

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 1

EXAM KEY

JANUARY 2009

Columbia is starting up with the Main Turbine synchronized to the grid with SM-1, SM-2, and SM-3 being powered from the Normal Transformers. The Reactor Operator is preparing to transfer SH-5 and SH-6 to the Normal Transformer when the Startup Transformer loses power.

Which of the following is correct?

- A. An immediate Reactor Scram is required; place the MODE switch in SHUTDOWN.
- B. ABN-LEVEL is entered due to the unplanned decrease in Reactor water level.
- C. ABN-POWER is entered and Reactor power is lowered to LE 3486 MWT.
- D. With no operator action, the Reactor will scram on low RPV water level.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295001 AA1.02 Ability to operate and/or monitor the following as they apply to partial or complete loss of forced core flow circulation: RPS (3.3 / 3.3)

REFERENCE: ABN-RRC-LOSS; ABN-POWER; ABN-LEVEL

SOURCE: New

LO: 11781 Predict the impacts that a partial or complete loss of the Reactor Recirculation System will have on the following: Reactor Scram; 6733 State the immediate actions associated with ABN-RRC-LOSS.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: With the loss startup power to SH-5 and SH-6, all RRC flow is lost (RRC-P-1A powered from SH-5 and RRC-P-1B powered from SH-6). Immediate action for ABN-RRC-LOSS is to initiate a Reactor Scram. A is correct. B is incorrect as RPV level will rise. C is incorrect as power is already LE 3486 MWT. D is incorrect as feed flow is not affected. This distracter would be correct if SM-1, SM-2 and SM-3 were still powered from the Startup Transformer.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 2

EXAM KEY

JANUARY 2009

If the breaker for the normal AC source to E-IN-1 is opened, which of the following would then be supplying power to US-PP?

- A. MC-7A
- B. MC-7F
- C. DP-S1-2
- D. DP-S2-1

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295003 AK2.06 Knowledge of the interrelationships between Partial or Complete Loss of AC Power and the following: DC electrical loads (3.4 / 3.5)

REFERENCE: SD000194 UPS Systems Text Pg 4 and figure 3

SOURCE: New

LO: 11826 Identify the effect that a loss or malfunction of the AC Electrical Distribution system will have on the following: DC electrical distribution

RATING: L3

ATTACHMENT: None

JUSTIFICATION: When normal AC power is lost (MC-7A), the static switch automatically swaps to the DC input which is from battery DP-S2-1. MC-7A is the normal AC input and also the bypass source. MC-7F is the bypass AC source. DP-S1-1 is a Div 1 125VDC battery and supplies IN-2/3 not IN-1.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 3

EXAM KEY

JANUARY 2009

The plant was operating at 99% power when a LOCA signal was received. While verifying auto actions, the CRO notes neither LPCS-P-1 nor RHR-P-2A started. Additionally, the CRO notes that neither system has valve position indication on P601.

The CRO attempts to start both pumps but neither pump starts with the control switch on P601.

Which of the following is the correct explanation for these conditions?

A loss of...

- A. both B1-1 and C1-1 after the LOCA signal.
- B. both B1-1 and C1-1 prior to the LOCA signal.
- C. both B1-2 and C1-2 after the LOCA signal.
- D. both B1-2 and C1-2 before the LOCA signal.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295004 AA2.02 Ability to determine and/or interpret the following as they apply to Partial or Complete Loss of DC power: Extent of partial or complete loss of DC Power (3.5 / 3.9)

REFERENCE: ABN-ELEC-125VDC Page 12

SOURCE: Bank Modified

LO: 5262 Given a list of loads that are important to plant safety or vital to plant operation, identify its relationship to 125 VDC Bus. 11842 Describe the effect of a partial or complete loss of DC power on the following: (C) DC bus loads

RATING: L3

ATTACHMENT: None

JUSTIFICATION: Losing DC after the LOCA signal (and thus after the pumps have started) would not turn the pumps off. LPCS and RHR are Div. 1 systems. B1-1 and C1-1 are Div. 1. B1-2 and C1-2 are Div 2 and would not affect Div. 1 systems if lost. B is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 4

EXAM KEY

JANUARY 2009

Which of the following is designed to mitigate the effect that if a scram were to occur late in core life, the first few inches of control rod travel would add less negative reactivity than if the scram were to occur earlier in core life?

Reactor Recirculation pumps.....

- A. runback if a Reactor Feedwater Turbine trips and RPV level drops below level 4.
- B. trip due to a Main Turbine trip if Reactor power is GT 30%.
- C. runback to 15 Hz if RPV level drops below level 3.
- D. trip due to RPV level drop below level 2.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295005 AK3.02 Knowledge of the reason for the following responses as they apply to Main Turbine Generator Trip: Recirculation pump downshift/trip (3.4 / 3.5)

REFERENCE: SD000178 Pg 23; SD000126 Pg 26 and 27.

SOURCE: New

LO: 11647 Explain the reasons for the following responses as they apply to Main Turbine trip: b. Recirculation pump trip

RATING: H2

ATTACHMENT: None

JUSTIFICATION: While all of the possible answers are true, the RRC pump trip on a MT trip (EOC-RPT) is designed to mitigate effects of scram late in core life. B is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 5

EXAM KEY

JANUARY 2009

A series of events has occurred resulting in the Control Room Supervisor entering the EOPs.

Which of the following combinations would not require a transition to PPM 5.1.2, RPV Control ATWS, by ensuring that there is sufficient shutdown margin to assure the reactor is shutdown under all conditions?

1. one control rod at position 48
2. one control rod at position 08
3. two control rods at position 04
4. two control rods at position 02
5. all other Control Rods at position 04
6. all other Control Rods at position 02
7. all other Control Rods at position 00

- A. 1 and 2 and 7
- B. 2 and 3 and 6
- C. 2 and 4 and 7
- D. 1 and 4 and 5

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295006 AK1.02 Knowledge of the operational implications of the following as they apply to SCRAM: Shutdown Margin (3.4 / 3.7)

REFERENCE: OI-15 Page 19

SOURCE: New

LO: 7784 Given a list, identify the criteria that must be met to ensure that the existing rod pattern alone can always assure reactor shutdown.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: Per OI 15 the reactor is shutdown with one rod at any position and all others at least inserted to position 02. C is the only choice that meets that criteria.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 6

EXAM KEY

JANUARY 2009

The Shift Manager has directed abandonment of the Main Control Room.

Which of the following statements is correct?

Switch manipulations at the.....

- A. Remote Shutdown Panel starts both WMA-FN-52B and WMA-FN-53B.
- B. Alternate Remote Panel starts both WMA-FN-52A and WMA-FN-53A.
- C. Remote Shutdown Panel starts only WMA-FN-52B.
- D. Alternate Remote Panel starts only WMA-FN-52A.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295016 AK2.03 Knowledge of the interrelationships between Control Room abandonment and the following: Control room HVAC (2.9 / 3.1)

REFERENCE: SD000201 Page 13

SOURCE: New

LO: 7736 State the effect when each of the FRTP Switches is placed in 'Emergency'.

RATING: L4

ATTACHMENT: None

JUSTIFICATION: Placing the FRTS to emergency at the RSD starts both the 52B and 53B fans. The only fan that gets a start signal from ARSD is the 53A fan. A is correct.

COMMENTS: During validation ensure this required to be memorized?

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 7

EXAM KEY

JANUARY 2009

CAS-C-1B was operating when a loss of TSW occurred. CAS-C-1B tripped due to high discharge air temperature. The control room directed fire water be aligned to the compressor. The control switch for CAS-C-1B, on P840, is still in the "RUN" position.

Which of the following describes the restart of CAS-C-1B?

- A. CAS-C-1B will automatically restart on low control air system pressure regardless of the status of the low cooling water pressure condition.
- B. CAS-C-1B will automatically restart as soon as the low cooling water pressure condition clears.
- C. After the low cooling water pressure condition clears, CAS-C-1B will restart when the reset pushbutton at the local control cabinet is depressed.
- D. After the low cooling water pressure condition clears, CAS-C-1B will restart when the control switch on P840 is placed in "OFF" then back to "RUN".

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295018 AA2.05 Ability to determine and/or interpret the following as they apply to Partial or Complete Loss of Component Cooling Water: system pressure (2.9 / 2.9)

REFERENCE: SD000205 Page 13; ARP 4.840.A5 1-5

SOURCE: Bank modified LR00418

LO: 5873 Describe the actions necessary to reset a Control Air Compressor trip when the trip condition has cleared.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: To restart a tripped CAS compressor the condition must clear and the reset P/B locally needs to be depressed. C is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 8

EXAM KEY

JANUARY 2009

During operation at full power, CRO2 responds to a 'ADS N2 HDR B ISOLATED' alarm and refers to Alarm Response Procedure 4.820.B1 6-4. ADS Header pressure is checked and found to be 157 psig and trending down slowly. Five minutes later CRO2 reports that CIA system pressure is trending up.

Which of the following would describe the system status that CRO2 would observe when automatic actions of the ARP are verified and then again when the alarm clears?

- A. CIA-V-39B is closed. When header pressure is GT 160 psig, the alarm clears but no automatic actions occur.
- B. CIA-V-39B is closed. When header pressure is GT 160 psig, the alarm clears and CIA-V-39B automatically opens.
- C. Three minutes after receiving the alarm, CIA-V-39B will close. When header pressure is GT 160 psig, the alarm clears but no automatic actions occur.
- D. Three minutes after receiving the alarm, CIA-V-39B will close. When header pressure is GT 160 psig, the alarm clears and three minutes later, CIA-V-39B automatically opens.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295019 2.4.10 Partial or complete loss of Inst. Air. Knowledge of Annunciator response procedures (3.0 / 3.1)

REFERENCE: ARP 4.820.B1 6-4; SD000156 Page 7

SOURCE: New

LO: 11755 Describe the function, purpose and design features of the following Containment Instrument Air System components: Solenoid actuated air operated valves: CIA-V-39A and CIA-V-39B

RATING: L3

ATTACHMENT: None

JUSTIFICATION: The alarm annunciates when pressure has been LT 160 psig for 3 minutes. Automatic actions include CIA-V-39B going closed. When pressure rises above 160 psig the annunciator clears and CIA-V-39B automatically opens. B is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 9

EXAM KEY

JANUARY 2009

Columbia has shutdown for a refueling outage after a long run at full power. Refueling activities are underway. A full core offload is approximately half way completed. One RHR Systems is providing Shutdown Cooling and the other RHR loop is providing Fuel Pool Cooling Assist. Temperatures in the Reactor Vessel and the Spent Fuel Pool are currently stable.

If RHR-P-2A trips, which of the following is correct?

- A. Temperatures remain fairly constant in both the Reactor Vessel and the Spent Fuel Pool.
- B. Temperatures in both the Reactor Vessel and the Spent Fuel Pool uniformly increase.
- C. Reactor Vessel temperature remains fairly constant while Spent Fuel Pool temperature increases.
- D. Reactor Vessel temperature increases while Spent Fuel Pool temperature remains fairly constant.

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295021 2.2.27 Loss of Shutdown Cooling. Knowledge of the refueling process (2.6 / 3.5)

REFERENCE: SD000198 Page 6

SOURCE: Bank modified

LO: 5774 Describe the flow-path within the appropriate RHR System for each of the following: b. Shutdown Cooling; g. FPC Assist (refuel)

RATING: H3

ATTACHMENT: None

JUSTIFICATION: Only B RHR provides Fuel Pool Cooling Assist. 'A' RHR loop is in Shutdown Cooling. A loss of SDC results in rising temperature in the Reactor Vessel. Temperature in the Spent Fuel Pool remains constant as B RHR is still operating. D is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 10

EXAM KEY

JANUARY 2009

During refueling, a subcritical check is performed to demonstrate adequate margin to criticality exists thus preventing a possible refueling accident due to inadvertent criticality.

Which of the following describes the relationship between the RPS shorting links and performing a subcritical check?

- A. Installing the shorting links prevents an SRM from generating a rod withdraw block to RMCS which then allows a control rod to be withdrawn to perform the subcritical checks.
- B. Removing the shorting links allows any SRM to generate a upscale trip reactor scram signal and makes IRM and APRM scram trips non-coincident.
- C. Installing the shorting links allows any SRM to generate a upscale trip reactor scram signal if counts become $GT 2 \times 10^5$ but does nothing to change the IRM or APRM trips.
- D. Removing the shorting links allows any SRM to generate a upscale trip reactor scram signal if counts become $GT 2 \times 10^5$ but does nothing to change the IRM or APRM trips.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295023 AK3.04 Knowledge of the reason for the following responses as they apply to Refueling Accidents: Non-coincident Scram function (3.0 / 3.5)

REFERENCE: PPM 6.3.3; SD000132 page 26

SOURCE: New

LO: 5843 List the scrams and rod blocks generated by the SRM system; 7677 Describe the effect(s) on RPS when the shorting links are removed.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: Removal of the shorting links activates the SRM scram trip capability and also makes the IRM and APRM scram trips non-coincident, B is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 11

EXAM KEY

JANUARY 2009

With Columbia operating at power, a small leak inside containment occurs causing drywell pressure to rise. A manual scram is inserted prior to the high drywell pressure scram signal. Shortly after the manual scram the automatic high drywell scram signal comes in. All components function as designed.

Which of the following is correct concerning the Standby Gas Treatment systems response to this condition?

- A. SGT-FN-1A1 starts based on the high drywell signal.
- B. SGT-FN-1B1 starts based on the high drywell signal.
- C. SGT-EHC-1A1 energizes based on the high drywell signal and SGT-FN-1A1 starts 10 seconds later.
- D. SGT-EHC-1B1 energizes based on the high drywell signal and SGT-FN-1B1 starts 10 seconds later.

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295024 EA1.20 Ability to operate and/or monitor the following as they apply to High Drywell Pressure: Standby Gas Treatment/FRVS Plant Specific (3.5 / 3.6)

REFERENCE: SD000144 Page 8 and 10

SOURCE: New

LO: 5828 State the SGT system response to a FAZ signal. Include all major valves, heaters, and fans and their associated delay times.

RATING: L2

ATTACHMENT: None

JUSTIFICATION: High Drywell Signal energizes the heaters for the lead fans SGT-FN-1A1/1B2. 10 seconds after the heaters energize the fans start. SGT-FN-1A1 and 1B2 are lead fans. SGT-FN-1B1 would only start if SGT-FN-1B2 did not. A is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 12

EXAM KEY

JANUARY 2009

With Columbia operating in MODE 1 a reactor scram occurs. All rods go full in. After conditions stabilize, CRO1 places the SDV High Level Bypass switch to the bypass position and resets the scram by depressing both scram reset P/Bs on P603. CRO1 notes the following:

- all RPS A/B Logic white indicating lights illuminate
- all Backup scram amber indicating lights de-energize
- the scram discharge volume vent and drain valves do not open

Based on the information given, which of the following signals caused the reactor scram?

- A. A Drywell pressure rise to 2 psig
- B. A Reactor power rise to 110 percent
- C. A Reactor pressure rise to 1130 psig
- D. A Reactor level drop to -35 inches

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295025 EA1.07 Ability to operate and/or monitor the following as they apply to High Reactor Pressure: ARI/RPT/ATWS: Plant Specific (4.1 / 4.1)

REFERENCE: SD000161 page 5; SD000142 page 21 and 22

SOURCE: New

LO: 5188 - Describe the sequence of events that occur to the SDV vent and drain valves during a scram, scram reset, and valve testing; 5189 State the signals and explain the logic that causes the ATWS-ARI valves to open

RATING: H3

ATTACHMENT: None

JUSTIFICATION: All choices are scram signals. Only the Reactor pressure of 1130 psig (which is GT 1120 psig signal) operate the ATWS/ARI valves. Depressing only the scram reset P/Bs does not reset ATWS/ARI and without ATWS/ARI the SDV V & D valves will not open. The ATWS/ARI RESET P/B has to be depressed. C is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 13

EXAM KEY

JANUARY 2009

PPM 5.2.1, "Primary Containment Control" provides direction to enter PPM 5.1.1, "RPV Control" before Wetwell temperature reaches 110°F.

Which of the following correctly describes the basis for this direction?

- A. Directs entry to ensure RPV level and pressure are monitored to determine the cause of the wetwell temperature increase.
- B. Assures that adequate core cooling is provided prior to placing the second loop of RHR in suppression pool cooling mode.
- C. Assures that the reactor is scrammed and shutdown by control rod insertion before the requirement for boron injection is reached.
- D. Directs a Reactor scram to terminate heat addition to the wetwell before the wetwell design temperature is exceeded.

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295026 EK3.05 Knowledge of the reason for the following responses as they apply to Suppression Pool High Water Temperature: Reactor Scram (3.9 / 4.1)

REFERENCE: PPM 5.0.10 page 255

SOURCE: Bank – slightly modified - LR00971

LO: 8300 Given a list, identify the statement that describes the reason for entering PPM 5.1.1, "RPV Control", before wetwell temperature reaches 110°F.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: Per 5.0.10 a scram is required prior to boron injection. C is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 14

EXAM KEY

JANUARY 2009

A small steam line rupture has caused drywell temperature to rise to 200°F.

Assuming the actual water level in the RPV were to remain constant, which of the following describes the effect on indicated RPV water level?

Indicated RPV water level would indicate.....

- A. higher as heating of the reference leg increases the delta-P.
- B. lower as heating of the reference leg increases the delta-P.
- C. lower as heating of the reference leg decreases the delta-P.
- D. higher as heating of the reference leg decreases the delta-P.

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295028 EK1.01 Knowledge of the operational implications of the following concepts as they apply to High Drywell Temperature: Reactor water level measurement (3.5 / 3.7)

REFERENCE: 5.0.10 Page 62

SOURCE: New

LO: 8488 Given a list of RPV water level instrument responses, identify the response that could occur if the RPV saturation temperature curve is exceeded.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: As drywell temperature increases, the density of water in the reference leg decreases which would decrease the delta-P between the reference and variable legs given that the variable leg remains the same (actual RPV level). This would cause indicated water level to rise. D is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 15

EXAM KEY

JANUARY 2009

Due to lowering Suppression Pool water level, PPM 5.2.1, Primary Containment Control, was entered . If Suppression Pool water level can not be maintained GT 19'2", an Emergency Depressurization is required to be performed.

What is the bases for this direction?

- A. Adequate suppression of steam discharged from the RPV cannot be assured below this level.
- B. The code allowable stresses on the SRV Tailpipes will not be exceeded during the blowdown.
- C. Scrubbing of the steam discharged from the SRVs cannot be assured below this level.
- D. Vortexes at the suction of the ECCS pumps begin at this level and can result in air binding of the pumps.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295030 EK3.01 Knowledge of the reason for the following responses as they apply to Low Suppression Pool Water Level: Emergency Depressurization (3.8 / 4.1)

REFERENCE: PPM 5.0.10 page 262

SOURCE: Bank modified

LO: 5387 Given a list, identify the statement that describes the reason for emergency depressurizing the RPV if wetwell level and reactor pressure cannot be restored and maintained below the SRVTPLL.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: PPM 5.0.10 states that maintaining SP water level GT 19'2" ensures water level GT downcomer vent openings. If this level was not maintained, steam may not be adequately condensed.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 16

EXAM KEY

JANUARY 2009

A small-break LOCA has occurred. No high pressure injection sources are available. All low pressure ECCS pumps are running with normal discharge pressures. At 1200 the following plant conditions exist:

Drywell pressure: 3.0 psig and trending up slowly

RPV level: -25 inches

RPV level is going down at 5 inches per minute

Assuming no operator action is taken, at what time will the ADS valves open?

- A. 1205
- B. 1207
- C. 1220
- D. 1222

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295031 EK2.08 Knowledge of the interrelationships between Reactor Low Water Level and the following: Automatic Depressurization System (4.2 / 4.3)

REFERENCE: SD000186 Page 5

SOURCE: INPO Exam bank #29223 Modified

LO: 5071 State the condition that will automatically initiate ADS. Include setpoints and time delays.

RATING: L2

ATTACHMENT: None

JUSTIFICATION: ADS initiates 105 seconds after RPV level drops to -129". At the rate of 5"/minute it will take 20 minutes to get level to -128". If you add the 105 seconds time delay and the other inch level needs to drop, that is approximately an additional 2 minutes. 1200 + 20 minutes + 2 minutes = 1222 making D correct. C is the time if the time delay is not taken into account. A & B are times using -50 inches vice -129".

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 17

EXAM KEY

JANUARY 2009

A series of events have occurred which has placed Columbia in an ATWS condition. Due to a failure of both SLC pumps to start, the CRS has directed performance of PPM 5.5.8, Alternate Boron Injection. PPM 5.5.8 directs RCIC-V-19 (Minimum Flow Bypass) be closed and breaker MC-S21A/5C opened.

Which of the following describes the reason for the above actions?

- A. Prevents draining the Condensate Storage Tanks to the Suppression Pool.
- B. Prevent SLC from being pumped to the Condensate Storage Tanks.
- C. Allows RCIC to be operated at speeds lower than 2100 rpm without damage to the pump.
- D. Prevent SLC from being pumped to the Suppression Pool.

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295037 EA1.10 Ability to operate and/or monitor the following as they apply to Scram Condition Present and Reactor Power Above APRM Downscale or Unknown: Alternate boron injection methods: Plant Specific (3.7 / 3.9)

REFERENCE: PPM 5.5.8

SOURCE: Bank Modified

LO: 5929 Describe the flowpath used to inject boron solution into the RPV using the RCIC System.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: The min flow for the RCIC system goes to the Suppression Pool. Closing the Minimum Flow Valve prevents RCIC from pumping boron into the SP. D is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 18

EXAM KEY

JANUARY 2009

Columbia is operating at full power. A small fuel pin leak is causing an increase in reactor coolant activity and an off site release.

Which of the following monitors could terminate the release by automatic actuation of plant equipment?

- A. Main Steam Line radiation monitors, MS-RIS-610A/B/C/D.
- B. Offgas Post-Treatment radiation monitors, OG-RIS-601A/B.
- C. Reactor Building Exhaust Plenum radiation monitors, REA-RIS-609A/B/C/D.
- D. Reactor Building Stack High Range radiation monitor, PRM-RE-1C.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295038 EK2.02 Knowledge of the interrelationships between High Off-Site Release Rate and the following: Offgas System (3.6 / 3.8)

REFERENCE: SD000147 Page 15, 18, 19, 20, 34, 35

SOURCE: New

LO: 5647 State the automatic actions associated with each of the following gaseous and liquid stream Process Radiation Monitors upon sensing high radiation levels:
a. Offgas Post-Treatment RMS f. Main Steam Line RMS g. Reactor Building Exhaust Plenum RMS

RATING: H4

ATTACHMENT: None

JUSTIFICATION: MSL PRMs cause an alarm and NS4 actuations. MSIVs do not close (A is incorrect); RB Exhaust Plenum PRMs cause alarm and Z isolations but do nothing to terminate release (C is incorrect); RB Stack PRM cause alarm only (D is incorrect). Only Offgas PRM causes OG-V-60 to close which would isolate/terminates the release.

COMMENTS: Watch validation to see if C is picked. You would have to read into the question that there was a RCS leak going into RB for C (RB Vent isolate & SGT start)

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 19

EXAM KEY

JANUARY 2009

Which of the following identifies two systems that are not fire protected, and as such, may not be reliable during a fire.

- A. RHR-A and RCIC
- B. RHR-B and RHR-C
- C. RCIC and HPCS
- D. HPCS and RHR-B

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 600000 AA2.04 Ability to determine and interpret the following as they apply to Plant Fire On Site: The fire's extent of potential operational damage to plant equipment (2.8 / 3.1)

REFERENCE: ABN-FIRE Page 27

SOURCE: New

LO:

RATING: H4

ATTACHMENT: None

JUSTIFICATION: Per ABN-Fire Bases, RCIC and HPCS are not fire protected and may not be reliable during a fire. C is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 20

EXAM KEY

JANUARY 2009

Columbia is in a condition where a scram is required and reactor power remained GT 5%. PPM 5.1.2 was entered and RPV level was lowered to a band of -140" to -80" and SLC injection was initiated. CRO1 has just reported that SLC tank level is 1100 gallons. The CRS has determined that Cold Shutdown Boron Weight has been injected into the core.

Which of the following identifies the effect of accomplishing injection of Cold Shutdown Boron Weight during an ATWS?

The reactor is shutdown.....

- A. and will remain shutdown under all conditions.
- B. but may return to power if a cooldown is initiated.
- C. but may return to power as Xenon depletes during the first 24 hours.
- D. with RPV level at its current value but may return to power if RPV level is raised.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295037 EK1.05 Knowledge of the operational implications of the following concepts as they apply to Scram Condition Present And Reactor Power Above APRM Downscale or Unknown; Cold Shutdown Boron Weight (3.4 / 3.6)

REFERENCE: PPM 5.0.10

SOURCE: Bank - modified slightly - LR00872

LO: 8180 Define Cold Shutdown Boron Weight

RATING: L3

ATTACHMENT: None

JUSTIFICATION: CSBW is determined assuming no Xenon, water at most reactive temperature; no voids. A is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 21

EXAM KEY

JANUARY 2009

Columbia is operating at 28% power during plant startup following an outage. The Main Turbine has been synchronized to the grid when vacuum starts to degrade.

If no operator action were taken, which of the following explains the relationship between the loss of vacuum and a Reactor Feedwater Pump.

- A. Only when power is LT 30% will the operating RFW pump trip at 0 in. Hg VAC.
- B. The operating RFW pump will trip at 0 in. Hg VAC, regardless of power level.
- C. Only when power is LT 30% will the operating RFW pump trip at 7 in. Hg VAC.
- D. The operating RFW pump will trip at 7 in. Hg VAC, regardless of power level.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295002 AK2.05 Knowledge of the interrelations between Loss of Main Condenser Vacuum and the following: Feedwater system (2.7 / 2.7)

REFERENCE: SD000151 page 27

SOURCE: New

LO: 5767 Identify the automatic and manual Reactor Feedwater Turbine trips (11 automatic 3 manual)

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Per reference the RFW pump trips at 0 in Hg VAC regardless of power level (B is correct and A, C, D are incorrect). The MT low vacuum scram is bypassed at LT 30% power and the BPV closure is at 7 in. Hg VAC.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 22

EXAM KEY

JANUARY 2009

The plant is operating in MODE 1, when a plant transient occurs. Below are some of the observations made by the Control Room staff:

SGT systems started
All MSIVs remained open
No Diesel Generators started
Control Room Emergency Filtration system started

Based on the above plant status, which of the following occurred?

- A. Reactor Building Exhaust Plenum radiation level increasing to 14 Mr/hr.
- B. Reactor Building Pressure increased to +2 inches H₂O.
- C. Reactor Water Level dropped to a level of -55 inches.
- D. Drywell Pressure increasing to 1.8 psig.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295034 EK2.06 Knowledge of the interrelations between Secondary Containment Ventilation High Radiation and the following: PCIS/NSSS (3.9 / 4.3)

REFERENCE: ABN-FAZ-QC page 3 & 4

SOURCE: Bank modified - LO00268

LO: 6914 Given plant conditions identify those annunciators and indications that would indicate a F, A or Z Signal Actuation and subsequent entry into ABN-FAZ

RATING: H3

ATTACHMENT: None

JUSTIFICATION: If RPV level would have dropped to -55", the MSIVs would have closed. If DW/P increased to 1.8 psig, the Diesel Generators would have started. RB/P increase would not have started SGT. High Radiation in Secondary Containment Ventilation starts SGT and Filtration units. A is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 23

EXAM KEY

JANUARY 2009

With Columbia operating at full power, an Operating Basis Earthquake occurs. The earthquake causes a large LOCA and the plant scrams due to high drywell pressure. Additionally, a number of downcomers shear off above the water level in the suppression pool.

Based on the above, which of the following is correct?

- A. Wetwell pressure could now cause the SRV Tail Pipe Level Limit to be exceeded and code allowable stresses on the tail pipe, supports, quenchers, and quencher supports will be exceeded.
- B. Wetwell pressure could now cause the Heat Capacity Temperature Limit to be exceeded, causing containment pressure to exceed the Primary Containment Pressure Limit during a reactor emergency depressurization.
- C. The high Drywell pressure could now cause operation in the restricted region of the Drywell Spray Initiation Limit, causing a drywell-wetwell interface failure if drywell sprays are initiated.
- D. The high Drywell pressure could now cause Wetwell pressure to exceed the Pressure Suppression Pressure and the Primary Containment Pressure Limit due to the pressure suppression function being bypassed.

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295010 AK1.01 Knowledge of the operational implications of the following concepts as they apply to High Drywell Pressure: Downcomer submergence (3.0 / 3.4)

REFERENCE: PPM 5.0.10 page 72, 87, 88 and 91

SOURCE: Bank Modified – LO00162

LO: 8339 Given a list, recognize the primary containment functions that the Pressure Suppression Curve is designed to protect.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: A is incorrect because SRVTLL is a function of RPV/P not WW/P. B is incorrect as HCTL is a function of WW/T and RPV/P not WW/P. C is incorrect as DSIL is more restrictive at lower DW pressures not higher DW pressures. D is correct per 5.0.10.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 24

EXAM KEY

JANUARY 2009

Due to a series of events, combustible limits have been reached in the primary containment. EOP 5.2.1, Primary Containment Control, requires an Emergency Depressurization if combustible limits are reached.

Which of the following is the bases for performing an Emergency Depressurization?

An Emergency Depressurization....

- A. stops the production of H₂ in the reactor.
- B. reduces the amount of energy in the containment.
- C. places the reactor in the lowest possible energy state.
- D. stops the production of O₂ in the reactor.

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 500000 EK3.04 Knowledge of the reasons for the following responses as they apply to High Primary Containment Hydrogen Concentrations: Emergency Depressurization (3.1 / 3.9)

REFERENCE: PPM 5.0.10 page 293

SOURCE: Bank – Modified LO01226

LO: 8443 Given a list, identify the statement that describes the reason for emergency depressurizing the RPV if deflagration conditions exist inside primary containment.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: PPM 5.0.10 states the reason for the Emergency Depressurization (ED) under these conditions is to place the reactor in the lowest possible energy state. C is correct. A and D are both incorrect because the ED will not stop the production of H₂ and O₂. B is incorrect because the ED does not change the amount of energy in the containment but it transfers the energy from one area to another.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 25

EXAM KEY

JANUARY 2009

Columbia experienced a loss of feed incident and a manual reactor scram was initiated. Due to lowering RPV level RCIC was started. RCIC is maintaining RPV level +13" to + 54".

A High Suppression Pool water level annunciator alarms. Suppression pool level is observed to be +4 inches and going up slow. As Suppression Pool water level continues to rise, which of the following is correct?

When Suppression Pool level reaches +5 inches....

- A. no change in the RCIC system valve lineup will occur.
- B. the RCIC test bypass valve (RCIC-V-22) will receive a close signal.
- C. the minimum flow will swap from the Suppression Pool to the CSTs.
- D. the RCIC suction lineup will swap from the CSTs to the Suppression Pool.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295029 EA1.04 Ability to operate and/or monitor the following as they apply to High Suppression Pool Water Level: RCIC: Plant Specific (3.4 / 3.5)

REFERENCE: SD00010 page15, 16, 17

SOURCE: New

LO: 5719 Describe the system response for any routine system lineup when the RCIC System initiation logic is satisfied.

RATING: L2

ATTACHMENT: None

JUSTIFICATION: There is no response from the RCIC system due to high Suppression Pool water level (just from the HPCS system). A is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 26

EXAM KEY

JANUARY 2009

During operation at full power, High Pressure Feedwater Heaters 5A and 6A trip due to high water level.

Which of the following is a required immediate action based on the plant effect due to a loss of feedwater heating?

- A. If rod line exceeds 105% then insert control rods using the fast shutdown sequence to obtain a rod line LE 105%.
- B. If thermal power has exceeded 3486 MWT then reduce thermal power to LE 3486 MWT.
- C. If RRC flow is GT 60 Mlbm/hr then reduce reactor power with flow to LE 60 Mlbm/hr core flow.
- D. If reactor power exceeds 102% then reduce reactor power with core flow to LE 80 Mlbm/hr.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 295014 AA1.07 Ability to operate and or monitor the following as they apply to Inadvertent Reactivity Addition: Cold Water Injection (4.0 / 4.1)

REFERENCE: ABN-POWER page 3 and 9

SOURCE: New

LO: 6747 State the immediate actions (and bases) associated with entry into ABN-POWER

RATING: H2

ATTACHMENT: None

JUSTIFICATION: Reducing MWT to LT 3486 is required per ABN-POWER. Rod line is required to be maintained LT 107%. RRC flow reduction, if required, is to 80 Mlbm/hr. There is no requirement to reduce flow based on a power level of 102%.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 27

EXAM KEY

JANUARY 2009

At 75% reactor power a feed flow to steam flow mismatch develops. RPV level is observed to be slowly rising, steadies after about a 3" level rise, and then returns to its original value.

Which of the following could account for this mismatch and the RPV level perturbation?

- A. A Safety Relief Valve opening
- B. A water level measurement fault that is sensing rising water level
- C. A steam flow measurement fault that is sensing lowering steam flow
- D. A feed flow measurement fault that is sensing lowering feed flow

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 205008 AA2.02 Ability to determine and/or interpret the following as they apply to High Reactor Water Level: Steam flow/Feed Flow Mismatch (3.4 / 3.4)

REFERENCE: SD000157 page 18 and 19

SOURCE: New

LO: 5400 Predict the expected response of the feedwater level control system in both Single and Three Element Control, to a failure or malfunction of the following: a. Loss of a Steam Flow Transmitter b. Loss of Feedwater Flow Transmitter c. Loss of the selected RPV Level Channel d. SRV failing open

RATING: H3

ATTACHMENT: None

JUSTIFICATION: A is incorrect – sensed steam flow drops causing feedflow to back off causing a level decrease. B is incorrect – causes feedflow to back off and a level decrease. C is incorrect – lower steam flow measurement causes lower feed flow causes level to decrease. D is correct – lower feed flow causes more flow causes level rise. PLC selects Single element before level changes by more than 3 inches.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 28

EXAM KEY

JANUARY 2009

Columbia is operating in MODE 1 with RHR-P-2A in Suppression Pool cooling. RHR-V-48A is being closed when a LOCA in containment occurs. The operator stops stroking RHR-V-48A and it is left in a partially opened position. Drywell pressure starts to rise and the CRS directs a reactor scram prior to a high drywell automatic scram. Eight minutes after the automatic scram signal, Drywell pressure is 5 psig.

Which of the following describes the response of the A RHR system to this event?

- A. RHR-V- 24A (SP Cooling/Test return) closed. RHR-V-48A (HX bypass) closed. RHR-V-42A (LPCI injection) opened. If RHR-V-48A is opened, it will stay open when the switch is released.
- B. RHR-V-24A (SP Cooling/Test return) closed. RHR-V-48A (HX bypass) opened. RHR-V-42A (LPCI injection) remained closed. If RHR-V-48A is closed, it will come back open when the switch is released.
- C. RHR-V-24A (SP Cooling/Test return) remained open. RHR-V-48A (HX bypass) opened. RHR-V-42A (LPCI injection) opened. If RHR-V-48A (HX bypass) is closed, it will stay closed when the switch is released.
- D. RHR-V-24A (SP Cooling/Test return) remained open. RHR-V-48A (HX bypass) closed. RHR-V-42A (LPCI injection) remained closed. If RHR-V-42A is opened, it will stay open when the switch is released.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 203000 A3.08 Ability to monitor automatic operation of the RHR/LPCI Injection Mode including System initiation sequence (4.1 / 4.1)

REFERENCE: SD000198 Page 15, 17, and 19

SOURCE: New

LO: 5779 Describe the expected system response, for any routine lineup, when the initiation logic for the LPCI mode of the RHR system is satisfied.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: On initiation RHR-V-24A closes, RHR-V-48A opens and will not stay closed for 10 minutes, RHR-V-42A remains closed until 470 psig RPV Pressure. B is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 29

EXAM KEY

JANUARY 2009

During a plant outage, the Startup Transformer is tagged out of service with supported load centers de-energized. RHR-P-2A and RHR-P-2B are operating in Shutdown Cooling. RPV level is being maintained at +65 inches.

A loss of which of the following would cause operators to have to monitor RPV metal temperatures every 30 minutes per OSP-RCS-C103 (RPV Hydrostatic In-service Inspection Temperature surveillance)?

- A. SM-1 or SM-3
- B. SM-1 and SM-3
- C. SM-7 or SM-8
- D. SM-7 and SM-8

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 205000 K2.01 Knowledge of the electrical power supplies to the following: Pump Motors (3.1 / 3.1)

REFERENCE: ABN-RHR-SDC-LOSS page 4

SOURCE: New

LO: 6486 With the procedures available, determine the required Cold Shutdown operating configurations for RHR and RPV level.

RATING: H1

ATTACHMENT: Yes - ABN-RHR-SDC-LOSS pages 1, 2, 3 and 4

JUSTIFICATION: Per ABN-RHR-SDC-LOSS, step 4.7, if forced circulation is not being provided by at least one SDC loop with RPV level GT 60", monitoring metal temp. is required. A loss of SM1 and/or SM-3 will not loose power to RHR pumps as TR-B is still powering SM-7/8. Loosing power to SM-7 or SM-8 would still give one loop in SDC. Loosing both SM-7 AND SM-8 meets the requirements to monitor temperatures. D is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 30

EXAM KEY

JANUARY 2009

Columbia has experienced a LOCA coincident with a Loss of Offsite Power. The following conditions exist:

RPV/L is -140 inches (for the past 2 minutes)
SM-8 is de-energized due to a lockout on the bus
RHR-P-2A is running with a sheared shaft
LPCS-P-1 is running normally
ADS has NOT been inhibited

If LPCS-P-1 trips and will not re-start, which of the following describes the plant response?

The ADS SRVs

- A. that were open, closed when LPCS discharge pressure became less than 145 psig.
- B. that are open, will remain open as long as RHR-P-2A is running.
- C. that were open, immediately closed when the LPCS-P-1 breaker opened.
- D. have not opened because discharge pressure from both RHR & LPCS pumps is not GT 125 psig.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 209001 K3.02 Knowledge of the effect that a loss or malfunction of the Low Pressure Core Spray System will have on the following: ADS logic (3.8 / 3.9)

REFERENCE: SD000192 page 16; SD000186 page 7

SOURCE: Bank – Modified LO00170

LO: 8737 Given that ADS has been initiated, state what actions can be taken to shut the ADS valves from the control room.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: ADS initiates 105 seconds after -129” with discharge pressure from either pump making D incorrect. B is incorrect because pressure must be GT 125 psig. C is incorrect because the logic works off of pressure and not breaker position. A is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 31

EXAM KEY

JANUARY 2009

Columbia is in MODE 1 when the Suppression Pool High Water Level alarm annunciates. A short time later the HPCS Suction Switchover Suppression Pool Level High alarm annunciates. After acknowledging the alarm, the CRO notes that HPCS-V-15 (Pump suction from Suppression Pool) is open and HPCS-V-1 (Pump Suction from CST) is closed.

Which of the following is correct?

- A. For the alarms that are currently annunciates, HPCS-V-1 and HPCS-V-15 are not positioned correctly.
- B. Restore Suppression Pool water level to within limits and restore HPCS suction to the CSTs within 12 hours.
- C. Enter PPM 5.2.1 Primary Containment Control and lower Suppression Pool water level per SOP-RHR-SPC.
- D. Restore Suppression Pool water level to within limits within 1 hour.

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 209002 A2.12 Ability to predict the impacts of the following on the High Pressure Core Spray System and based on those predictions, use procedures to correct, or mitigate the consequences of those abnormal conditions or operations: High Suppression Pool Water Level (3.3 / 3.5)

REFERENCE: ARP 4.601.A1 6-6; PPM 5.2.1 Primary Containment Control step L1

SOURCE: New

LO: 11721 Describe the physical connection and/or cause-and-effect relationship between the High Pressure Core Spray System and the following: Condensate transfer and storage system .5429 List the automatic initiations and interlocks associated with the following HPCS system components: CST suction valve (HPCS-V-1) and Suppression Pool Suction valve (HPCS-V-15).

RATING: H3

ATTACHMENT: Yes - 4.601.A1 6-6 which is the ARP for the HPCS Suction Switchover on High SP level. TS 3.6.2.2-1 for SP Water Level.

JUSTIFICATION: The switchover occurs at a level of +5.25". EOP entry into PPM 5.2.1 is at +2". Per step L1, SP Level is lowered per SOP-RHR-SPC making C correct and D incorrect. A is incorrect because the valves are in the correct position for alarms. B is incorrect because per TS you only have 2 hours – not 12 hours

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 32

EXAM KEY

JANUARY 2009

Towards the end of a refueling outage, you are sent to complete a valve lineup on the Standby Liquid Control system per SOP-SLC-FILL. During the performance of the valve lineup you note that the required position for some of the valves is 'C+'. You check the procedure but it does not indicate the meaning of the 'C+'.

Which of the following describes the required condition 'C+' indicates?

The valve is

- A. torqued closed to the torque value indicated in the comment section.
- B. simultaneously checked closed by two operators.
- C. Closed and a cap is then required to be installed.
- D. located in containment.

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 211000 G 2.1.29 Knowledge of how to conduct and verify valve lineups. (3.4 / 3.3)

REFERENCE: SOP-SLC-FILL page 13; Glossary page 57

SOURCE: New

LO: 9851 Given a valve checklist, determine the required condition of the valve.

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Per the glossary a + indicates the valve is closed and capped – C is correct.
COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 33

EXAM KEY

JANUARY 2009

Only the 'A1' trip channel logic for the Reactor Protection System (RPS) trips.

Which of the following is correct?

- A. Power to the 185 'A' scram pilot valve solenoids is deenergized causing the scram valves (CRD-V-117s) to open.
- B. No power is lost to the scram pilot valve solenoids until both the 'A1' and 'A2' channels trip. No scram valves (CRD-V-117 or CRD-V-118) open.
- C. Power to one half of the 185 'A' RPS scram pilot valve solenoids is deenergized causing the scram valves (CRD-V-117s) to open.
- D. Power to one quarter of the 185 scram pilot valve solenoids is deenergized causing the scram valves (CRD-V-117 and CRD-V-118) to open.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 212000 K5.02 Knowledge of the operational implications of the following concepts as they apply to Reactor Protection System: Specific logic arrangements (3.3 / 3.4)

REFERENCE: SD000161 Page 4

SOURCE: New

LO: 5955 Describe the RPS "one out of two taken twice" trip logic.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: Per the reference, a trip of only one of the two trip channels deenergizes the solenoids for all A side scram pilot valve solenoids causing the valves to open.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 34

EXAM KEY

JANUARY 2009

Columbia is in the process of starting up with reactor power approximately 2%. The following conditions exist:

IRM E indicates 75/125 on Range 8

IRM F indicates 39/40 on Range 7

IRM G indicates 45/125 on Range 8

If the CRO places the Range Switch for IRM G to Range 9, which of the following is correct?

- A. There is a ½ scram on RPS B and a Rod Block from IRM F. A full Scram is generated when the Range Switch for IRM G is placed on range 9.
- B. There is a ½ scram on RPS B and a Rod Block from IRM F. Another rod block is generated when the CRO places the Range Switch for IRM G on range 9.
- C. There is a ½ scram on RPS A. A rod block is generated when the CRO places the Range Switch for IRM G on range 9.
- D. A ½ scram and a Rod Block on RPS A is generated from placing the Range Switch for IRM G on range 9.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 215003 A1.05 Ability to predict and/or monitor parameters associated with the Intermediate Range Monitoring System controls including: scram and rod block trip setpoints. (3.9 / 3.9)

REFERENCE: SD000138 page 17

SOURCE: Bank Modified LO01238

LO: 5459 List the IRM scrams and rod blocks with setpoints and bypass conditions.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: An IRM F reading of 39/40 on Range 7 causes a rod block and a ½ scram on RPS B. Ranging IRM G to range 9 causes an addition downscale rod block which is 5/125.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 35

EXAM KEY

JANUARY 2009

Which of the following is correct concerning the SRM generated control rod withdrawal block which occurs when an SRM detector is not fully inserted and the SRM count rate is LE 100 cps?

This control rod withdrawal block is.....

- A. only bypassed when all SRMs have been fully retracted.
- B. bypassed when the MODE Switch is in any position other than STARTUP.
- C. bypassed if all IRMs are on Range 3 or higher.
- D. only bypassed if all IRMs are on Range 8 or higher.

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 215004 K4.06 Knowledge of Source Range Monitor (SRM) System design feature(s) and/or interlocks which provide for the following: IRM/SRM interlock (3.2 / 3.2)

REFERENCE: SD000132 page 25 and 26

SOURCE: New

LO: 5943 List the scrams and rod blocks generated by the SRM system. Include the setpoint for each and when they are bypassed.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: A and D are incorrect because there are other ways to bypass this rod block. B is wrong as the MODE switch should be in RUN. C is correct

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 36

EXAM KEY

JANUARY 2009

With no equipment out of service, the control room receives an 'LPRM Downscale' alarm on H13-P603. In response the CRO investigates at back panel H13-P608 and notices the downscale light illuminated for an LPRM associated with APRM B. The CRO takes the meter function switch for APRM A to the count position. The meter reads 110%.

Which of the following is correct concerning the indication?

- A. APRM B has 23 LPRMs assigned to it. One of the assigned LPRMs is not being counted due the downscale indication. Function switch position can not be determined by this switch position/indication.
- B. There are 22 LPRMs assigned to APRM B. All assigned LPRMs have their function switches in operate. Failed LPRMs can not be determined by this switch position/indication.
- C. There are 23 LPRMs assigned to APRM B. This reading indicates that one of the assigned LPRM either failed or the function switch is not in the operate position.
- D. APRM B has 22 LPRMs assigned to it. Function switch position nor failed LPRMs can be determined by this switch position/indication.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 215005 K5.06 Knowledge of the operational implications of the following concepts as they apply to Average Power Range Monitor/Local Power Range Monitor System: Assignment of LPRMs to specific APRM Channels (2.5 / 2.6)

REFERENCE: SD000143 page 9 & 14

SOURCE: New

LO: 5095 Describe the physical connections and/or cause-effect relationships between APRM System and the following: LPRMs 7758 Predict the effect(s) that a failure of the following will have on the APRM System: LPRMs

RATING: H3

ATTACHMENT: None

JUSTIFICATION: Per reference APRM B has 22 LPRMS assigned to it – A and C are incorrect. D is incorrect because the reading is the number of switches in operate. B is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 37

EXAM KEY

JANUARY 2009

During implementation of PPM 5.1.2, RPV Control ATWS, the CRS is working his way down the level leg. After he determines that reactor power is GT 5%, there is a block that says "RCIC injection will result in Main Turbine trip". If the CRS wants to keep the Main Turbine on line, directions are given to the CRO to prevent the initiation of RCIC.

In response, the CRO should.....

- A. reference the Quick Card for RCIC and take the control switch for RCIC-V-13 to the close position until the valve closes.
- B. reference the Quick Card for RCIC and take the control switch for RCIC-V-1 to the close position until the valve fully closes.
- C. arm and depress RCIC while holding the control switch for RCIC-V-13 in the close position. No procedure reference is required per OI-09, Operations Standards and Expectation.
- D. take the control switch for RCIC-V-1 to the closed position until the valve fully closes. No procedure reference is required per OI-09, Operations Standards and Expectation.

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 217000 A2.01 Ability to predict the impacts of the following on the Reactor Core Isolation Cooling System (RCIC); and based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: System initiation signal. (3.8 / 3.7)

REFERENCE: PPM 5.1.2 level leg block L-5; OI-09 Operations Standards and Expectation

SOURCE: New

LO: 11678 Predict the impact of the following on the Reactor Core Isolation Cooling System: System initiation signal

RATING: H2

ATTACHMENT: None

JUSTIFICATION: There is no quick card for preventing a RCIC start while in PPM 5.1.2 thus A & B are incorrect. C is viable because this is how HPCS is inhibited when in an ATWS. To prevent RCIC initiation, RCIC-V-1 is closed – D is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 38

EXAM KEY

JANUARY 2009

The Control Room has been abandoned and plant operation has been transferred to the Remote Shutdown Room. With all controls transferred to the Remote Shutdown Panel, which of the following is correct concerning operation of the ADS Safety Relief Valves?

Taking the control switches to 'OPEN' will open the ADS SRVs

- A. if the ADS logic is made up by energizing the SRVs 'A' solenoid.
- B. regardless of the ADS logic status by energizing the SRVs 'A' solenoids.
- C. if the ADS logic is made up by energizing the SRVs 'B' solenoid.
- D. regardless of the ADS logic status by energizing the SRVs 'B' solenoids.

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 218000 K1.05 Knowledge of the physical connections and/or cause-effect relationships between Automatic Depressurizing System and the following: Remote Shutdown System (3.9 / 3.9)

REFERENCE: SD000186 figure 4; SD000210 page 8

SOURCE: New

LO: 11874 Describe the physical connection and/or cause-and-effect relationship between the Automatic Depressurization System and the following: e. Remote Shutdown System

RATING: H2

ATTACHMENT: None

JUSTIFICATION: With controls transferred to the RSD, the ADS logic is isolated and operation of the SRVs is via the control switch and the B solenoids – D is correct. A solenoids are utilized on ADS SRVs at the Alternate RSD panel.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 39

EXAM KEY

JANUARY 2009

Which of the following sets of parameters would cause an automatic isolation of EDR-V-394 and EDR-V-395, Reactor Building Sump Discharge to Radwaste (NS4 Group 3) and an automatic isolation of RHR-V-40 and RHR-V-49, RHR Discharge to Radwaste (NS4 Group 5) ?

- A. RPV Level of -25 inches
- B. Drywell Pressure of 2.4 psig
- C. Main Condenser Vacuum of 0" Hg
- D. RB Vent Exhaust Rad level of 15 mr/hr

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 223002 A3.02 Ability to monitor automatic operations of the Primary Containment Isolation System/Nuclear Steam Supply Shut-Off including: Valve Closures (3.5 / 3.5)

REFERENCE: SD000173 Page 7, 8, 9

SOURCE: New

LO: 5597 Given the number and name of any of the 7 NS4 isolation groups, list the isolation signals and setpoints (except room and ventilation temps.) for that group.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: EDR-V-394/395 (Group 3) isolate on -50", 1.68#, and 13 mr/hr. RHR-V-40/49 (Group 5) isolate on +13", 1.68#. B is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 40

EXAM KEY

JANUARY 2009

Which of the following describes the vacuum breakers associated with the Safety Relief Valves?

1. One for each SRV tailpipe
 2. Two for each SRV tailpipe
 3. Located in the Drywell
 4. Located in the Wetwell
 5. Prevents suction of water into the tailpipe which could cause increased pipe stress and containment loading
 6. Prevents suction of water into the tailpipe which could cause acceleration and drag loads on submerged structures
- A. 2, 3, and 5
- B. 1, 4, and 5
- C. 1, 3, and 6
- D. 2, 4, and 6

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 239002 K6.05 Knowledge of the effect that a loss or malfunction of the following will have on Relief/Safety Valves: Discharge Vacuum Breaker (3.0 / 3.2)

REFERENCE: SD000128 page 11, 12 and Figure 1

SOURCE: New

LO: 11697 Predict the impact on the following with an SRV open: Tail pipe temperature; Reactor pressure; water level power; Turbine load; Suppression pool water temperature; Indicated vs. actual steam flow; Stuck open vacuum breaker; SRV stuck open

RATING: H2

ATTACHMENT: None

JUSTIFICATION: There are two vacuum breakers per tailpipe, located in the drywell and prevent suction of water to prevent increased pipe stress and containment loading.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 41

EXAM KEY

JANUARY 2009

With Columbia operating at 100% power, which of the following describes the effect of the reference leg sensing lines of two narrow range transmitters failing simultaneously?

- A. FWLC system shifts to the third narrow range input – no plant transient occurs.
- B. FWLC system shifts to single element control – no plant transient occurs.
- C. FWLC system shifts to the third narrow range input. The Main Turbine trips causing a Reactor scram.
- D. FWLC system shifts to single element control. The RRC Pumps run back to 30 Hz.

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 259002 K3.06 Knowledge of the effect that a loss or malfunction of the Reactor Water Level Control System will have on the following: Main Turbine (2.8 / 2.8)

REFERENCE: SD000157 Pages 6, 7 and 15

SOURCE: New

LO: 11699 Predict the plant impact that a loss or malfunction of the Feedwater Level Control System will have on the following: g. Main Turbine

RATING: H3

ATTACHMENT: None

JUSTIFICATION: A is incorrect as FWLC would select the third NR input but the MT would still trip. D is incorrect as RRC pump runback occurs as a result of scram to 15 Hz, not 30 Hz. B is incorrect as FWLC does shift to single element control as a result of scram and a MT Trip occurs. C is correct as the reference leg failures would cause dP to go to zero indicating high RPV water level which would cause a MT Trip.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 42

EXAM KEY

JANUARY 2009

A small leak in containment causes Drywell pressure to rise to 4 psig.

Which of the following describes the operation of SGT-V-1A, the primary containment purge exhaust duct isolation valve, and SGT-V-2A, the Reactor Building intake isolation valve?

On the high drywell pressure initiation signal, SGT-V-1A.....

- A. and SGT-V-2A received closed signals.
- B. and SGT-V-2A received open signals.
- C. received an open signal and SGT-V-2A received a closed signal.
- D. received a closed signal and SGT-V-2A received an open signal.

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 261000 A4.02 Ability to manually operate and/or monitor in the control room:
Suction Valves (3.1 / 3.1)

REFERENCE: SD000144 page 6

SOURCE: New

LO: 5828 State the SGT system response to a FAZ signal. Include all major valves, heaters, and fans and their associated delay times.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: Per reference, on an FAZ signal, SGT-V-1A gets a closed signal and SGT-V-2A gets a open signal. D is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 43

EXAM KEY

JANUARY 2009

Columbia is operating at power when a ground on electrical bus SM-7 occurs. Investigation reveals that the ground is associated with the breaker for CRD-P-1A.

Which of the following is correct concerning this ground?

CRD-P-1A.....

- A. could trip due to a ground fault. Refer to ABN-CRD for direction to start CRD-P-1B.
- B. will not trip due to a ground fault. Refer to ABN-ELEC-GRID for ground fault isolation directions.
- C. could trip due to a ground fault. Refer ABN-ELEC-SM1/SM7 for direction to reset ground fault.
- D. will not trip due to a ground fault. Refer to ABN-CRD for direction to start CRD-P-1B and secure CRD-P-1A.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 262001 A2.05 Ability to predict the impacts of the following on the AC Electrical Distribution; and based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Bus Grounds (2.9 / 3.3)

REFERENCE: SD000182 page 76; ABN-CRD

SOURCE: New

LO: 11831 Describe the effects of a ground fault within the AC distribution system.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: CRD-P-1A/1B are the only pumps that trip on a ground fault (A and D are incorrect). ABN-ELEC-SM1/SM7 does not give directions for resetting ground fault (C is incorrect). Entry into ABN-CRD is required due to the loss of CRD flow (A is correct).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 44

EXAM KEY

JANUARY 2009

A loss of power to which of the following inverters would cause the inboard MSIVs to close?

- A. E-IN-1
- B. E-IN-2A/2B
- C. E-IN-3A/3B
- D. E-IN-5

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 262002 K1.16 Knowledge of the physical connections and/or cause relationships between Uninterruptible Power Supply (A.C./D.C.) and the following: MSIVs (3.1 / 3.2)

REFERENCE: SD000194 Page 33

SOURCE: New

LO: 7783 Predict the effect a failure of IN-2(3) will have on: MSIVs

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Per reference, a loss of IN-2 will cause inboard MSIVs to close – B is correct. The outboard MSIVs close on a loss of IN-3 – C is incorrect. IN-1 and IN-5 do not supply power to the MSIVs – A and C are incorrect.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 45

EXAM KEY

JANUARY 2009

Which of the following describes effect on the RCIC system in response to a loss of the 250 VDC electrical bus S2-1?

- A. If running, the RCIC turbine will trip on mechanical overspeed, due to the loss of power to the speed sensor.
- B. IF running, the RCIC system will continue to operate with normal system flow control still available.
- C. The ability to start RCIC from the Control Room is lost and if RCIC is running, RCIC cannot be tripped using the trip pushbutton.
- D. If running, RCIC will continue to operate at the current flow and speed. RCIC-FIC-600, RCIC flow indicating controller loses power and speed/flow cannot be adjusted.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 263000 K3.03 Knowledge of the effect that a loss or malfunction of the D.C. Electrical Distribution will have on the following: Systems with DC components (3.4 / 3.8)

REFERENCE: SD000188 page 23

SOURCE: New

LO: 7657 Predict the effect(s) a failure of 250VDC bus S2-1 will have on: RCIC system

RATING: H3

ATTACHMENT: None

JUSTIFICATION: Per reference RCIC will continue to run with normal flow control (B is correct) and (A is incorrect). Normal flow control will still be available (D is incorrect). The manual trip pushbutton is still available (C is incorrect).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 46

EXAM KEY

JANUARY 2009

Which of the following describes the effect of going to RAISE on the VOLTAGE REGULATOR control switch for DG-1 in the following conditions?

1. DG-1 is running loaded but IS NOT connected to the grid
 2. DG-1 is running loaded and IS connected to the grid
-
- A.
 1. Voltage remain the same, MVARs increase
 2. Voltage increase, MVARs remain the same
 - B.
 1. Voltage increase, MVARs increase
 2. Voltage remains the same, MVARs increase
 - C.
 1. Voltage increase, MVARs remain the same
 2. Voltage increase, MVARs increase
 - D.
 1. Voltage increase, MVARs remain the same
 2. Voltage remains the same, MVARs increase

ANSWER: D

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 264000 A4.01 Ability to manually operate and/or monitor in the Control Room: Adjustment of voltage (3.3 / 3.4)

REFERENCE: SD000200 Page 22

SOURCE: New

LO: 5319 State how DG Megawatts, Megavars, Hertz, Kiloamps and Kilovolts will change when the DG voltage regulator switch is taken to RAISE when: b. DG is loaded but not connected to the grid and c. DG is paralleled to the grid.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: Per reference going to raise increases voltage when loaded and not connected to grid and MVARs when loaded and connected to grid. MVARs. D is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 47

EXAM KEY

JANUARY 2009

With Columbia operating in MODE 1 with all systems operating in a normal lineup and no equipment out of service. The Control Room receives a 'Control Air Header Pressure Low' annunciator.

If CAS pressure continues to drop, which of the following is the next expected response to the drop in air pressure?

- A. The Service Air system isolates when SA-PCV-2 closes.
- B. The standby CAS compressor(s) start(s).
- C. The Control Air Dryer Bypass valve, CAS-PCV-1 opens.
- D. The Service Air compressor auto starts.

ANSWER: A

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 300000 K4.02 Knowledge of the Instrument Air design features and/or interlocks which provide for the following: Cross-over to other air systems. (3.0 / 3.0)

REFERENCE: SD000205 Pages 11, 12,13,14

SOURCE: New

LO: 5878 List the expected automatic Control Air system response due to a leak in the Control Air System, for each of the following pressures: a. 100 psig b. 95 psig c. 80 psig d. 75 psig; 5871 Describe the features associated with each position of the Service Air/Control Air Header Crosstie valve SA-PCV-2 (CLOSE, AUTO, OPEN).

RATING: H2

ATTACHMENT: None

JUSTIFICATION: The low CAS pressure alarm annunciates at 95 psig. The standby CAS compressor starts at 100 psig so they should have already started B is incorrect; SA-PCV-2 closes at 80 psig, A is correct; CAS-PCV-1 opens at 75 psig, C is incorrect; There are no automatic starts on the Service Air compressor, D is incorrect.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 48

EXAM KEY

JANUARY 2009

During operation at full power the Control Room receives a RCC HIGH RAD alarm.

Which of the following components is the most likely to leak into the RCC system and cause the high radiation condition?

- A. Reactor Recirculation Pump shaft seal heat exchangers
- B. Reactor Recirculation Pump jacket coolers
- C. RWCU Non-regenerative heat exchangers
- D. RWCU Pump motor coolers

ANSWER: C

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 400000 K1.04 Knowledge of the physical connections and/or cause-effect relationships between CCWS and the following: Reactor Coolant System in order to determine source (s) of RCS leakage into CCWS. (2.9 / 3.1)

REFERENCE: SD000196 Page 15

SOURCE: New

LO: 7669 Identify the possible sources of leakage into RCC and how the sources may be identified.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: Per reference the RWCU Non-regenerative heat exchangers are the most likely source of leakage into the RRC system (C is correct).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 49

EXAM KEY

JANUARY 2009

With Columbia operating at power, events occur that include the High Pressure Core Spray pump starting and HPCS-V-4 opening.

Given that the HPCS pump start is from a valid initiation signal, which of the following is correct?

Due to this valid start, entry into.....

- A. PPM 5.2.1, Primary Containment Control, will always be required.
- B. PPM 5.1.1, RPV Control, will always be required.
- C. SOP-HPCS-START, will always be required.
- D. ABN-POWER will always be required.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 209002 2.4.2 Knowledge of system set points / interlocks and automatic actions associated with EOP entry conditions (3.9 / 4.1)

REFERENCE: SD000174 Page 7; EOP 5.1.1 Entry conditions

SOURCE: New

LO: 5423 List the signals (including setpoints) which will cause an automatic initiation of the HPCS system; 8017 Given plant conditions, recognize an EOP entry condition(s) and enter the appropriate flow chart.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: HPCS initiates on -50: RPV/L and 1.68 psig DW/P. Both of these setpoints requires entry into PPM 5.1.1 (B is correct); PPM 5.2.1 is not entered on low RPV level (A is incorrect); ABN-Power is not entered on a scram but is entered in inadvertent HPCS initiation (D is incorrect); SOP-HPCS-START is superseded by EOP entry condition (C is incorrect).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 50

EXAM KEY

JANUARY 2009

With Columbia operating at full power the following alarms and indications are observed at H13-P603:

APRM ACE UPSCL TRIP OR INOP	H13-P603.A7 2-5 in alarm
ROD OUT BLOCK	H13-P603.A7 2-7 in alarm
NEUTRON MONITOR SYSTEM TRIP	H13-P603.A7 3-3 in alarm
1/2 SCRAM SYSTEM A	H13-P603.A7 3-4 in alarm
OPRM ENABLED RPS A	H13-P603.A7 3-7 in alarm
APRM UPSCALE	H13-P603.A8 2-6 in alarm
FLOW REFERENCE OFF NORMAL	H13-P603.A8 3-6 in alarm

APRM A, C, AND E: UPSC ALARM lights are illuminated

APRM A, C, AND E: UPSC TR OR INOP lights are illuminated

Flow Unit A: COMPAR light illuminated

Flow Unit C: COMPAR light illuminated

Which of the following failures produced the above indications?

- A. Flow transmitter RRC-FT-24A, "B" Recirc Loop flow to Flow Unit A failed downscale.
- B. Flow transmitter RRC-FT-14C, "A" Recirc Loop flow to Flow Unit C failed downscale.
- C. Flow transmitter RRC-FT-24A, "B" Recirc Loop flow to Flow Unit A failed upscale.
- D. Flow transmitter RRC-FT-14C, "A" Recirc Loop flow to Flow Unit C failed upscale.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 215005 K6.07 Knowledge of the effect that a loss of the following will have on APRM System: Flow converter/comparator network: Plant Specific (3.2 / 3.2)

REFERENCE: Columbia Simulator

SOURCE: Bank Modified LR00739

LO: 5087 Describe the physical connection and/or cause-and-effect relationship between the APRM Flow Units and: a. APRM Channels b. RBM Channels c. Flow Unit Comparators

RATING: H3

ATTACHMENT: None

JUSTIFICATION: Flow transmitter failing upscale does not give 1/2 scram (C & D are incorrect); B loop flow transmitter failure would give 1/2 scram on B RPS (A is incorrect).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 51

EXAM KEY

JANUARY 2009

With 'A' SGT out of service for maintenance, "B" SGT is in operation following a LOCA. While raising SGT flow, a 'HEPA B-1 OUTLET MOIST HIGH' alarm is received.

Which of the following describes the possible result of continued SGT operation?

- A. Operation of the SGT system with high moisture could reduce the life of the downstream HEPA filters.
- B. There is a potential for decreased charcoal filter efficiency which could result in an increase in radioactive iodine being released offsite.
- C. There is a potential that SGT "B" electric strip heaters are not energized. Proper operation of the electric strip heater SGT-ESH-1B should be locally verified.
- D. Operation of the SGT system with high moisture could allow particulate matter to pass through the HEPA filter and become entrapped in the charcoal adsorbers resulting in reduced charcoal bed efficiency and increased offsite release rates.

ANSWER: B

QUESTION TYPE: RO/SRO Closed Book

KA # & KA VALUE: 261000 A1.03 Ability to predict and/or monitor changes in parameters associated with operation of the Standby Gas Treatment System controls including: Off-Site Release Levels (3.2 / 3.8)

REFERENCE: Alarm Response Procedures 4.811.K2 1-2; 1-3, 3-6, 4-3

SOURCE: New

LO: None (LO# 11960 'Predict the impact of the following on the Standby Gas Treatment System: d. High train moisture content' is being developed)

RATING: H3

ATTACHMENT: None

JUSTIFICATION: Reduction of HEPA filter life could be a result of high dP in the prefilter (A is incorrect); Per ARP moisture could result in iodine release (B is correct); If strip heaters are not on a Low Temp alarm would annunciate (C is incorrect); A high HEPA dP could result in particulate matter passing thru filter (D is incorrect)

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 52

EXAM KEY

JANUARY 2009

RPS Trip System 'B' can be powered from which of the following load centers?

- A. Alternate power is fed from MC-6B and normal power is fed from MC-8A
- B. Alternate power is fed from MC-6A and normal power is fed from MC-8A
- C. Alternate power is fed from MC-6B and normal power is fed from MC-8B
- D. Alternate power is fed from MC-6A and normal power is fed from MC-8B

ANSWER: A

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 212000 K2.02 Knowledge of the electrical power supplies to the following: RPS Trip System Logic Cabinets (2.7 / 2.9)

REFERENCE: SD000161 Page 20

SOURCE: New

LO: 5950 List the normal and alternate power supplies to the RPS System.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: Per reference alternate power is from MC-6B and normal power is from MC-8A
COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 53

EXAM KEY

JANUARY 2009

Columbia is operating in MODE 1. Efforts are underway to transfer IN-1 from the Bypass AC Source that is feeding the Maintenance Bypass Switch to the Normal AC source that is fed from the UPS Inverter.

Concerning the transfer, which of the following is correct?

Power is being transferred from...

- A. MC-7A. The Kirk Key interlocked breakers will be operated and it will be a make-before-break transfer.
- B. MC-7F. The Kirk Key interlocked breakers will be operated and it will be a break-before-make transfer.
- C. MC-7A. The transfer will be a make-before-break transfer.
- D. MC-7F. The transfer will be a make-before-break transfer.

ANSWER: D

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 262002 A4.01 Ability to manually operate or monitor in the control room: Transfer from alternate source to preferred source (2.8 / 3.1)

REFERENCE: SD000194 Page 3, 4 and 34

SOURCE: Bank modified LO01194

LO: 5896 List the power supplies to each inverter: a. IN-1; 5890 State the function of the IN-1 Kirk Key Interlock.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: The Bypass AC power supply to IN1 is from MC-7F not MC-7A (A and C are incorrect). Maintenance Bypass Switch for IN-1 is powered from MC-7F, not MC-7A (A and C are incorrect). The Kirk Key interlocked breakers are operated when transferring IN-1 from its Bypass Source, which is MC-7A and would be a break-before-make transfer (B is incorrect).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 54

EXAM KEY

JANUARY 2009

Columbia in operating in MODE 1 with CRD-P-1A running. Events occur that result in an ATWS condition. The CRS directs performance of PPM 5.5.11. The first action of PPM 5.5.11 is to ensure both CRD pumps are running. CRO1 starts CRD-P-1B and 30 seconds later, the 'CRD PUMPS ABNORMAL OPERATION' alarm annunciates (along with other annunciators).

Which of the following describes the probable cause for the annunciator and the actions necessary to correct the situation?

- A. Only CRD-P-1A tripped on low suction pressure. Continue with PPM 5.5.11 which places both suction filters in service and restarts the tripped CRD pump.
- B. Only CRD-P-1B tripped on low suction pressure. Continue with PPM 5.5.11 which places both suction filters in service and restarts the tripped CRD pump.
- C. Only CRD-P-1B tripped on low suction pressure. Enter ABN-CRD-MAXFLOW and place the second CRD suction filter in service.
- D. Both CRD pumps tripped on low suction pressure. Enter ABN-CRD and place the second CRD suction filter in service.

ANSWER: D

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 201001 A2.01 Ability to predict the impacts of the following on the Control Rod Drive Hydraulic System and based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Pump Trips (3.2 / 3.3)

REFERENCE: PPM 5.5.11; 4.603.A7 4-6; ABN-CRD-MAXFLOW

SOURCE: New

LO: 5190 State the CRD pump trips; 11633 Determine the potential problem associated with operation of both CRD pumps and maximum flow.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: Both CRD pumps will trip on low suction (with a 3 second time delay). PPM 5.5.11 does not direct placing both filters in service. Entry conditions are for ABN-CRD and not ABN-CRD –MAXFLOW. C is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 55

EXAM KEY

JANUARY 2009

Columbia is starting up following a refueling outage. Control Rod sequence A1 is selected and the Reactor Operators have just completed withdrawal of all the control rods in RSCS group 1, RSCS group 2, RSCS group 3, and RSCS group 4.

Which of the following is the control rod density for this condition?

- A. 25 percent
- B. 40 percent
- C. 50 percent
- D. 100 percent

ANSWER: C

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 201004 K5.03 Knowledge of the operational implications of the following concepts as they apply to Rod Sequence Control System: Group notch control limits and rod density (3.3 / 3.5)

REFERENCE: SD000160 Page 13 and 14

SOURCE: New

LO: 5806 Explain the following terms: d. Control Rod density; e. Control Rod sequence

RATING: H2

ATTACHMENT: None

JUSTIFICATION: Completion of the 1st 4 (out of 10) RSCS rod groups places 50% of the rods in the full out position. This is 50% rod density. C is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 56

EXAM KEY

JANUARY 2009

Reactor Recirculation Pump 1A (RRC-P-1A) is being started.

If only one ASD channel is in operation, which of the following is correct?

- A. RRC pump speed is limited to a maximum of 30 Hz.
- B. RRC Pump speed is limited to a maximum of 51 Hz.
- C. When the 'RAISE' P/B is depressed, the rate of pump speed increase is always limited to 0.2 Hz/sec.
- D. The 'ONE ASD CHANNEL FAILURE' limiter light is illuminated until the second ASD channel is started.

ANSWER: B

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 202002 K4.07 Knowledge of the Recirculation Flow Control System design features and/or interlocks which provide for the following: Minimum and maximum pump speed setpoint (2.9 / 2.9)

REFERENCE: SD000184 Pages 4 & 10

SOURCE: New

LO: 9682 Given an initial operating condition, describe the response of the RRFC system to the removal or trip of a single ASD channel.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: Per reference, with one ASD channel – frequency is limited to 51 Hz (B is correct). 30 Hz is a runback speed (A is incorrect); Speed increase is limited for just the first 1.5 seconds at 0.2 Hz/sec (C is incorrect); This light is illuminated when a runback condition exists and only one channel is powered (D is incorrect).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 57

EXAM KEY

JANUARY 2009

Given the following plant parameters:

RPV Level is -120 inches on uncompensated fuel zone meter MS-LI 610

RPV Level is -150 inches on wide range level instrument MS-LIS-36A

Mode Switch is in Shutdown

Reactor Power is 6 %

Drywell pressure is 4 psig

Drywell Temperature is 285 °F

Wetwell Temperature is 112 °F

RPV Pressure is 380 psig

Which of the following is correct?

- A. RPV level should be reported as -100 inches.
- B. RPV level should be reported as -120 inches.
- C. RPV level should be reported as -150 inches.
- D. RPV level cannot be determined due to operation within the SAT curve.

ANSWER: A

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 216000 A3.01 Ability to monitor automatic operation of the Nuclear Boiler Instrumentation including: Relationship between meter/recorder readings and actual parameter valves: Plant Specific (3.4 / 3.4)

REFERENCE: Operator Aid #94-089

SOURCE: New

LO: 5582 List the...and nominal ranges for each of the five ranges of reactor water level instruments: bowie Range; 11774 Describe the operational implications of the following concepts as they apply to the NBI: Vessel level measurement

RATING: H4

ATTACHMENT: Yes – EOP 5.2.1 SAT Curve, Operator Aid #94-089

JUSTIFICATION: Parameters given indicate level/power conditions exist. Based on pressure no level correction is needed but because of level power conditions you add +20 inches to indicated (B is correct)

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 58

EXAM KEY

JANUARY 2009

Which of the following is designed to prevent the differential pressure across the primary containment boundary from exceeding the design limit?

- A. Reactor Building to Drywell vacuum breakers.
- B. Standby Gas Treatment (SGT) system.
- C. Reactor Building to Wetwell vacuum breakers.
- D. Wetwell to Drywell vacuum breakers.

ANSWER: C

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 223001 K4.06 Knowledge of the Primary Containment System and Auxiliaries design feature(s) and/or interlocks which provide for the following: Maintains proper containment/secondary containment to drywell differential pressure (3.1 / 3.3)

REFERENCE: SD000127 Page 4

SOURCE: Bank modified LO00472

LO: 5636 Describe the function, purpose and design features of the following Primary Containment System components: h Reactor building to wetwell vacuum breakers

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Per reference the RB to WW vacuum breakers are designed to prevent dP from exceeding design limit (C is correct)

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 59

EXAM KEY

JANUARY 2009

With Columbia operating at 80 percent power following a refueling outage, a CIA leak causes the MSIVs to close and an automatic reactor scram occurred and Safety Relief Valves are observed to be cycling.

Which of the following correctly describes actions to take?

- A. The MSIV control switches should be placed in CLOSED. SRVs are cycled to control RPV pressure at 800 psig to 1000 psig. No EOP entry conditions exist.
- B. Take manual control of cycling SRVs and maintain RPV pressure 800 psig to 1000 psig. Report EOP entry into PPM 5.1.1.
- C. Report EOP entry into PPM 5.1.1 and PPM 5.2.1. Wait until CRS directs pressure control band to open SRVs.
- D. Manually cycle SRVs as needed to maintain Bypass Valves full open. Report EOP entry into PPM 5.1.1.

ANSWER: B

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 239001 A2.10 Ability to predict the impacts of the following on the Main And Reheat Steam System and based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Closure of one or more MSIVs at power (3.8 / 3.9)

REFERENCE: OI-15; SD000128 page 5; EOP 5.1.1

SOURCE: New

LO: 8017 Given plant conditions, recognize an EOP entry condition(s) and enter the appropriate flow chart.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: SRVs start to cycle at 1091 psig. EOP entry into PPM 5.1.1 is at 1060 psig (A is incorrect). No EOP entry into 5.2.1 is given (C is incorrect); Bypass valves are isolated due to MSIV closure (D is incorrect).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 60

EXAM KEY

JANUARY 2009

With the reactor scrammed and MSIVs closed, SRVs are being cycled to control RPV pressure. CRO3 reports EOP entries into PPM 5.2.1 on high Suppression Pool temperature and high Wetwell level. In response, the CRS enters EOP 5.2.1.

Which of the following is correct?

The CRS should direct....

- A. either RHR 'A' or RHR 'B' be started as both allow reduction of suppression pool temperature. PPM 5.2.1 then requires HPCS be started to lower Wetwell level per PPM 5.5.23.
- B. either RHR 'A' or RHR 'B' be started as both allow reduction of suppression pool temperature and letdown of Wetwell to RadWaste.
- C. RHR 'A' be started to allow reduction of suppression pool temperature and letdown of Wetwell to RadWaste.
- D. RHR 'B' be started to allow reduction of suppression pool temperature and letdown of Wetwell to RadWaste.

ANSWER: D

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 268000 K1.09 Knowledge of the physical connections and/or cause-effect relationship between Radwaste and the following: ECCS Systems (2.6 / 2.8)

REFERENCE: SD000198 Figure 1; EOP 5.2.1 WW Level leg

SOURCE: New

LO: 11801 Describe the function, purpose and design features of the following Residual Heat Removal System components: RHR-V-40/49, RHR discharge to RadWaste

RATING: H3

ATTACHMENT: None

JUSTIFICATION: Only RHR-B can both cool the SP and letdown to RadWaste (B and C are incorrect, D is correct); PPM 5.5.23 actually raises SP level (A is incorrect)

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 61

EXAM KEY

JANUARY 2009

Columbia is starting up. One Condensate pump is currently running in short cycle cleanup. COND-FC-11, the Condensate Pump Min Flow Controller, is in AUTO and in the CASCADE position.

Which of the following describes Condensate System flow when a second and a third Condensate pump is started?

- A. As each condensate pump is started, COND-LCV-11 is re-positioned manually using the controller tapeset.
- B. Controller setpoint will increase by 5600 gpm when the second condensate pump is started and 800 gpm when the third condensate pump is started.
- C. Controller setpoint will increase by 5600 gpm when the second condensate pump is started and 5600 gpm when the third condensate pump is started.
- D. As each condensate pump is started, COND-LCV-11 is re-positioned manually by depressing the OPEN pushbutton on the controller.

ANSWER: B

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 256000 A1.01 Ability to predict and/or monitor changes in parameters associated with operating the Reactor Condensate System controls including: System Flow (2.9 / 2.9)

REFERENCE: SD000134 Page 15

SOURCE: New

LO: 5167 Explain the operation of the Condensate Pump minimum flow controller when in the CASCADE mode of automatic control.

RATING: H2

ATTACHMENT: None

JUSTIFICATION: COND-FC-11 opens (in Auto and Cascade) to allow 5600 gpm per pump breaker closed up to a maximum of 12000 gpm. (5600+5600+800=12000 gpm B is correct)

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 62

EXAM KEY

JANUARY 2009

Columbia is starting up with Reactor Feed pump 1B being started. The TURBINE EMERG TRIP/RESET selector switch is placed in the RESET position. A few seconds later the HP stop valve (MS-V-172B) IN TEST light goes out and only the red open position light is illuminated. Ten seconds later the CRO looks back down and notices that the IN TEST light is still illuminated for the LP stop valve (BS-V-60B) but neither the green nor the red position indicating lights are illuminated.

Which of the following explains this indication?

- A. This is a normal indication. BS-V-60B is in the process of stroking open.
- B. Control power for BS-V-60B has been lost. BS-V-60B will not open.
- C. The IN TEST light for BS-V-60B will extinguish when the TURBINE EMERG TRIP/RESET selector switch is released.
- D. The trip oil header has not pressurized yet. BS-V-60B will start to open when the header pressurizes and the IN TEST light extinguishes.

ANSWER: A

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 259001 A3.09 Ability to monitor operation of the Reactor Feedwater System including: Lights and Alarms (3.0 / 3.0)

REFERENCE: SD000151 Page 17, Simulator

SOURCE: New

LO: 5753 Describe the functions of the RFP Turbine Emerg Trip/Reset switch in each of its positions (TRIP, NORM, and RESET).

RATING: L3

ATTACHMENT: None

JUSTIFICATION: Per reference and simulator the indications in the stem is how the system functions. A is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 63

EXAM KEY

JANUARY 2009

Columbia is in the process of a reactor shutdown. With reactor power being reduced from 35% to 30% power, CRO1 receives a Below/LPAP Rod Worth Minimizer (RWM) alarm.

Which of the following signals causes this Rod Worth Minimizer alarm?

- A. The total steam flow from all four main steam line flow instruments.
- B. The average Reactor power from all APRM instruments.
- C. Reactor power as calculated by PPCRS.
- D. Main Turbine first stage pressure.

ANSWER: A

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 201006 K1.04 Knowledge of the physical connections and/or cause-effect relationships between Rod Worth Minimizer and the following: Steam flow/Reactor power (3.1 / 3.2)

REFERENCE: SD000154 Page 5 and 16

SOURCE: Bank LX00601 Modified slightly

LO: 5916 Describe the physical connection and/or cause-and-effect relationship between RMW and: a. FWLC

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Per reference the steam flow inputs are summed to determine 32% power and give the alarm (A is correct).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 64

EXAM KEY

JANUARY 2009

Columbia is operating in MODE 1 at 60 % power with ROA-FN-1A and REA-FN-1A maintaining Reactor Building dp. ROA-FN-1B and REA-FN-1B are in standby. A lockout on bus SM-1 occurs and TR-B re-energizes SM-7.

Which of the following correctly describes the plant response to this event?

- A. ROA-FN-1A and REA-FN-1A stop on the loss of power to SM-7 but will automatically restart when power to SM-7 is restored. Reactor Building dp decreases slightly but is restored to -0.6" WG.
- B. After a 10 second time delay, ROA-FN-1B and REA-FN-1B auto start on low dp across the other fan. Reactor Building dp decreases but is restored to -0.6" WG.
- C. ROA-FN-1A and REA-FN-1A stop on the loss of power to SM-7. ROA-FN-1B and REA-FN-1B do not auto start. Reactor Building dp decreases to approximately 0" WG.
- D. After a 25 second time delay, ROA-FN-1B and REA-FN-1B auto start on low dp across the other fan. Reactor Building dp drops to approximately 0" WG but is restored to -0.6" WG.

ANSWER: C

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 288000 K3.05 Knowledge of the effect that a loss or malfunction of the Plant Ventillation System will have on the following: Reactor Building pressure (3.1 / 3.3)

REFERENCE: SD000183 Page 16 and 17

SOURCE: New

LO: 5680 List the signals that will result in an automatic start and an automatic trip of ROA-FN-1A and 1B; 5681 List the signals that will result in an automatic start and an automatic trip of REA-FN-1A and 1B.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: The standby fans will only auto start on low dp on opposite running fan. There is a 10 second time delay for the auto start and the time delay is 25 seconds if TR-B re-energizes SM-7.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 65

EXAM KEY

JANUARY 2009

A series of events has resulted in a high drywell pressure reactor scram. Drywell pressure is currently 14 psig and down slow due to the initiation of wetwell sprays on RHR-P-2B and drywell sprays on RHR-P-2A.

If a malfunction causes RHR-V-4A to go closed, which of the following is correct?

RHR-P-2A will trip.....

- A. as soon as RHR-V-4A is not fully opened. RHR-V-16A and RHR-V-17A should then be manually closed.
- B. when RHR-V-4A is fully closed. RHR-V-16A and RHR-V-17A will automatically go closed.
- C. as soon as RHR-V-4A is not fully opened. RHR-V-16A and RHR-V-17A will automatically go closed.
- D. when RHR-V-4A is fully closed. RHR-V-16A and RHR-V-17A should then be manually closed.

ANSWER: A

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 226001 K6.13 Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI Containment Spray System Mode: Suction Flow Path (3.2 / 3.2)

REFERENCE: SD000198 Page 10, 12, 14, 15; ARP for BISI for RHR-N-4A not full open 4.601.A4

SOURCE: New

LO: 5781 List the interlocks and trips associated with the following RHR System components: a. RHR Pumps; e. RHR-V-16A/B and RHR-V-17A/B

RATING: L3

ATTACHMENT: None

JUSTIFICATION: RHR-V-4A going closed immediately trips RHR-P-2A. The spray valves have to be manually closed. A is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 66

EXAM KEY

JANUARY 2009

Due to lowering condenser vacuum the Control Room Supervisor directed a manual reactor scram be inserted. A hydraulic ATWS occurred. EOP 5.1.1 was entered on reactor scram required and reactor power GT 5% and EOP 5.1.2 was transitioned to. The Main Turbine tripped and both RRC Pumps tripped off. RPV level is currently at its lowest level of the transient at -5 inches and trending down slowly. The CRS directs SLC be initiated. CRO1 initiates both SLC pumps. Two minutes after SLC initiation, the GDS valve status screen is checked, and the border for GROUP 7 is yellow.

Which of the following could explain this indication?

- A. Both RWCU-V-1 and RWCU-V-4 are closed. All GROUP 7 isolations ARE complete.
- B. RWCU-V-1 is closed and RWCU-V-4 is open. All GROUP 7 isolations ARE complete.
- C. Both RWCU-V-1 and RWCU-V-4 are open. All GROUP 7 isolations ARE NOT complete.
- D. RWCU-V-1 is open and RWCU-V-4 is closed. All GROUP 7 isolations ARE NOT complete.

ANSWER: C

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.1.19 Ability to use plant computer to obtain and evaluate parametric information on system or component status (3.0 / 3.0)

REFERENCE: SD000173 page 7; None for GDS – Simulator was used.

SOURCE: New

LO: 5925 Describe the expected response to placing the SLC SYSTEM A or B keylock switch in the OPERATE position. None for GDS.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: Initiation of SLC results in the closure of RWCU-V-4. The position of RWCU-V-1 does not change with SLC initiation and RPV/L did not reach -50" so RWCU-V-1 does not close. (B is incorrect). GDS having a yellow background indicates a valve in the group has not isolated (A and D are incorrect). C is correct as RWCU-V-4 should have closed but did not and isolations are not complete.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 67

EXAM KEY

JANUARY 2009

Which of the following thermal limits is a Technical Specification Safety Limit that attempts to prevent fuel failure by assuring that bulk nucleate boiling heat transfer is maintained for all expected operational transients?

- A. APLHGR
- B. MFLPD
- C. LHGR
- D. MCPR

ANSWER: D

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits (2.5 / 3.7)

REFERENCE: Tech Spec Bases page B 2.1.1-3

SOURCE: Bank – Modified slightly LX00264

LO: 6924 State Columbia's safety limits, applicability, action statements and bases.

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Per bases MCPR attempts to prevent fuel failure by assuring that bulk nucleate boiling heat transfer is maintained for all expected operational transients (D is correct). LHGR is the actual rate of heat generation per unit length of a specified fuel rod (C is incorrect); MFLPD is the actual linear heat generation rate (LHGR) divided by the technical specification limit for LHGR (B is incorrect); APLHGR limits the peak cladding temperature will not exceed 2200°F after a design loss of coolant accident (A is incorrect).

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 68

EXAM KEY

JANUARY 2009

When PPM 5.4.1, Radioactivity Release Control, is entered it directs that Radwaste and Turbine Building HVAC be restarted if not running.

Which of the following describes the reason for restarting the HVAC?

- A. Without Radwaste and Turbine Building HVAC running, the Area Radiation Monitors will not give accurate indication of local radiation levels.
- B. Operation of Radwaste and Turbine Building HVAC preserves personal accessibility and provides for an elevated monitored release path.
- C. Operation of Radwaste and Turbine Building HVAC prevents the Control Room from becoming uninhabitable due to high radiation levels.
- D. With Radwaste and Turbine Building HVAC running, the air balance is maintained and there is less leakage from the Reactor Building.

ANSWER: B

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.3.11 Ability to control radiation releases (2.7 / 3.2)

REFERENCE: PPM 5.0.10 Page 318

SOURCE: Bank Modified LO00213

LO: 8477 Identify the statement that describes the purpose of restarting turbine building and RadWaste building HVAC during attempts to control offsite radioactivity release rates above the Alert Level.

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Per PPM 5.0.10 B is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 69

EXAM KEY

JANUARY 2009

When completing the Control Room Logs taken by CRO3 per PPM 3.1.10, which of the following is NOT required?

- A. If a specific procedure gives direction or permission to N/A a data entry, the performer should place his initials by the N/A.
- B. Only Operations Department personnel should complete the Operating Data Logs.
- C. Red circling an out of spec reading on the cover page of the log.
- D. All pump and equipment starts should be logged.

ANSWER: C

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.1.18 Ability to make accurate / clear and concise logs / records / status boards / and reports (2.9 / 3.0)

REFERENCE: PPM 3.1.10 Page 12 and 13

SOURCE: New

LO: RO-0577 Maintain required logs, records, charts, printouts, and status boards.

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Per PPM 3.1.10, red circle is optional for out of spec readings recorded on cover page of log

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 70

EXAM KEY

JANUARY 2009

Which of the following level instruments is identified as post-accident instrumentation?

- A. MS-LI-604, the Wide Range level indicator on H13-P603, which has a orange placard with black letters that read 'PAM'.
- B. MS-LR-623A, the Wide Range level indicator on H13-P601, which has a red placard with white letters that read 'PAM'.
- C. MS-LI-605, the Shutdown Flooding level indicator on H13-P602, which has a black placard with white letters that read 'PAM'.
- D. MS-LI-612, the Compensated Fuel Zone level indicator on H13-P601, which has a white placard with black letters that read 'PAM'.

ANSWER: B

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.4.3 Ability to identify post-accident instrumentation (3.5 / 3.8)

REFERENCE: SD000173 Page 14, Simulator

SOURCE: New

LO: 11264 Ability to identify post-accident instrumentation.

RATING: L2

ATTACHMENT: None

JUSTIFICATION: Only MS-LR-623A is a PAM instrument per reference and control board marking of a red placard with white lettering.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 71

EXAM KEY

JANUARY 2009

With Columbia starting up following a refueling outage and reactor power at 35%. Condensate Pumps COND-P-1A, COND-P-1B and COND-P-1C are running. Condensate Booster Pumps (CBP) COND-P-2A and COND-P-2B are running. A lockout on breaker N1-2 occurs and all systems operate as designed.

Which of the following describes a required immediate action that should be performed for this event?

- A. Reduce RRC flow to 60 Mlbm/hr.
- B. If HPCS DG is running, trip the HPCS DG.
- C. There are no required immediate actions that should be performed for this event.
- D. Reduce power with flow to ensure a 'CBP Suction Pressure Low' alarm does not annunciate.

ANSWER: C

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls (4.0 / 4.0)

REFERENCE: ABN-ELEC-SM2/SM4

SOURCE: New

LO: 10343 Given that a loss of power to SM-2, SM-4 or MC-4A has occurred, determine the immediate actions (and bases) required. [ABN-ELEC-SM2/SM4]

RATING: H3

ATTACHMENT: None

JUSTIFICATION: A lockout on breaker N1-2 causes a loss of power to SM-2, SM-4 will be energized by the HPCS DG. With power at 35%, RRC Flow is already LT 60 mlbm/hr (A is incorrect); Tripping the HPCS DG is only required if HPCS-P-2 is not operating and stem says all systems operate as designed (B is incorrect); Reducing power to ensure low pressure alarm doesn't annunciate is a subsequent action (D is incorrect). C is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 72

EXAM KEY

JANUARY 2009

While hanging or removing a tag out, which of the following has been determined to be a cumulative exposure that will allow the CRS/Shift Manager to consider waiving the performance of independent or simultaneous verification.

- A. 1 mrem
- B. 5 mrem
- C. 25 mrem
- D. 50 mrem

ANSWER: B

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.2.13 Knowledge of tagging and clearance procedure (3.6 / 3.8)

REFERENCE: PPM 1.3.1 Conduct of Operations page 41; PPM 1.3.64 Plant Clearance Order Page 27

SOURCE: New

LO: 6264 State who has the authority to waive Independent Verification when significant radiation exposures are likely to occur as a result of performing an Independent Verification and state how this is performed.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: Per PPM 1.3.1 and PPM 1.3.64, a cumulative exposure of 5 mrem allows waiving verification by CRS/SM.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 73

EXAM KEY

JANUARY 2009

Columbia has entered PPM 5.1.4, RPV Flooding, due to a series of events that has caused a loss of all RPV water level instruments.

Which of the following provides indications that the RPV has been flooded to the elevation of the Main Steam Lines?

1. Increasing RPV pressure as noncondensibles are compressed
 2. Actuation of SRV tailpipe temperature switches
 3. Average WW temperatures respond to SRV flow
 4. WW level decreases from sources aligned to the WW as the RPV and steam lines are flooded
 5. WW level steadies if suction sources are from WW
 6. If a Main Steam Line is not isolated, audible 2-phase flow in the vicinity of the steam tunnel
- A. 1, 2, 5, and 6
- B. 1, 3, 4, and 5
- C. 1, 2, and 5 only
- D. 3, 4, and 6 only

ANSWER: A

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions including: 1. Reactivity Control; 2. Core cooling and heat removal; 3. Reactor Coolant System integrity; 4. Containment Conditions, 5. Radioactivity release control (3.7 / 4.3)

REFERENCE: PPM 5.0.10 Page 205 table 12 of PPM 5.1.4

SOURCE: Bank Modified Stem slightly LO001290

LO: 11021 Given a list, identify the indications of Flooded Main Steam Lines.

RATING: H3

ATTACHMENT: None

JUSTIFICATION: Per Table 12 of PPM 5.1.4, choices 1, 2, 5 and 6 are correct. A is answer.
COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 74

EXAM KEY

JANUARY 2009

Which statement best describes Minimum Steam Cooling Pressure?

Minimum Steam Cooling Pressure is the lowest RPV pressure at which.....

- A. steam flow through the Minimum Number of SRVs Required for Emergency Depressurization is sufficient to remove all decay heat from the core.
- B. steam flow through open SRVs is sufficient to preclude any clad temperature from exceeding 2200 deg F with RPV level at or below TAF.
- C. the covered portion of the reactor core will generate sufficient steam to preclude any clad temperature in the uncovered portion of the core from exceeding 1800 deg F.
- D. steam flow through open SRVs is sufficient to preclude any clad temperature from exceeding 1500 deg F even with RPV level below TAF.

ANSWER: D

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.4.17 Knowledge of EOP terms and definitions. (3.1 / 3.8)

REFERENCE: PPM 5.0.10

SOURCE: Bank Modified LO01416

LO: 8040 Given a standard EOP term or phrase and a list of possible definitions, identify the definition that states the meaning of the term or phrase.

RATING: L3

ATTACHMENT: None

JUSTIFICATION: Per PPM 5.0.10 D is correct.

COMMENTS:

COLUMBIA GENERATING STATION WRITTEN EXAMINATION

QUESTION # 75

EXAM KEY

JANUARY 2009

With Columbia operating in MODE 1, the Control Room receives an R-4 sump High level alarm. The alarm response procedure requires local investigation of sump level.

To investigate the cause of this alarm, CRO3 should dispatch....

- A. OPS 2 to the RHR-C pump room.
- B. OPS 3 to the RHR-A pump room.
- C. OPS 2 to the RHR-B pump room.
- D. OPS 3 to the RHR-B pump room.

ANSWER: A

QUESTION TYPE: RO/SRO Closed

KA # & KA VALUE: 2.1.8 Ability to coordinate personnel activities outside the control room (3.8 / 3.6)

REFERENCE: SD000139 figure 2A; PPM 1.3.1 Conduct of Operations Page 54

SOURCE: New

LO: None

RATING: L2

ATTACHMENT: None

JUSTIFICATION: OPS 2 is the Reactor Building watch stander and R-4 sump is in the RHR-C pump room – A is correct

COMMENTS: