U. S. NUCLEAR REGULATORY COMMISSION

REGION 1

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| Docket No: | 50-443 |
| Report No: | 50-443/98-301 |
| License No: | NPF-86 |
| Licensee: | North Atlantic Energy Service Corporation |
| Facility: | Seabrook Station |
| Location: | Seabrook, New Hampshire |
| Dates: | October 16 - 23, 1998 |
| Chief Examiner: | P. Bissett, Senior Operations Engineer/Examiner |
| Examiners: | J. Caruso, Operations Engineer/Examiner<br>S. Barr, Operations Engineer/Examiner |
| Approved by: | Richard J. Conte, Chief<br>Operator Licensing and Human Performance Branch<br>Division of Reactor Safety |

# EXECUTIVE SUMMARY

Seabrook Station
Inspection Report No. 50-443/98-301


Operations

All five instant SRO applicants and the four RO applicants passed all portions of the initial license examination.

The applicants were well prepared for the examination, indicating that the facility adequately evaluated the knowledge and ability of each candidate in an effort to determine their readiness to sit for an initial NRC senior and reactor operator examination.

Crew communications and crew briefings during the simulator scenario portion of the examinations were good. Overall, the applicants were knowledgeable of those selected systems in which they were examined as evident from both the written and operating tests. Exceptions were noted for feedback to the training program.

Overall, examination quality was good. The training department was effective in following the guidance set forth in the examiner standards during the development of the examinations with some exceptions noted: a few questions for JPMs and the administrative area were direct look-up; several written exam questions were not discriminatory test items at the RO or SRO level; and, one exam scenario was not validated after changes had been made.

## Report Details

## I. Operations

**05 Operator Training and Qualifications**

05.1 Senior Reactor Operator and Reactor Operator Initial Examinations

a. Scope

The examination was prepared by Seabrook station personnel in accordance with the guidelines in Interim Revision 8, of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." The initial operator licensing examinations were administered to five senior reactor operator (SRO) and four reactor operator (RO) applicants. All of the SROs were SRO instant applicants. The NRC administered the operating portion of the examinations, whereas the Seabrook training organization administered the written examination prior to the administration of the operating examination.

b. Observations and Findings

Grading and Results

The results of the SRO examinations are summarized below:

| | RO Pass/Fail | SRO Pass/Fail | Total Pass/Fail |
|---|---|---|---|
| Written | 4/0 | 5/0 | 9/0 |
| Operating | 4/0 | 5/0 | 9/0 |
| Overall | 4/0 | 5/0 | 9/0 |

Preparations

The written examination, job performance measures (JPMs), including follow-up questions, and simulator scenarios were developed by Seabrook training and/or contract personnel in accordance with NUREG-1021. All individuals involved in examination development signed a security agreement once the development of the examination commenced. Seabrook personnel also validated the examination prior to their submitting it to the NRC.

During the exam preparation week of October 5, 1998, the NRC reviewed and validated, together with Seabrook personnel, all portions of the proposed examinations. Overall, the written exam, JPMs and scenarios required only minor changes. The examiners determined that several administrative questions and job performance measure (JPM) follow-up questions were essentially direct look-up questions not testing at a high cognitive level for an open reference question. Also, some written examination questions (less than 10%) were not viewed as being sufficiently discriminatory at the RO or SRO testing level, i.e., simple memory level questions. After discussion with training representatives, these questions, were revised or replaced.

Also reviewed, were the eligibility requirements for three of the SRO instant applicants. Questions on meeting the number of years of responsible power plant experience (RPPE) as defined in Regulatory Guide (RG) 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Rev.2 was adequately resolved. Operator Licensing Branch Report on Interaction (ROI) 98-17 detailed NRC's acceptance of their eligibility to sit for the examination upon certification of program completion from the applicant and facility on NRC Form 398. As detailed in ROI 98-17, it was determined that a waiver was not necessary since the applicants possessed a combination of knowledge and experience that was equivalent to RPPE as defined in RG 1.8, Rev.2. The Seabrook station has since modified their definition of RPPE in their licensed operator program description.

The examiner reviewed the documentation of significant control manipulations in accordance with 10CFR55.31(a)(5) and found no problems.

Administration and Performance

The written portion of the examination was administered by Seabrook station training personnel on October 16, 1998, and consisted of 100 multiple choice questions. There were no post-examination comments by either the NRC or Seabrook representatives concerning the adequacy of questions on the written examination

The operating portion of the examination was conducted from October 19 - 23, 1998. Simulator performance by the SRO and RO applicants was good. Communications during the scenarios, included the use of repeat backs. Crew briefings were held when time permitted and where deemed necessary by the SRO. Procedural usage was appropriate throughout the conduct of all scenarios. Good control board awareness by all of the candidates was evident throughout each of the scenarios observed by the NRC examiners.

During the conduct of two different scenarios, two premature reactor trips occurred as a result of unforeseen problems with the simulator. During one scenario, a simulator event trigger (initiator) caused plant conditions to degrade such that the crew was forced to trip the reactor earlier than planned. In another scenario, an instrument failure had been changed prior to the exam, however, the change had not been validated on the simulator. Again, unforeseen plant conditions called for a reactor trip, which the crew executed correctly. These two premature trips resulted in the NRC having to conduct additional scenarios for those involved, because the NRC did not have the opportunity to fully evaluate the applicants response to a number of planned instrument and component failures. The training department management initiated an event report to ensure that a further review and subsequent action would be performed to address the problems that occurred during the exam.

Several of the applicants experienced difficulty during the performance of two particular JPMs, thus indicating a generic weakness in system knowledge in two different areas. One JPM (LOIT #13AP) dealt with the performance of a main feedwater isolation valve partial closure surveillance test, and the other JPM (LOIT #05) dealt with the alignment of the boron thermal regeneration system.

The Seabrook training facility also performed a written examination analysis and provided the results to the NRC. For feedback to the initial licensed operator training program, the examiners noted, as did the facility, that the following questions were missed by the majority of the applicants.

| Question # | Question Topic |
|---|---|
| 27 (SRO/RO) | Knowledge of the effects of the interlock override function of the refueling machine. |
| 49 (SRO/RO) | FR-C.1, Response to inadequate core cooling actions necessary to establish injection flow. |
| 63 (SRO/RO) | Knowledge of the most accurate leak rate determination during a small primary to secondary leak. |
| 67 (SRO/RO) | Knowledge of distinguishing attributes of a feedwater break. |
| 75 (SRO/RO) | Conditions constituting a temporary modification. |
| 79 (SRO) | Knowledge of minimum service water flow to the PCCW heat exchanger if SW pumps are lost. |
| 87 (SRO) | Conditions allowing a transition to ES-1.1, SI Termination. |
| 89 (SRO) | Actions to take if A Train control room emergency makeup air and filtration system is inoperable. |
| 96 (SRO) | Actions taken to terminate a steam generator tube rupture if pressurizer pressure control is lost. |

c. Conclusions

All five instant SRO applicants and the four RO applicants passed all portions of the initial license examination.

The applicants were well prepared for the examination, indicating that the facility adequately evaluated the knowledge and ability of each candidate in an effort to determine their readiness to sit for an initial NRC senior and reactor operator examination.

Crew communications and crew briefings during the simulator scenario portion of the examinations were good. For the most part, the applicants were knowledgeable of those selected systems in which they were examined as evident from both the written and operating tests. Exceptions were noted for feedback to the training program.

Overall, examination quality was good. The training department was effective in following the guidance set forth in the examiner standards during the development of the examinations with some exceptions noted: a few questions for JPMs and the administrative area were direct look-up; several written exam questions were not discriminatory test items at the RO or SRO level; and one exam scenario was not validated after changes had been made.

## V. Management Meetings

### X1 Exit Meeting Summary

On October 23, 1998, the NRC discussed their observations regarding the examination with Seabrook station operations and training management representatives. The examiners discussed generic applicant performance, as observed during the administration of the simulator scenarios and job performance measures.

The NRC also expressed their appreciation for the cooperation and assistance that was provided during both the preparation and examination week by licensed operator training and operations personnel.

## PARTIAL LIST OF PERSONS CONTACTED

Seabrook Station

T. Cassidy, Operations Training Supervisor
B. Drawbridge, Director of Services
T. Feigenbaum, Site Vice-President
R. Hickok, Seabrook Training Manager
S. Kessinger, Senior Operations Instructor
G. St. Pierre, Operations Manager

NRC

P. Bissett, Senior Operations Engineer/Examiner
S. Barr, Reactor Operations Engineer
J. Caruso, Operations Engineer/Examiner
R. Lorsen, Senior Resident Inspector, Seabrook Station

Attachments:
Attachment 1: Seabrook Reactor Operator (RO) Written Examination
Attachment 2: Seabrook Senior Reactor Operator (SRO) Written Examination
Attachment 3: Simulation Facility Report

Attachment 1

## SEABROOK STATION RO WRITTEN EXAMINATION W/ANSWER KEY

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

| Applicant Information | |
|---|---|
| Name: | Region: I |
| Date: | Facility/Unit: Seabrook Station |
| License Level: RO | Reactor Type: Westinghouse PWR |
| Start Time: | Finish Time: |

## Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected four hours after the examination starts.

## Applicant Certification

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

______________________________

Applicant's Signature

## Results

| | |
|---|---|
| Examination Value | ______ Points |
| Applicant's Score | ______ Points |
| Applicant's Grade | ______ Percent |

U.S.N.R.C. Site-Specific Written Examination
Seabrook Station
Reactor Operator

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | A | B | C | D | 26. | A | B | C | D |
| 2. | A | B | C | D | 27. | A | B | C | D |
| 3. | A | B | C | D | 28. | A | B | C | D |
| 4. | A | B | C | D | 29. | A | B | C | D |
| 5. | A | B | C | D | 30. | A | B | C | D |
| 6. | A | B | C | D | 31. | A | B | C | D |
| 7. | A | B | C | D | 32. | A | B | C | D |
| 8. | A | B | C | D | 33. | A | B | C | D |
| 9. | A | B | C | D | 34. | A | B | C | D |
| 10. | A | B | C | D | 35. | A | B | C | D |
| 11. | A | B | C | D | 36. | A | B | C | D |
| 12. | A | B | C | D | 37. | A | B | C | D |
| 13. | A | B | C | D | 38. | A | B | C | D |
| 14. | A | B | C | D | 39. | A | B | C | D |
| 15. | A | B | C | D | 40. | A | B | C | D |
| 16. | A | B | C | D | 41. | A | B | C | D |
| 17. | A | B | C | D | 42. | A | B | C | D |
| 18. | A | B | C | D | 43. | A | B | C | D |
| 19. | A | B | C | D | 44. | A | B | C | D |
| 20. | A | B | C | D | 45. | A | B | C | D |
| 21. | A | B | C | D | 46. | A | B | C | D |
| 22. | A | B | C | D | 47. | A | B | C | D |
| 23. | A | B | C | D | 48. | A | B | C | D |
| 24. | A | B | C | D | 49. | A | B | C | D |
| 25. | A | B | C | D | 50. | A | B | C | D |

U.S.N.R.C. Site-Specific Written Examination
Seabrook Station
Reactor Operator

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 51. | A | B | C | D | 76. | A | B | C | D |
| 52. | A | B | C | D | 77. | A | B | C | D |
| 53. | A | B | C | D | 78. | A | B | C | D |
| 54. | A | B | C | D | 79. | A | B | C | D |
| 55. | A | B | C | D | 80. | A | B | C | D |
| 56. | A | B | C | D | 81. | A | B | C | D |
| 57. | A | B | C | D | 82. | A | B | C | D |
| 58. | A | B | C | D | 83. | A | B | C | D |
| 59. | A | B | C | D | 84. | A | B | C | D |
| 60. | A | B | C | D | 85. | A | B | C | D |
| 61. | A | B | C | D | 86. | A | B | C | D |
| 62. | A | B | C | D | 87. | A | B | C | D |
| 63. | A | B | C | D | 88. | A | B | C | D |
| 64. | A | B | C | D | 89. | A | B | C | D |
| 65. | A | B | C | D | 90. | A | B | C | D |
| 66. | A | B | C | D | 91. | A | B | C | D |
| 67. | A | B | C | D | 92. | A | B | C | D |
| 68. | A | B | C | D | 93. | A | B | C | D |
| 69. | A | B | C | D | 94. | A | B | C | D |
| 70. | A | B | C | D | 95. | A | B | C | D |
| 71. | A | B | C | D | 96. | A | B | C | D |
| 72. | A | B | C | D | 97. | A | B | C | D |
| 73. | A | B | C | D | 98. | A | B | C | D |
| 74. | A | B | C | D | 99. | A | B | C | D |
| 75. | A | B | C | D | 100. | A | B | C | D |

**Question 001**

During a reactor startup the Primary Board Operator is withdrawing Control Bank D rods for the approach to criticality.

Which of the following represents the speed at which the control rods should be moving?

A. 8 Steps Per Minute

B. 48 Steps Per Minute

C. 64 Steps Per Minute

D. 72 Steps Per Minute

**Question 002**

The plant is at 88% power. The following events occur:

- OS1201.01, RCP MALFUNCTION, is entered due to abnormal seal leakoff on RCP B
- RCP B #1 seal leakoff indicates 6.1 gpm
- Total seal leakoff indicates 7.9 gpm
- Seal water inlet temperature is STABLE

Per OS1201.01, the crew commences a normal shutdown to MODE 3 to facilitate shutdown of RCP B. With the plant at 46% power, the following conditions are observed:

- RCP B seal leakoff has increased to 6.9 gpm
- Total seal leakoff has increased to 9.7 gpm

What action should the crew take?

A. Continue with the shutdown to MODE 3. Stop RCP B after the reactor trip breakers are open.

B. Trip the reactor, go to E-0, REACTOR TRIP OR SAFETY INJECTION. Trip RCP B after step 4 of E-0 is complete.

C. Feed SG B to between 60% and 70% NR, Trip RCP B, shutdown to MODE 3 within 6 hours.

D. Isolate seal leakoff on RCP B. If total leakoff stabilizes below 8 gpm, continue with the normal shutdown to MODE 3.

**Question 003**

The plant is at 100 % power. All control systems are operating in AUTOMATIC. Letdown flow indicates 75 gpm. Pressurizer level is 61% and STABLE.

Which of the following describes the effect on CVCS if Letdown flow is INCREASED to 100 gpm?

A. HCV-182 must be throttled CLOSED to DECREASE Seal Injection flow rate to its original value.

B. HCV-182 must be throttled OPEN to DECREASE Seal Injection flow rate to its original value.

C. HCV-182 must be throttled CLOSED to INCREASE Seal Injection flow rate to its original value.

D. HCV-182 must be throttled OPEN to INCREASE Seal Injection flow rate to its original value.

**Question 004**

Which of the following describes the automatic operation of the PCCW system in response to PCCW B head tank level decreasing to 42 %?

A. Train A and B Waste Processing Building (WPB) PCCW isolation valves close.

B. Train A and B WPB and PCCW containment isolation valves close.

C. Train B PCCW radiation monitor isolation valve and B PCCW containment isolation valves close.

D. Train B PCCW radiation monitor isolation valve and B WPB isolation valves close.

**Question 005**

The plant is at 49% power. An event occurs resulting in the following conditions:

- All Steam Generator Pressures DECREASING slowly
- Containment temperature, pressure, and humidity INCREASING
- Tave DECREASING
- Reactor power is INCREASING

For this event, which of the following actions is designed to prevent the containment from exceeding its design pressure limit?

A. Safety Injection Actuation

B. Main Steam Line Isolation

C. Containment Isolation Phase A

D. Feedwater Isolation

**Question 006**

The plant is at 88 % power. Control Bank D Group Demand Counters indicate 228 steps.

Due to an Urgent Failure of DRPI Data B, the Accuracy Mode Select Switch is placed in the DATA A position.

How does this affect the OPERABILITY of Rod Position Indication?

A. Rod Position Indication is INOPERABLE. THERMAL POWER must be reduced to less than 50% of RATED THERMAL POWER within 8 hours.

B. Rod Position Indication is OPERABLE and capable of determining rod position within ± 12 steps.

C. Rod Position Indication is INOPERABLE. POWER OPERATION may continue as long as the affected rod positions are determined indirectly by the Incore Detector System within 8 hours.

D. Rod Position indication is OPERABLE and capable of determining rod position within ± 6 steps.

**Question 007**

The plant is at 7 % power during a plant startup. Intermediate Range channel N36 fails HIGH.

Which of the following describes the effect of the IR N36 failure?

A. The startup may continue after bypassing C-1 for IR N36.

B. The startup may continue after bypassing C-1 for IR N35 AND IR N36.

C. The reactor must be placed in HOT STANDBY within 6 hours. P-6 will not automatically energize with IR N36 failed high.

D. The reactor will trip on High Intermediate Range Flux.

**Question 008**

The following conditions exist:

The plant is at 98 % power.
Control Bank D is withdrawn to 225 steps

Due to a divergent xenon oscillation, it has been determined that active AFD control is necessary.

Reactor Engineering has recommended controlling Delta-I by using PUSH/PULL/DRIFT to target.

Which of the following describes how to initiate active AFD control using PUSH/PULL/DRIFT to target?

A. As AFD is passing through target after a POSITIVE peak, INSERT Control Bank D to hold AFD on target. Borate as necessary to maintain power constant.

B. As AFD reaches a NEGATIVE peak, WITHDRAW Control Bank D rods to move AFD in the positive direction. Borate as necessary to maintain power constant.

C. As AFD is passing through target after a POSITIVE peak, WITHDRAW Control Bank D rods to move AFD in the positive direction. Dilute as necessary to maintain power constant.

D. As AFD is passing through target after a NEGATIVE peak, INSERT Control Bank D to hold AFD on target. Dilute as necessary to maintain power constant.

**Question 009**

A LOCA is in progress.

Reactor Trip and Safety Injection have initiated. All safeguards systems are functioning as designed.

Containment Pressure indicates 24 psig and trending down slowly.

Which of the following describes the status of Containment Cooling Systems?

A. Containment Structure Cooling fans are RUNNING; CRDM Cooling fans are RUNNING; Containment Recirculation fans are operating in the FILTER MODE.

B. Containment Structure Cooling fans are TRIPPED; CRDM Cooling fans are TRIPPED; Containment Recirculation fans are operating in the FILTER MODE.

C. Containment Structure Cooling fans are RUNNING; CRDM Cooling fans are RUNNING; Containment Recirculation fans are operating in the RECIRC MODE.

D. Containment Structure Cooling fans are TRIPPED; CRDM Cooling fans are TRIPPED; Containment Recirculation fans are operating in the RECIRC MODE.

**Question 010**

The plant has sustained a Large Break LOCA. The following conditions exist:

- Cold Leg ECCS Flow on SI-FI-917 indicates 900 gpm
- Safety Injection flow is 600 GPM in EACH train
- RHR flow is 3700 GPM in EACH train
- Train A CBS pump is running with discharge pressure at 190 psig
- Train B CBS pump did NOT start upon actuation of CBS

Assuming the RWST was at it's Tech Spec minimum level when the event occurred, approximately how much time will pass before initiation of swapover to Cold Leg recirculation?

A. 15 minutes

B. 30 minutes

C. 45 minutes

D. 60 minutes

**Question 011**

The plant is at 96 % power. All control systems are aligned for AUTOMATIC operation.

A bus fault causes the incoming UAT feeder to 4.16KV bus 3 to trip open.

With NO operator action, which of the following describes the response of the plant?

A. The reactor will trip on LO-LO SG levels.

B. The alternate supply breaker to bus 3 from the RAT will close.

C. DG A and B will automatically start and supply busses E5 and E6.

D. The reactor will trip on Loss of RCS flow.

**Question 012**

The plant is at 16% power when the following events occur:

- Main Feedwater pumps trip
- Feedwater Isolation Valves close
- Feedwater regulating and bypass valves close
- The Main Turbine trips
- The reactor has NOT tripped

Which of the following is the likely cause of this event?

A. P-4 AND Low Tave

B. Safety Injection AND P-14

C. P-14

D. Safety Injection

**Question 013**

DG B is OOS.

A loss of Off-Site power results in a reactor trip.

Which of the following sources of EFW are immediately available?

A. EFW pump P-37A ONLY.

B. EFW pump P-37A and the Startup Feed pump.

C. EFW pump P-37A and P-37B.

D. EFW pump P-37B and the Startup Feed pump.

**Question 014**

Which of the following will automatically CLOSE the Waste Gas compressor discharge flow control valve, 1-WG-FV-1602?

A. High Hydrogen concentration

B. High effluent radiation

C. High Vent Header discharge flow

D. High Oxygen concentration

**Question 015**

The plant is in MODE 5. The following conditions exist:

- RCS temperature is 166°F.
- The pressurizer is SOLID.
- RCS pressure is being maintained at 255 - 275 psig

Which of the following describes the system response to an RCS heatup of 10°F?

A. Letdown Pressure Control Valve, PCV-131, OPENS to maintain RCS pressure constant. Letdown flow through RH-HCV-128 will DECREASE.

B. Letdown Pressure Control Valve, PCV-131, CLOSES to maintain RCS pressure constant. Letdown flow through RH-HCV-128 will DECREASE.

C. Letdown Pressure Control Valve, PCV-131, OPENS to maintain RCS pressure constant. Letdown flow through RH-HCV-128 will INCREASE.

D. Letdown Pressure Control Valve, PCV-131, CLOSES to maintain RCS pressure constant. Letdown flow through RH-HCV-128 will INCREASE.

**Question 016**

Which of the following describes the logic required to initiate the ESF actuations generated by the following signals?

| | Containment HI-1 (SI) | Containment HI-2 (MSLI) | Containment HI-3 (CBS/P/CVI) |
|---|---|---|---|
| A. | 2 of 3 | 2 of 3 | 2 of 3 |
| B. | 2 of 4 | 2 of 4 | 2 of 3 |
| C. | 2 of 3 | 2 of 4 | 2 of 4 |
| D. | 2 of 3 | 2 of 3 | 2 of 4 |

**Question 017**

The following VAS alarm is received:

- D7746 ROD CTL URGENT FAILURE

Subsequent investigation reveals a phase failure in Power Cabinet 1BD. The failure is determined to be in Control Bank D, Group 1

A demand signal for control bank insertion occurs before action is taken to repair the problem and reset the alarm.

Which of the following describes the response of the Rod Control system?

A. Control Banks B and D, Group 1 are frozen. Group 2 will insert in response to an AUTOMATIC signal.

B. Control Banks B and D are frozen. All other Control Banks will insert in AUTO or MANUAL.

C. Control Banks B and D, Groups 1 and 2, will not move in AUTO or MANUAL control, but may be moved in INDIVIDUAL BANK SELECT.

D. Control Banks B and D, groups 1 and 2 will not move in AUTO or MANUAL. Control Banks not powered from Cabinet 1BD may be moved in INDIVIDUAL BANK SELECT.

**Question 018**

The reactor has tripped. The following conditions exist:

- RCS Tave is 557°F and STABLE
- EFW flow to SG A, B, and D is 220 gpm each, and STABLE
- EFW flow to SG C is 480 gpm and INCREASING

Assuming the current trends continue, with NO operator action, which of the following describes the expected plant response?

A. EFW flow to SG C will be limited to 525 gpm by DP across a venturi in the EFW piping.

B. SG C EFW flow control MOVs will close when flow reaches 525 gpm.

C. EFW flow to SG C will be limited to 750 gpm by DP across a flow orifice in the EFW piping.

D. EFW flow to SG C will be limited to 750 gpm by the size of the EFW piping.

**Question 019**

The plant has sustained a Small Break LOCA. The following conditions exist:

- PORV 456B is stuck OPEN, and has NOT been isolated
- RCS pressure is 1050 psig
- Core Exit Thermocouples are approximately 550°F
- All RCPs are TRIPPED.

Which of the following instruments will provide the most reliable indication of actual RCS inventory?

A. Pressurizer Hot-calibrated level instrument LT-459

B. Pressurizer Cold-calibrated level instrument LT-462

C. Reactor Vessel Dynamic Range DP

D. Reactor Vessel Full Range DP

**Question 020**

A Large Break LOCA has occurred. All safeguards equipment functioned as designed. NO safeguards actuation signals have been RESET.

RWST LO-LO level alarm is actuated.

How will swapover to Cold Leg recirculation be performed?

A. Containment recirculation sump valves, CBS-V8 and CBS-V14, will automatically open. RWST suction valves, CBS-V2 and CBS-V5, will automatically close when the containment recirculation suction valves are fully open.

B. Containment recirculation sump valves, CBS-V8 and CBS-V14, will automatically open. RWST suction valves, CBS-V2 and CBS-V5, must be manually closed when the containment recirculation valves are open.

C. Containment recirculation sump valves, CBS-V8 and CBS-V14, must be manually opened. RWST suction valves, CBS-V2 and CBS-V5, must be manually closed.

D. Containment recirculation sump valves, CBS-V8 and CBS-V14, must be manually opened. RWST suction valves, CBS-V2 and CBS-V5, automatically close when the containment recirculation valves are open.

**Question 021**

The Pressurizer pressure control system is in AUTOMATIC with PT-455 and PT-456 selected as the controlling and backup channels respectively. Which of the following describes a function of PT-458?

A. Arms RC-PCV-456B (PORV B) when pressure is 2350 psig.

B. If closed, opens RC-V-124, block valve for RC-PCV-456B (PORV B) at 2350 psig.

C. If closed, opens RC-V-122, block valve for RC-PCV-456A (PORV A), at 2350 psig.

D. Opens RC-PCV-456B (PORV B) when pressure is 2385 psig.

**Question 022**

The plant is at 100 % power with all Control Systems operating in AUTOMATIC.

The backup pressurizer level control channel fails low causing letdown to isolate. The primary board operator responds by placing CS-FK-121, Charging Flow Controller in MANUAL to reduce charging flow. (The Master Level Controller, RC-LK-459, remains in AUTO)

Letdown flow is re-established and pressurizer level has been returned to program.

What actions are necessary to place the Pressurizer Level Control system back in AUTO?

A. Place RC-LK-459 in MANUAL. Adjust the output of CS-FK-121 to match the output of RC-LK-459 and place RC-LK-459 in AUTO. Then place CS-FK-121 in AUTO.

B. Place RC-LK-459 in MANUAL and adjust its output to match the input and setpoint signals on CS-FK-121. Place CS-FK-121 in AUTO. Place RC-LK-459 in AUTO.

C. Leave RC-LK-459 in AUTO. Adjust the output of CS-FK-121 to match the input of CS-FCV-121. Place CS-FCV-121 in AUTO.

D. Leave RC-LK-459 in AUTO. Adjust the output of CS-FK-121 to match the input of RC-LK-459 and place CS-FK-121 in AUTO.

**Question 023**

The plant is at 85% power. The following conditions exist:

- PT-505 fails LOW

30 seconds later, a Loss of Feed occurs requiring a reactor trip. The reactor does NOT trip.

10 seconds after the reactor fails to trip, the following conditions are observed:

- SG A narrow range level is 2%
- SG B narrow range level is 6%
- SG C narrow range level is 4%
- SG D narrow range level is 3%

Which of the following is the expected response of the ATWS Mitigation System Actuation Circuitry (AMSAC)?

A. AMSAC will NOT actuate because it is not armed.

B. AMSAC will TRIP the Main Turbine and START the EFW pumps.

C. AMSAC will NOT actuate because power will be below the C-20 setpoint before the actuation timer expires.

D. AMSAC will TRIP the reactor and START the EFW pumps in 60 seconds.

**Question 024**

The plant is at 17% power during a plant startup.

- Steam Dump MODE Selector is in the STEAM PRESSURE MODE.
- MFP 32A is operating in AUTO
- MS-PK-507 is in AUTOMATIC
- Main Steam Header Pressure Instrument PT-507 fails HIGH.

Which of the following describes the response of the plant to the failure?

A. Feed Pump speed will INCREASE. Steam dumps will CLOSE, and will not reopen until Steam Dump MODE selector is placed in TAVE MODE.

B. Feed Pump speed will DECREASE. Steam dumps will CLOSE, and will not reopen until both Steam Dump Interlock control switches are RESET.

C. Feed Pump speed will INCREASE. Steam dumps will OPEN, and will not close until one Steam Dump Interlock control switch is placed in OFF.

D. Feed Pump speed will DECREASE. Steam Dumps will OPEN, and will not close until MS-PK-507 is placed in MANUAL.

**Question 025**

The plant is in MODE 5. Containment Pre-entry purge is in progress.

What is the response of the Containment Purge system if a Train B Containment Ventilation Isolation (CVI) signal is generated?

A. Containment Pre-entry purge supply fan (FN-9) and Purge Exhaust fan (FN-10) will trip. The Train A (V-1, V-4) and Train B (V-2, V-3) containment isolation valves will close.

B. Containment Pre-entry purge exhaust fan (FN-10) will trip. Train B containment isolation valves (V-2, V-3) will close.

C. Containment Pre-entry purge exhaust fan (FN-10) will trip. All 4 Containment isolation valves (V-1, V-2, V-3, V-4) will close.

D. Containment Pre-entry purge supply fan (FN-9) will trip. The Train B containment isolation valves (V-2, V-3) will close.

**Question 026**

Which of the following describes a source of EMERGENCY makeup to the Spent Fuel Pool?

A. CVCS

B. DWST

C. RWST

D. PCCW

**Question 027**

While performing refueling operations, it becomes necessary to use the INTERLOCK OVERRIDE function of the refueling machine.

The refueling machine operator latches a fuel assembly and attempts to raise the assembly into the mast.

Which of the following conditions result due to the INTERLOCK OVERRIDE condition?

A. The hoist speed is AUTOMATICALLY limited to SLOW speed.

B. Limiting UPWARD motion is controlled by the Refueling Machine Operator ONLY.

C. Bridge and Trolley motion is AUTOMATICALLY DEFEATED until the fuel assembly is completely in the mast.

D. Hoist motion will NOT automatically stop if there is a hoist overload condition.

**Question 028**

The plant is at 40% power with all control systems in automatic. Due to a failure in the control circuitry, the B SG MSIV closes.

Assuming no operator action, what effect will this have on the plant?

A. Reactor power stabilizes at 30% due to the lack of steam flow from the affected SG.

B. The reactor will trip on LO-LO narrow range level in the affected SG.

C. The reactor will trip on high pressurizer pressure.

D. Reactor power stabilizes at 40% with the unaffected SGs providing more steam flow to the turbine.

**Question 029**

The plant has sustained a Loss of Off-Site power. All safeguards equipment is functioning as designed.

Assuming no operator action, which of the following equipment is running / energized?

A. Charging pump A, Emergency Feedwater pump B, Service Water pump A.

B. Charging pump B, Emergency Feedwater Pump A, Pressurizer Heater Backup group B.

C. Service Water pump A, PCCW pump A, Startup Feed Pump.

D. Charging Pump A, Startup Feed pump, Pressurizer Heater Backup group A.

**Question 030**

Which of the following will automatically trip Emergency Diesel Generator 1A following an SI start?

A. High Jacket Water temperature

B. Loss of Field

C. Engine High Vibration

D. Primary protection lockout (86 DP)

**Question 031**

When the plant is at full power, which reactor trip provides a backup for the Power Range High Neutron Flux Trip?

A. Overtemperature $\Delta T$

B. Overpower $\Delta T$

C. Power Range Neutron Flux High Positive Rate

D. Intermediate Range High Neutron Flux

**Question 032**

The plant is in MODE 5. Train B RHR is in service in COOLDOWN mode. The following conditions exist:

- Tave is 182°F and STABLE
- RHR heat exchanger outlet valve, RH-HCV-607 is 10% OPEN
- RHR heat exchanger bypass flow control valve, RH-FCV-619, is maintaining total RHR flow at 3500 gpm

A loss of Instrument Air occurs. Which of the following describes the effect on the RHR system and on RCS temperature?

| | RH-HCV-607 | RH-FCV-619 | RCS Temperature |
|---|---|---|---|
| A. | FAILS AS IS | FAILS AS IS | INCREASES |
| B. | FAILS AS IS | FAILS CLOSED | INCREASES |
| C. | FAILS OPEN | FAILS AS IS | DECREASES |
| D. | FAILS OPEN | FAILS CLOSED | DECREASES |

**Question 033**

The plant has sustained a LOCA. Safety Injection has actuated. All safeguards systems are functioning as designed.

Which of the following describes the Service Water system alignment?

A. PCCW heat exchangers and DG cooling is supplied from Cooling Towers. SCCW heat exchangers are supplied from Service Water pumps.

B. PCCW heat exchangers and DG cooling is supplied from Service Water pumps. SCCW heat exchangers are isolated.

C. PCCW heat exchangers and DG cooling is supplied from Cooling Towers. SCCW heat exchangers are isolated.

D. PCCW heat exchangers, DG cooling, and SCCW heat exchangers are supplied from Service Water pumps.

**Question 034**

Which of the following describes the operation of the Service Air isolation valves, SA-V92 and SA-V93, during an Instrument Air leak?

A. AUTOMATICALLY CLOSE at 90 psig decreasing, resets to allow MANUAL OPENING above 93 psig INCREASING.

B. AUTOMATICALLY CLOSE at 90 psig decreasing, AUTOMATICALLY REOPEN above 93 psig INCREASING.

C. AUTOMATICALLY CLOSE at 80 psig decreasing, resets to allow MANUAL OPENING above 83 psig INCREASING.

D. AUTOMATICALLY CLOSE at 80 psig decreasing, AUTOMATICALLY REOPEN above 83 psig INCREASING.

**Question 035**

The plant is at 12 % power during a Plant Startup.

RCP A trips on Phase Differential Overcurrent.

With no operator action, describe the response of the plant to the RCP trip.

A. Steam flow decreases in all SGs. All SG levels initially decrease, then increase as the secondary plant stabilizes and SGWLC responds. Control Rods withdraw to maintain Tave on program.

B. Steam pressure decreases in all SGs. SG A level initially increases due to overfeeding. SG B, C, and D levels initially decrease due to increased steam demand. SG levels return to normal as SGWLC responds. Tave remains unaffected because Reactor power remains unaffected.

C. Steam pressure decreases in all SGs. SG A level decreases due to the loss of heat input. SG B, C and D levels increase due to increased steam demand. SG levels return to normal as SGWLC responds. Tave stabilizes at a lower value.

D. Steam pressure decreases in all SGs. SG A level decreases due to the loss of heat input. SG B, C and D levels increase due to increased steam demand. SG levels return to normal as SGWLC responds. Control rods withdraw to maintain Tave on program.

**Question 036**

The plant is at 99 % power. All control systems are operating in AUTO, with the exception of Rod Control, which is operating in MANUAL.

Control Bank D is at 198 steps.

The Primary Board Operator withdraws Control Bank D two steps to maintain Tave on program. When the In/Hold/Out switch is released, Control Bank D rods continue to move in the OUT direction.

What action should be taken?

A. Trip the reactor, go to E-0, REACTOR TRIP OR SAFETY INJECTION.

B. Attempt to reinsert Control Bank D to 198 steps using the In/Hold/Out switch. If Control Bank D will not stop moving, trip the reactor and go to E-0, REACTOR TRIP OR SAFETY INJECTION.

C. Place the Rod Bank Selector Switch to the CBD position. If rods will not stop moving trip the reactor and go to E-0, REACTOR TRIP OR SAFETY INJECTION.

D. Place the Rod Bank Selector Switch in the AUTO position. If rods will not stop moving trip the reactor and go to E-0, REACTOR TRIP OR SAFETY INJECTION.

**Question 037**

The crew is performing a rapid power decrease at BOL from 100% power to 30% power.

Control Rods are in AUTO. Load reduction is being performed using turbine LOAD LIMIT.

The following alarms are received:

- D7761 CTL ROD BANK D INSERTION LIMIT LOW
- D7762 CTL ROD BANK D INSERTION LIMIT LO-LO

The crew initiates rapid boration per OS1202.04. Assuming the turbine load decrease rate remains constant throughout the event, which of the following describes the effects of the boration on the plant?

A. Control rods will insert at a FASTER rate.
Tave will INCREASE

B. Control rod insertion rate is unchanged
Tave will DECREASE

C. Control rods will insert at a SLOWER rate
Tave will DECREASE

D. Control rod insertion rate is unchanged
Tave will INCREASE

**Question 038**

The plant is operating at 100 % power.

- PT-505, Turbine Impulse Pressure, has failed low.
- The crew is performing step 1 of OS1235.05, TURBINE IMPULSE PRESSURE PT-505 OR PT-506 INSTRUMENT FAILURE.
- The Steam Dump MODE Selector is still in the TAVG position

The following events occur:

- Letdown isolates
- All steam dump valves open

Which of the following events may have caused these actuations?

A. PT-506 failed high.

B. Tave input to the Load Rejection controller failed low.

C. PP-1B, 120 VAC Vital Instrument Bus, lost power.

D. A Loss of Instrument Air has occurred.

**Question 039**

The plant is at 47 % power. Which of the following events will initiate a reactor trip?

A. 1 of 3 detectors on 2 of 4 loops indicating < 90 % RCS loop flow.

B. 13.8 KV bus 1 and 2 frequency drops to 58 Hz for 2 seconds.

C. 2 of 3 detectors on 1 of 4 loops indicating < 90 % RCS loop flow.

D. 13.8 KV bus 1 voltage drops to 9000 volts for 0.5 seconds.

**Question 040**

The plant is operating at 100 % power when a Loss of Off-Site power causes a reactor trip. Ten minutes following the trip, the following conditions exist:

- SG A Pressure 1135 psig and stable
- SG B Pressure 1125 psig and stable
- SG C Pressure 1130 psig and stable
- SG D Pressure 1125 psig and stable

RCS Pressure is 2250 psig and stable

Thot is approximately 580°F in all 4 loops and trending down slowly

Core Exit TCs indicate approximately 585°F

Tcold is approximately 561°F in all 4 loops and stable

Based on the above indications, what is the condition of the RCS?

A. Natural Circulation exists. Heat removal is being maintained by the condenser steam dumps.

B. Natural Circulation does not exist. Heat removal may be established by opening the condenser steam dumps.

C. Natural Circulation exists. Heat removal is being maintained by atmospheric steam dumps.

D. Natural Circulation does not exist. Heat removal may be established by opening the atmospheric steam dump valves.

**Question 041**

Which of the following conditions result in the WORST CASE Main Steam Line Break?

A. Beginning of Core Life; Hot Full Power

B. End of Core Life; Hot Full Power

C. Beginning of Core Life; Hot Zero Power

D. End of Core Life; Hot Zero Power

**Question 042**

Which of the following is characteristic of an event that would require entry to FR-P.1, RESPONSE TO PRESSURIZED THERMAL SHOCK?

A. RCS PRESSURE DECREASE followed by rapid RCS HEATUP

B. Rapid RCS COOLDOWN followed by RCS PRESSURE DECREASE

C. Rapid RCS COOLDOWN followed by rapid RCS HEATUP

D. Rapid RCS COOLDOWN followed by RCS PRESSURE INCREASE

**Question 043**

Which of the following plant conditions would require the crew to verify that adequate Shutdown Margin exists?

A. Control Bank D rods Group demand position and DRPI indication deviate by 10 steps.

B. One Control Bank D rod is misaligned by 13 steps and cannot be moved.

C. Tave is 550°F in all loops during MODE 1 operation.

D. Calculated Moderator Temperature Coefficient (MTC) is outside the limits specified in the COLR for MODE 1 operation.

**Question 044**

A Loss of All AC power has occurred.

The crew has entered ECA-0.0, LOSS OF ALL AC POWER. An operator has been dispatched to perform Attachment A to shed DC loads.

When Attachment A is completed, which of the following loads will still be energized?

A. ED-PP-12E, Non-Vital Instrument Distribution Panel 12E

B. EDE-PP-1A, Vital Instrument Distribution Panel 1A

C. Bus E61 Auxiliary Bus

D. CP-CP-111, Reactor Trip Switchgear

**Question 045**

The Station fire brigade is dispatched to fight a fully developed fire that has erupted in the main turbine lube oil reservoir room. Which of the following extinguishing agents is best for extinguishing the fire AND minimizing the possibility of reflash?

A. Dry chemical

B. Carbon dioxide

C. Water fog

D. Foam

**Question 046**

DG 1A has been placed in LOCAL control.

How will DG 1A respond to a Loss of Off-Site Power?

A. DG1A will automatically start, the output breaker will automatically close, and load sequencing will automatically occur.

B. DG 1A will automatically start, the output breaker must be manually closed, and load sequencing will automatically occur upon breaker closure.

C. DG1A must be manually started, the output breaker will automatically close, and load sequencing must be performed manually.

D. DG 1A will automatically start, the output breaker must be manually closed, and load sequencing must be performed manually.

**Question 047**

A Loss of all AC power has occurred. The crew is performing the actions of ECA-0.0, LOSS OF ALL AC POWER.

The crew commences dumping steam from all steam generators to minimize RCS leakage.

Which of the following describes the reason that the steam generators should NOT be depressurized below 125 psig?

A. Remaining above this pressure reduces Pressurized Thermal Shock concern for the reactor vessel.

B. It represents the minimum pressure that the steam generators serve as an effective heat sink.

C. Minimizes the possibility of SI accumulator nitrogen intrusion into the RCS.

D. It represents the minimum pressure that the steam generators can effectively supply the Turbine Driven EFW pump.

**Question 048**

PLANT CONDITIONS:

- Reactor Power is 37 %
- Turbine load is 420 MWE
- Condenser Vacuum is 22 inches Hg and stable
- Load reduction is in progress
- The cause of the vacuum loss has been identified and corrected

Based on the above indications, which action is the crew required to take?

A. Immediately trip the reactor and go to E-0, REACTOR TRIP OR SAFETY INJECTION.

B. Continue the load decrease to increase condenser vacuum to > 25 inches Hg.

C. Immediately trip the turbine, verify all stop valves are closed and the generator breaker opens, and go to ON1231.02, TURBINE TRIP BELOW P-9.

D. Continue the load decrease and if vacuum remains greater than 22 inches Hg remove the turbine generator from service IAW OS1000.06, POWER DECREASE.

**Question 049**

The crew has entered FR-C.1, RESPONSE TO INADEQUATE CORE COOLING due to a valid RED path on the Core Cooling CSF.

- CS-P-2A is Danger tagged out of service.
- CS-P-2B cannot be started due to a loss of power to bus E-6.
- RCS pressure is 1900 psig and slowly increasing.
- CETCs are 750 °F and slowly increasing.
- All other ECCS equipment is functioning as designed.
- ECCS flow cannot be verified in either train.

What action should the crew initially take to establish some form of injection flow?

A. Start the Positive Displacement Charging Pump and establish flow through CS-FCV-121.

B. Start one RCP to collapse any voids in the RCS that restrict ECCS flow.

C. Open one PORV to depressurize the RCS and allow ECCS flow.

D. Depressurize all intact SGs to 125 psig.

**Question 050**

The plant has sustained a Main Steam Line Break affecting all 4 Steam Generators.

The crew is currently performing ECA 2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 2.

The crew has throttled EFW to 25 gpm to each steam generator to minimize the RCS cooldown.

The following conditions exist:

| SG | Level | Pressure |
|---|---|---|
| SG 1A | 20% WR | 360 psig STABLE |
| SG 1B | 19% WR | 320 psig DECREASING |
| SG 1C | 18% WR | 310 psig DECREASING |
| SG 1D | 26% WR | 380 psig INCREASING |

Which of the following describes the action that should be taken and the reason for the action?

A. Transition to E-2, FAULTED STEAM GENERATOR ISOLATION, because there is an intact Steam Generator available.

B. Transition to FR-H.1, LOSS OF SECONDARY HEAT SINK, because there is a RED condition on the Heat Sink Status Tree.

C. Transition to E-3, STEAM GENERATOR TUBE RUPTURE, because there is an unexplained increase in Steam Generator Level.

D. Continue with ECA 2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, because Safety Injection termination is not complete.

**Question 051**

The plant is operating at 88% power. All control systems are operating in AUTOMATIC.

Pressurizer pressure is 2235 psig.

A malfunction in the Master pressure controller (PK-455A) causes the controller setpoint to change to 2320 psig.

Assuming no operator action, which of the following describes the initial response of the pressurizer pressure control system?

A. Spray valves open, all pressurizer heaters de-energize.

B. PORV 456A opens, spray valves open, all pressurizer heaters de-energize.

C. Spray valves close, pressurizer control heaters fully on, backup heaters on.

D. Spray valves modulate towards the CLOSED position, pressurizer control heaters reduce output, pressurizer backup heaters energize.

**Question 052**

Which of the following describes the alignment of Hot Leg Recirculation after a LOCA?

A. RHR and SI pumps are aligned to provide ECCS flow to the hot legs to prevent excessive boron precipitation in the reactor vessel upper plenum.

B. RHR pumps provide flow to the cold legs, SI pumps are aligned to provide flow to the hot legs to provide mixing and prevent boron stratification in the reactor core.

C. RHR and SI pumps are aligned to provide ECCS flow to the hot legs to prevent excessive boron precipitation in the reactor core.

D. RHR pumps are aligned to provide flow to hot legs, SI pumps are aligned to provide flow to cold legs to flush the reactor vessel in the case of a large cold leg rupture.

**Question 053**

The plant has sustained an ATWS.

The crew has entered FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS.

The BOP operator was unable to trip the turbine by pressing the Manual Turbine Trip pushbutton. What action should he take next?

A. Manually run back the turbine

B. Close MSIVs and bypass valves

C. Open the Generator breaker

D. Check the EFW pumps operating

**Question 054**

Reactor trip and Safety Injection have occurred.

ECA-1.2, LOCA OUTSIDE CONTAINMENT, has been entered from E-0, REACTOR TRIP OR SAFETY INJECTION, due to RDMS indication of high radiation levels in the RHR vaults.

After closing RH-V14, RHR Train A discharge to RCS, and RH-V22, RHR Train A discharge cross-connect, the following conditions exist:

- RCS pressure is 1100 psig and INCREASING
- ECCS flow is DECREASING

Which of the following describes the status of the LOCA and required action?

A. The LOCA is ISOLATED. Additional actions will be performed in E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

B. The LOCA is ISOLATED. Additional actions will be performed in ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

C. The LOCA is ISOLATED. Additional actions will be performed in E-0, REACTOR TRIP OR SAFETY INJECTION.

D. The LOCA is ISOLATED. Additional actions will be performed in ES-1.1, SI TERMINATION.

**Question 055**

An ATWS has occurred. The crew has shut down the reactor using manual rod insertion and boration.

One PORV has stuck open on the initial pressure transient, resulting in Safety Injection actuation. The stuck open PORV has been ISOLATED.

The crew has transitioned to ES-1.1, SI TERMINATION. When the Primary Board Operator attempts to reset SI, it will not reset.

What a possible cause of the SI reset failure?

A. The initiating condition causing the SI actuation has not cleared.

B. The Reactor Trip Breakers are closed.

C. The timer in the Safety Injection Block/Reset logic has not timed out.

D. P-11 is not energized.

**Question 056**

Which of the following describes the preferred method of operating RCPs during the performance of ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION?

A. Starting any RCP is undesirable because starting a RCP during Natural Circulation may cause a Steam Generator Safety Valve to lift.

B. Starting one RCP is desirable to provide normal pressurizer spray flow and mix the RCS.

C. Starting any RCP is undesirable because it is an unnecessary heat input to the RCS inhibiting RCS cooldown.

D. Starting two or more RCPs is desirable because it collapses RCS voids and allows true measurement of RCS inventory.

**Question 057**

The plant is at 100 % power.

A lightning strike on site results in electrical relaying throughout the plant and indication of several bus faults.

The crew manually trips the plant and enters E-0, REACTOR TRIP OR SAFETY INJECTION.

While verifying the reactor trip, the RO reports the following indications:

- NO Rod Bottom lights lit. All DRPI indication is lost.
- Intermediate Range flux is DECREASING on all channels
- Reactor trip breakers are OPEN

Which of the following describes the condition of the plant?

A. The reactor is tripped, no further action required to verify the trip.

B. The reactor is tripped. Boration is required until DRPI indication is available to verify no more than 1 stuck control rod.

C. The reactor is not tripped. Attempt a manual trip. If reactor trip cannot be verified, go to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS.

D. The reactor is not tripped. Boration is required until Shutdown Margin can be established and verified.

**Question 058**

The plant is at 81 % power.

A pressurizer code safety valve inadvertently lifts and remains partially open.

The following indications exist:

- Pressurizer pressure is 2205 psig and DECREASING.
- Temperature downstream of the safety valve indicates 276°F and INCREASING slowly
- PRT pressure is 47 psig and INCREASING

Which of the following is the reason for the temperature indication seen downstream of the safety valve?

A. The enthalpy of the saturated fluid in the pressurizer vapor space decreases rapidly when it becomes subcooled in the safety valve tailpipe.

B. The enthalpy of the saturated fluid in the pressurizer vapor space decreases as it loses energy due to the high-velocity head loss in the safety valve tailpipe.

C. The enthalpy of the saturated fluid in the pressurizer vapor space decreases as it passes through a safety valve, resulting in a temperature indication corresponding to the low-energy fluid in the tailpipe.

D. The enthalpy of the saturated fluid in the vapor space does not change as it passes through a safety valve, resulting in a temperature indication corresponding to the pressure in the PRT.

**Question 059**

A Small Break LOCA has occurred. The crew is performing the actions of ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION.

ECCS pumps have been stopped. Normal Charging is aligned. The crew is depressurizing the RCS. When the depressurization is stopped, the following conditions exist:

- RCS Subcooling is 37°F and DECREASING
- Pressurizer Level is 18% and DECREASING

Based on these indications, what actions should be taken?

A. ISOLATE Letdown. Check to ensure Pressurizer Level stabilizes above 5%.

B. Manually START ECCS pumps as necessary to regain subcooling.

C. REINITIATE Safety Injection and verify all safeguards equipment has actuated.

D. INCREASE RCS pressure using pressurizer heaters to regain subcooling.

**Question 060**

The plant is in MODE 5, Reduced Inventory, with the RCS intact.

Both trains of RHR are available, with Train B in operation.

Both PORVs are lined up for LTOP mode of operation.

Due to indication of cavitation on RHR Pump 8B, the crew enters OS1213.03, LOSS OF RHR AT REDUCED INVENTORY OR MIDLOOP WITH THE RCS INTACT.

Per the procedure, the crew isolates both trains of RHR by placing both RHR pumps in Pull-to-Lock and closes RHR suction valves RC-V22, V23, V87, and V88.

How does this action affect the Tech. Spec. operability of Overpressure Protection Systems?

A. Tech. Spec requirements are met. Isolating RHR suction valves does not affect operability of the RHR suction reliefs.

B. Tech. Spec requirements are NOT met. At least 1 RHR suction relief must be available for overpressure protection.

C. Tech. Spec requirements are met. Both PORVs are available for overpressure control.

D. Tech. Spec requirements are NOT met. BOTH PORVs and BOTH RHR suction reliefs are required for overpressure control while in Reduced Inventory.

**Question 061**

Reactor startup is in progress.

IR power indicates 5 $X10^{-11}$ amps on both channels. Source Range High Flux trip has NOT been blocked.

For the two switch positions shown below, describe the Reactor Protection System response to a blown control power fuse on Source Range channel N-31.

| | SR Level Trip Bypass: NORMAL | SR Level Trip Bypass: BYPASS |
|---|---|---|
| A. | No Reactor Trip | No Reactor Trip |
| B. | Reactor Trip | No Reactor Trip |
| C. | No Reactor Trip | Reactor Trip |
| D. | Reactor Trip | Reactor Trip |

**Question 062**

During a Reactor Startup the following conditions exist:

- P-6 has just energized
- Source Range Channel N-31 indicates 5 X $10^3$ CPS
- Source Range Channel N-32 indicates 4 X $10^3$ CPS
- Intermediate Range Channel N35 indicates 2 X $10^{-10}$ amps
- Intermediate Range Channel N36 indicates 2 X $10^{-11}$ amps

Which of the following is the likely cause of the above readings?

A. Intermediate Range Channel N35 is undercompensated.

B. Intermediate Range Channel N36 is undercompensated.

C. Intermediate Range Channel N35 is overcompensated.

D. Intermediate Range Channel N36 is overcompensated.

**Question 063**

The plant is at 79% power with a very small tube leak in SG A.

Under these conditions, which of the following will give the most accurate leak rate correlation for determining primary to secondary leakage?

A. Condenser Air Evacuation Monitor

B. Local radiation monitoring using low range detectors

C. Main Steam Line Monitors

D. Steam Generator Blowdown Sample Monitors

**Question 064**

The following VAS alarm is received:

- D6004 Vital UPS 1B DC Supply Volt Low

No other inverter alarms are present.

Which of the following is the likely cause of the alarm?

A. MCC-E631 supply to PP-1B has opened.

B. Inverter 1B rectifier phase failure.

C. MCC-E612 supply to inverter 1B has opened.

D. Battery input breaker from bus 11B has opened.

**Question 065**

During a loss of Instrument Air, which one of the following valves will fail CLOSED?

A. CC-TCV-2271-2, PCCW Loop B Heat Exchanger Bypass Valve

B. CS-FCV-110A, Boric Acid flow to Blender

C. CS-HCV-182, RCP Seal Flow Control

D. SW-V16, DG A Service Water Heat Exchanger Isolation

**Question 066**

A LOCA is in progress. The crew is performing actions of E-1, LOSS OF REACTOR OR SECONDARY COOLANT. The following conditions exist:

- RWST level is 127,000 gallons
- BOTH RHR pumps tripped on overload during Safety Injection actuation. All other safeguards equipment functioned as designed.

The crew is verifying Cold Leg recirculation capability per E-1, step 11. Which of the following actions are required?

A. Transition to ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, when RWST level reaches 125,000 gallons.

B. Remain in E-1, Loss of Reactor or Secondary Coolant until directed to transition to ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

C. Transition to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

D. Transition to ECA-1.2, LOCA OUTSIDE CONTAINMENT.

**Question 067**

The plant has sustained a Feedwater Line break downstream of the Feed Line check valves inside containment.

Which of the following indications distinguishes the Feedwater Line break from a Main Steam Line break inside containment?

A. Steam Generator level prior to reactor trip

B. Containment pressure after reactor trip

C. Steam generator pressure after reactor trip

D. RCS Tave after reactor trip

**Question 068**

Which of the following instruments provide input to Train A of the RCS Subcooling Monitor?

A. RCS Wide Range Pressure instrument PT-403 and the average of all core exit thermocouples

B. RCS Wide Range Pressure instrument PT-405 and the auctioneered high core exit thermocouple

C. RCS Wide Range Pressure instrument PT-403 and the auctioneered high average quadrant temperature

D. RCS Wide Range Pressure instrument PT-405 and the auctioneered high average quadrant temperature

**Question 069**

The plant is at 100 % power. The PCCW system is aligned for automatic operation.

With no immediate operator action, which of the following describes an effect of the Train A PCCW heat exchanger temperature controller failing to the "FULL FLOW" MODE of operation?

A. PCCW flow to the Letdown Heat Exchanger will increase.

B. RCP A Motor Bearing temperature will INCREASE.

C. RCP A Thermal Barrier cooling isolation valve, V-428, will CLOSE on high flow.

D. The Letdown Heat Exchanger Temperature Control Valve will modulate in the CLOSED direction.

**Question 070**

The plant is at 100% power.

A small steam leak inside containment is contacting the reference leg of Pressurizer Level transmitter LT-459.

How is Pressurizer level indication affected?

A. LT-459 will indicate lower than actual level, and higher than Cold calibrated level indicator LT-462.

B. LT-459 will indicate higher than actual level, and lower than Cold calibrated level indicator LT-462.

C. LT-459 will indicate lower than actual level, and lower than Cold calibrated level indicator LT-462.

D. LT-459 will indicate higher than actual level, and higher than Cold calibrated level indicator LT-462.

**Question 071**

The plant is at 100% power. All electrical systems are in their normal full power lineup.

No surveillances are in progress.

Which of the following describes how 4.16KV bus E5 is energized following a Loss of Off-Site power?

A. First level undervoltage relays will immediately activate the EPS.

B. Second level undervoltage relays will activate the EPS following a 10-second time delay.

C. First level undervoltage relays will activate the EPS following a 1.2-second time delay.

D. Second level undervoltage relays will activate the EPS following a 1.2-second time delay.

**Question 072**

The plant has sustained a Steam Generator tube rupture concurrent with a loss of Off-Site power. All safeguards systems functioned as designed.

Actions of E-3, STEAM GENERATOR TUBE RUPTURE, have been performed. The crew is preparing to cool down and depressurize the RCS to MODE 5.

Based on current plant conditions, which of the following cooldown methods is preferred?

A. ES-3.1, POST SGTR COOLDOWN USING BACKFILL, because it minimizes radiological release.

B. ES-3.2, POST SGTR COOLDOWN USING BLOWDOWN, because it minimizes the spread of contamination to secondary plant components.

C. ES-3.3, POST SGTR COOLDOWN USING STEAM DUMP, because it is the fastest method of cooldown.

D. ES-3.3, POST SGTR COOLDOWN USING STEAM DUMP, because it conserves CST inventory.

**Question 073**

You are an On-coming watchstander that has been on vacation for 10 days.

When you are reviewing logs and journal entries for your position, how far back are you required to review?

A. 24 Hours

B. 72 hours

C. 7 Days

D. Review all logs and journal entries since the last time you were assigned to the position.

**Question 074**

The plant is operating at 3% power during a plant startup. A steam dump malfunction causes Tave to DECREASE to 550°F.

What ACTION is required?

A. RESTORE Tave within its limit in 15 minutes or be in HOT STANDBY within the following 15 minutes.

B. RESTORE Tave within its limit in 15 minutes or be in HOT STANDBY within 1 hour.

C. RESTORE Tave within its limit in 1 hour or be in HOT STANDBY within the following 1 hour.

D. RESTORE Tave within its limit in 1 hour or be in HOT STANDBY within the following 6 hours.

**Question 075**

Which of the following is considered a Temporary Modification per MA 4.3, TEMPORARY MODIFICATIONS?

A. Disconnecting a faulty VAS alarm circuit.

B. Installing a portable heater connected to a welding outlet.

C. Hoses connected to drain lines to temporarily route effluent.

D. Removal of floor plugs.

**Question 076**

Which of the following signals will isolate Primary Component Cooling Water flow to the Containment Structure Cooling Unit?

A. CC Head Tank Level LO

B. S signal

C. T signal

D. P signal

**Question 077**

The plant is at 88% power. All control systems are in AUTOMATIC.

The controlling Steam Flow channel for SC A instantaneously fails low.

In accordance with OS1235.04, SG FEED FLOW – STEAM FLOW OR STEAM PRESSURE INSTRUMENT FAILURE, what action should initially be taken to control level in the affected SG?

A. Select the alternate Steam Flow channel for control and monitor SG level between 50 and 70%.

B. Place SG A feed regulating valve controller in MANUAL and maintain SG A NR level between 50 and 70%.

C. Place Main Feed pump master speed controller in MANUAL and control Feedwater flow to maintain SG levels between 50 and 70 %.

D. Dispatch an NSO to take local control of SG A feed regulating valve, and stabilize SG A level between 50 and 70 %.

**Question 078**

VCT Automatic Makeup has failed.

The Primary Board Operator has completed a MANUAL makeup to the VCT. No other evolutions are in progress.

Approximately 15 minutes later, Control Bank D rods begin to INSERT slowly.

The following conditions exist:

- Tave – Tref mismatch is +2°F
- Pressurizer level is 1% above program
- Reactor power indicates 100.2% on all channels

Which of the following operations may have caused these indications?

A. The BORIC ACID BLENDER MODE SELECTOR was inadvertently selected to the ALTERNATE DILUTE mode of operation.

B. The TOTAL MAKEUP BATCH COUNTER was inadvertently set too LOW.

C. The TOTAL MAKEUP FLOW CONTROLLER was inadvertently set too LOW.

D. The BORIC ACID BATCH COUNTER was inadvertently set too LOW.

**Question 079**

Given the following conditions:

- A Small Break LOCA has occurred
- RCS pressure stabilizes at 1335 psig
- Maximum Average Quadrant CETC reading is 535°F

Which of the following describes the Subcooling Monitor reading, and the condition of the RCS?

A. RCS Subcooling Monitor reads +47° indicating the RCS is superheated.

B. RCS Subcooling Monitor reads -47° indicating the RCS is superheated.

C. RCS Subcooling Monitor reads +47° indicating the RCS is subcooled.

D. RCS Subcooling Monitor reads -47° indicating the RCS is subcooled.

**Question 080**

The plant is at 100% power. All control systems are operating in AUTOMATIC.

All Main Control Board DRPI display lights go out.

Subsequent investigation reveals that the DRPI control board display unit feeder breaker on MCC-531 has tripped open, and cannot be reclosed.

Under these circumstances where can individual rod positions be determined?

A. Test/Monitor cards in the DRPI Data Cabinets

B. Test/Monitor cards in the Rod Control logic cabinets

C. Detector/Encoder cards in the display unit card rack

D. Electro-Mechanical pulse counters in the Rod Control logic cabinets

**Question 081**

The plant is at 67% power.

BOTH Control Room Emergency Makeup Air and Filtration Systems are declared INOPERABLE due to a common mode failure.

What ACTION is required?

A. Restore BOTH Trains to OPERABLE status within 7 days or be in HOT STANDBY within 6 hours and COLD SHUTDOWN within the following 30 hours.

B. Restore AT LEAST ONE Train to OPERABLE status within 7 days or be in HOT STANDBY within 6 hours and COLD SHUTDOWN within the following 30 hours.

C. Restore AT LEAST ONE Train to OPERABLE status within 24 hours or be in HOT STANDBY within 6 hours and COLD SHUTDOWN within the following 30 hours.

D. Within 1 hour, initiate action to place the plant in HOT STANDBY within 6 hours and COLD SHUTDOWN within the following 30 hours.

**Question 082**

The plant is at 100% power. The following VAS alarm is received:

- D6096 DC BUS 11B VOLT LO-LO

Hardwired alarm UA-55, DC BUS 11B VOLTS LO/DC BUS 11D VOLTS LO annunciates.

DC Bus 11B voltmeter indicates ZERO volts.

Which of the following systems or components are still able to function normally when required?

A. Emergency Feedwater pump P-37B

B. Normal Feedwater Control

C. Diesel Generator B

D. PORV 456A

**Question 083**

The plant is at 100% power, all electrical systems are in their normal MODE 1 lineups.

A Loss of Off-Site power occurs. All systems function as designed.

With NO operator action, which of the following describes the electrical lineup of the 120-volt Vital AC Distribution system one minute after the event?

A. Vital Instrument Panel PP-1B is supplied through its inverter from DC Bus 11B via Battery B-1B.

B. Vital Instrument Panel PP-1B is supplied through its inverter from DC Bus 11B via Battery Charger BC-1B.

C. Vital Instrument Panel PP-1B is supplied through its inverter from MCC-E612.

D. Vital Instrument Panel PP-1B is supplied from its Maintenance supply, MCC-E631.

**Question 084**

Which of the following describes the circumstances under which two 125 volt vital DC battery chargers may be operated in parallel?

A. When neither battery on a train is capable of supplying it's associated DC bus.

B. When one battery in a train is used to provide back up power for both DC busses in the train.

C. When performing an equalizing charge for either battery in a train.

D. When AC input power is lost to one battery charger in a train.

**Question 085**

Which of the following parameters is used to determine RCS subcooling margin following a reactor trip due to a loss of Off-Site power?

A. Hot Leg to Cold Leg temperature difference

B. Core Exit thermocouple temperatures

C. Hot Leg temperatures

D. Heated Junction Thermocouple temperatures

**Question 086**

The plant is at 100% power. Power Range N41 fails high.

All required actions have been taken to stabilize the plant and take N41 out of service.

Per I&C request, N41 has been placed in BYPASS with all Technical Specification requirements being satisfied.

Which of the following is the MINIMUM actuation logic required to initiate a reactor trip on High Power level for the remaining Power Range NI channels?

A. 1 of 3

B. 2 of 3

C. 1 of 2

D. 2 of 2

**Question 087**

The plant has sustained a LOCA. All safeguards systems are operating as designed.

RCS pressure has decreased to 940 psig and has stabilized.

Which of the following describes the ECCS equipment injecting into the RCS?

A. Centrifugal Charging pumps ONLY

B. Centrifugal Charging and SI pumps ONLY

C. Centrifugal Charging, SI pumps, SI accumulators ONLY

D. Centrifugal Charging, SI pumps, SI accumulators, and RHR pumps

**Question 088**

Which of the following is the major LONG-TERM contributor to post-LOCA hydrogen generation?

A. Zirconium-Water reaction

B. Radiolysis of water in the containment sump

C. Corrosion of metals in containment

D. Hydrogen used in RCS for chemistry control

**Question 089**

While responding to a reactor trip, the Primary Board Operator determines that Loop 2 Tave has failed HIGH.

Assuming no action is taken by the crew to defeat the failed channel, Main Steam Pressure will:

A. DECREASE to approximately 1035 psig.

B. DECREASE to approximately 1092 psig.

C. INCREASE to approximately 1125 psig.

D. INCREASE to approximately 1185 psig.

**Question 090**

Which of the following is designed to TRIP the Main Generator output breaker during a reverse power condition?

A. Generator Primary Protection Relay (86GP)

B. Generator Backup Protection Relay (86GB)

C. Generator Underexcited Reactive Ampere Limit (URAL)

D. Generator/Transformer Overall Protection Lockout Relay (86GT)

**Question 091**

The plant is at 50% power. The second main feedpump is being placed in service by the BOP operator. The Primary Board Operator is performing a rod withdrawal of 2 steps to maintain Tave matched with Tref. Prior to performing the rod withdrawal, the Primary Board Operator must:

A. Announce his intention and obtain acknowledgement from the Unit Supervisor

B. Attend a pre-evolution briefing

C. Announce his intention and obtain acknowledgement from the Shift Manager

D. Be relieved of responsibility for responding to alarms

**Question 092**

Following a reactor trip from 100% power, the BOP operator is throttling EFW flow to all steam generators.

Which of the following describes the precaution used to minimize potential for Loss of Heat Sink when throttling EFW flow?

A. Throttle or isolate flow to each steam generator using the Train A EFW flow control valve.

B. Throttle or isolate EFW flow to 2 steam generators using the Train A EFW flow control valve, and to 2 steam generators using the Train B EFW flow control valve.

C. Throttle or isolate EFW flow to each steam generator using the Train B EFW flow control valve.

D. Throttle EFW flow to each steam generator by using ONE EFW flow control valve. Isolate EFW flow to each steam generator with the OPPOSITE train EFW flow control valve.

**Question 093**

The plant is in MODE 6, Refueling operations are in progress.

Which of the following conditions require CORE ALTERATIONS to be stopped?

A. ONE door in EACH personnel airlock is open.

B. The operating RHR loop is removed from operation to facilitate fuel movement near the hot legs.

C. One RHR loop becomes INOPERABLE when water level above the top of the reactor vessel flange is less than 23 feet.

D. Source Range Audible indication is lost in the Containment and the control room.

**Question 094**

A clearance has been generated for work on equipment requiring the use of BLUE tags.

Which of the following statements represents the use of BLUE tags for devices or components?

A. A BLUE tagged device may have no other DANGER, CAUTION, or BLUE tags attached.

B. A BLUE tagged device may have more than one BLUE tag, but no DANGER or CAUTION tags.

C. A BLUE tagged device may have CAUTION tags, but no BLUE or DANGER tags.

D. A BLUE tagged device may have other BLUE or CAUTION tags as long as all work packages on the clearance are under the control of one CONTACT PERSON.

**Question 095**

Which of the following conditions violates a SAFETY LIMIT as defined by Technical Specifications?

A. MODE 1, 100% power, RCS pressure is 2300 psig and highest loop Tave is 595°F.

B. MODE 5, RCS pressure exceeds 1500 psig.

C. MODE 5, RCS Tave exceeds 200°F.

D. MODE 1, 100% power, RCS pressure is 2850 psig and highest loop Tave is 610°F.

**Question 096**

Spent Fuel Pool Cooling pumps SF-P-10A and SF-P-10C were in service for Train A and Train B spent fuel pool cooling, respectively, following a full core off-load.

A loss of Off-Site power occurred. Both emergency diesels started and power was restored to busses E5 and E6.

Which of the following describes the actions required by the crew relative to spent fuel pool cooling?

A. Verify that SF-P-10A and SF-P-10C restarted automatically when busses E5 and E6 were re-energized.

B. Verify that SF-P-10A started automatically, RESET Train B EPS RMO, then manually restart SF-P-10C at MCC-612.

C. RESET Train A and Train B EPS RMO then verify that SF-P-10A and SF-P-10C restart automatically.

D. RESET Train A and Train B EPS RMO, then manually restart SF-P-10A at MCB-BR and manually restart SF-P-10C at MCC-612.

**Question 097**

Which of the following represents the Seabrook Station employee administrative guidelines for Total Effective Dose Equivalent (TEDE) exposure?

A. 500 mr/year

B. 1000 mr/year

C. 3000 mr/year

D. 5000 mr/year

**Question 098**

When performing actions in the EOP network, some High-Level tasks have associated subtasks.

If the sequence of subtask performance is IMPORTANT, how are the subtasks designated in the procedure step?

A. NOTES or CAUTIONS preceding the step

B. Indented in Outline format

C. Procedure Bullets

D. Alphabetic Letters

**Question 099**

Which of the following describes the purpose of the Operator Action Summary pages in the EOPs?

A. Contains information or actions that are applicable at any step of the procedure, allowing procedure transitions based on symptoms that may appear at any time.

B. Contains a summary of ALL CAUTIONS and NOTES that are applicable during the use of the associated procedure.

C. Contains a summary of contingency actions to be taken if the ACTION/EXPECTED RESPONSE directions do not place the plant in a stable condition.

D. Contains a summary of ALL AUTOMATIC setpoints and actuations associated with the use of the associated procedure.

**Question 100**

The following conditions exist:

- RED Path on Core Cooling
- RED Path on Heat Sink

FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, has been entered.

When the crew starts RCPs, the Core Cooling Status Tree changes to an ORANGE condition.

Which of the following actions should the crew take?

A. Immediately transition to FR-H.1, RESPONSE TO LOSS OF HEAT SINK.

B. Immediately transition to FR-C.2, RESPONSE TO DEGRADED CORE COOLING.

C. Remain in FR-C.1 until completion, then transition to FR-H.1.

D. Remain in FR-C.1 until completion, then transition to FR-C.2.

Attachment 2

# SEABROOK STATION SRO WRITTEN EXAMINATION W/ANSWER KEY

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

| Applicant Information | |
|---|---|
| Name: | Region: I |
| Date: | Facility/Unit: Seabrook |
| License Level: SRO | Reactor Type: Westinghouse PWR |
| Start Time: | Finish Time: |

## Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected four hours after the examination starts.

## Applicant Certification

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

______________________________
Applicant's Signature

## Results

| | |
|---|---|
| Examination Value | ______ Points |
| Applicant's Score | ______ Points |
| Applicant's Grade | ______ Percent |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | A | B | C | D | 26. | A | B | C | D |
| 2. | A | B | C | D | 27. | A | B | C | D |
| 3. | A | B | C | D | 28. | A | B | C | D |
| 4. | A | B | C | D | 29. | A | B | C | D |
| 5. | A | B | C | D | 30. | A | B | C | D |
| 6. | A | B | C | D | 31. | A | B | C | D |
| 7. | A | B | C | D | 32. | A | B | C | D |
| 8. | A | B | C | D | 33. | A | B | C | D |
| 9. | A | B | C | D | 34. | A | B | C | D |
| 10. | A | B | C | D | 35. | A | B | C | D |
| 11. | A | B | C | D | 36. | A | B | C | D |
| 12. | A | B | C | D | 37. | A | B | C | D |
| 13. | A | B | C | D | 38. | A | B | C | D |
| 14. | A | B | C | D | 39. | A | B | C | D |
| 15. | A | B | C | D | 40. | A | B | C | D |
| 16. | A | B | C | D | 41. | A | B | C | D |
| 17. | A | B | C | D | 42. | A | B | C | D |
| 18. | A | B | C | D | 43. | A | B | C | D |
| 19. | A | B | C | D | 44. | A | B | C | D |
| 20. | A | B | C | D | 45. | A | B | C | D |
| 21. | A | B | C | D | 46. | A | B | C | D |
| 22. | A | B | C | D | 47. | A | B | C | D |
| 23. | A | B | C | D | 48. | A | B | C | D |
| 24. | A | B | C | D | 49. | A | B | C | D |
| 25. | A | B | C | D | 50. | A | B | C | D |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 51. | A | B | C | D | 76. | A | B | C | D |
| 52. | A | B | C | D | 77. | A | B | C | D |
| 53. | A | B | C | D | 78. | A | B | C | D |
| 54. | A | B | C | D | 79. | A | B | C | D |
| 55. | A | B | C | D | 80. | A | B | C | D |
| 56. | A | B | C | D | 81. | A | B | C | D |
| 57. | A | B | C | D | 82. | A | B | C | D |
| 58. | A | B | C | D | 83. | A | B | C | D |
| 59. | A | B | C | D | 84. | A | B | C | D |
| 60. | A | B | C | D | 85. | A | B | C | D |
| 61. | A | B | C | D | 86. | A | B | C | D |
| 62. | A | B | C | D | 87. | A | B | C | D |
| 63. | A | B | C | D | 88. | A | B | C | D |
| 64. | A | B | C | D | 89. | A | B | C | D |
| 65. | A | B | C | D | 90. | A | B | C | D |
| 66. | A | B | C | D | 91. | A | B | C | D |
| 67. | A | B | C | D | 92. | A | B | C | D |
| 68. | A | B | C | D | 93. | A | B | C | D |
| 69. | A | B | C | D | 94. | A | B | C | D |
| 70. | A | B | C | D | 95. | A | B | C | D |
| 71. | A | B | C | D | 96. | A | B | C | D |
| 72. | A | B | C | D | 97. | A | B | C | D |
| 73. | A | B | C | D | 98. | A | B | C | D |
| 74. | A | B | C | D | 99. | A | B | C | D |
| 75. | A | B | C | D | 100. | A | B | C | D |

**Question 001**

During a reactor startup the Primary Board Operator is withdrawing Control Bank D rods for the approach to criticality.

Which of the following represents the speed at which the control rods should be moving?

A. 8 Steps Per Minute

B. 48 Steps Per Minute

C. 64 Steps Per Minute

D. 72 Steps Per Minute

**Question 002**

The plant is at 88% power. The following events occur:

- OS1201.01, RCP MALFUNCTION, is entered due to abnormal seal leakoff on RCP B
- RCP B #1 seal leakoff indicates 6.1 gpm
- Total seal leakoff indicates 7.9 gpm
- Seal water inlet temperature is STABLE

Per OS1201.01, the crew commences a normal shutdown to MODE 3 to facilitate shutdown of RCP B. With the plant at 46% power, the following conditions are observed:

- RCP B seal leakoff has increased to 6.9 gpm
- Total seal leakoff has increased to 9.7 gpm

What action should the crew take?

A. Continue with the shutdown to MODE 3. Stop RCP B after the reactor trip breakers are open.

B. Trip the reactor, go to E-0, REACTOR TRIP OR SAFETY INJECTION. Trip RCP B after step 4 of E-0 is complete.

C. Feed SG B to between 60% and 70% NR, Trip RCP B, shutdown to MODE 3 within 6 hours.

D. Isolate seal leakoff on RCP B. If total leakoff stabilizes below 8 gpm, continue with the normal shutdown to MODE 3.

**Question 003**

The plant is at 100 % power. All control systems are operating in AUTOMATIC. Letdown flow indicates 75 gpm. Pressurizer level is 61% and STABLE.

Which of the following describes the effect on CVCS if Letdown flow is INCREASED to 100 gpm?

A. HCV-182 must be throttled CLOSED to DECREASE Seal Injection flow rate to its original value.

B. HCV-182 must be throttled OPEN to DECREASE Seal Injection flow rate to its original value.

C. HCV-182 must be throttled CLOSED to INCREASE Seal Injection flow rate to its original value.

D. HCV-182 must be throttled OPEN to INCREASE Seal Injection flow rate to its original value.

**Question 004**

Which of the following describes the automatic operation of the PCCW system in response to PCCW B head tank level decreasing to 42 %?

A. Train A and B Waste Processing Building (WPB) PCCW isolation valves close.

B. Train A and B WPB and PCCW containment isolation valves close.

C. Train B PCCW radiation monitor isolation valve and B PCCW containment isolation valves close.

D. Train B PCCW radiation monitor isolation valve and B WPB isolation valves close.

**Question 005**

The plant is at 49% power. An event occurs resulting in the following conditions:

- All Steam Generator Pressures DECREASING slowly
- Containment temperature, pressure, and humidity INCREASING
- Tave DECREASING
- Reactor power is INCREASING

For this event, which of the following actions is designed to prevent the containment from exceeding its design pressure limit?

A. Safety Injection Actuation

B. Main Steam Line Isolation

C. Containment Isolation Phase A

D. Feedwater Isolation

**Question 006**

The plant is at 88 % power. Control Bank D Group Demand Counters indicate 228 steps.

Due to an Urgent Failure of DRPI Data B, the Accuracy Mode Select Switch is placed in the DATA A position.

How does this affect the OPERABILITY of Rod Position Indication?

A. Rod Position Indication is INOPERABLE. THERMAL POWER must be reduced to less than 50% of RATED THERMAL POWER within 8 hours.

B. Rod Position Indication is OPERABLE and capable of determining rod position within ± 12 steps.

C. Rod Position Indication is INOPERABLE. POWER OPERATION may continue as long as the affected rod positions are determined indirectly by the Incore Detector System within 8 hours.

D. Rod Position indication is OPERABLE and capable of determining rod position within ± 6 steps.

**Question 007**

The plant is at 7 % power during a plant startup. Intermediate Range channel N36 fails HIGH.

Which of the following describes the effect of the IR N36 failure?

A. The startup may continue after bypassing C-1 for IR N36.

B. The startup may continue after bypassing C-1 for IR N35 AND IR N36.

C. The reactor must be placed in HOT STANDBY within 6 hours. P-6 will not automatically energize with IR N36 failed high.

D. The reactor will trip on High Intermediate Range Flux.

**Question 008**

The following conditions exist:

The plant is at 98 % power.
Control Bank D is withdrawn to 225 steps

Due to a divergent xenon oscillation, it has been determined that active AFD control is necessary.

Reactor Engineering has recommended controlling Delta-I by using PUSH/PULL/DRIFT to target.

Which of the following describes how to initiate active AFD control using PUSH/PULL/DRIFT to target?

A. As AFD is passing through target after a POSITIVE peak, INSERT Control Bank D to hold AFD on target. Borate as necessary to maintain power constant.

B. As AFD reaches a NEGATIVE peak, WITHDRAW Control Bank D rods to move AFD in the positive direction. Borate as necessary to maintain power constant.

C. As AFD is passing through target after a POSITIVE peak, WITHDRAW Control Bank D rods to move AFD in the positive direction. Dilute as necessary to maintain power constant.

D. As AFD is passing through target after a NEGATIVE peak, INSERT Control Bank D to hold AFD on target. Dilute as necessary to maintain power constant.

**Question 009**

A LOCA is in progress.

Reactor Trip and Safety Injection have initiated. All safeguards systems are functioning as designed.

Containment Pressure indicates 24 psig and trending down slowly.

Which of the following describes the status of Containment Cooling Systems?

A. Containment Structure Cooling fans are RUNNING; CRDM Cooling fans are RUNNING; Containment Recirculation fans are operating in the FILTER MODE.

B. Containment Structure Cooling fans are TRIPPED; CRDM Cooling fans are TRIPPED; Containment Recirculation fans are operating in the FILTER MODE.

C. Containment Structure Cooling fans are RUNNING; CRDM Cooling fans are RUNNING; Containment Recirculation fans are operating in the RECIRC MODE.

D. Containment Structure Cooling fans are TRIPPED; CRDM Cooling fans are TRIPPED; Containment Recirculation fans are operating in the RECIRC MODE.

**Question 010**

The plant has sustained a Large Break LOCA. The following conditions exist:

- Cold Leg ECCS Flow on SI-FI-917 indicates 900 gpm
- Safety Injection flow is 600 GPM in EACH train
- RHR flow is 3700 GPM in EACH train
- Train A CBS pump is running with discharge pressure at 190 psig
- Train B CBS pump did NOT start upon actuation of CBS

Assuming the RWST was at it's Tech Spec minimum level when the event occurred, approximately how much time will pass before initiation of swapover to Cold Leg recirculation?

A. 15 minutes

B. 30 minutes

C. 45 minutes

D. 60 minutes

**Question 011**

The plant is at 96 % power. All control systems are aligned for AUTOMATIC operation.

A bus fault causes the incoming UAT feeder to 4.16KV bus 3 to trip open.

With NO operator action, which of the following describes the response of the plant?

A. The reactor will trip on LO-LO SG levels.

B. The alternate supply breaker to bus 3 from the RAT will close.

C. DG A and B will automatically start and supply busses E5 and E6.

D. The reactor will trip on Loss of RCS flow.

**Question 012**

The plant is at 16% power when the following events occur:

- Main Feedwater pumps trip
- Feedwater Isolation Valves close
- Feedwater regulating and bypass valves close
- The Main Turbine trips
- The reactor has NOT tripped

Which of the following is the likely cause of this event?

A. P-4 AND Low Tave

B. Safety Injection AND P-14

C. P-14

D. Safety Injection

**Question 013**

DG B is OOS.

A loss of Off-Site power results in a reactor trip.

Which of the following sources of EFW are immediately available?

A. EFW pump P-37A ONLY.

B. EFW pump P-37A and the Startup Feed pump.

C. EFW pump P-37A and P-37B.

D. EFW pump P-37B and the Startup Feed pump.

**Question 014**

Which of the following will automatically CLOSE the Waste Gas compressor discharge flow control valve, 1-WG-FV-1602?

A. High Hydrogen concentration

B. High effluent radiation

C. High Vent Header discharge flow

D. High Oxygen concentration

**Question 015**

The plant is in MODE 5. The following conditions exist:

- RCS temperature is 166°F.
- The pressurizer is SOLID.
- RCS pressure is being maintained at 255 - 275 psig

Which of the following describes the system response to an RCS heatup of 10°F?

A. Letdown Pressure Control Valve, PCV-131, OPENS to maintain RCS pressure constant. Letdown flow through RH-HCV-128 will DECREASE.

B. Letdown Pressure Control Valve, PCV-131, CLOSES to maintain RCS pressure constant. Letdown flow through RH-HCV-128 will DECREASE.

C. Letdown Pressure Control Valve, PCV-131, OPENS to maintain RCS pressure constant. Letdown flow through RH-HCV-128 will INCREASE.

D. Letdown Pressure Control Valve, PCV-131, CLOSES to maintain RCS pressure constant. Letdown flow through RH-HCV-128 will INCREASE.

**Question 016**

Which of the following describes the logic required to initiate the ESF actuations generated by the following signals?

| | Containment HI-1 (SI) | Containment HI-2 (MSLI) | Containment HI-3 (CBS/P/CVI) |
|---|---|---|---|
| A. | 2 of 3 | 2 of 3 | 2 of 3 |
| B. | 2 of 4 | 2 of 4 | 2 of 3 |
| C. | 2 of 3 | 2 of 4 | 2 of 4 |
| D. | 2 of 3 | 2 of 3 | 2 of 4 |

**Question 017**

The following VAS alarm is received:

- D7746 ROD CTL URGENT FAILURE

Subsequent investigation reveals a phase failure in Power Cabinet 1BD. The failure is determined to be in Control Bank D, Group 1

A demand signal for control bank insertion occurs before action is taken to repair the problem and reset the alarm.

Which of the following describes the response of the Rod Control system?

A. Control Banks B and D, Group 1 are frozen. Group 2 will insert in response to an AUTOMATIC signal.

B. Control Banks B and D are frozen. All other Control Banks will insert in AUTO or MANUAL.

C. Control Banks B and D, Groups 1 and 2, will not move in AUTO or MANUAL control, but may be moved in INDIVIDUAL BANK SELECT.

D. Control Banks B and D, groups 1 and 2 will not move in AUTO or MANUAL. Control Banks not powered from Cabinet 1BD may be moved in INDIVIDUAL BANK SELECT.

**Question 018**

The reactor has tripped. The following conditions exist:

- RCS Tave is 557°F and STABLE
- EFW flow to SG A, B, and D is 220 gpm each, and STABLE
- EFW flow to SG C is 480 gpm and INCREASING

Assuming the current trends continue, with NO operator action, which of the following describes the expected plant response?

A. EFW flow to SG C will be limited to 525 gpm by DP across a venturi in the EFW piping.

B. SG C EFW flow control MOVs will close when flow reaches 525 gpm.

C. EFW flow to SG C will be limited to 750 gpm by DP across a flow orifice in the EFW piping.

D. EFW flow to SG C will be limited to 750 gpm by the size of the EFW piping.

**Question 019**

The plant has sustained a Small Break LOCA. The following conditions exist:

- PORV 456B is stuck OPEN, and has NOT been isolated
- RCS pressure is 1050 psig
- Core Exit Thermocouples are approximately 550°F
- All RCPs are TRIPPED.

Which of the following instruments will provide the most reliable indication of actual RCS inventory?

A. Pressurizer Hot-calibrated level instrument LT-459

B. Pressurizer Cold-calibrated level instrument LT-462

C. Reactor Vessel Dynamic Range DP

D. Reactor Vessel Full Range DP

**Question 020**

A Large Break LOCA has occurred. All safeguards equipment functioned as designed. NO safeguards actuation signals have been RESET.

RWST LO-LO level alarm is actuated.

How will swapover to Cold Leg recirculation be performed?

A. Containment recirculation sump valves, CBS-V8 and CBS-V14, will automatically open. RWST suction valves, CBS-V2 and CBS-V5, will automatically close when the containment recirculation suction valves are fully open.

B. Containment recirculation sump valves, CBS-V8 and CBS-V14, will automatically open. RWST suction valves, CBS-V2 and CBS-V5, must be manually closed when the containment recirculation valves are open.

C. Containment recirculation sump valves, CBS-V8 and CBS-V14, must be manually opened. RWST suction valves, CBS-V2 and CBS-V5, must be manually closed.

D. Containment recirculation sump valves, CBS-V8 and CBS-V14, must be manually opened. RWST suction valves, CBS-V2 and CBS-V5, automatically close when the containment recirculation valves are open.

**Question 021**

The Pressurizer pressure control system is in AUTOMATIC with PT-455 and PT-456 selected as the controlling and backup channels respectively. Which of the following describes a function of PT-458?

A. Arms RC-PCV-456B (PORV B) when pressure is 2350 psig.

B. If closed, opens RC-V-124, block valve for RC-PCV-456B (PORV B) at 2350 psig.

C. If closed, opens RC-V-122, block valve for RC-PCV-456A (PORV A), at 2350 psig.

D. Opens RC-PCV-456B (PORV B) when pressure is 2385 psig.

**Question 022**

The plant is at 100 % power with all Control Systems operating in AUTOMATIC.

The backup pressurizer level control channel fails low causing letdown to isolate. The primary board operator responds by placing CS-FK-121, Charging Flow Controller in MANUAL to reduce charging flow. (The Master Level Controller, RC-LK-459, remains in AUTO)

Letdown flow is re-established and pressurizer level has been returned to program.

What actions are necessary to place the Pressurizer Level Control system back in AUTO?

A. Place RC-LK-459 in MANUAL. Adjust the output of CS-FK-121 to match the output of RC-LK-459 and place RC-LK-459 in AUTO. Then place CS-FK-121 in AUTO.

B. Place RC-LK-459 in MANUAL and adjust its output to match the input and setpoint signals on CS-FK-121. Place CS-FK-121 in AUTO. Place RC-LK-459 in AUTO.

C. Leave RC-LK-459 in AUTO. Adjust the output of CS-FK-121 to match the input of CS-FCV-121. Place CS-FCV-121 in AUTO.

D. Leave RC-LK-459 in AUTO. Adjust the output of CS-FK-121 to match the input of RC-LK-459 and place CS-FK-121 in AUTO.

**Question 023**

The plant is at 85% power. The following conditions exist:

- PT-505 fails LOW

30 seconds later, a Loss of Feed occurs requiring a reactor trip. The reactor does NOT trip.

10 seconds after the reactor fails to trip, the following conditions are observed:

- SG A narrow range level is 2%
- SG B narrow range level is 6%
- SG C narrow range level is 4%
- SG D narrow range level is 3%

Which of the following is the expected response of the ATWS Mitigation System Actuation Circuitry (AMSAC)?

A. AMSAC will NOT actuate because it is not armed.

B. AMSAC will TRIP the Main Turbine and START the EFW pumps.

C. AMSAC will NOT actuate because power will be below the C-20 setpoint before the actuation timer expires.

D. AMSAC will TRIP the reactor and START the EFW pumps in 60 seconds.

**Question 024**

The plant is at 17% power during a plant startup.

- Steam Dump MODE Selector is in the STEAM PRESSURE MODE.
- MFP 32A is operating in AUTO
- MS-PK-507 is in AUTOMATIC
- Main Steam Header Pressure Instrument PT-507 fails HIGH.

Which of the following describes the response of the plant to the failure?

A. Feed Pump speed will INCREASE. Steam dumps will CLOSE, and will not reopen until Steam Dump MODE selector is placed in TAVE MODE.

B. Feed Pump speed will DECREASE. Steam dumps will CLOSE, and will not reopen until both Steam Dump Interlock control switches are RESET.

C. Feed Pump speed will INCREASE. Steam dumps will OPEN, and will not close until one Steam Dump Interlock control switch is placed in OFF.

D. Feed Pump speed will DECREASE. Steam Dumps will OPEN, and will not close until MS-PK-507 is placed in MANUAL.

**Question 025**

The plant is in MODE 5. Containment Pre-entry purge is in progress.

What is the response of the Containment Purge system if a Train B Containment Ventilation Isolation (CVI) signal is generated?

A. Containment Pre-entry purge supply fan (FN-9) and Purge Exhaust fan (FN-10) will trip. The Train A (V-1, V-4) and Train B (V-2, V-3) containment isolation valves will close.

B. Containment Pre-entry purge exhaust fan (FN-10) will trip. Train B containment isolation valves (V-2, V-3) will close.

C. Containment Pre-entry purge exhaust fan (FN-10) will trip. All 4 Containment isolation valves (V-1, V-2, V-3, V-4) will close.

D. Containment Pre-entry purge supply fan (FN-9) will trip. The Train B containment isolation valves (V-2, V-3) will close.

**Question 026**

Which of the following describes a source of EMERGENCY makeup to the Spent Fuel Pool?

A. CVCS

B. DWST

C. RWST

D. PCCW

**Question 027**

While performing refueling operations, it becomes necessary to use the INTERLOCK OVERRIDE function of the refueling machine.

The refueling machine operator latches a fuel assembly and attempts to raise the assembly into the mast.

Which of the following conditions result due to the INTERLOCK OVERRIDE condition?

A. The hoist speed is AUTOMATICALLY limited to SLOW speed.

B. Limiting UPWARD motion is controlled by the Refueling Machine Operator ONLY.

C. Bridge and Trolley motion is AUTOMATICALLY DEFEATED until the fuel assembly is completely in the mast.

D. Hoist motion will NOT automatically stop if there is a hoist overload condition.

**Question 028**

The plant is at 40% power with all control systems in automatic. Due to a failure in the control circuitry, the B SG MSIV closes.

Assuming no operator action, what effect will this have on the plant?

A. Reactor power stabilizes at 30% due to the lack of steam flow from the affected SG.

B. The reactor will trip on LO-LO narrow range level in the affected SG.

C. The reactor will trip on high pressurizer pressure.

D. Reactor power stabilizes at 40% with the unaffected SGs providing more steam flow to the turbine.

**Question 029**

The plant has sustained a Loss of Off-Site power. All safeguards equipment is functioning as designed.

Assuming no operator action, which of the following equipment is running / energized?

A. Charging pump A, Emergency Feedwater pump B, Service Water pump A.

B. Charging pump B, Emergency Feedwater Pump A, Pressurizer Heater Backup group B.

C. Service Water pump A, PCCW pump A, Startup Feed Pump.

D. Charging Pump A, Startup Feed pump, Pressurizer Heater Backup group A.

**Question 030**

Which of the following will automatically trip Emergency Diesel Generator 1A following an SI start?

A. High Jacket Water temperature

B. Loss of Field

C. Engine High Vibration

D. Primary protection lockout (86 DP)

**Question 031**

When the plant is at full power, which reactor trip provides a backup for the Power Range High Neutron Flux Trip?

A. Overtemperature $\Delta T$

B. Overpower $\Delta T$

C. Power Range Neutron Flux High Positive Rate

D. Intermediate Range High Neutron Flux

**Question 032**

The plant is in MODE 5. Train B RHR is in service in COOLDOWN mode. The following conditions exist:

- Tave is 182°F and STABLE
- RHR heat exchanger outlet valve, RH-HCV-607 is 10% OPEN
- RHR heat exchanger bypass flow control valve, RH-FCV-619, is maintaining total RHR flow at 3500 gpm

A loss of Instrument Air occurs. Which of the following describes the effect on the RHR system and on RCS temperature?

| | RH-HCV-607 | RH-FCV-619 | RCS Temperature |
|---|---|---|---|
| A. | FAILS AS IS | FAILS AS IS | INCREASES |
| B. | FAILS AS IS | FAILS CLOSED | INCREASES |
| C. | FAILS OPEN | FAILS AS IS | DECREASES |
| D. | FAILS OPEN | FAILS CLOSED | DECREASES |

**Question 033**

The plant has sustained a LOCA. Safety Injection has actuated. All safeguards systems are functioning as designed.

Which of the following describes the Service Water system alignment?

A. PCCW heat exchangers and DG cooling is supplied from Cooling Towers. SCCW heat exchangers are supplied from Service Water pumps.

B. PCCW heat exchangers and DG cooling is supplied from Service Water pumps. SCCW heat exchangers are isolated.

C. PCCW heat exchangers and DG cooling is supplied from Cooling Towers. SCCW heat exchangers are isolated.

D. PCCW heat exchangers, DG cooling, and SCCW heat exchangers are supplied from Service Water pumps.

**Question 034**

Which of the following describes the operation of the Service Air isolation valves, SA-V92 and SA-V93, during an Instrument Air leak?

A. AUTOMATICALLY CLOSE at 90 psig decreasing, resets to allow MANUAL OPENING above 93 psig INCREASING.

B. AUTOMATICALLY CLOSE at 90 psig decreasing, AUTOMATICALLY REOPEN above 93 psig INCREASING.

C. AUTOMATICALLY CLOSE at 80 psig decreasing, resets to allow MANUAL OPENING above 83 psig INCREASING.

D. AUTOMATICALLY CLOSE at 80 psig decreasing, AUTOMATICALLY REOPEN above 83 psig INCREASING.

**Question 035**

The plant is at 12 % power during a Plant Startup.

RCP A trips on Phase Differential Overcurrent.

With no operator action, describe the response of the plant to the RCP trip.

A. Steam flow decreases in all SGs. All SG levels initially decrease, then increase as the secondary plant stabilizes and SGWLC responds. Control Rods withdraw to maintain Tave on program.

B. Steam pressure decreases in all SGs. SG A level initially increases due to overfeeding. SG B, C, and D levels initially decrease due to increased steam demand. SG levels return to normal as SGWLC responds. Tave remains unaffected because Reactor power remains unaffected.

C. Steam pressure decreases in all SGs. SG A level decreases due to the loss of heat input. SG B, C and D levels increase due to increased steam demand. SG levels return to normal as SGWLC responds. Tave stabilizes at a lower value.

D. Steam pressure decreases in all SGs. SG A level decreases due to the loss of heat input. SG B, C and D levels increase due to increased steam demand. SG levels return to normal as SGWLC responds. Control rods withdraw to maintain Tave on program.

**Question 036**

The plant is at 99 % power. All control systems are operating in AUTO, with the exception of Rod Control, which is operating in MANUAL.

Control Bank D is at 198 steps.

The Primary Board Operator withdraws Control Bank D two steps to maintain Tave on program. When the In/Hold/Out switch is released, Control Bank D rods continue to move in the OUT direction.

What action should be taken?

A. Trip the reactor, go to E-0, REACTOR TRIP OR SAFETY INJECTION.

B. Attempt to reinsert Control Bank D to 198 steps using the In/Hold/Out switch. If Control Bank D will not stop moving, trip the reactor and go to E-0, REACTOR TRIP OR SAFETY INJECTION.

C. Place the Rod Bank Selector Switch to the CBD position. If rods will not stop moving trip the reactor and go to E-0, REACTOR TRIP OR SAFETY INJECTION.

D. Place the Rod Bank Selector Switch in the AUTO position. If rods will not stop moving trip the reactor and go to E-0, REACTOR TRIP OR SAFETY INJECTION.

**Question 037**

The crew is performing a rapid power decrease at BOL from 100% power to 30% power.

Control Rods are in AUTO. Load reduction is being performed using turbine LOAD LIMIT.

The following alarms are received:

- D7761 CTL ROD BANK D INSERTION LIMIT LOW
- D7762 CTL ROD BANK D INSERTION LIMIT LO-LO

The crew initiates rapid boration per OS1202.04. Assuming the turbine load decrease rate remains constant throughout the event, which of the following describes the effects of the boration on the plant?

A. Control rods will insert at a FASTER rate.
Tave will INCREASE

B. Control rod insertion rate is unchanged
Tave will DECREASE

C. Control rods will insert at a SLOWER rate
Tave will DECREASE

D. Control rod insertion rate is unchanged
Tave will INCREASE

**Question 038**

The plant is operating at 100 % power.

- PT-505, Turbine Impulse Pressure, has failed low.
- The crew is performing step 1 of OS1235.05, TURBINE IMPULSE PRESSURE PT-505 OR PT-506 INSTRUMENT FAILURE.
- The Steam Dump MODE Selector is still in the TAVG position

The following events occur:
- Letdown isolates
- All steam dump valves open

Which of the following events may have caused these actuations?

A. PT-506 failed high.

B. Tave input to the Load Rejection controller failed low.

C. PP-1B, 120 VAC Vital Instrument Bus, lost power.

D. A Loss of Instrument Air has occurred.

**Question 039**

The plant is at 47 % power. Which of the following events will initiate a reactor trip?

A. 1 of 3 detectors on 2 of 4 loops indicating < 90 % RCS loop flow.

B. 13.8 KV bus 1 and 2 frequency drops to 58 Hz for 2 seconds.

C. 2 of 3 detectors on 1 of 4 loops indicating < 90 % RCS loop flow.

D. 13.8 KV bus 1 voltage drops to 9000 volts for 0.5 seconds.

**Question 040**

The plant is operating at 100 % power when a Loss of Off-Site power causes a reactor trip. Ten minutes following the trip, the following conditions exist:

- SG A Pressure 1135 psig and stable
- SG B Pressure 1125 psig and stable
- SG C Pressure 1130 psig and stable
- SG D Pressure 1125 psig and stable

RCS Pressure is 2250 psig and stable

Thot is approximately 580°F in all 4 loops and trending down slowly

Core Exit TCs indicate approximately 585°F

Tcold is approximately 561°F in all 4 loops and stable

Based on the above indications, what is the condition of the RCS?

A. Natural Circulation exists. Heat removal is being maintained by the condenser steam dumps.

B. Natural Circulation does not exist. Heat removal may be established by opening the condenser steam dumps.

C. Natural Circulation exists. Heat removal is being maintained by atmospheric steam dumps.

D. Natural Circulation does not exist. Heat removal may be established by opening the atmospheric steam dump valves.

**Question 041**

Which of the following conditions result in the WORST CASE Main Steam Line Break?

A. Beginning of Core Life; Hot Full Power

B. End of Core Life; Hot Full Power

C. Beginning of Core Life; Hot Zero Power

D. End of Core Life; Hot Zero Power

**Question 042**

Which of the following is characteristic of an event that would require entry to FR-P.1, RESPONSE TO PRESSURIZED THERMAL SHOCK?

A. RCS PRESSURE DECREASE followed by rapid RCS HEATUP

B. Rapid RCS COOLDOWN followed by RCS PRESSURE DECREASE

C. Rapid RCS COOLDOWN followed by rapid RCS HEATUP

D. Rapid RCS COOLDOWN followed by RCS PRESSURE INCREASE

**Question 043**

Which of the following plant conditions would require the crew to verify that adequate Shutdown Margin exists?

A. Control Bank D rods Group demand position and DRPI indication deviate by 10 steps.

B. One Control Bank D rod is misaligned by 13 steps and cannot be moved.

C. Tave is 550°F in all loops during MODE 1 operation.

D. Calculated Moderator Temperature Coefficient (MTC) is outside the limits specified in the COLR for MODE 1 operation.

**Question 044**

A Loss of All AC power has occurred.

The crew has entered ECA-0.0, LOSS OF ALL AC POWER. An operator has been dispatched to perform Attachment A to shed DC loads.

When Attachment A is completed, which of the following loads will still be energized?

A. ED-PP-12E, Non-Vital Instrument Distribution Panel 12E

B. EDE-PP-1A, Vital Instrument Distribution Panel 1A

C. Bus E61 Auxiliary Bus

D. CP-CP-111, Reactor Trip Switchgear

**Question 045**

The Station fire brigade is dispatched to fight a fully developed fire that has erupted in the main turbine lube oil reservoir room. Which of the following extinguishing agents is best for extinguishing the fire AND minimizing the possibility of reflash?

A. Dry chemical

B. Carbon dioxide

C. Water fog

D. Foam

**Question 046**

DG 1A has been placed in LOCAL control.

How will DG 1A respond to a Loss of Off-Site Power?

A. DG1A will automatically start, the output breaker will automatically close, and load sequencing will automatically occur.

B. DG 1A will automatically start, the output breaker must be manually closed, and load sequencing will automatically occur upon breaker closure.

C. DG1A must be manually started, the output breaker will automatically close, and load sequencing must be performed manually.

D. DG 1A will automatically start, the output breaker must be manually closed, and load sequencing must be performed manually.

**Question 047**

A Loss of all AC power has occurred. The crew is performing the actions of ECA-0.0, LOSS OF ALL AC POWER.

The crew commences dumping steam from all steam generators to minimize RCS leakage.

Which of the following describes the reason that the steam generators should NOT be depressurized below 125 psig?

A. Remaining above this pressure reduces Pressurized Thermal Shock concern for the reactor vessel.

B. It represents the minimum pressure that the steam generators serve as an effective heat sink.

C. Minimizes the possibility of SI accumulator nitrogen intrusion into the RCS.

D. It represents the minimum pressure that the steam generators can effectively supply the Turbine Driven EFW pump.

**Question 048**

PLANT CONDITIONS:

- Reactor Power is 37 %
- Turbine load is 420 MWE
- Condenser Vacuum is 22 inches Hg and stable
- Load reduction is in progress
- The cause of the vacuum loss has been identified and corrected

Based on the above indications, which action is the crew required to take?

A. Immediately trip the reactor and go to E-0, REACTOR TRIP OR SAFETY INJECTION.

B. Continue the load decrease to increase condenser vacuum to > 25 inches Hg.

C. Immediately trip the turbine, verify all stop valves are closed and the generator breaker opens, and go to ON1231.02, TURBINE TRIP BELOW P-9.

D. Continue the load decrease and if vacuum remains greater than 22 inches Hg remove the turbine generator from service IAW OS1000.06, POWER DECREASE.

**Question 049**

The crew has entered FR-C.1, RESPONSE TO INADEQUATE CORE COOLING due to a valid RED path on the Core Cooling CSF.

- CS-P-2A is Danger tagged out of service.
- CS-P-2B cannot be started due to a loss of power to bus E-6.
- RCS pressure is 1900 psig and slowly increasing.
- CETCs are 750 °F and slowly increasing.
- All other ECCS equipment is functioning as designed.
- ECCS flow cannot be verified in either train.

What action should the crew initially take to establish some form of injection flow?

A. Start the Positive Displacement Charging Pump and establish flow through CS-FCV-121.

B. Start one RCP to collapse any voids in the RCS that restrict ECCS flow.

C. Open one PORV to depressurize the RCS and allow ECCS flow.

D. Depressurize all intact SGs to 125 psig.

**Question 050**

The plant has sustained a Main Steam Line Break affecting all 4 Steam Generators.

The crew is currently performing ECA 2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 2.

The crew has throttled EFW to 25 gpm to each steam generator to minimize the RCS cooldown.

The following conditions exist:

| SG | Level | Pressure |
|---|---|---|
| SG 1A | 20% WR | 360 psig STABLE |
| SG 1B | 19% WR | 320 psig DECREASING |
| SG 1C | 18% WR | 310 psig DECREASING |
| SG 1D | 26% WR | 380 psig INCREASING |

Which of the following describes the action that should be taken and the reason for the action?

A. Transition to E-2, FAULTED STEAM GENERATOR ISOLATION, because there is an intact Steam Generator available.

B. Transition to FR-H.1, LOSS OF SECONDARY HEAT SINK, because there is a RED condition on the Heat Sink Status Tree.

C. Transition to E-3, STEAM GENERATOR TUBE RUPTURE, because there is an unexplained increase in Steam Generator Level.

D. Continue with ECA 2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, because Safety Injection termination is not complete.

**Question 051**

The plant is operating at 88% power. All control systems are operating in AUTOMATIC.

Pressurizer pressure is 2235 psig.

A malfunction in the Master pressure controller (PK-455A) causes the controller setpoint to change to 2320 psig.

Assuming no operator action, which of the following describes the initial response of the pressurizer pressure control system?

A. Spray valves open, all pressurizer heaters de-energize.

B. PORV 456A opens, spray valves open, all pressurizer heaters de-energize.

C. Spray valves close, pressurizer control heaters fully on, backup heaters on.

D. Spray valves modulate towards the CLOSED position, pressurizer control heaters reduce output, pressurizer backup heaters energize.

**Question 052**

Which of the following describes the alignment of Hot Leg Recirculation after a LOCA?

A. RHR and SI pumps are aligned to provide ECCS flow to the hot legs to prevent excessive boron precipitation in the reactor vessel upper plenum.

B. RHR pumps provide flow to the cold legs, SI pumps are aligned to provide flow to the hot legs to provide mixing and prevent boron stratification in the reactor core.

C. RHR and SI pumps are aligned to provide ECCS flow to the hot legs to prevent excessive boron precipitation in the reactor core.

D. RHR pumps are aligned to provide flow to hot legs, SI pumps are aligned to provide flow to cold legs to flush the reactor vessel in the case of a large cold leg rupture.

**Question 053**

The plant has sustained an ATWS.

The crew has entered FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS.

The BOP operator was unable to trip the turbine by pressing the Manual Turbine Trip pushbutton. What action should he take next?

A. Manually run back the turbine

B. Close MSIVs and bypass valves

C. Open the Generator breaker

D. Check the EFW pumps operating

**Question 054**

Reactor trip and Safety Injection have occurred.

ECA-1.2, LOCA OUTSIDE CONTAINMENT, has been entered from E-0, REACTOR TRIP OR SAFETY INJECTION, due to RDMS indication of high radiation levels in the RHR vaults.

After closing RH-V14, RHR Train A discharge to RCS, and RH-V22, RHR Train A discharge cross-connect, the following conditions exist:

- RCS pressure is 1100 psig and INCREASING
- ECCS flow is DECREASING

Which of the following describes the status of the LOCA and required action?

A. The LOCA is ISOLATED. Additional actions will be performed in E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

B. The LOCA is ISOLATED. Additional actions will be performed in ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

C. The LOCA is ISOLATED. Additional actions will be performed in E-0, REACTOR TRIP OR SAFETY INJECTION.

D. The LOCA is ISOLATED. Additional actions will be performed in ES-1.1, SI TERMINATION.

**Question 055**

An ATWS has occurred. The crew has shut down the reactor using manual rod insertion and boration.

One PORV has stuck open on the initial pressure transient, resulting in Safety Injection actuation. The stuck open PORV has been ISOLATED.

The crew has transitioned to ES-1.1, SI TERMINATION. When the Primary Board Operator attempts to reset SI, it will not reset.

What is a possible cause of the SI reset failure?

A. The initiating condition causing the SI actuation has not cleared.

B. The Reactor Trip Breakers are closed.

C. The timer in the Safety Injection Block/Reset logic has not timed out.

D. P-11 is not energized.

**Question 056**

Which of the following describes the preferred method of operating RCPs during the performance of ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION?

A. Starting any RCP is undesirable because starting a RCP during Natural Circulation may cause a Steam Generator Safety Valve to lift.

B. Starting one RCP is desirable to provide normal pressurizer spray flow and mix the RCS.

C. Starting any RCP is undesirable because it is an unnecessary heat input to the RCS inhibiting RCS cooldown.

D. Starting two or more RCPs is desirable because it collapses RCS voids and allows true measurement of RCS inventory.

**Question 057**

The plant is at 100 % power.

A lightning strike on site results in electrical relaying throughout the plant and indication of several bus faults.

The crew manually trips the plant and enters E-0, REACTOR TRIP OR SAFETY INJECTION.

While verifying the reactor trip, the RO reports the following indications:

- NO Rod Bottom lights lit. All DRPI indication is lost.
- Intermediate Range flux is DECREASING on all channels
- Reactor trip breakers are OPEN

Which of the following describes the condition of the plant?

A. The reactor is tripped, no further action required to verify the trip.

B. The reactor is tripped. Boration is required until DRPI indication is available to verify no more than 1 stuck control rod.

C. The reactor is not tripped. Attempt a manual trip. If reactor trip cannot be verified, go to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS.

D. The reactor is not tripped. Boration is required until Shutdown Margin can be established and verified.

**Question 058**

The plant is at 81 % power.

A pressurizer code safety valve inadvertently lifts and remains partially open.

The following indications exist:

- Pressurizer pressure is 2205 psig and DECREASING.
- Temperature downstream of the safety valve indicates 276°F and INCREASING slowly
- PRT pressure is 47 psig and INCREASING

Which of the following is the reason for the temperature indication seen downstream of the safety valve?

A. The enthalpy of the saturated fluid in the pressurizer vapor space decreases rapidly when it becomes subcooled in the safety valve tailpipe.

B. The enthalpy of the saturated fluid in the pressurizer vapor space decreases as it loses energy due to the high-velocity head loss in the safety valve tailpipe.

C. The enthalpy of the saturated fluid in the pressurizer vapor space decreases as it passes through a safety valve, resulting in a temperature indication corresponding to the low-energy fluid in the tailpipe.

D. The enthalpy of the saturated fluid in the vapor space does not change as it passes through a safety valve, resulting in a temperature indication corresponding to the pressure in the PRT.

**Question 059**

A Small Break LOCA has occurred. The crew is performing the actions of ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION.

ECCS pumps have been stopped. Normal Charging is aligned. The crew is depressurizing the RCS. When the depressurization is stopped, the following conditions exist:

- RCS Subcooling is 37°F and DECREASING
- Pressurizer Level is 18% and DECREASING

Based on these indications, what actions should be taken?

A. ISOLATE Letdown. Check to ensure Pressurizer Level stabilizes above 5%.

B. Manually START ECCS pumps as necessary to regain subcooling.

C. REINITIATE Safety Injection and verify all safeguards equipment has actuated.

D. INCREASE RCS pressure using pressurizer heaters to regain subcooling.

**Question 060**

The plant is in MODE 5, Reduced Inventory, with the RCS intact.

Both trains of RHR are available, with Train B in operation.

Both PORVs are lined up for LTOP mode of operation.

Due to indication of cavitation on RHR Pump 8B, the crew enters OS1213.03, LOSS OF RHR AT REDUCED INVENTORY OR MIDLOOP WITH THE RCS INTACT.

Per the procedure, the crew isolates both trains of RHR by placing both RHR pumps in Pull-to-Lock and closes RHR suction valves RC-V22, V23, V87, and V88.

How does this action affect the Tech. Spec. operability of Overpressure Protection Systems?

A. Tech. Spec requirements are met. Isolating RHR suction valves does not affect operability of the RHR suction reliefs.

B. Tech. Spec requirements are NOT met. At least 1 RHR suction relief must be available for overpressure protection.

C. Tech. Spec requirements are met. Both PORVs are available for overpressure control.

D. Tech. Spec requirements are NOT met. BOTH PORVs and BOTH RHR suction reliefs are required for overpressure control while in Reduced Inventory.

**Question 061**

Reactor startup is in progress.

IR power indicates 5 $X10^{-11}$ amps on both channels. Source Range High Flux trip has NOT been blocked.

For the two switch positions shown below, describe the Reactor Protection System response to a blown control power fuse on Source Range channel N-31.

| | SR Level Trip Bypass: NORMAL | SR Level Trip Bypass: BYPASS |
|---|---|---|
| A. | No Reactor Trip | No Reactor Trip |
| B. | Reactor Trip | No Reactor Trip |
| C. | No Reactor Trip | Reactor Trip |
| D. | Reactor Trip | Reactor Trip |

**Question 062**

During a Reactor Startup the following conditions exist:

- P-6 has just energized
- Source Range Channel N-31 indicates $5 \times 10^{3}$ CPS
- Source Range Channel N-32 indicates $4 \times 10^{3}$ CPS
- Intermediate Range Channel N35 indicates $2 \times 10^{-10}$ amps
- Intermediate Range Channel N36 indicates $2 \times 10^{-11}$ amps

Which of the following is the likely cause of the above readings?

A. Intermediate Range Channel N35 is undercompensated.

B. Intermediate Range Channel N36 is undercompensated.

C. Intermediate Range Channel N35 is overcompensated.

D. Intermediate Range Channel N36 is overcompensated.

**Question 063**

The plant is at 79% power with a very small tube leak in SG A.

Under these conditions, which of the following will give the most accurate leak rate correlation for determining primary to secondary leakage?

A. Condenser Air Evacuation Monitor

B. Local radiation monitoring using low range detectors

C. Main Steam Line Monitors

D. Steam Generator Blowdown Sample Monitors

**Question 064**

The following VAS alarm is received:

- D6004 Vital UPS 1B DC Supply Volt Low

No other inverter alarms are present.

Which of the following is the likely cause of the alarm?

A. MCC-E631 supply to PP-1B has opened.

B. Inverter 1B rectifier phase failure.

C. MCC-E612 supply to inverter 1B has opened.

D. Battery input breaker from bus 11B has opened.

**Question 065**

During a loss of Instrument Air, which one of the following valves will fail CLOSED?

A. CC-TCV-2271-2, PCCW Loop B Heat Exchanger Bypass Valve

B. CS-FCV-110A, Boric Acid flow to Blender

C. CS-HCV-182, RCP Seal Flow Control

D. SW-V16, DG A Service Water Heat Exchanger Isolation

**Question 066**

A LOCA is in progress. The crew is performing actions of E-1, LOSS OF REACTOR OR SECONDARY COOLANT. The following conditions exist:

- RWST level is 127,000 gallons
- BOTH RHR pumps tripped on overload during Safety Injection actuation. All other safeguards equipment functioned as designed.

The crew is verifying Cold Leg recirculation capability per E-1, step 11. Which of the following actions are required?

A. Transition to ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, when RWST level reaches 125,000 gallons.

B. Remain in E-1, Loss of Reactor or Secondary Coolant until directed to transition to ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

C. Transition to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

D. Transition to ECA-1.2, LOCA OUTSIDE CONTAINMENT.

**Question 067**

The plant has sustained a Feedwater Line break downstream of the Feed Line check valves inside containment.

Which of the following indications distinguishes the Feedwater Line break from a Main Steam Line break inside containment?

A. Steam Generator level prior to reactor trip

B. Containment pressure after reactor trip

C. Steam generator pressure after reactor trip

D. RCS Tave after reactor trip

**Question 068**

Which of the following instruments provide input to Train A of the RCS Subcooling Monitor?

A. RCS Wide Range Pressure instrument PT-403 and the average of all core exit thermocouples

B. RCS Wide Range Pressure instrument PT-405 and the auctioneered high core exit thermocouple

C. RCS Wide Range Pressure instrument PT-403 and the auctioneered high average quadrant temperature

D. RCS Wide Range Pressure instrument PT-405 and the auctioneered high average quadrant temperature

**Question 069**

The plant is at 100 % power. The PCCW system is aligned for automatic operation.

With no immediate operator action, which of the following describes an effect of the Train A PCCW heat exchanger temperature controller failing to the "FULL FLOW" MODE of operation?

A. PCCW flow to the Letdown Heat Exchanger will increase.

B. RCP A Motor Bearing temperature will INCREASE.

C. RCP A Thermal Barrier cooling isolation valve, V-428, will CLOSE on high flow.

D. The Letdown Heat Exchanger Temperature Control Valve will modulate in the CLOSED direction.

**Question 070**

The plant is at 100% power.

A small steam leak inside containment is contacting the reference leg of Pressurizer Level transmitter LT-459.

How is Pressurizer level indication affected?

A. LT-459 will indicate lower than actual level, and higher than Cold calibrated level indicator LT-462.

B. LT-459 will indicate higher than actual level, and lower than Cold calibrated level indicator LT-462.

C. LT-459 will indicate lower than actual level, and lower than Cold calibrated level indicator LT-462.

D. LT-459 will indicate higher than actual level, and higher than Cold calibrated level indicator LT-462.

**Question 071**

The plant is at 100% power. All electrical systems are in their normal full power lineup.

No surveillances are in progress.

Which of the following describes how 4.16KV bus E5 is energized following a Loss of Off-Site power?

A. First level undervoltage relays will immediately activate the EPS.

B. Second level undervoltage relays will activate the EPS following a 10-second time delay.

C. First level undervoltage relays will activate the EPS following a 1.2-second time delay.

D. Second level undervoltage relays will activate the EPS following a 1.2-second time delay.

**Question 072**

The plant has sustained a Steam Generator tube rupture concurrent with a loss of Off-Site power. All safeguards systems functioned as designed.

Actions of E-3, STEAM GENERATOR TUBE RUPTURE, have been performed. The crew is preparing to cool down and depressurize the RCS to MODE 5.

Based on current plant conditions, which of the following cooldown methods is preferred?

A. ES-3.1, POST SGTR COOLDOWN USING BACKFILL, because it minimizes radiological release.

B. ES-3.2, POST SGTR COOLDOWN USING BLOWDOWN, because it minimizes the spread of contamination to secondary plant components.

C. ES-3.3, POST SGTR COOLDOWN USING STEAM DUMP, because it is the fastest method of cooldown.

D. ES-3.3, POST SGTR COOLDOWN USING STEAM DUMP, because it conserves CST inventory.

**Question 073**

You are an On-coming watchstander that has been on vacation for 10 days.

When you are reviewing logs and journal entries for your position, how far back are you required to review?

A. 24 Hours

B. 72 hours

C. 7 Days

D. Review all logs and journal entries since the last time you were assigned to the position.

**Question 074**

The plant is operating at 3% power during a plant startup. A steam dump malfunction causes Tave to DECREASE to 550°F.

What ACTION is required?

A. RESTORE Tave within its limit in 15 minutes or be in HOT STANDBY within the following 15 minutes.

B. RESTORE Tave within its limit in 15 minutes or be in HOT STANDBY within 1 hour.

C. RESTORE Tave within its limit in 1 hour or be in HOT STANDBY within the following 1 hour.

D. RESTORE Tave within its limit in 1 hour or be in HOT STANDBY within the following 6 hours.

**Question 075**

Which of the following is considered a Temporary Modification per MA 4.3, TEMPORARY MODIFICATIONS?

A. Disconnecting a faulty VAS alarm circuit.

B. Installing a portable heater connected to a welding outlet.

C. Hoses connected to drain lines to temporarily route effluent.

D. Removal of floor plugs.

**Question 076**

The liquid radwaste test tank discharge radiation monitor (R-6509) has been declared INOPERABLE.

Which of the following describes the Technical Specification ACTION that will permit continued release from the liquid waste system?

A. Liquid waste discharge will not be permitted until the discharge radiation monitor is returned to operable status.

B. A temporary monitor may be used provided its alarm setpoint is more conservative than the R-6509 setpoint to allow the operator sufficient time to manually secure the discharge in the event an alarm condition occurs.

C. Two independent samples of the tank to be discharged must be analyzed, and two technically qualified staff members must independently verify the release rate calculations and the discharge line valve lineup.

D. Samples must be taken every 15 minutes while the discharge is in progress, to verify the effluent is within Technical Specification limits.

**Question 77**

The following conditions exist:

- All control systems in AUTOMATIC

An event occurs, causing a drop in reactor power to 97% followed by an increase to 99%
- Tave DECREASED 2°F
- Control Bank D is at 222 steps and withdrawing

Which of the following events may have caused these indications?

A. A Main Turbine Contrcl valve inadvertently closed.

B. A control rod has dropped.

C. Inadvertent control rod withdrawal.

D. A Main Steam safety valve is leaking.

**Question 078**

The plant has sustained a Steam Line Break.

The reactor has been manually tripped due to INCREASING Power Range indication.

The following conditions exist:

SG A pressure - 800 psig and STABLE
SG B pressure - 760 psig and DECREASING
SG C pressure - 800 psig and STABLE
SG D pressure - 800 psig and STABLE
RCS pressure - 1880 psig and DECREASING
Containment pressure - 6.1 psig and INCREASING

Assuming NO additional actions have been taken and all safeguards systems function as designed, which of the following actuations should have occurred?

A. SI and CONTAINMENT ISOLATION phase A ONLY.

B. SI, CONTAINMENT ISOLATION phase A, and MAIN STEAMLINE ISOLATION ONLY.

C. SI, CONTAINMENT ISOLATION phase A, MAIN STEAMLINE ISOLATION, and CONTAINMENT SPRAY ACTUATION ONLY.

D. SI, CONTAINMENT ISOLATION phase A, MAIN STEAMLINE ISOLATION, CONTAINMENT SPRAY ACTUATION, and CONTAINMENT ISOLATION phase B.

**Question 079**

OS1216.01, DEGRADED ULTIMATE HEAT SINK, requires that Service Water flow be throttled to a PCCW heat exchanger if flow cannot be established from the ocean-supplied Service Water pumps due to a loss of driving head.

What is the MINIMUM allowable Service Water flow to the PCCW heat exchanger?

A. 8000 GPM

B. 8600 GPM

C. 9000 GPM

D. 9600 GPM

**Question 080**

The plant is at 100% power. All control systems are operating in AUTOMATIC.

The following conditions exist:

- VCT level is 44% and STABLE
- Letdown flow is 75 gpm

VCT level transmitter, CS-LT-112, fails LOW.

Assuming NO operator action, how does this failure affect the Reactor Makeup Control System?

A. Automatic Makeup is disabled. Charging pump suction will swap to the RWST.

B. Automatic Makeup initiates. Makeup will be terminated by VCT high level at 90%.

C. Automatic Makeup initiates. Makeup will not automatically terminate. LCV-112A/LV-112A will open to divert to PDT/CRIE.

D. Automatic Makeup is disabled. Charging pump swapover to RWST is disabled. As VCT level decreases, Charging pumps will lose suction.

**Question 081**

The crew is responding to a LOCA in accordance with E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

A RED path occurs on the HEAT SINK Critical Safety Function Status Tree.

The crew transitions to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.

The following conditions exist:

- Total available EFW flow is 350 gpm
- RCS pressure is 470 psig and STABLE
- Containment pressure is 17 psig and INCREASING
- SG A,B,C,D pressures are all 950 psig and STABLE
- SG A,B,C,D wide range levels are 59% and DECREASING

**Which of the following actions are required?**

A. Transition back to E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

B. Immediately TRIP all RCPs.

C. Immediately perform FR-H.1, steps 10 – 14, to initiate Feed and Bleed.

D. Attempt to establish EFW flow to at least ONE steam generator.

**Question 082**

Per Technical Specifications, loads in excess of 2100 pounds are prohibited from travel over fuel assemblies in the storage pool.

Which of the following describes the basis for this restriction?

A. If the load is dropped, any possible distortion in the fuel racks will not result in a critical array.

B. If the load is dropped, the activity released will be within the design capacity of the Fuel Storage Building Emergency Air Cleaning System.

C. If the load is dropped, the radiation level at the surface of the Spent Fuel Pit will remain less than 2.5 mr/hr.

D. If the load is dropped, the radiation released will not exceed the limits imposed by 10CFR20, Appendix A, Release to unrestricted areas.

**Question 083**

A reactor startup is being performed. The following conditions exist:

- The reactor is critical. Startup Rate is .3 DPM
- Reactor power is below Point of Adding Heat (POAH)
- Moderator Temperature Coefficient is +1 PCM/°F
- Tave is 557°F

Which of the following events will cause Startup Rate to DECREASE?

A. The BOP INCREASES the Steam Dump pressure setpoint on PK-507.

B. One Main Steam Safety Valve on SG A fails open.

C. Main Condenser Vacuum DECREASES to 22 inches Hg.

D. The BOP places one of the Steam Dump Bypass Interlock Control switches to OFF.

**Question 084**

From the list of Process Radiation Monitors below, SELECT the monitors that have an associated control actuation function.

1. R-6509, Waste Liquid Test Tank discharge monitor
2. R-6519, Steam Generator Blowdown Flash Tank discharge monitor
3. R-6514, Waste Liquid Test Tank Inlet monitor
4. R-6505, Condenser Air Evacuation discharge monitor
5. R-6516, PCCW Loop A Activity monitor

A. 1 and 2 ONLY

B. 1, 2, and 3 ONLY

C. 2 and 3 ONLY

D. 1, 2, 4, and 5 ONLY

**Question 085**

A Control Room Evacuation is being performed per OS1200.02, SAFE SHUTDOWN AND COOLDOWN FROM THE REMOTE SAFE SHUTDOWN FACILITIES.

A Loss of Off-Site power has occurred. The Primary NSO reports that DG A is running with its output breaker OPEN.

What action should be taken?

A. Place DG A in LOCAL control. STOP DG A using the LOCAL DG Engine NORMAL STOP pushbutton.

B. Place the UAT, RAT, and DG output breakers on bus E5 in LOCAL control. Place the UAT and RAT breakers in PULL TO LOCK. CLOSE the DG output breaker.

C. Place all breakers on bus E5 in LOCAL control. Place all load breakers in PULL TO LOCK. CLOSE DG A output breaker.

D. Place DG A in LOCAL control. Press BOTH EMERGENCY STOP pushbuttons.

**Question 086**

Reactor trip and Safety Injection have occurred.

SI pump A FAILED to start, AUTOMATICALLY and MANUALLY.

The following conditions exist:

- Pressurizer level is 17% and INCREASING SLOWLY
- Pressurizer pressure is 1900 psig and INCREASING slowly
- Tave is 551°F and STABLE

SI pump B TRIPS on electrical overload. All other conditions are normal.

Which of the following describes the effects of the degraded ECCS flow?

| | Pressurizer Level | RCS Subcooling |
|---|---|---|
| A. | DECREASING | DECREASING |
| B. | DECREASING | STABLE |
| C. | STABLE | DECREASING |
| D. | INCREASING | INCREASING |

**Question 087**

A Steam Line Break has occurred on Main Steam Line B inside containment. The crew is performing the actions of E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

The following conditions exist:

- Containment pressure is 6 psig SLOWLY INCREASING
- RCS pressure is 1770 psig and SLOWLY INCREASING
- RCS subcooling is 110°F and SLOWLY INCREASING
- Total EFW flow is 400 gpm
- Wide Range level in all intact SGs is 70% and INCREASING
- Narrow Range level in all intact SGs is OFF-SCALE LOW
- Pressurizer level is 9% and INCREASING

Which of the following conditions must be changed to allow transition to ES-1.1, SI TERMINATION?

A. EFW flow must INCREASE.

B. Pressurizer level must INCREASE.

C. Wide Range SG level must INCREASE.

D. RCS pressure must INCREASE.

**Question 088**

The RCS leakage computer report for the previous shift indicated the following RCS leakage:

- IDENTIFIED – 2.7 gpm
- UNIDENTIFIED - 0.55 gpm

The RCS leakage report for your shift indicates that:

- IDENTIFIED leakage has INCREASED by 4.8 gpm
- UNIDENTIFIED leakage has INCREASED by 0.60 gpm

Which of the following describes the status of the Technical Specification RCS leakage limits?

A. IDENTIFIED leakage is exceeding Tech. Spec limits. UNIDENTIFIED leakage is within the allowable limit.

B. IDENTIFIED leakage is within the allowable limit. UNIDENTIFIED leakage is exceeding the Tech. Spec. limit.

C. IDENTIFIED leakage and UNIDENTIFIED leakage are within the allowable leakage limits.

D. IDENTIFIED leakage and UNIDENTIFIED leakage are exceeding Tech. Spec. limits.

**Question 089**

The plant is in MODE 6.

Train A Control Room Emergency Makeup Air and Filtration System is declared INOPERABLE.

What, if any, ACTION is required?

A. Place Train B in the FILTRATION/RECIRCULATION mode AND Restore Train A to OPERABLE status within 7 days.

B. Restore Train A to OPERABLE status within 7 days OR initiate and maintain operation of Train B in the FILTRATION/RECIRCULATION mode.

C. Immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

D. No ACTION required. Only 1 Train is required to be OPERABLE in MODE 6.

**Question 090**

Which of the following is considered a NON-INTENT change to an operating procedure?

A. Changing the acceptance criteria for a surveillance test.

B. Modifying the basic method of task performance.

C. Changing the wording of a procedure step to clarify a task.

D. Changing the scope or applicability of a procedure.

**Question 091**

While work is being performed on feedwater heater drain components, the CONTACT PERSON for one work package requests a temporary lift.

There are two additional work packages assigned to the clearance. The Work Control Supervisor is unable to locate the CONTACT PERSON on one work package.

How should the request be processed?

A. Obtain concurrence from another SRO licensed individual and designate an alternate CONTACT PERSON for notification of the temporary lift, then approve the request after notification is made.

B. Do NOT approve the request until the designated CONTACT PERSON is located.

C. Obtain concurrence from a supervisor in the same department as the designated CONTACT PERSON, then approve the request for temporary lift.

D. Temporarily assign the person requesting the temporary lift the CONTACT PERSON responsibility for all work packages under the clearance while the temporary lift is in effect. When responsibility has been assumed, approve the request.

**Question 092**

Which of the following describes the basis for the Technical Specification limit on TOTAL Steam Generator tube leakage of 1 GPM for ALL steam generators?

A. To ensure that steam generator tube integrity is maintained in the event of a main steam line rupture or under LOCA conditions.

B. A limited amount of leakage is expected and this threshold value is sufficiently low to ensure early detection of additional leakage.

C. This limitation provides allowance for a limited amount of leakage from known sources whose presence will not interfere with the detection of UNIDENTIFIED leakage by the leakage detection systems

D. The limit ensures that the dosage contribution from tube leakage will be limited to a small fraction of 10CFR100 dose guidelines in the event of a main steam break or a steam generator tube rupture.

**Question 093**

OS1000.09, Refueling Operation, requires that no more than two irradiated fuel assemblies be allowed in the cavity and canal at any one time.

Which of the following statements describes how this limitation is applied?

A. Fuel in the Transfer Car is counted as if it were in the canal until it is latched by the Spent Fuel Handling Tool.

B. Fuel in the cavity is counted as in the core as soon as it is being lowered to its core location.

C. Fuel in the cavity is counted as in the core until it is removed from its core location.

D. Fuel in the core is counted as in the cavity as soon as it is above and clear of the vessel.

**Question 094**

The plant is in MODE 6. You are assigned as the Refueling SRO in containment.

- Fuel moves are in progress.
- There is a spent fuel assembly in the refueling machine mast.
- Refueling Cavity level has been DECREASING at approximately 2 inches per minute.
- The spent fuel assembly CANNOT be moved to a core location
- Refueling Cavity level is DECREASING below the reactor vessel flange

Where do you direct the refueling machine operator to place the spent fuel assembly?

A. In the transfer canal with the refueling machine mast fully extended

B. In the RCCA change fixture

C. In the upender in a vertical position

D. On the transfer canal floor

**Question 095**

A SITE AREA EMERGENCY was declared 50 minutes ago. Notification has been made to the States and the NRC.

Conditions have stabilized and the event can be terminated.

Who is responsible for termination of the classification?

A. Short Term Emergency Director

B. Emergency Operations Manager

C. Licensing Coordinator

D. Response Manager

**Question 096**

A Steam Generator Tube Rupture has occurred. RCS pressure control has been lost and the crew transitions to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Assuming pressurizer pressure control cannot be restored, which of the following describes the strategy used to terminate the SGTR?

A. Establish RCS subcooling and inventory, stop all but one Charging or SI pump, and then monitor RCS inventory using RVLIS.

B. Initiate a rapid RCS cooldown to refill the pressurizer. When adequate RCS subcooling and inventory are established, stop all but one Charging or SI pump.

C. Maximize SI flow to establish RCS inventory, then operate Charging or SI pumps as necessary to maintain pressurizer level during RCS cooldown.

D. Maximize feed water flow to intact steam generators, depressurize the RCS by stopping SI pumps, and establish normal Charging and Letdown for RCS inventory control.

**Question 097**

Who is responsible for Final Approval of a Planned Special Exposure (PSE) for NAESCO employees?

A. The individual's Group Manager

B. Shift Manager

C. Health Physics Department Supervisor

D. Station Director

**Question 098**

The plant is at 15% power.

Which of the following plant conditions require an immediate reactor trip and entry into E-0, REACTOR TRIP OR SAFETY INJECTION?

A. The turbine has tripped due to an EHC failure.

B. Power Range channel N-42 fails low due to a blown control power fuse.

C. SG C level indicates 11% on all narrow range channels due to a Feed Control failure.

D. RCP A frame vibration exceeds 10 mils.

**Question 099**

The following conditions exist:

Reactor trip and Safety Injection have initiated.

E-1, LOSS OF REACTOR OR SECONDARY COOLANT, has been entered.

The Critical Safety Function Status Trees are as follows:

| | |
|---|---|
| 1. Heat Sink | RED |
| 2. Containment | ORANGE |
| 3. Subcriticality | ORANGE |
| 4. Integrity | RED |
| 5. Inventory | YELLOW |
| 6. Core Cooling | ORANGE |
| 7. Emergency Recirculation | GREEN |
| 8. RDMS | YELLOW |

Which of the following describes the order in which the Safety Functions should be addressed?

A. 1, 4, 3, 2, 6, 8, 5

B. 1, 4, 2, 3, 6, 8, 5

C. 1, 4, 6, 3, 2, 5, 8

D. 1, 4, 3, 6, 2, 5, 8

**Question 100**

During the performance of FR-P.1, RESPONSE TO PRESSURIZED THERMAL SHOCK, the crew is directed to check if SI can be terminated.

What is the basis for terminating SI while performing FR-P.1?

A. The temperature soak required by FR-P.1 is ineffective if SI is flowing to the RCS Cold Legs.

B. SI flow may cause the PORVs to lift, resulting in a loss of RCS inventory.

C. SI flow may prevent a subsequent reduction in RCS pressure.

D. SI flow is not necessary to maintain adequate subcooling in a PTS event.

Attachment 3

## SIMULATION FACILITY REPORT

Facility Licensee: Seabrook Station

Facility Docket No: 50-443

Operating Tests Administered from: October 19-23, 1998

This form is used only to report simulator observations. These observations do not constitute audit or inspection findings and are not, without further verification and review, indicative of noncompliance with 10 CFR 55.45(b). These observations do not affect NRC certification or approval of the simulation facility other than to provide information that may be used in future evaluations. No licensee action is required in response to these observations.

Pre-set event initiators, called triggers, caused some difficulties during the conduct of the scenario and JPM examinations. The problems encountered resulted in events occurring, based upon plant conditions, before it was intended for them to occur. In one instance, this resulted in a premature trip of the reactor, thus preventing the examiners from observing operator actions for several instrument and component failures. These so-called triggers were intended to facilitate a smooth execution of failures in a timely, predetermined manner, since the simulator programing is FORTRAN based and extensive failure codes must be entered for events to occur. Problems encountered during this examination should not occur during future NRC exams, since the facility had previously initiated plans to change the present configuration over to a PC based operation, once the examinations were completed.