.4.14 1	1.00	MCS	B
75	GEN 2.4.8 1	1.00	MCS	C
SECTION 1 (75 items)		75.00		