

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 50-335, 50-389
License Nos.: DPR-67, NPF-16
Report No.: 50-335/97-301
Licensee: Florida Power and Light Company
Facility: St. Lucie Plant Units 1 & 2
Location: Jensen Beach, FL
Dates: October 13-16, 1997

Examiners: *George T. Hopper*
George T. Hopper, Chief License Examiner

Ronald F. Aiello, License Examiner
Richard S. Baldwin, License Examiner

Approved by: *Thomas A. Peebles*
Thomas A. Peebles, Chief,
Operator Licensing and Human Performance Branch
Division of Reactor Safety

EXECUTIVE SUMMARY

St. Lucie Plant Units 1 & 2 NRC Examination Report No. 50-335/97-301 and 50-389/97-301

During the period June 16 - 19, 1997, NRC examiners conducted an announced operator licensing initial examination in accordance with the guidance of Examiner Standards, NUREG-1021, Revision 7. This examination implemented the operator licensing requirements of 10 CFR 55.41, 55.43, and 55.45.

Operations

- One Senior Reactor Operator (SRO) candidate and six Reactor Operator Candidates received written examinations and operating tests. All examinations were administered by NRC operator licensing examiners. The written examination was administered on October 10, 1997, and the operating tests were administered October 13-16, 1997. All candidates passed the examination. (Section 05.1)
- Candidate Pass/Fail

	SRO	RO	Total	Percent
Pass	1	6	7	100%
Fail	0	0	0	0%

- The NRC concluded that the quality of the examination materials needed to be improved for future submittals. Greater emphasis needs to be placed on ensuring the technical accuracy of the examinations. (Section 05.2)
- The examiners concluded that candidate performance on the written examination was weak. Overall performance on the operating test was satisfactory with some weaknesses noted in the areas of recognizing adverse plant parameters, understanding system response and radiological controls. (Section 05.3)
- During examination validation activities, one minor procedure discrepancy was noted. (Section 08.1)



Report Details

Summary of Plant Status

During the period of the examinations Unit 1 and Unit 2 were at 100 percent power.

I. Operations

05 Operator Training and Qualifications

05.1 General Comments

NRC examiners conducted regular, announced operator licensing initial examinations during the period October 13-16, 1997. NRC examiners administered examinations developed by the licensee's training department, under the requirements of an NRC security agreement, in accordance with the guidelines of the Examiner Standards (ES), NUREG-1021, Interim Revision 8. One SRO instant and six RO applicants received written examinations and operating tests.

Seven candidates passed the examination. Six of the seven candidates passed the examination but showed weaknesses. Five of these six candidates showed weaknesses on the written examination. Three candidates were weak on the administrative portion of the operating test only. One candidate was passed illustrating weaknesses on both the administrative and JPM portion of the examination. Two other candidates showed weaknesses, one on the JPM portion and the other on the simulator portion of the operating examination. Candidates were considered to have passed but showed weaknesses if they received an unsatisfactory grade on any one administrative topic area, completed only 80 percent of the JPMs successfully, or received a grade of 1.8 to 2.0 on any one competency during the dynamic simulator examinations. Candidates were considered to have passed the written examination but showed weaknesses if they receive a grade of 80-82. Detailed candidate performance comments have been transmitted under separate cover for management review and to allow appropriate candidate remediation.

05.2 Pre-Examination Activities

a. Scope

The NRC reviewed the licensee's examination submittal using the criteria specified for examination development contained in NUREG 1021 Interim Rev 8.

b. Observations and Findings

The licensee developed the SRO and RO written examinations, two JPM sets, and three dynamic simulator scenarios for use during this examination. All materials were submitted to the NRC on time. NRC examiners reviewed, modified, and approved the examination prior to

examiners reviewed, modified, and approved the examination prior to administration. The NRC conducted an on-site preparation visit during the week of September 29, 1997, to validate examination materials and familiarize themselves with the details required for examination administration. No delays were encountered. However, significant effort was required to modify examination materials to meet the criteria set forth in NUREG 1021 Interim Rev. 8.

(1) Written Examination Development

The written examination was submitted on time. The licensee submitted 134 questions to be used between both the SRO and RO examinations. The organization of examination with some of the reference material attached expedited the examination review process.

This was the licensee's first attempt at developing the examinations under the new examination development pilot program. The examination contained numerous deficiencies that were similar in scope and nature to the deficiencies that have been noted at other facilities on the first attempt. The following is a partial listing of some of the problems noted.

- (a) Several questions contained information in the question stem that revealed the correct answer without testing the desired concept or easily eliminated one or more distractors.
- (b) Approximately 25 percent of the questions had to have one or more distractors significantly altered or changed.
- (c) Six questions contained distractors which were additional correct answers. Two questions had the wrong answer and one other question had no correct answer.
- (d) Twelve questions had to be rewritten or replaced for reasons such as no discriminatory value or to increase the cognitive level of the question. Seven questions were deleted from the examination due to significant overlap in one topic area or non discriminatory value.
- (e) Approximately 10% of the questions submitted were identified as higher cognitive level questions when in fact they were only memory level. The final count of memory level questions came close to exceeding the 50 percent value allowed by NUREG 1021. The chief examiner determined that 45 percent of the questions were written at the memory level on the RO examination and 49 percent on the SRO test.

Aside from minor editorial changes to clarify or improve the language of the questions, the kind and number of technical errors noted were significant enough to require additional resources to correct. The licensee worked diligently to resolve the NRC



comments. The final version of the written examination met the criteria specified in NUREG 1021 Interim Rev 8.

One fundamental axiom of the new examination development process is that licensee's will develop and submit an examination that will be more accurate and technically correct than an examination developed by the NRC or one of its contractors. This process can only succeed if this premise is true. Licensee's have the advantage of greater site specific knowledge of plant systems and procedures and have been empowered to develop an examination of higher quality than has been produced in the past. Technical accuracy and adherence to the development guidelines are imperative to ensure that the examination is a valid means of measuring an operator's competence.

(2) Operating Test Development

The NRC reviewed two Job Performance Measure (JPM) and administrative sections of the examination for the walk-through portion of the examination. The examiners found the JPMs to be at the appropriate level of difficulty. Overall quality of the JPMs was satisfactory. However, the NRC found some technical errors that should have been detected and eliminated via a thorough verification and validation process. Examples of these problems included incorrect calculation of a Shutdown Margin Calculation, and an incorrect determination of Estimated Critical Conditions. Several JPM questions had to be replaced due to their non-discriminatory value.

The NRC reviewed three simulator scenarios for the examination. Some changes and additions were made to the scenarios to enhance the examiners opportunity to observe candidates perform the required competencies. Overall the scenarios were found to be satisfactory. The examiners noted that the required operator actions section of each scenario contained insufficient detail to be used as a stand alone document for grading a candidate's performance. The licensee added additional detail to each scenario prior to examination administration.

c. Conclusion

The NRC concluded that the quality of the examination materials needed to be improved for future submittals. Greater emphasis needs to be placed on ensuring that the technical accuracy of the examinations is satisfactory. This is necessary to ensure that a fair, accurate and valid measure of the candidates' skills is achieved during the examination process.

05.3 Examination Results and Related Findings, Observations, and Conclusions

a. Scope

The examiners reviewed the results of the written examination and evaluated the candidates' compliance with and use of plant procedures during the simulator scenarios and JPMs. The guidelines of NUREG-1021, Forms ES-303-3 and ES-303-4, "Competency Grading Worksheets for Integrated Plant Operations," were used as a basis for the operating test evaluations.

b. Observations and Findings.

The examiner's reviewed the results of the written examination and found that performance of the candidates was weak. The median score on the exam was a comparatively low 82.6 percent. Five candidates passed the written examination but showed weaknesses. Examiners also identified several weaknesses in candidate performance during the operations portion of the examination. Details of the discrepancies are described in each individual's examination report, Form ES-303-1, "Operator Licensing Examination Report." Several candidates demonstrated a lack of awareness of plant conditions and understanding integrated plant response during the dynamic simulator portion of the examination. On one occasion candidates failed to recognize increasing plant pressure with resulting failures incurred from an electric bus failure, and were unable to take appropriate compensatory measures to prevent a trip of the plant. On another occasion, candidates failed to realize that they were feeding a faulted steam generator despite the fact that they had positive indication of flow. On the administrative portion of the operating test, several candidates made errors while initiating a clearance. In addition, four of the seven candidates were unable to apply the $1/R^2$ rule and determine a dose rate at a given distance from a point source given the radiation field strength at a distance of one meter. This is basic radiation protection knowledge which is necessary to properly implement ALARA (As Low As Reasonably Achievable) principles.

c. Conclusion

The examiners concluded that candidate performance on the written examination was weak. Overall performance on the operating test was satisfactory with some weaknesses noted in the areas of recognizing adverse plant parameters, understanding system response and radiological controls.

08 Miscellaneous Operations Issues

08.1 Examiner Observations

During the course of examination validation and administration, the examiners noted discrepancies in EOP-03, "Loss of Coolant Accident." Step 48 directed operators to place Low Temperature Overpressure



Protections (LTOP) in service with emphasis placed in substep B.5 to verify that no Power Operated Relief Valve (PORV) leakage was evident. However, the procedure did not contain any contingency actions on what to do if PORV leakage was indicated. The licensee put this into their corrective action program.

V. Management Meetings

X1. Exit Meeting Summary

At the conclusion of the site visit, the examiners met with representatives of the plant staff listed on the following page to discuss the results of the examinations and other issues.

None of the material provided to the examiners was identified by the licensee as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Allen, Training Manager
D. Fadden, Services Manager
H. Johnson, Operations Manager
C. Ladd, Operations
G. Lorec, Training
J. Martin, Simulator Services Manager
K. Metzger, Operations Training Supervisor
L. Rich, Training
J. Scarola, Plant General Manager
J. Stall, Site Vice President
E. Weinkam, Licensing Manager
R. Weller, Operations Supervisor

NRC

D. Lanyi, Resident Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

None

SIMULATION FACILITY REPORT

Facility Licensee: Florida Power and Light - St. Lucie Plant

Facility Docket Nos.: 50-335 and 50-389

Operating Tests Administered on: October 13-16, 1997

This form is to be used only to report 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.

While conducting the simulator portion of the operating tests, the following items were observed (if none, so state):

ITEM

DESCRIPTION

NONE

WRITTEN EXAMINATION(S) AND ANSWER KEY(S) (SRO/RO)

Enclosure 3

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

Applicant Information

Name:	Region: II
Date: 10/10/97	Facility/Unit: St. Lucie 1 & 2
License Level: SRO	Reactor Type: CE
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

Applicant: _____

Circle your choice. if you change your answer write it in the blank

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| 21. a b c d | _____ | 46. a b c d | _____ |
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Circle your choice, if you change your answer write it in the blank

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| 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 | ___ |
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| 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 | ___ |

Senior Reactor Operator Examination

1. Which ONE of the following describes a channel check of the Steam Generator (S/G) water level instruments?
- All S/G levels are verified to be within a specific value of all other S/G level instruments.
 - Each channel is checked to verify it is accurately reflecting the input signal.
 - All S/G level instruments are qualitatively compared with other S/G level instruments and verified to be correct for the plant conditions.
 - All S/G level instruments are verified to be within a specific band for the current plant conditions.

2. Given the following conditions:

- An emergency exists due to a mispositioned control element assembly.
- The on call Reactor Engineer (RE) was unable to be contacted.
- Another Reactor Engineer was contacted but the engineer reports drinking a glass of wine approximately 3 hours ago.

Which ONE of the following lists the requirement, in addition to passing a breathalyzer test, that must be met to call out the RE?

- The RE called must be the only qualified RE available.
 - Approval must be received from the Operations Manager to call out the RE.
 - A security guard must be available to accompany the RE while on site.
 - The Fitness for Duty Coordinator, or designee, must be notified prior to allowing the RE on-site.
3. Of the listed area radiation levels, which ONE of the following is the maximum which would NOT be required to be protected by a locked door?
- 345 mrem/hr at 30 cm.
 - 750 mrem/hr at 30 cm.
 - 900 mrem/hr at 30 cm.
 - 1200 mrem/hr at 30 cm.

Senior Reactor Operator Examination

4. Of the listed positions, which ONE of the following is the minimum approval level to depart from Technical Specifications during an emergency?
- a. Both the NPS and ANPS must approve the action.
 - b. The ANPS can approve the action.
 - c. Plant General Manager must approve the action.
 - d. Vice President - St. Lucie Plant must approve the action.

5. An Alert has just been declared.

Which ONE of the following lists when non-essential personnel are evacuated from the Protected Area to their staging areas?

- a. Always when an Alert is declared.
- b. At the NPS discretion during the Alert, but if upgraded to a Site Area Emergency, evacuation is required.
- c. During any Alert when fuel damage has occurred or high radiation levels are identified.
- d. During any Alert when one of the fission product barriers is lost.

6. A dilution for startup is in progress when the Reactor Control Operator (RCO) must be relieved for a Short Term Relief.

Which ONE of the following lists the requirement that must be met to allow the Reactor Control Operator to be relieved?

- a. The NPS must give permission and supervise the turnover.
- b. Two active licenses must be cognizant of the reactivity manipulation.
- c. The ANPS must monitor the reactor parameters while the turnover is performed.
- d. The dilution must be stopped and ANPS permission received for the turnover.



Senior Reactor Operator Examination

7. Due to not having a manual valve available for isolation as part of a clearance, an MOV is to be used as an isolation point.

In accordance with OP-0010122, "Inplant Equipment Clearance Orders", which ONE of the following is the acceptable method for verifying the MOV is closed?

- a. Verifying RTGB green position light is lit.
 - b. Manually going to close on the motor operator.
 - c. Using the position indicator on the motor operator.
 - d. Placing the RTGB control switch to CLOSE for five seconds.
8. A valve under administrative controls is to be repositioned to support a hydrostatic test. The hydrostatic test does not include a valve lineup to be completed following the hydrostatic test.

Which ONE of the following conditions will allow this valve to be repositioned without hanging a Deviation Tag?

- a. An operator will be standing by the valve when it is out of the normal position.
 - b. A caution tag is attached indicating the valve is part of the lineup for a hydrostatic test.
 - c. Upon completion of all hydrostatic tests on the system, a valve lineup will be performed, per the system operating procedure.
 - d. The NPS authorizes the valve to be repositioned without hanging a Deviation Tag.
9. A fire pump has failed to start during a surveillance conducted on dayshift. Repairs are estimated to take 3 days.

Which ONE of the following is the time limit for notifying Risk Management?

Risk Management is required to be notified:

- a. immediately.
- b. within 8 hours of the failure.
- c. within 24 hours of the failure.
- d. within 48 hours of the failure.

10. RCS temperature is 135 °F and keff is less than .95.

Which ONE of the following identifies when Operational Mode 6 is entered?

- a. When the first vessel head closure bolt is detentioned.
 - b. When all vessel head closure bolts are detentioned.
 - c. When the vessel head is removed.
 - d. When the first core alteration is performed.
11. Which ONE of the following states when a step, which will not be performed due to current plant conditions, can be marked N/A and skipped?

The step can be marked N/A and skipped:

- a. only if the procedure specifically allows the step to be marked N/A.
 - b. at the discretion of the RCO performing the procedure.
 - c. at the discretion of the ANPS.
 - d. only when the step is N/A due to equipment availability.
12. Plant conditions require declaration of a General Emergency, however, analysis to determine if specific Protective Action Recommendations (PAR) are required will NOT be complete within the time limit for reporting the General Emergency to the state.

Which ONE of the following lists the information, concerning a Protective Action Recommendation (PAR), that will be included in the notification of the General Emergency?

- a. Indicate that a potential PAR will be made as soon as the required analysis is complete.
- b. Provide a PAR based on the worst case results of the ongoing analysis.
- c. Shelter all persons within a 2 mile radius and in downwind sectors out to 5 miles radius.
- d. Evacuate all persons within a 2 mile radius and shelter all persons in downwind sectors out to 5 miles.

13. Both units are operating. Due to flu, the shift is working with the minimum allowable licenses. The NPS becomes sick four hours into the shift and indicates that a replacement is required.

Which ONE of the following lists when a replacement for the NPS would be required?

- a. Before the NPS leaves site.
 - b. Within one hour of the NPS leaving site.
 - c. Within two hours of the NPS leaving site.
 - d. Within four hours of the NPS leaving site.
14. Which ONE of the following lists the minimum times an annunciator would have to alarm, for unexpected reasons, during an eight hour shift to be a NUISANCE alarm?
- a. 4
 - b. 6
 - c. 8
 - d. 10

15. An Unusual Event has just been upgraded to an Alert.

The OSC and TSC:

- a. may have been activated at the UE, but are required to be activated for the Alert.
- b. may have been activated at the UE and activation remains optional at the Alert.
- c. are NOT activated for a UE and activation for the Alert is optional.
- d. are NOT activated for a UE but are required to be activated for the Alert.

16. Given the following:

- A manual butterfly valve has been fully opened following Equipment Clearance Order removal.
- The valve has remote indication, in the Control Room, when it is in the fully open position.

Which ONE of the following describes when the RCO can perform the Independent Verification (IV) for the valve using Control Room indication?

- a. Anytime an Independent Verification is required.
 - b. When the verification is part of an Equipment Clearance Order.
 - c. Only when the valve is located in a radiation area greater than 100 mrem/hr.
 - d. Only in special circumstances with previous approval from the NPS/ANPS.
17. In accordance with OP-0010120, "Conduct of Operations," which ONE of the following identifies a reactivity manipulation and who is allowed to perform the identified manipulation?
- a. An RO, who is reactivating her license, places a Purification Ion Exchanger in service.
 - b. A trainee in the license operator training program performs 2C Charging Pump surveillance.
 - c. A trainee in the license operator training program starts an AFW pump and feeds the SG at 10% power.
 - d. An RO, who is reactivating his license, starts an AFW pump and feeds the SG at 10% power.



18. Which ONE of the following describes the proper positioning of valves in the CVCS system on SIAS?

The boration flow path from the Boric Acid Makeup Tanks (BAM Tanks), is:

- a. through the gravity feed valves, through the Boric Acid Makeup pumps, through the Boric Acid Strainer, through manual boration valve V-2174, directly to the Charging Pump suction.
 - b. bypassing the gravity feed valves, through the Boric Acid Makeup Pumps, through the Boric Acid Strainer, through FCV-2210Y, directly to the Charging Pump suction.
 - c. bypassing the gravity feed valves, through the Boric Acid Makeup pumps, through Emergency Borate Valve (MV-2514), directly to the Charging Pump suction.
 - d. through the gravity feed valves, through the Boric Acid Makeup Pumps, Emergency Borate Valve (MV-2514), directly to the Charging Pump suction.
19. Which ONE of the following statements is correct concerning the containment spray system?
- a. Unit 2 pumps are larger and therefore have larger minimum flow requirements.
 - b. Unit 1 pumps are larger and have increased internal pump cooling flow requirements.
 - c. Unit 2 pumps do not have a separate seal water heat exchanger and therefore need more recirc flow for seal cooling and lubrication.
 - d. Unit 1 pumps do not have a separate seal water heat exchanger and therefore need more recirc flow for seal cooling and lubrication.
20. Which ONE of the following automatic actions occurs help prevent a Steam Generator overflow event?
- a. A ramp down of the feed pump speed rate to 50% within one minute following a Reactor Trip.
 - b. A trip of one of the running Main Feed Pumps on the receipt of a Steam Generator hi level signal.
 - c. A ramp down of the 100% bypass valves to 15% of full open on the receipt of a Steam Generator Hi level signal.
 - d. A reduction of the feed water supply rate to 5% of full power flow within one minute following a Reactor Trip.

21. If the Reactor Vessel Level Monitoring System (RVLMS) shows a void indication for reactor vessel sensors 1 through 5, which ONE of the following conclusions can be made?
- RCS liquid level is below the fuel assemblies.
 - RCS liquid level is at or below the Fuel Alignment Plate.
 - RCS liquid level is at the Hot Leg Nozzle centerline.
 - The reactor vessel space above the core is 75% full.
22. Which ONE of the following describes the response of the Unit-1 charging pumps following receipt of an automatic SIAS signal, coincident with a Loss of Offsite Power? Assume normal electrical lineup and all equipment is operable.
- Only one charging pump is automatically started on each emergency bus 5 minutes after it is energized by the diesel.
 - All charging pumps are automatically started immediately after their respective bus is energized by the diesel.
 - All charging pumps are automatically started 5 minutes after their respective buses are energized by the diesel.
 - Only one charging pump is automatically started onto each emergency bus immediately after it is energized by the diesel.
23. Given the following conditions:
- Unit 1 has just tripped from 100% power
 - 1B 125 VDC has been lost
 - Operators are performing 1-EOP-01, "Standard Post Trip Actions"
 - No Contingency Actions have been performed.

Which ONE of the following describes the configuration of the Auxiliary Feedwater (AFW) system immediately following the AFAS actuation?

- All AFW pumps running and feeding both Steam Generators.
- Only the 1C AFW pump running and feeding both Steam Generators.
- Only the 1A AFW pump running and feeding the 1A Steam Generator.
- Only the 1A and 1C AFW pumps will be running and feeding both Steam Generators.

24. The 1A Motor Driven Auxiliary Feedwater Pump Motor operated valves receives normal 480 VAC electrical power from which ONE of the following sources?
- 1AB 4.16 kV Bus
 - 2A3 4.16 kV Bus
 - 1A3 4.16 kV Bus
 - 2B3 4.16 KV Bus
25. Which ONE of the following interlocks must be satisfied before Shutdown Group A CEAs can be inserted in MANUAL GROUP mode?

All regulating group CEAs:

- must be at the DDPS lower group stop.
 - must be at their LEL.
 - and Shutdown Group B CEAs must be at their LEL.
 - must be at their LEL and Shutdown Group B CEAs must be at the UEL.
26. Given the following:
- A Unit 1 reactor startup is in progress.
 - The Reactor Operator is withdrawing Regulating Group 1 CEAs in the MANUAL GROUP mode.
 - Regulating group 1 is at 120 inches.
 - No CEA deviations exist.

Which ONE of the following will be the FIRST to automatically stop CEA movement?

- Highest CEA reaches the Upper Group Stop (UGS).
- Lowest CEA reaches the Upper Group Stop (UGS).
- Highest CEA reaches the Upper Electrical Limit (UEL).
- Lowest CEA reaches the Upper Electrical Limit (UEL).



27. Which ONE of the following would indicate to the operator that the Extended Range Bistable in the Nuclear Instrumentation System is operating correctly?

During reactor startup,:

- a. reactor power indication in % log power begins at 1000 cps increasing.
 - b. the audio count rate circuit is enabled at 1000 cps.
 - c. the % Log power lamp is extinguished and the CPS lamp illuminated at 1000 cps increasing.
 - d. the LOG LED is illuminated indicating the HIGH SUR Trip is enabled.
28. Which ONE of the following will result in the initiation of an AUTOMATIC trip of the "A" Main Feedwater pump when Unit 1 is at 45% power?
- a. Loss of normal 4160 VAC power supply.
 - b. Suction pressure decreases to 270 psig.
 - c. Feedpump oil pressure decreases to 10 psig.
 - d. Trip of the "B" condensate pump.
29. Which ONE of the following describes why the Containment Spray Pumps are rated at a minimum AND maximum flow rate.
- a. The flow control valves in the Spray header slowly throttle open during post accident as a result of changing containment pressure.
 - b. Containment atmosphere exerts a backpressure to flow during the injection phase of containment spray actuation but does NOT in the recirculation phase.
 - c. The minimum flow guaranties that the required amount of iodine removal media is injected and the maximum flow guarantees that the pumps will not loose suction pressure during operation.
 - d. Ensure the vendor's recommended pump flow for reliable operation is not exceeded.



30. Charging pumps are running on Unit 1 and an SIAS is present. (Assume no operator action)

Which ONE of the following lists the charging pump response when the BAM tanks are emptied?

The charging pumps will:

- a. trip on thermal overload.
 - b. trip on low suction pressure.
 - c. automatically align to the RWT.
 - d. continue to run and become gas bound.
31. Which ONE of the following correctly describes the interlock which will prevent the 125 VDC bus 2AB from being connected to the 2A-2AA bus and the 2B-2BB bus simultaneously?
- a. 2 breakers and 2 keys under strict administrative control.
 - b. 4 breakers and 4 keys under strict administrative control.
 - c. 2 breakers and 1 key captured in the closed position.
 - d. 4 breakers and 2 keys captured in the closed position.
32. Which ONE of the following describes the operation of the DSS?
- a. DSS uses RPS input parameters and trips the reactor by opening line contactors upstream of the Reactor Trip breakers.
 - b. DSS uses non-safety related parameters and trips the reactor by opening the CEA MG set input breakers.
 - c. DSS uses ESFAS parameters and trips the reactor by opening the CEA MG set input breakers.
 - d. DSS uses ESFAS parameters and trips the reactor by opening line contactors upstream of the Reactor Trip breakers.

33. Which ONE of the following responses completes the statement correctly?

Removing both ISOLATION modules from one of the Engineered Safety Features channels places the ACTUATION logic in:

- a. 2 out of 4 for unit 1.
 - b. 1 out of 3 for unit 1.
 - c. 2 out of 3 for unit 2.
 - d. 2 out of 4 for unit 2.
34. Unit 1 is operating at full power when Reactor Trip Breakers TCBs 1&5 and TCBs 2&6 open. The reactor does NOT trip and NO other TCBs open.

Which ONE of the following equipment failures is the cause of this event?

- a. Instrument inverter 1A
 - b. Maintenance Bypass bus 1B
 - c. 125 Volt DC bus 1A
 - d. CEA MG set B
35. The 2A diesel generator is running and tied to the grid for periodic testing.

Which ONE of the following is a description of the response by the diesel generator output breaker if a Loss of Offsite Power (LOOP) is received?

- a. The diesel generator output breaker will remain closed, will pick up all required loads, and continue to supply power to the emergency loads.
- b. The diesel generator output breaker will remain closed, will try to pick up the required loads but will trip on overcurrent.
- c. The diesel generator output breaker will immediately trip open on undervoltage and remain open.
- d. The diesel generator output breaker will remain closed for 3 seconds after which it will open and then reclose starting the appropriate loading sequence.

36. Given the following Unit 2 conditions:

- A LOCA has occurred in containment.
- Containment pressure is 1 psig.
- RCS pressure is 300 psig.

Which ONE of the following will stop a diesel generator?

- a. Block and reset SIAS ONLY and place control switch to STOP.
- b. Block and reset CIAS and SIAS. Place control switch to STOP.
- c. Depress the Emergency Stop pushbutton on the RTGB.
- d. Place the RTGB diesel generator control switch to STOP.

37. Given the following information:

- Delta T power indicates 43%
- Nuclear power indicates 41.8%
- Variable High Power Trip (VHPT) setpoint is 46.7%
- Variable High Power (VHP) pre-trip setpoint is 44.7%

Which ONE of the following is the new VHP Trip and Pre-trip setpoint after the VHPT RESET button is depressed?

- a. VHPT = 51.4%, VHP pre-trip = 49.4%
- b. VHPT = 52.6%, VHP pre-trip = 50.6%
- c. VHPT = 54.3%, VHP pre-trip = 52.3%
- d. VHPT = 56.3%, VHP pre-trip = 54.3%

38. When the High Pressurizer Pressure Trip BYPASS key is installed in a Reactor Protection System (RPS) panel, it closes contacts which inhibit the High Pressurizer Pressure trip.

Which ONE of the following is an additional function that is performed?

- a. Blocks the Diverse Scram System (DSS) input from that channel of RPS.
- b. Prevents an ESFAS signal from being generated from that channel.
- c. Prevents a reactor trip signal being generated from that channel when power is less than 0.1% power on Unit 1.
- d. Bypasses the PORV actuation from that channel of RPS.

39. Given the following:

- Reactor power is at 100%.
- I&C personnel are performing a test on the Trip Circuit Breakers (TCBs).
- Control Room "K" relay indicating lights for TCB-1 and 5 are NOT lit.

Which ONE of the following describes TCB operation for this plant condition?

- a. The RPS cannot automatically trip TCBs 1 and 5.
 - b. TCBs 1 and 5 should trip when their undervoltage relays are ENERGIZED.
 - c. The manual trip pushbuttons on panel RTGB will not trip TCBs 1 and 5.
 - d. TCBs 1 and 5 should trip when their undervoltage relays are DE-ENERGIZED.
40. On a loss of the "1A3" 4.16 kV bus, which ONE of the following occurs to the Unit 1 Shutdown Cooling (SDC) system?
- a. One SDC Hot Leg Suction Valve in each train is de-energized.
 - b. The SDC Temperature Control Valve (HCV-3657) is de-energized.
 - c. One Low Pressure Safety Injection Header Isolation Valve in each train is de-energized.
 - d. The SDC Heat Exchanger Bypass Valve (FCV-3306) fails closed due to a loss of Instrument Air.
41. Which ONE of the following lists the components in the Unit 2 Containment Iodine Removal System?
- a. a hydrazine storage tank, a constant metering pump and isolation valves.
 - b. a sodium hydroxide storage tank, a constant metering pump and isolation valves.
 - c. a nitrogen pressurized hydrazine storage tank, isolation valves, eductor and an orifice.
 - d. a nitrogen pressurized sodium hydroxide storage tank, isolation valves, eductor and an orifice.

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42. Following a LOCA on Unit 1, RCS pressure is at 300 psia and dropping.
Which ONE of the following lists the status of LPCI and SITs flow to the RCS?
- a. Neither LPSI and SITs are injecting
 - b. Only LPSI is injecting
 - c. Only SITs are injecting
 - d. Both LPSI and SITs are injecting
43. Which ONE of the following describes the pressurizer heaters that would be available following a Loss of Off-site Power(LOOP)? Assume the EDGs start and carry the emergency loads.
- a. Proportional Heater Bank-P1 and Backup Heater Bank-B4.
 - b. Proportional Heater Bank-P1 & P2.
 - c. Backup Heater Bank-B1 & B4.
 - d. Backup Heater Bank-B1 and Proportional Heater Bank-P1.
44. Which ONE of the following describes the response of the SELECTED Pressurizer Level channel failing LOW? (Assume no operator actions are taken)
- a. All heaters will deenergize, letdown goes to minimum, standby charging pump starts, actual pressurizer level and pressure increase, the reactor trips on High Pressurizer pressure.
 - b. All heaters will deenergize, pressurizer pressure decreases, the reactor trips on TM/LP.
 - c. All heaters remain energized, letdown goes to maximum, only one charging pump remains ON, Actual pressurizer pressure and level decrease, the reactor trips on TM/LP.
 - d. All heaters remain energized, letdown goes to minimum, actual pressurizer level and pressure increase, the reactor trips on High Pressurizer Pressure.

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45. Which ONE of the following is the expected response of the Instrument Air System to a major Turbine Building Instrument Air header rupture on Unit 1?
- Station air compressor will automatically start at 85 psig.
 - Instrument air cross-tie valve to Unit 2 will OPEN, then RECLOSE if the Unit 2 Instrument Air System pressure drops below 85 psig.
 - Instrument air cross-tie valve to Unit 2 will CLOSE when Unit 1 Instrument Air System pressure drops below 75 psig.
 - The Station Air System cross-tie valve will OPEN to supply the Unit 1 Instrument Air System when pressure drops below 85 psig.
46. The recirculation minimum flow isolation valves for Unit 1 LPSI pumps have key operated lockout power switches.

Which ONE of the following describes why these switches are NOT included on Unit 2?

- The recirculation line returns to the pump suction.
 - The recirculation path does not return to the RWT.
 - Each train of LPSI has a separate recirculation line.
 - A relief valve on each LPSI discharge line provides recirculation.
47. In accordance with NOP 1-0410022, "Shutdown Cooling," which ONE of the following describes the preferred method of controlling RCS cooldown while on shutdown cooling on Unit 1?
- Manually adjust the SDC heat exchanger bypass valve (FCV-3306) and manually adjust the SDC heat exchanger temperature control valve (HCV 3657) to attain the desired cooldown rate.
 - Manually adjust the SDC heat exchanger bypass valve (FCV-3306) and allow automatic control of the SDC heat exchanger temperature control valve (HCV-3657) to attain the desired cooldown rate.
 - Allow automatic control of the SDC heat exchanger bypass valve (FCV-3306) and manually adjust the SDC heat exchanger temperature control valve (HCV-3657) to attain the desired cooldown rate.
 - Allow automatic control of the SDC heat exchanger bypass valve (FCV-3306) and automatic control of the SDC heat exchanger temperature control valve (HCV 3657) to attain the desired cooldown rate.

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48. Which ONE of the following describes the basis for the Trisodium Phosphate Dodecahydrate (TSP) stored in the Unit 2 containment basement?

Maintain the pH of the water in the basement following a LOCA:

- a. less than or equal to 7.0 to ensure radioactive Iodine is scrubbed from Containment Spray Water.
 - b. greater than or equal to 7.0 to ensure radioactive Iodine is scrubbed from Containment Spray Water.
 - c. less than or equal to 7.0 to prevent corrosion cracking of metals inside containment.
 - d. greater than or equal to 7.0 to prevent corrosion cracking of metals inside containment.
49. The annunciator "START DC FAILURE/CS ISOLATED" has energized on the 1A Diesel Generator control panel.

Which ONE of the following describes the response of the diesel generator if a start signal is received?

The diesel generator will:

- a. start because only 2 of the 8 air start motors are affected by a loss of DC volts.
 - b. start because backup power supplies will allow power to be supplied to all 8 of the air start motors.
 - c. NOT start since DC power will only be supplied to 4 of the 8 air start motors.
 - d. NOT start because DC power is unavailable to any of the air start motors.
50. Which ONE of the following is the source of control power for breakers on 4.16 kV bus 1A3?
- a. 125 V Non-Vital DC
 - b. 125 V Vital DC
 - c. 120 V Non-Vital AC
 - d. 120 V Vital AC

51. Given the following conditions:

- Unit 1 CEDM fan HVE-21A is in AUTO after START.
- Unit 1 CEDM fan HVE-21B is in AUTO after STOP.
- Unit 1 CEDM fan HVE-21A trips on overcurrent.

Which ONE of the following lists the signals required by the logic needed to start HVE-21B?

- a. The trip signal from HVE-21A.
- b. The trip signal from HVE-21A concurrent with a low flow signal.
- c. A low flow signal.
- d. The trip signal from HVE-21A concurrent with a low flow signal and air inlet temperature signal to the cooling coils is greater than 100 °F.

52. Given the following Unit 1 control room and chemistry reports:

- RCS pressure is 1600 psig.
- RCS temperature is 360 °F.
- Safety Injection tank #1A1 boron concentration = 1750 ppm.
- Safety Injection tank #1A1 level = 1150 cubic feet
- Safety Injection tank #1A1 pressure = 225 psig
- All rods are inserted.

Which ONE of the following identifies the operability status of #1A1 Safety Injection Tank (SIT)?

- a. The Safety Injection tank is NOT required to be operable.
- b. Safety Injection tank level is above the allowable level therefore the SIT is NOT operable.
- c. Safety Injection tank pressure is above allowable pressure therefore the SIT is NOT operable.
- d. Boron concentration is below allowable concentration therefore the SIT is NOT operable.

53. At 0830 a Unit 1 cooldown is in progress with Tcold loop temperature at 210 °F.

Which ONE of the following is the earliest time that temperature can be at 180 °F?

- a. 0848
- b. 0851
- c. 0853
- d. 0857

54. The static inverter section of #1 Static Uninterruptable Power Supply (SUPS) has failed.

Which ONE of the following identifies the source of power to #1A Vital Bus?

#1A Vital AC Bus will be:

- a. powered by MCC 1AB via the battery charger because the transfer to alternate power is automatic.
 - b. powered by MCC 1AB via the SOLA transformer because the static switch will automatically transfer.
 - c. powered by MCC 1AB via the battery charger because the inverter section is ONLY used by the battery as a backup to the AC input.
 - d. deenergized because the manual transfer switch would have to be aligned to the SOLA transformer.
55. Which ONE of the following describes the response of Unit 1 Shutdown Cooling (SDC) to a loss of instrument air to SDC instrument air operated valves?

All SDC flow will:

- a. be through both the SDC heat exchanger and bypass valves.
 - b. be stopped.
 - c. be through the SDC heat exchanger.
 - d. bypass the SDC heat exchanger.
56. Unit 1 reactor power is 82%. Reactor Cavity Cooling fan HVS-2B is in service when it trips due to electrical fault.

Which ONE of the following describes the required operator actions, if any?

- a. HVS-2A will automatically start after 10 seconds. No operator action is required.
- b. HVS-2A must be started within 30 minutes or a reactor trip is required.
- c. HVS-2A must be started within 45 minutes or reactor power must be reduced to < 30%.
- d. HVS-2A must be started within 45 minutes or a reactor trip is required.

57. Given the following:

- Reactor power at 100%
- A transient has caused pressurizer level to decrease 4.2% below the programmed level.

Which ONE of the following is the response of the pressurizer level control system?

- a. Both backup charging pumps will be running, with letdown flow isolated.
- b. No backup charging pumps will be running, with minimum letdown.
- c. Both backup charging pumps will be running, with minimum letdown.
- d. No backup charging pumps will be running, with letdown flow isolated.

58. During performance of the Standard Post Trip Actions, which ONE of the following radiation monitors indicating greater than a specified amount would require a contingency action to be performed?

- a. Containment
- b. Condenser Air Ejector
- c. Blowdown
- d. Main Steamline

59. Given the following conditions:

- The reactor has experienced a Steam Generator Tube Rupture.
- All systems responded as expected.
- The performance of EOP-04 is in progress.
- One steam generator has been isolated.
- RCS cooldown using natural circulation is in progress.

Which ONE of the following describes the concern associated with the affected SG pressure prior to placing the RCS on SDC?

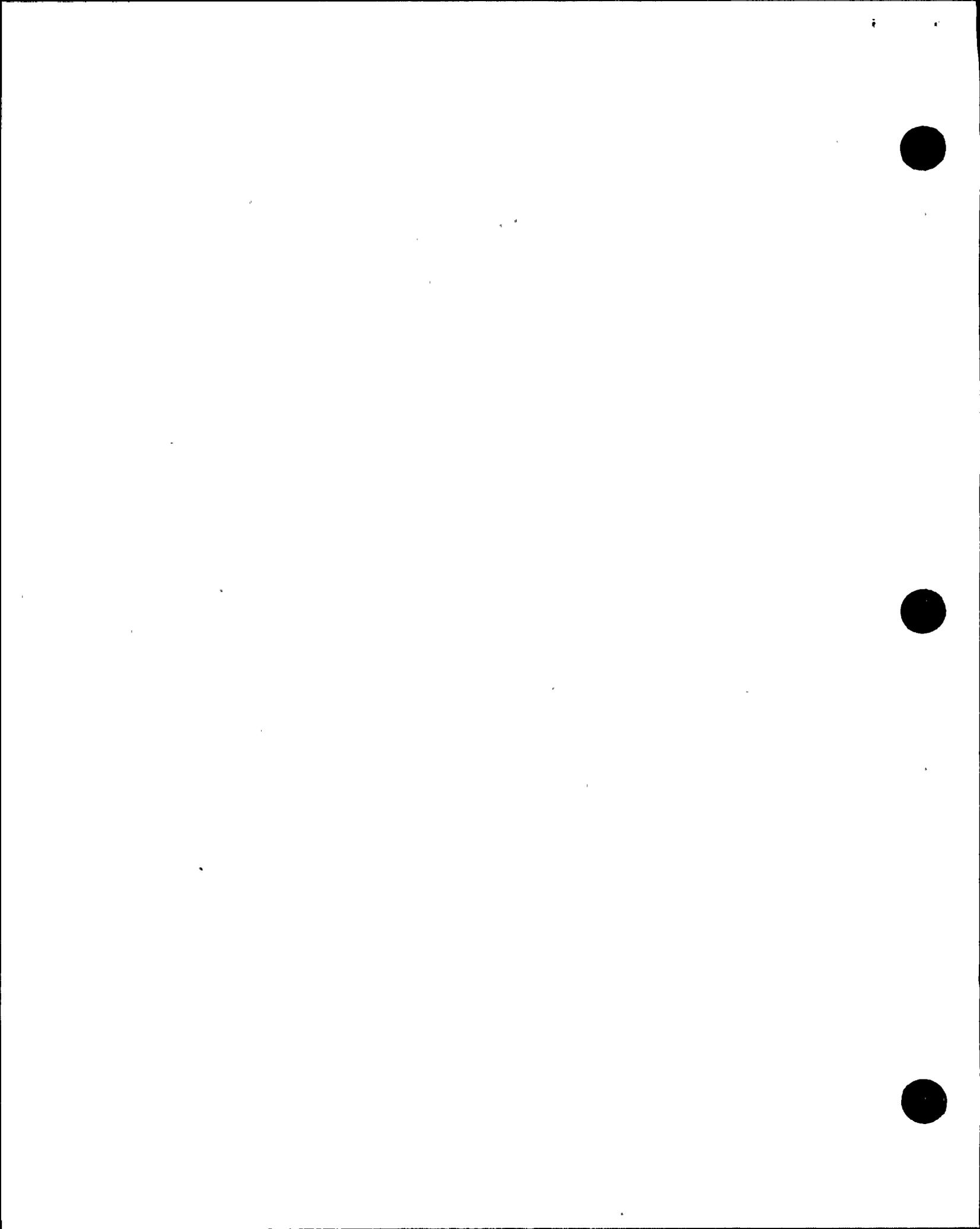
- a. The SG pressure would be too low due to excessive cooldown causing RCS water to enter the SG and reducing RCS inventory.
- b. The SG pressure would be slightly less than RCS pressure causing water to enter the RCS resulting in a dilution.
- c. The SG temperature would be too high to allow for SG depressurization.
- d. The SG pressure would be too high due to thermal stratification of the secondary water.

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60. Assuming no other indication is available, which ONE of the following describes how the required AFW flow rate of approximately 150 gpm can be obtained during a Station Blackout (SBO) event?
- Locally opening the AFW header isolation valves 6 turns from fully closed.
 - Opening the AFW flow control valves for 6 seconds from fully closed.
 - Observation of increasing SG level while varying the speed of the C AFW pump.
 - Locally opening the AFW flow control valves 6 turns from fully closed.
61. Which ONE of the following will enhance natural circulation?
- Lowering Pressurizer level
 - Raising Pressurizer level
 - Lowering Steam Generator level
 - Raising Steam Generator level
62. In accordance with 1-EOP-03, "Loss of Coolant Accident", which ONE of the following is an alternate method of establishing hot leg injection during a LOCA event on Unit 1?
- Containment Spray pumps discharging to the pressurizer auxiliary spray line.
 - Containment Spray pumps discharging to the hot legs via the shutdown cooling suction lines.
 - HPSI pumps discharging to the normal pressurizer spray lines.
 - HPSI pumps discharging to the hot legs via the shutdown cooling suction lines.
63. The following plant conditions exist:
- Unit 2 is at 100% power.
 - All control systems are in AUTOMATIC.
 - Pressurizer spray valve is stuck OPEN.
 - NO operator action is taken.

Which ONE of the following describes the effect of RCS pressure DECREASING to 2210 psia?

- Pressurizer LOW PRESSURE alarm is energized.
- Proportional heaters are fully energized.
- Setpoint for backup heaters is reached.
- TM/LP SETPOINT HI/LO alarm is energized.



64. One of the first actions the RCO is instructed to take on increased RCS activity is to adjust letdown flow.

Which ONE of the following statements is correct as to the adjustment and the reason?

- a. Increase letdown to maximum so that more RCS water can be diverted and processed by the waste management system.
- b. Decrease letdown to minimize the amount of water processed by the waste management system.
- c. Decrease letdown to minimum to minimize the amount of radioactive letdown that is flowing throughout the auxiliary building.
- d. Increase letdown flow so that a maximum amount of RCS water can flow through the CVCS ion exchanger.

65. The following plant conditions exist:

- A steam line break exists upstream of the S/G "A" MSIV on Unit 2.
- MSIS has automatically initiated.

Which ONE of the following conditions could result if a steaming flowpath from the unaffected steam generator is NOT established immediately following dryout of the affected steam generator?

- a. Rapid repressurization of the RCS and subsequent Pressurized Thermal Shock (PTS) conditions.
 - b. Inability to open S/G "B" MSIV due to pressure difference created by depressurization of the affected steam generators.
 - c. Rapid decrease in T-cold of the unaffected loop resulting in an interruption of natural circulation.
 - d. Decrease in the core exit temperatures resulting in an interruption of natural circulation.
66. During an Excess Steam Demand event, both steam generators are suspected of being affected.

Which ONE of the following steam generators should be isolated?

- a. BOTH steam generators, since a potential exists to over-cool the RCS.
- b. ONLY the steam generator with the highest Tcold.
- c. EITHER steam generator, since it will aid in identification of the most affected S/G.
- d. ONLY the steam generator with the lowest pressure.



67. The following plant conditions exist:

- Reactor power is 77%
- CEA 55 Rod bottom light is lit
- Group 5 CEAs are at 128 inches.

In ONOP 2-0110030, "CEA Off-Normal Operation and Realignment", which ONE of the following describes the CEA recovery method "?

- a. Increase turbine load to maintain Tave constant during CEA withdrawal.
- b. Borate to maintain reactor power constant during CEA withdrawal.
- c. Withdraw CEA slowly over a 10 minute period and maintain Tave constant with dilution.
- d. Withdraw CEA slowly over a 10 minute period and use Group 5 rods to maintain Tave and power constant.

68. When isolating a Unit 1 Steam Generator with a tube leak per EOP-99, "Appendix R", which ONE of the following normally maintained open valves is required to be CLOSED?

- a. Main Steam Isolation Valves bypass valves
- b. 1C AFW Pump Steam Admission valve
- c. 1C AFW Pump Steam Supply Warmup (Bypass) valves
- d. 1C AFW Pump Trip and Throttle valve

69. Unit 1 is being shutdown to HOT STANDBY due to a Steam Generator Tube Leak.

Which ONE of the following indicates the TUBE LEAK has become a TUBE RUPTURE?

- a. When all available charging pumps are running, letdown has been isolated, and pressurizer level can no longer be controlled at setpoint.
- b. When all available charging pumps are running, and letdown flow has reached the minimum letdown limiter and has to be isolated to control pressurizer level.
- c. When letdown flow combined with the tube rupture flow exceeds 132 GPM with three (3) charging pumps running.
- d. When charging flow equals 132 GPM.

70. Which ONE of the following mechanisms is utilized to satisfy the RCS Pressure Control Safety function during a Small Break LOCA event when RCS pressure is 1000 psia?

- a. Containment Spray
- b. Pressurizer heaters
- c. LPSI Pumps
- d. HPSI Pumps

71. The following Unit 2 conditions exist:

- A large break LOCA has occurred.
- A Loss of Off-Site Power has occurred.
- Two Phase Natural Circulation and Break Flow is being verified

Which ONE of the following is used to check Two Phase Natural Circulation and Break Flow is sufficient to maintain Core Heat Removal in EOP-15?

- a. Core Exit Thermocouples indicate less than 700 ° F.
- b. Thot - Tcold delta T is less than 50 ° F.
- c. Core Exit Thermocouples indicate less than 22 ° F superheat.
- d. RCS Subcooling indicates less than 22 ° F superheat.

72. Given the following conditions:

- Pressurizer level is 0
- Pressurizer pressure is 1200 psig
- Containment Pressure is 4 psig.
- Tcold is 380 °F.

Which ONE of the following is the leak's location?

- a. On RCS inside containment.
- b. On a Main Steam Line inside containment.
- c. In a Steam Generator Tube.
- d. On a feedwater line inside containment upstream of the Feedwater check valve.

73. Which ONE of the following describes the overriding strategy employed in EOP-10, Station Blackout, prior to power availability?

- a. Utilize Natural Circulation to establish and maintain SDC entry conditions.
- b. Utilize Natural Circulation to maintain the RCS temperature constant.
- c. Utilize Natural Circulation to maintain RCS subcooling.
- d. Maintain SG level greater than 65% wide range.

74. In accordance with 1-0310030, "Component Cooling Water Off-Normal," which ONE of the following CCW malfunctions would require the Reactor to be TRIPPED?

- a. Low level in the CCW Surge Tank.
- b. Rupture of the "N" CCW Header.
- c. Loss of the "A" CCW Pump.
- d. High CCW Temperature.

75. Unit 2 has been operating at 100% power when a load decrease to 50% is initiated. During the load decrease ONE CEA remains at its fully withdrawn position while the other CEAs in the Group are inserted.

Which ONE of the following annunciator alarms would provide indication the CEA was misaligned?

- a. L-24 REGULATING CEA SHORT TERM INSERTION.
- b. K-11 CEA MOTION INHIBIT.
- c. K-19 GROUP OUT OF SEQUENCE (DDPS).
- d. K-29 CEA POWER DEPENDENT INSERTION (ADS).

76. Given the following Unit 1 conditions:

- Steam Generator #1A has .35 gpm tube leak.
- RCS Identified leakage is 9.2 gpm.

Which ONE of the following is the maximum allowable leakage from #1B Steam Generator?

- a. .35 gpm
- b. .65 gpm
- c. .80 gpm
- d. 1.0 gpm

77. Given the following power supplies for Unit 1 control room annunciators:

- 1AB DC CKT 6
- 1AB DC CKT 3

Which ONE of the following lists when Emergency Plan implementation will be required if these breakers open for more than 15 minutes.

- a. Opening only one of the listed breakers will NOT require E-Plan Implementation.
- b. Opening "1AB DC CKT 6" will require E-Plan Implementation
- c. Opening "1AB DC CKT 3" will require E-Plan Implementation.
- d. Opening either breaker will require E-Plan Implementation.

78. A loss of 1B 125 VDC bus has occurred. Without operator action, which ONE of the following will cause the SIAS initiation?

- a. Low pressurizer pressure due to loss of control power to pressurizer heaters.
- b. Low pressurizer pressure due to open PORVs.
- c. Low pressurizer level causing a loss of pressure control.
- d. Deenergizing ESFAS cabinets.

79. A fire has occurred in the cable spreading room of Unit 1 requiring evacuation of Unit 1 control room.

Which ONE of the following describes procedural requirements for control of reactor and other plant components?

- a. Train A components must be used. Train B components can be used but are not reliable.
- b. Train A components must be used. Train B components cannot be used because they are not reliable.
- c. Train B components must be used. Train A components can be used but are not reliable.
- d. Train B components must be used. Train A components cannot be used because they are not reliable.

80. Given the following:

- Reactor power is 98%
- A fire has been detected in a panel in the control room
- The NPS has determined that the control room is to be evacuated
- All immediate actions of CONTROL ROOM INACCESSIBILITY procedures are performed
- Time did NOT permit performance of any EOP-1, "Standard Post Trip Actions." for Unit 1

Which ONE of the following describes the response of RCS temperature upon abandoning the control room?

- a. Temperature will be controlled at 525 °F by SBCS.
- b. Temperature will be controlled at 525 °F by ADVs.
- c. Temperature will be controlled by the MSSVs.
- d. Temperature will be controlled by AFW flow and ADVs operating in automatic control.

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81. Given the following parameters following a loss of offsite power:

	0830	0845
Thot	482	482
Pzr Temp.	495	498
Tcold	467	466
RCS Pressure	675	690

QSPDS is NOT available.

Which ONE of the following describes the conclusion that can be made about single phase natural circulation?

Single phase natural circulation has:

- a. NOT been established because Thot is remaining constant.
- b. been established because the delta between Thot and Tcold is increasing.
- c. been established because Tcold adequate subcooled margin exists.
- d. NOT been established because the delta between Thot and Pzr temperature is too small.

82. A loss of condenser backpressure occurred Unit 1 with reactor power at 60% power. The operators are reducing power and maintaining condenser backpressure between 4 and 5 inches Hga.

In accordance with ONOP 1-0610031, "Loss of Condenser Vacuum", which ONE of the following is the power level at which the turbine will have to be tripped if vacuum is maintained between 4 and 5 inches while reducing power?

- a. 0 megawatts
- b. 20%.
- c. 30%.
- d. 50%



83. An air supply to one RCP component cooling water return line containment isolation valve has been broken while scaffolding was being erected.

Which ONE of the following describes the effect, if any, this will have on Reactor Coolant Pump operation?

- a. RCPs will have to be tripped immediately.
 - b. RCP temperatures on only two of the four pumps will increase.
 - c. RCPs will be able to operate for 10 minutes.
 - d. RCP temperatures will be unaffected.
84. Which ONE of the following would be the primary radiation hazard if new fuel were damaged?
- a. neutron
 - b. alpha
 - c. gamma
 - d. beta
85. Which ONE of the following is the basis for the Technical Specification limit for steam generator tube leakage?
- a. assures that the leakage rate used in the analysis for a steam line break accident is NOT exceeded.
 - b. assures that the leakage rate used in the analysis for a steam generator tube rupture accident is NOT exceeded.
 - c. is set at the minimum rate that can be reliably detected by the Main Steam Line Radiation Monitors.
 - d. is set to limit the exposure to plant personnel that could occur if a atmospheric dump were to open.
86. Which ONE of the following lists ALL RCP temperatures that can exceed 200 °F and allow the RCP to continue to operate?
- a. Upper and lower guide bearing temperatures.
 - b. Upper and downward thrust bearing temperatures.
 - c. Upper and lower guide bearing and upper and downward thrust bearing temperatures.
 - d. Controlled bleed off cavity temperatures.

87. Given the following conditions for RCP seals:

- Controlled bleedoff cavity temperature is 243 °F.
- RCS pressure is 2250 psig
- The lower seal pressure is 2200 psig
- The middle seal pressure is 1050 psig
- The upper seal pressure is 975 psig.

Which ONE of the following describes the status of the RCP seals?

- a. Seal damage is NOT occurring.
- b. Seal damage is occurring as indicated only by controlled bleedoff cavity temperature.
- c. Seal damage is occurring as indicated by controlled bleedoff cavity temperature and delta P between the upper seal and bleedoff cavity.
- d. Seal damage is occurring as indicated by controlled bleedoff cavity temperature and delta P between the middle and upper seal.

88. A loss of instrument air has occurred at 98% power. The need for a reactor shutdown is evaluated if instrument air pressure decreases below 75 psig because of the effect on controlling steam generator levels.

Which ONE of the following describes the how steam generator levels will respond as instrument air pressure decreases and the cause of that response?

Steam generator levels will:

- a. lower due to Feed Regulating valves closing.
- b. lower due to Feed Pump Discharge Recirc valves opening.
- c. raise due to Feed Regulating valves opening.
- d. lower due to Main Feed Isolation valves closing.

89. A natural circulation cooldown is in progress. While cooling down with SBCS, which ONE of the following will cause the most restrictive limitation on cooldown rate?

- a. Isolating one steam generator.
- b. Complying with Technical Specifications RCS cooldown restrictions.
- c. Maintaining Steam Generator Tube differential temperature within limits.
- d. Complying with Technical Specifications Pressurizer cooldown restrictions.

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90. A Unit 1 gaseous release is in progress. The operator observes that the blue FAIL light on the Channel 42 ratemeter is de-energized.

Which ONE of the following describes status of the Gaseous Waste Monitor and V6565, Plant Vent from GST and GDT FCV?

- a. The monitor is working correctly and V6565 remains open.
- b. A failure in the Gaseous Waste Monitor has occurred, however V6565 remains open and will only close if the monitor has failed upscale.
- c. A failure in the Gaseous Waste Monitor has occurred and V6565 is open and must be manually closed.
- d. A failure in the Gaseous Waste Monitor has occurred and V6565 is closed.

91. Which ONE of the following will be controlling Unit 1 RCS temperature following a complete loss of instrument air?

- a. ADVs in automatic mode.
- b. ADVs in manual mode from the RTGB.
- c. Main Steam Safety valves.
- d. Steam bypass valves.

92. 120 VAC power to ESFAS panel MC has been lost.

Which ONE of the following signals will be operating in a 2/3 logic?

- a. SIAS
- b. CIS
- c. MSIS
- d. CSAS

93. A total loss of all AC has occurred on Unit 1. Unit 2 has one diesel generator running supplying bus 2A3.

Which ONE of the following describes how power would be supplied to Unit 1 from Unit 2?

- a. The Station Blackout Breaker on 1AB would be closed first then the Station Blackout Breaker on 2AB would be closed.
- b. The Station Blackout Breaker on 2AB would be closed first then the Station Blackout Breaker on 1AB would be closed.
- c. The Station Blackout Breaker on 1A3 would be closed first then the Station Blackout Breaker on 2A3 would be closed.
- d. The Station Blackout Breaker on 2A3 would be closed first then the Station Blackout Breaker on 1A3 would be closed.

94. Given the following conditions:

- A Unit 1 reactor trip occurred from 100% power.
- Ten minutes after the reactor trip the 1C Auxiliary Feedwater Pump tripped due to mechanical overspeed.

When resetting the 1C AFW pump, which ONE of the following describes when the 1C AFW pump will restart?

- a. As soon as the trip and throttle valve trip lever is reset.
- b. As soon as the trip and throttle valve trip lever is reset AND the AFAS AB Bypass switch is returned to the NORMAL position.
- c. As soon as the AFAS AB Bypass switch is placed in BYPASS AND the trip and throttle valve trip lever is reset.
- d. As soon as the trip and throttle valve trip lever is reset, the AFAS AB Bypass switch is returned to the NORMAL position AND the 1C Auxiliary Feedwater pump START/STOP switch is placed to START.

95. The 2A Main Feedwater Regulating valve (FRV) is being operated manually at the FRV when a reactor trip occurs.

Which ONE of the following describes the required action?

- a. Direct the operator to locally close the 2A FRV.
- b. Close the 2A Main Feedwater Block Valve.
- c. Direct the operator to position the 2A FRV to 5% open.
- d. Direct the operator to vent air from the 2A FRV.

96. Given the following conditions:

- Reactor power is 45% with both main feedwater pumps in service.
- 2A and 2B condensate pumps are in operation.
- The 2A Main Feedwater pump control switch is placed in to STOP.

Which ONE of the following describes the response of the feedwater system if the 2A Condensate pump is tripped?

2B Main Feedwater pump will:

- a. trip then the 2A pump will start on the trip signal from the 2B pump.
- b. remain in service.
- c. trip and 2A Main Feedwater Pump can be restarted.
- d. trip and 2A Main Feedwater Pump cannot be restarted.



97. Given the following conditions:

- Unit 1 was shutdown 2 weeks
- Refueling is in progress
- Cavity level is 60 feet
- RCS temperature is 125 ° F.
- Shutdown cooling has just been lost

Which ONE of the following is the time it will take the RCS to boil?

- a. 3.2 hours
- b. 3.9 hours
- c. 4.5 hours
- d. 5.5 hours

98. Given the following conditions:

- Emergency boration is required for Unit 2.
- "Emergency Borate Valve", V2514 failed to open.
- VCT level is at its normal level.
- The operator places "Gravity Feed Valve" V2508 control switch to OPEN.
- "VCT Outlet" V2501 control switch was placed to CLOSE until the valve was fully closed.
- "VCT Outlet" V2501 control switch was allowed to return to AUTO after CLOSE indication was received.

Which ONE of the following describes whether or not adequate boration flow exists? Identify the reason boration flow is adequate or not adequate?

Boration flow will:

- a. be adequate because only one "Gravity Feed Valve" V2508 and V2509 is required to be open and the "VCT Outlet" V2501 will be closed.
- b. be adequate because only one "Gravity Feed Valve" V2508 or V2509 is required to be open and the "VCT Outlet" V2501 will be open.
- c. NOT be adequate because only one "Gravity Feed Valve" V2508 or V2509 is open.
- d. NOT be adequate because the "VCT Outlet" V2501 will be open.

99. Given the following conditions:

- A reactor heatup is in progress.
- Reactor pressure is 2000 psig.
- The acoustic monitor for a PORV indicates valve leakage.
- Quench tank pressure is 5 psig.

Which ONE of the following describes the expected tail pipe temperature and how tail pipe temperature will respond if RCS pressure decreases to 500 psig?

(Assume pressure downstream of the PORV remains constant.)

- a. Tail pipe temperature will be higher than if the PORV leaks at normal operating pressure. As pressure decreases tail pipe temperature will increase.
- b. Tail pipe temperature will be higher than if the PORV leaks at normal operating pressure. As pressure decreases tail pipe temperature will decrease.
- c. Tail pipe temperature will be lower than if the PORV leaks at normal operating pressure. As pressure decreases tail pipe temperature will increase.
- d. Tail pipe temperature will be lower than if the PORV leaks at normal operating pressure. As pressure decreases tail pipe temperature will decrease.

100. The following plant conditions exist:

- Group 5 CEAs are at 130 inches.
- CEA 7 is at 117 inches.
- CEA 9 Rod bottom light is lit.
- Pressurizer level decreases to 55%.
- Reactor power decreases from 100% to 85%.
- Pressurizer pressure decreases to 1950 psia.
- ASI is + 0.2
- RCS Tcold is 548.5 °F.

Which ONE of the following is the minimum action required?

- a. Trip the reactor, trip the Turbine.
- b. Reduce Turbine load to match Reactor power.
- c. Commence a reactor shutdown to subcritical.
- d. Reduce power to less than 70% within 60 minutes.

S 1 OPS

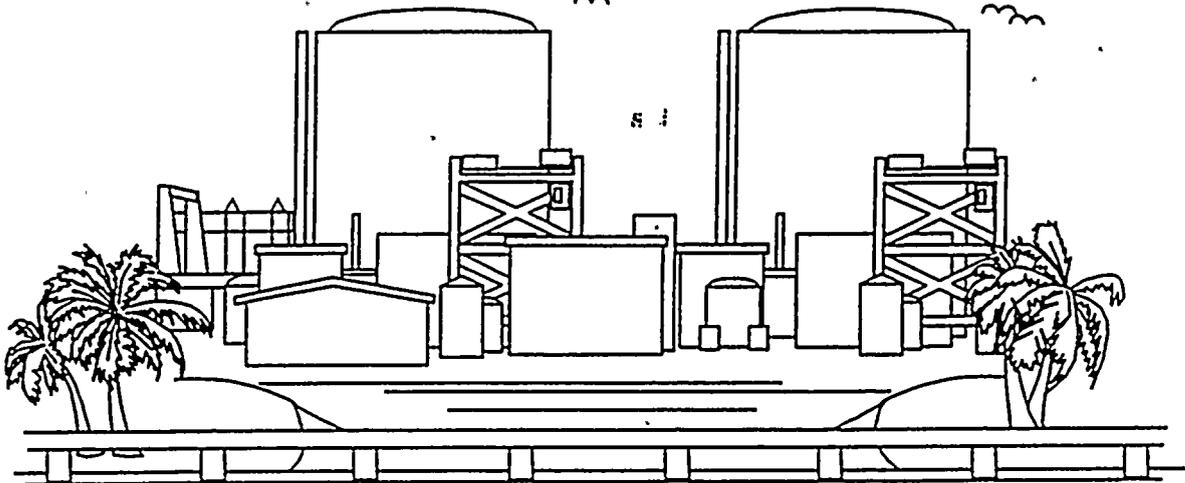
DATE _____
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DOCN 1-0030137
SYS _____
COMP COMPLETED
ITM 5

FLORIDA POWER & LIGHT

ST. LUCIE PLANT

UNIT NO. 1

1-0030137 REVISION 5



PARTIAL OR COMPLETE LOSS OF ANNUNCIATORS

OFF-NORMAL OPERATING PROCEDURE

REVISION	REVIEWED BY FRG ON	APPROVED BY	DATE
0	<u>September 6, 1988</u>	<u>G. J. Boissy</u> Plant General Manager	<u>September 21, 1988</u>
5	<u>October 21, 1996</u>	<u>J. Scarola</u> Plant General Manager	<u>September 21, 1996</u>

Responsible
Department: OPERATIONS

DA 10/23/96



REVISION NO.: 5	PROCEDURE TITLE: PARTIAL OR COMPLETE LOSS OF ANNUNCIATORS OFF-NORMAL OPERATING PROCEDURE ST. LUCIE UNIT 1	PAGE: 2 of 7
PROCEDURE NO.: 1-0030137		

1.0 TITLE:

PARTIAL OR COMPLETE LOSS OF ANNUNCIATORS

2.0 PURPOSE:

This procedure provides guidance for resolving conditions resulting from the loss of control room annunciators. The actions listed are intended to be a guide in responding to the loss of annunciators and are NOT intended to be a substitute for good judgement based on plant conditions.

3.0 REFERENCES:

3.1 UFSAR Section 7.5.1.6.3

§, 3.2 EPIP 3100022E, "Classification of Emergencies".

3.3 CWD 8770-B-327.

3.4 ONOP 1-0030131, "Annunciator Summary".

3.5 One or more of the following symbols may be used in this procedure.

1. § Indicates a Regulatory commitment made by technical specifications, condition of license, audit, LER, bulletin, etc., and should NOT be revised without Facility Review Group approval.
2. ¶ Indicates a management directive, vendor recommendation, plant practice or other non-regulatory commitment that should NOT be revised without consultation with the plant staff.
3. Ψ Indicates a step that requires a sign off on a data sheet.

4.0 RECORDS REQUIRED:

4.1 Normal log entries.

REVISION NO.: 5	PROCEDURE TITLE: PARTIAL OR COMPLETE LOSS OF ANNUNCIATORS OFF-NORMAL OPERATING PROCEDURE ST. LUCIE UNIT 1	PAGE: 3 of 7
PROCEDURE NO.: 1-0030137		

5.0 ENTRY CONDITIONS:

- 5.1 Plant parameters exceed alarm setpoints without annunciation.
- 5.2 Annunciator check indicates a complete or partial loss of annunciation.

6.0 EXIT CONDITIONS:

- 6.1 All annunciators have been returned to operation and are functioning properly.



REVISION NO.: 5	PROCEDURE TITLE: PARTIAL OR COMPLETE LOSS OF ANNUNCIATORS OFF-NORMAL OPERATING PROCEDURE ST. LUCIE UNIT 1	PAGE: 4 of 7
PROCEDURE NO.: 1-0030137		

7.0 OPERATOR ACTIONS:

7.1 Immediate Operator Actions:

1. None

7.2 Subsequent Operator Actions:

INSTRUCTIONS

**CONTINGENCY
ACTIONS**

1. RECORD the time that annunciators were lost. /R5
2. TEST all control room alarm panels to determine the extent of any malfunction. /R5
- §1 3. IMPLEMENT Appendix A. /R5
4. Use one of the following methods of monitoring affected plant equipment:
 - A. Increase the frequency of monitoring RTGB and local indications for plant equipment affected.
 - B. Periodically examine available reflash panels on the affected annunciator panels.
5. Check annunciator power supplies per Appendix "B".
6. Contact I&C for trouble-shooting and repair.



**APPENDIX A - ST. LUCIE UNIT 1
SAFETY SYSTEM ANNUNCIATORS**

NOTE

- For purposes of E-Plan Implementation, a loss of "most or all" safety system annunciators is defined as a loss of greater than 50% of the total.
- The total below assumes a complete loss of an annunciator panel(s) resulting in the loss of all the safety system annunciators associated with that panel.

i

1. Determine the affected annunciator panels (A, B, C, LR, etc.).
2. From the table below, add the numbers together in the "% of Total" column for all affected annunciator panels.
3. If this number (i.e., total of lost safety system annunciators) exceeds 50% for greater than 15 minutes, Then implement the E-Plan as required in EPIP 3100022E, Classification of Emergencies.

PERCENTAGE OF SAFETY SYSTEM ANNUNCIATORS PER PANEL

PANEL	% OF TOTAL
A	8.6%
B	8.6%
C	0.8%
D	0.0%
E	2.3%
F	2.7%
G	3.4%
H	5.5%
J	1.3%
K	4.8%
L	6.3%

PANEL	% OF TOTAL
M	6.3%
N	4.2%
P	6.7%
Q	10.3%
R	10.9%
S	10.3%
LR	0.8%
X	2.3%
Y	3.1%
Z	0.8%

REVISION NO.: 5	PROCEDURE TITLE: PARTIAL OR COMPLETE LOSS OF ANNUNCIATORS OFF-NORMAL OPERATING PROCEDURE ST. LUCIE UNIT 1	PAGE: 6 of 7
PROCEDURE NO.: 1-0030137		

APPENDIX B
POWER SUPPLIES
(Page 1 of 2)

NOTE

The neon light on the back of RTGB alarm panels indicates the DC converter is operating. After power is removed from the panel, it may be necessary to remove and replace the fuse to restart the converter.

1. Verify the following power supplies to the affected control room annunciators and reset as required. ;

RTGB	ANN. PAN.	POWER SUPPLY	GROUND DET.
101	A, B, C, D	RTGB 101 KKK F-4, F-12 1AB DC CKT 6	GD-1
102	E, F, G	RTGB 101 KKK F-3, F-11 1AB DC CKT 6	GD-2
103	H, J	RTGB 101 KKK F-5, F-13 1AB DC CKT 3	GD-3
104	K, L	RTGB 101 KKK F-6, F-14 1AB DC CKT 3	GD-4
105	M, N	RTGB 101 KKK F-8, F-16 1AB DC CKT 3	GD-5
106	P, Q, R, S	RTGB 101 KKK F-7, F-15 1AB DC CKT 3	GD-6

NOTE

Power supply "RTGB 101 KKK F-7, F-15 1AB DC Ckt. 3" also supplies seismic monitoring.

CRAC Panel Y	Fuses 11F5, 11F7	1B DC CKT 25
CRAC Panel Z	Fuses 11F10, 11F12	1B DC CKT 25
Rad. Monitor Alarms	F-10 in Rad. Mon. Cabinet	DC PP 119 CKT 1

2. Test all the control room annunciator panels from the control room test panels.
3. Test all the reflash modules feeding annunciators on the affected panels.

REVISION NO.: 5	PROCEDURE TITLE: PARTIAL OR COMPLETE LOSS OF ANNUNCIATORS OFF-NORMAL OPERATING PROCEDURE ST. LUCIE UNIT 1	PAGE: 7 of 7
PROCEDURE NO.: 1-0030137		

APPENDIX B
POWER SUPPLIES
(Page 2 of 2)

NOTE

I & C Department assistance may be required.

4. Select an annunciator on each affected panel and functionally check by generating the annunciator from the field.
5. Contact I&C Department to investigate and troubleshoot the problem.

/R5

END OF APPENDIX B

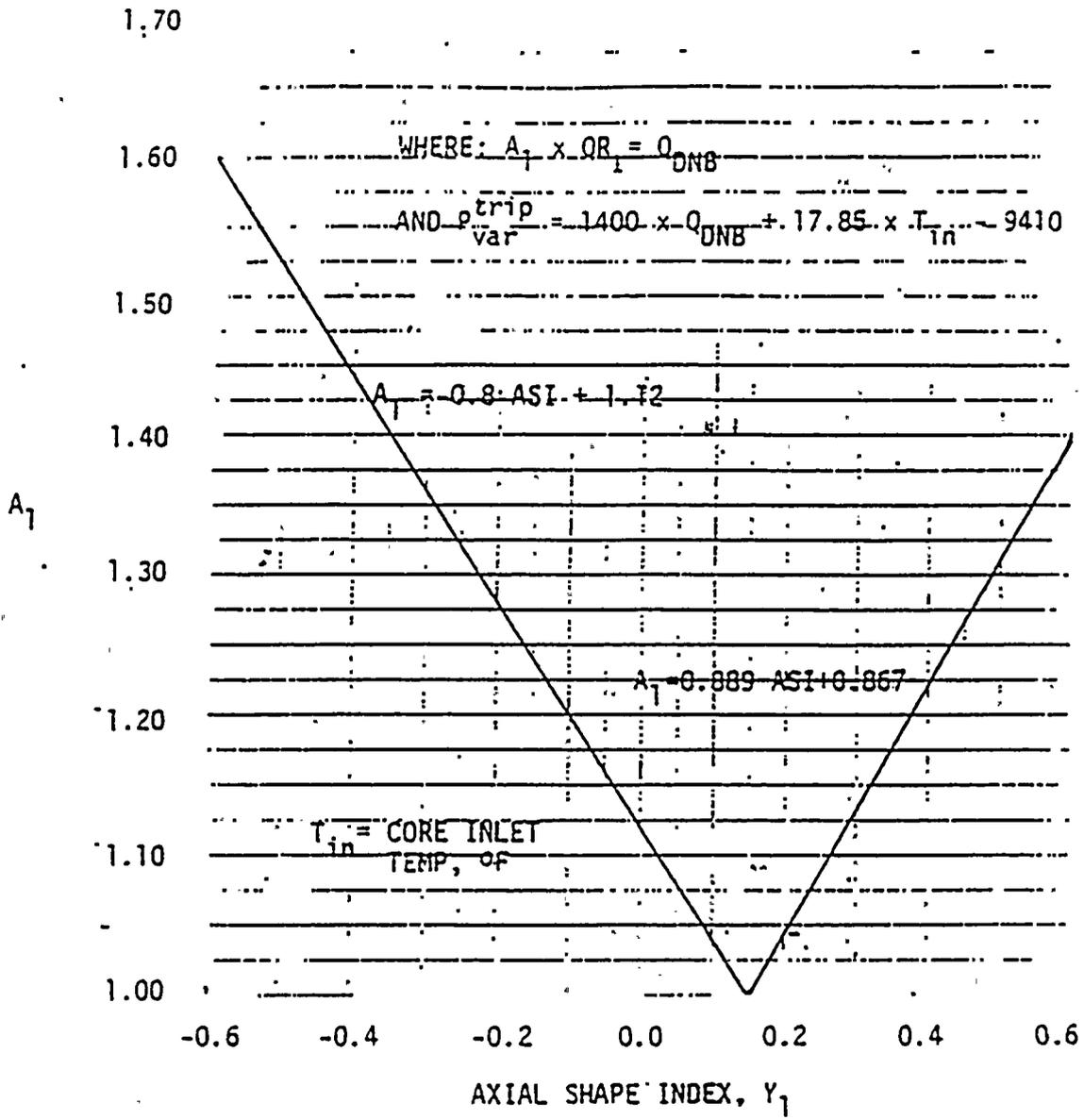


FIGURE 2.2-3
 THERMAL MARGIN/LOW PRESSURE TRIP SETPOINT
 PART 1 (Y_1 Versus A_1)

WHERE: $A_1 \times QR_1 = Q_{DNB}$

AND $p_{var}^{trip} = 1400 \times Q_{DNB} + 17.85 \times T_{in} - 9410$

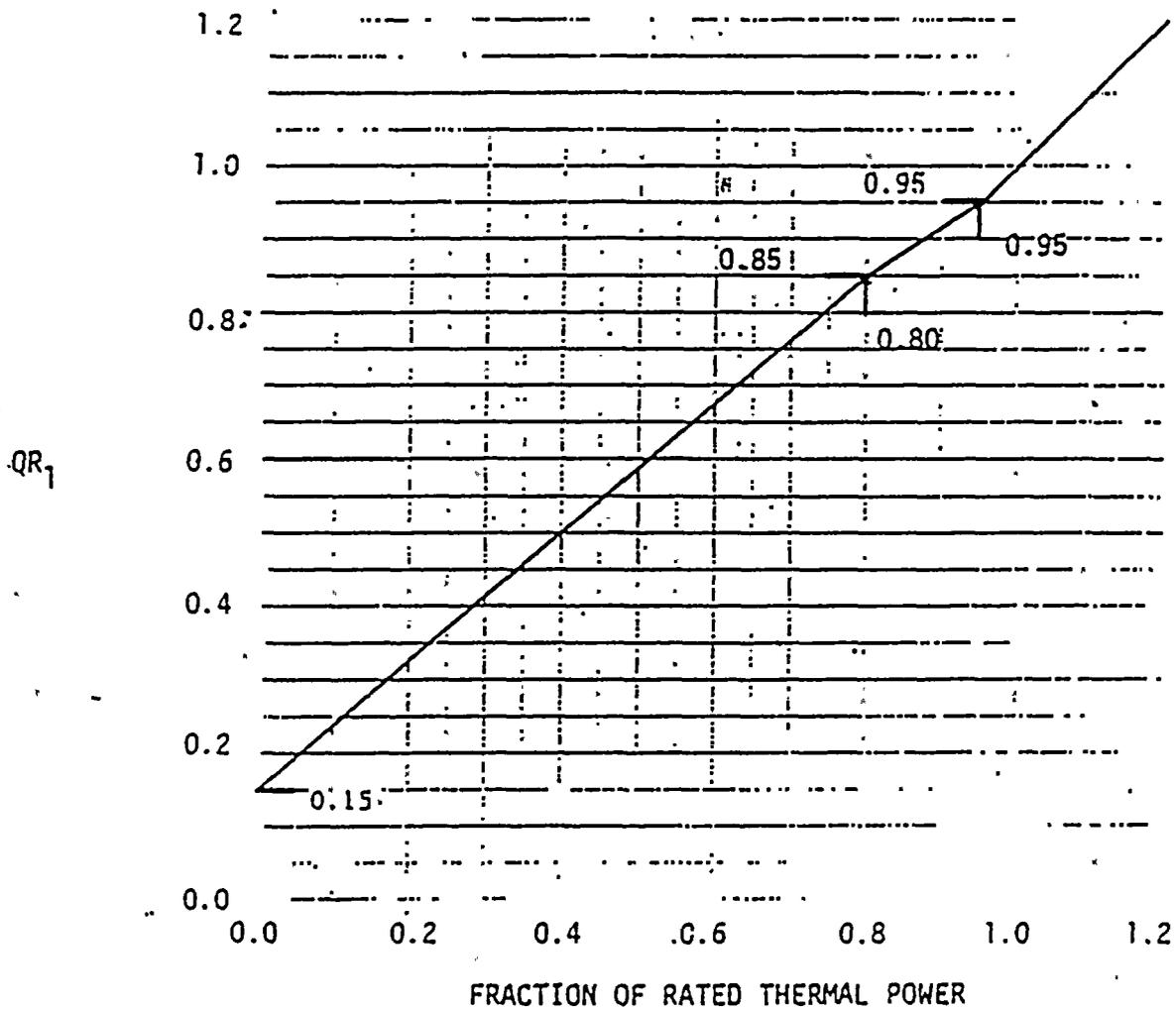


FIGURE 2.2-4

THERMAL MARGIN/LOW PRESSURE TRIP SETPOINT
PART 2 (FRACTION OF RATED THERMAL POWER VERSUS QR₁)

REVISION NO.:

.26

PROCEDURE TITLE:

NATURAL CIRCULATION COOLDOWN

PAGE:

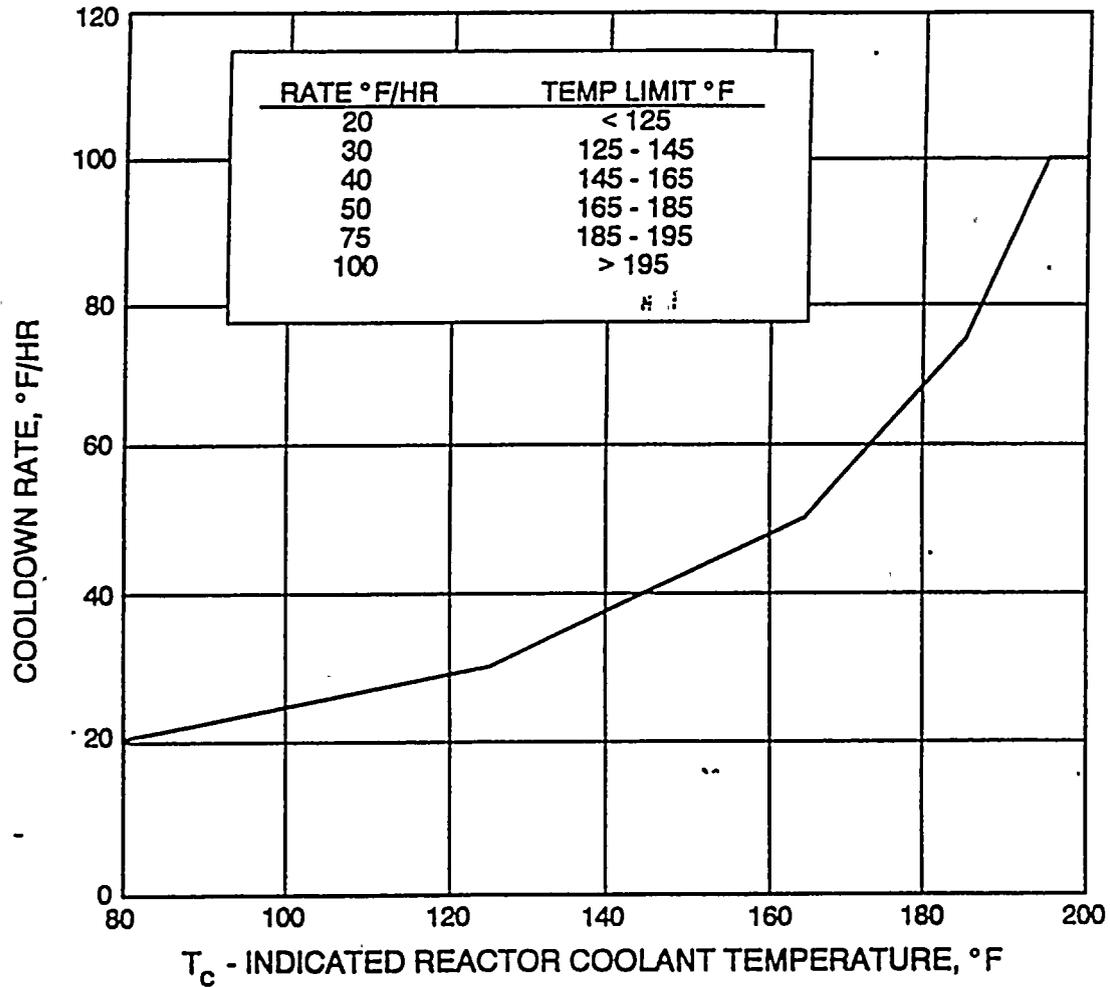
39 of 41

PROCEDURE NO.:

1-0120039

OFF-NORMAL OPERATING PROCEDURE
ST. LUCIE UNIT 1

T.S. FIGURE 3.4-3
ST. LUCIE UNIT 1, 23.6 EFPY
MAXIMUM ALLOWABLE COOLDOWN RATES



(0120039G.WPG)

REVISION NO.:
26

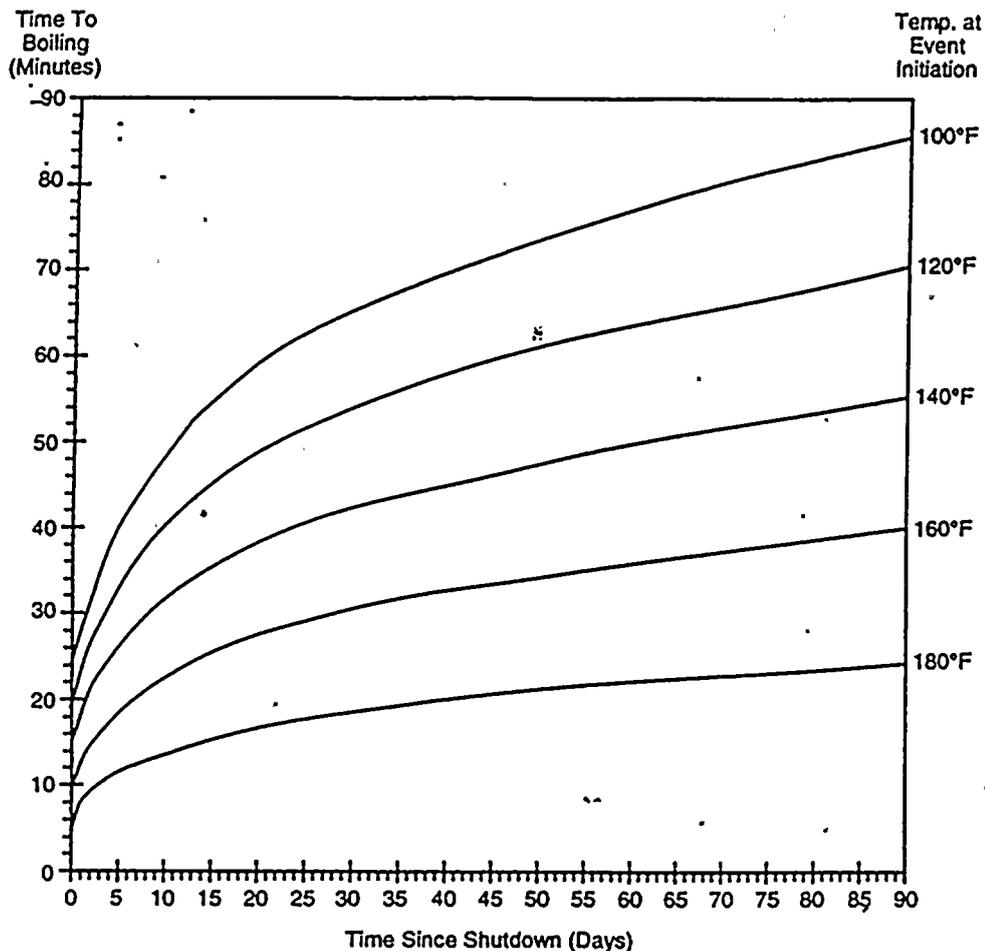
PROCEDURE NO.:
1-0440030

PROCEDURE TITLE:
SHUTDOWN COOLING OFF-NORMAL

OFF-NORMAL OPERATING PROCEDURE
ST. LUCIE UNIT 1

PAGE:
1

FIGURE 1
TIME TO CORE BOILING



(DOPSEOP-F1-A1)

Adjusting for Refueling Cavity Inventory (Level must be greater than 36 feet)

- A. Refueling Cavity level (elevation): _____ (Ft.)
- B. Subtract 36 from value in (A): _____ (Ft.)
- C. Determine time-to-boil multiplier:
 $\{1 + [0.23][\text{value in (B)}]\} =$ _____
- D. Obtain time-to-boil value in Figure 1: _____ (minutes)
- E. Time-to-boil, when RFP has inventory, is:
 $[\text{value in (C)}][\text{value in (D)}] =$ _____ (minutes)



Senior Reactor Operator Answer Key

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

Senior Reactor Operator Answer Key

- 51. b
- 52. a
- 53. c
- 54. b
- 55. d
- 56. d
- 57. c
- 58. a
- 59. d
- 60. b
- 61. d
- 62. b
- 63. b
- 64. d
- 65. a
- 66. d
- 67. b
- 68. c
- 69. a
- 70. d
- 71. c
- 72. b
- 73. c
- 74. b
- 75. b

- 76. b
- 77. c
- 78. d
- 79. c
- 80. c
- 81. d
- 82. c
- 83. c
- 84. b
- 85. a
- 86. d
- 87. d
- 88. b
- 89. a
- 90. d
- 91. c
- 92. d
- 93. a
- 94. b
- 95. b
- 96. b
- 97. b
- 98. d
- 99. a
- 100. a

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

Applicant Information

Name:	Region: II
Date: 10/10/97	Facility/Unit: St. Lucie 1 & 2
License Level: RO	Reactor Type: CE
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

Circle your choice. if you change your answer write it in the blank

- | | | | |
|-------------|-------|-------------|-------|
| 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 | _____ |

Circle your choice. if you change your answer write it in the blank

51. a b c d ____

52. a b c d ____

53. a b c d ____

54. a b c d ____

55. a b c d ____

56. a b c d ____

57. a b c d ____

58. a b c d ____

59. a b c d ____

60. a b c d ____

61. a b c d ____

62. a b c d ____

63. a b c d ____

64. a b c d ____

65. a b c d ____

66. a b c d ____

67. a b c d ____

68. a b c d ____

69. a b c d ____

70. a b c d ____

71. a b c d ____

72. a b c d ____

73. a b c d ____

74. a b c d ____

75. a b c d ____

76. a b c d ____

77. a b c d ____

78. a b c d ____

79. a b c d ____

80. a b c d ____

81. a b c d ____

82. a b c d ____

83. a b c d ____

84. a b c d ____

85. a b c d ____

86. a b c d ____

87. a b c d ____

88. a b c d ____

89. a b c d ____

90. a b c d ____

91. a b c d ____

92. a b c d ____

93. a b c d ____

94. a b c d ____

95. a b c d ____

96. a b c d ____

97. a b c d ____

98. a b c d ____

99. a b c d ____

100. a b c d ____

Reactor Operator Examination

1. A fire has been reported to the control room.

In accordance with EPIP 3100029E, "Duties of an Individual who Discovers and Emergency Condition." which ONE of the following lists part of the required information to be provided to the control room?

- a. Names of people presently combating the fire.
 - b. Radioactive materials that are in the vicinity of the fire.
 - c. The extent of plant component damage.
 - d. Fire class, i.e. A, B, C or D.
2. Of the listed area radiation levels, which ONE of the following is the maximum which would NOT be required to be protected by a locked door?
- a. 345 mrem/hr at 30 cm.
 - b. 750 mrem/hr at 30 cm.
 - c. 900 mrem/hr at 30 cm.
 - d. 1200 mrem/hr at 30 cm.

3. A dilution for startup is in progress when the Reactor Control Operator (RCO) must be relieved for a Short Term Relief.

Which ONE of the following lists the requirement that must be met to allow the Reactor Control Operator to be relieved?

- a. The NPS must give permission and supervise the turnover.
- b. Two active licenses must be cognizant of the reactivity manipulation.
- c. The ANPS must monitor the reactor parameters while the turnover is performed.
- d. The dilution must be stopped and ANPS permission received for the turnover.



Reactor Operator Examination

4. Due to not having a manual valve available for isolation as part of a clearance, an MOV is to be used as an isolation point.

In accordance with OP-0010122, "Inplant Equipment Clearance Orders", which ONE of the following is the acceptable method for verifying the MOV is closed?

- a. Verifying RTGB green position light is lit.
 - b. Manually going to close on the motor operator.
 - c. Using the position indicator on the motor operator.
 - d. Placing the RTGB control switch to CLOSE for five seconds.
5. A valve under administrative controls is to be repositioned to support a hydrostatic test. The hydrostatic test does not include a valve lineup to be completed following the hydrostatic test.

Which ONE of the following conditions will allow this valve to be repositioned without hanging a Deviation Tag?

- a. An operator will be standing by the valve when it is out of the normal position.
- b. A caution tag is attached indicating the valve is part of the lineup for a hydrostatic test.
- c. Upon completion of all hydrostatic tests on the system, a valve lineup will be performed, per the system operating procedure.
- d. The NPS authorizes the valve to be repositioned without hanging a Deviation Tag.

6. A normal operating procedure contains the following two steps in the order given:

1. Verify valve "A" is closed.
2. Ensure valve "B" is open.

The initial position of valve "A" is open and valve "B" is closed.

Which ONE of the following describes the correct method for performing these two steps?

- a. Close valve "A" then open valve "B". Inform the ANPS that both valves were mispositioned.
- b. Investigate why valve "A" is open. Do not position either valve until the investigation is complete.
- c. Close valve "A" then investigate why valve "B" is closed before repositioning valve "B".
- d. Obtain specific permission from the Desk RCO, then open valve "A". Then close valve "B".

7. Which ONE of the following states when a step, which will not be performed due to current plant conditions, can be marked N/A and skipped?

The step can be marked N/A and skipped:

- a. only if the procedure specifically allows the step to be marked N/A.
- b. at the discretion of the RCO performing the procedure.
- c. at the discretion of the ANPS.
- d. only when the step is N/A due to equipment availability.

8. Which ONE of the following designates how dual train procedures are to be marked when the procedure is performed on one train?

- a. As each step is performed components that are operated are marked with a highlighter.
- b. Prior to performing each step the components to be performed are highlighted by some method.
- c. Prior to performing each step any components that are NOT to be operated are crossed out.
- d. Prior to performing the procedure all components to be operated are highlighted by some method.

Reactor Operator Examination

9. Which ONE of the following lists the minimum times an annunciator would have to alarm, for unexpected reasons, during an eight hour shift to be a NUISANCE alarm?

- a. 4
- b. 6
- c. 8
- d. 10

10. Given the following:

- A manual butterfly valve has been fully opened following Equipment Clearance Order removal.
- The valve has remote indication, in the Control Room, when it is in the fully open position.

Which ONE of the following describes when the RCO can perform the Independent Verification (IV) for the valve using Control Room indication?

- a. Anytime an Independent Verification is required.
- b. When the verification is part of an Equipment Clearance Order.
- c. Only when the valve is located in a radiation area greater than 100 mrem/hr.
- d. Only in special circumstances with previous approval from the NPS/ANPS.

11. Which ONE of the following identifies when Operational Mode will change from Mode 3 to Mode 2 during a reactor heatup and startup?

- a. When temperature increases to greater than or equal to 325 ° F.
- b. When power increases to greater than or equal to 1%.
- c. When control rods are withdrawn to increase keff to greater than or equal to .99.
- d. When the reactor is declared critical.

Reactor Operator Examination

12. According to AP 0010120, "Conduct of Operations", in which ONE of the following list(s) the conditions when the operators CAN take reasonable actions that deviate from plant procedures when procedural guidance is not adequate or does not exist?
- a. Minimizing or preventing equipment damage.
 - b. Preventing environmental damage to the Sea Turtle Refuge.
 - c. Avoiding exceeding time limits specified in Technical Specifications.
 - d. Minimizing economic losses provided reactor safety is NOT affected.
13. In accordance with OP-0010120, "Conduct of Operations," which ONE of the following identifies a reactivity manipulation and who is allowed to perform the identified manipulation?
- a. An RO, who is reactivating her license, places a Purification Ion Exchanger in service.
 - b. A trainee in the license operator training program performs 2C Charging Pump surveillance.
 - c. A trainee in the license operator training program starts an AFW pump and feeds the SG at 10% power.
 - d. An RO, who is reactivating his license, starts an AFW pump and feeds the SG at 10% power.
14. Which ONE of the following describes the proper positioning of valves in the CVCS system on SIAS?

The boration flow path from the Boric Acid Makeup Tanks (BAM Tanks), is:

- a. through the gravity feed valves, through the Boric Acid Makeup pumps, through the Boric Acid Strainer, through manual boration valve V-2174, directly to the Charging Pump suction.
- b. bypassing the gravity feed valves, through the Boric Acid Makeup Pumps, through the Boric Acid Strainer, through FCV-2210Y, directly to the Charging Pump suction.
- c. bypassing the gravity feed valves, through the Boric Acid Makeup pumps, through Emergency Borate Valve (MV-2514), directly to the Charging Pump suction.
- d. through the gravity feed valves, through the Boric Acid Makeup Pumps, Emergency Borate Valve (MV-2514), directly to the Charging Pump suction.

15. During normal operation the Unit 2 Component Cooling Water radiation monitor alarms. Which ONE of the following describes the automatic actions(s) that occur?
- The CCW surge tank vent valve, 2-RCV-14-1, and the demineralized water makeup valve, 2-LCV-14-2, close.
 - The CCW surge tank vent valve, 2-RCV-14-1, diverts to the chemical drain tank.
 - The non-essential (N) CCW header supply and return valves close.
 - The individual discharge valves on the RCP seal coolers close.

16. Given the following conditions:

- Unit 2 is cooling down using ADVs in preparation for a refueling outage in accordance with 2-0030127, "Reactor Plant Cooldown."
- The Reactor Operator places LTOP in service by selecting "LTOP" on V-1475 Mode Select Switch.
- Annunciator H-47, "LTOP Channel B Transient" comes in

Which ONE of the following is the cause of this annunciator?

- RCS temperature is below LTOP setpoint.
 - RCS temperature is above LTOP setpoint.
 - RCS pressure is below LTOP setpoint.
 - RCS pressure is above LTOP setpoint.
17. If the Reactor Vessel Level Monitoring System (RVLMS) shows a void indication for reactor vessel sensors 1 through 5, which ONE of the following conclusions can be made?
- RCS liquid level is below the fuel assemblies.
 - RCS liquid level is at or below the Fuel Alignment Plate.
 - RCS liquid level is at the Hot Leg Nozzle centerline.
 - The reactor vessel space above the core is 75% full.

18. Which ONE of the following is indication of a leak in the 1A1 Reactor Coolant Pump (RCP) shaft seal heat exchanger?
- High RCP Component Cooling Water (CCW) outlet temperature on RCP 1A1.
 - Low level in the CCW surge tank.
 - LO CCW outlet flow.
 - High RCP CCW outlet flow on RCP 1A1.
19. Which ONE of the following describes the response of the Unit-1 charging pumps following receipt of an automatic SIAS signal, coincident with a Loss of Offsite Power? Assume normal electrical lineup and all equipment is operable.
- Only one charging pump is automatically started on each emergency bus 5 minutes after it is energized by the diesel.
 - All charging pumps are automatically started immediately after their respective bus is energized by the diesel.
 - All charging pumps are automatically started 5 minutes after their respective buses are energized by the diesel.
 - Only one charging pump is automatically started onto each emergency bus immediately after it is energized by the diesel.
20. Given the following conditions:
- Unit 1 has just tripped from 100% power
 - 1B 125 VDC has been lost
 - Operators are performing 1-EOP-01, "Standard Post Trip Actions"
 - No Contingency Actions have been performed.

Which ONE of the following describes the configuration of the Auxiliary Feedwater (AFW) system immediately following the AFAS actuation?

- All AFW pumps running and feeding both Steam Generators.
- Only the 1C AFW pump running and feeding both Steam Generators.
- Only the 1A AFW pump running and feeding the 1A Steam Generator.
- Only the 1A and 1C AFW pumps will be running and feeding both Steam Generators.

21. The 1A Motor Driven Auxiliary Feedwater Pump Motor operated valves receives normal 480 VAC electrical power from which ONE of the following sources?

- a. 1AB 4.16 kV Bus
- b. 2A3 4.16 kV Bus
- c. 1A3 4.16 kV Bus
- d. 2B3 4.16 KV Bus

22. Given the following:

- A Unit 1 reactor startup is in progress.
- The Reactor Operator is withdrawing Regulating Group 1 CEAs in the MANUAL GROUP mode.
- Regulating group 1 is at 120 inches.
- No CEA deviations exist.

Which ONE of the following will be the FIRST to automatically stop CEA movement?

- a. Highest CEA reaches the Upper Group Stop (UGS).
- b. Lowest CEA reaches the Upper Group Stop (UGS).
- c. Highest CEA reaches the Upper Electrical Limit (UEL).
- d. Lowest CEA reaches the Upper Electrical Limit (UEL).

23. On Unit 1, a failure of which ONE of the following Nuclear Instrumentation Systems will generate a Boron Dilution Monitor alarm?

- a. Startup Channel.
- b. Linear Power Range Safety Channel.
- c. Wide-Range Logarithmic Safety Channel.
- d. Excore Neutron Monitoring System Channel.

24. Which ONE of the following would indicate to the operator that the Extended Range Bistable in the Nuclear Instrumentation System is operating correctly?

During reactor startup,:

- a. reactor power indication in % log power begins at 1000 cps increasing.
 - b. the audio count rate circuit is enabled at 1000 cps.
 - c. the % Log power lamp is extinguished and the CPS lamp illuminated at 1000 cps increasing.
 - d. the LOG LED is illuminated indicating the HIGH SUR Trip is enabled.
25. Which ONE of the following will result in the initiation of an AUTOMATIC trip of the "A" Main Feedwater pump when Unit 1 is at 45% power?
- a. Loss of normal 4160 VAC power supply.
 - b. Suction pressure decreases to 270 psig.
 - c. Feedpump oil pressure decreases to 10 psig.
 - d. Trip of the "B" condensate pump.
26. Which ONE of the following describes why the Containment Spray Pumps are rated at a minimum AND maximum flow rate.
- a. The flow control valves in the Spray header slowly throttle open during post accident as a result of changing containment pressure.
 - b. Containment atmosphere exerts a backpressure to flow during the injection phase of containment spray actuation but does NOT in the recirculation phase.
 - c. The minimum flow guaranties that the required amount of iodine removal media is injected and the maximum flow guarantees that the pumps will not loose suction pressure during operation.
 - d. Ensure the vendor's recommended pump flow for reliable operation is not exceeded.

27. Charging pumps are running on Unit 1 and an SIAS is present. (Assume no operator action)

Which ONE of the following lists the charging pump response when the BAM tanks are emptied?

The charging pumps will:

- a. trip on thermal overload.
 - b. trip on low suction pressure.
 - c. automatically align to the RWT.
 - d. continue to run and become gas bound.
28. During reactor plant heat-up (cold to hot standby), the RCP bleedoff to the VCT should not be opened if the pressurizer pressure is less than the VCT pressure.

Which one of the following is the reason for this precaution?

- a. The VCT may drain back into the RCS causing possible dilution of the RCS.
 - b. The higher VCT pressure could damage the RCP seals if backflow were to occur.
 - c. Seal injection flow would be diverted away from the RCP seals.
 - d. The RCP bleedoff excess flow check valves may be damaged because they are not designed to prevent reverse flow.
29. Which ONE of the following correctly describes the interlock which will prevent the 125 VDC bus 2AB from being connected to the 2A-2AA bus and the 2B-2BB bus simultaneously?
- a. 2 breakers and 2 keys under strict administrative control.
 - b. 4 breakers and 4 keys under strict administrative control.
 - c. 2 breakers and 1 key captured in the closed position.
 - d. 4 breakers and 2 keys captured in the closed position.

30. Which ONE of the following describes the operation of the DSS?
- a. DSS uses RPS input parameters and trips the reactor by opening line contactors upstream of the Reactor Trip breakers.
 - b. DSS uses non-safety related parameters and trips the reactor by opening the CEA MG set input breakers.
 - c. DSS uses ESFAS parameters and trips the reactor by opening the CEA MG set input breakers.
 - d. DSS uses ESFAS parameters and trips the reactor by opening line contactors upstream of the Reactor Trip breakers.

31. Which ONE of the following responses completes the statement correctly?

Removing both ISOLATION modules from one of the Engineered Safety Features channels places the ACTUATION logic in:

- a. 2 out of 4 for unit 1.
- b. 1 out of 3 for unit 1.
- c. 2 out of 3 for unit 2.
- d. 2 out of 4 for unit 2.

32. Which ONE of the following lists the condition established to prevent flashing in the Chemical and Volume Control System (CVCS) Letdown line between the Letdown Heat Exchanger and the Letdown Flow Control Valves?

- a. Maximum Letdown flow.
- b. Maximum Letdown backpressure.
- c. Minimum Letdown flow.
- d. Minimum Letdown backpressure.

33. Unit 1 is operating at full power when Reactor Trip Breakers TCBs 1&5 and TCBs 2&6 open. The reactor does NOT trip and NO other TCBs open.

Which ONE of the following equipment failures is the cause of this event?

- a. Instrument inverter 1A
- b. Maintenance Bypass bus 1B
- c. 125 Volt DC bus 1A
- d. CEA MG set B

34. The 2A diesel generator is running and tied to the grid for periodic testing.

Which ONE of the following is a description of the response by the diesel generator output breaker if a Loss of Offsite Power (LOOP) is received?

- a. The diesel generator output breaker will remain closed, will pick up all required loads, and continue to supply power to the emergency loads.
- b. The diesel generator output breaker will remain closed, will try to pick up the required loads but will trip on overcurrent.
- c. The diesel generator output breaker will immediately trip open on undervoltage and remain open.
- d. The diesel generator output breaker will remain closed for 3 seconds after which it will open and then reclose starting the appropriate loading sequence.

35. Given the following Unit 2 conditions:

- A LOCA has occurred in containment.
- Containment pressure is 1 psig.
- RCS pressure is 300 psig.

Which ONE of the following will stop a diesel generator?

- a. Block and reset SIAS ONLY and place control switch to STOP.
- b. Block and reset CIAS and SIAS. Place control switch to STOP.
- c. Depress the Emergency Stop pushbutton on the RTGB.
- d. Place the RTGB diesel generator control switch to STOP.

36. When stopping an Emergency Diesel Generator following a periodic test, load is first reduced to approximately 100 kW before the output breaker is opened.

Which ONE of the following is the basis for selecting this power level?

- a. The generator may motor if power is LOWER.
- b. The engine may overcrank if power is HIGHER.
- c. The breaker has a manual interlock above 100 kW.
- d. The engine trip circuit is energized below 75 kW.

37. Given the following information:

- Delta T power indicates 43%
- Nuclear power indicates 41.8%
- Variable High Power Trip (VHPT) setpoint is 46.7%
- Variable High Power (VHP) pre-trip setpoint is 44.7%

Which ONE of the following is the new VHP Trip and Pre-trip setpoint after the VHPT RESET button is depressed?

- a. VHPT = 51.4%, VHP pre-trip = 49.4%
- b. VHPT = 52.6%, VHP pre-trip = 50.6%
- c. VHPT = 54.3%, VHP pre-trip = 52.3%
- d. VHPT = 56.3%, VHP pre-trip = 54.3%

38. When the High Pressurizer Pressure Trip BYPASS key is installed in a Reactor Protection System (RPS) panel, it closes contacts which inhibit the High Pressurizer Pressure trip.

Which ONE of the following is an additional function that is performed?

- a. Blocks the Diverse Scram System (DSS) input from that channel of RPS.
- b. Prevents an ESFAS signal from being generated from that channel.
- c. Prevents a reactor trip signal being generated from that channel when power is less than 0.1% power on Unit 1.
- d. Bypasses the PORV actuation from that channel of RPS.

39. Given the following:

- Reactor power is at 100%.
- I&C personnel are performing a test on the Trip Circuit Breakers (TCBs).
- Control Room "K" relay indicating lights for TCB-1 and 5 are NOT lit.

Which ONE of the following describes TCB operation for this plant condition?

- a. The RPS cannot automatically trip TCBs 1 and 5.
 - b. TCBs 1 and 5 should trip when their undervoltage relays are ENERGIZED.
 - c. The manual trip pushbuttons on panel RTGB will not trip TCBs 1 and 5.
 - d. TCBs 1 and 5 should trip when their undervoltage relays are DE-ENERGIZED.
40. On a loss of the "1A3" 4.16 kV bus, which ONE of the following occurs to the Unit 1 Shutdown Cooling (SDC) system?
- a. One SDC Hot Leg Suction Valve in each train is de-energized.
 - b. The SDC Temperature Control Valve (HCV-3657) is de-energized.
 - c. One Low Pressure Safety Injection Header Isolation Valve in each train is de-energized.
 - d. The SDC Heat Exchanger Bypass Valve (FCV-3306) fails closed due to a loss of Instrument Air.
41. Which ONE of the following lists the components in the Unit 2 Containment Iodine Removal System?
- a. a hydrazine storage tank, a constant metering pump and isolation valves.
 - b. a sodium hydroxide storage tank, a constant metering pump and isolation valves.
 - c. a nitrogen pressurized hydrazine storage tank, isolation valves, eductor and an orifice.
 - d. a nitrogen pressurized sodium hydroxide storage tank, isolation valves, eductor and an orifice.

Reactor Operator Examination

42. Following a LOCA on Unit 1, RCS pressure is at 300 psia and dropping.

Which ONE of the following lists the status of LPSI and SITs flow to the RCS?

- a. Neither LPSI and SITs are injecting
 - b. Only LPSI is injecting
 - c. Only SITs are injecting
 - d. Both LPSI and SITs are injecting
43. Which ONE of the following describes the pressurizer heaters that would be available following a Loss of Off-site Power(LOOP)? Assume the EDGs start and carry the emergency loads.
- a. Proportional Heater Bank-P1 and Backup Heater Bank-B4.
 - b. Proportional Heater Bank-P1 & P2.
 - c. Backup Heater Bank-B1 & B4.
 - d. Backup Heater Bank-B1 and Proportional Heater Bank-P1.
44. Which ONE of the following describes the response of the SELECTED Pressurizer Level channel failing LOW? (Assume no operator actions are taken)
- a. All heaters will deenergize, letdown goes to minimum, standby charging pump starts, actual pressurizer level and pressure increase, the reactor trips on High Pressurizer pressure.
 - b. All heaters will deenergize, pressurizer pressure decreases, the reactor trips on TM/LP.
 - c. All heaters remain energized, letdown goes to maximum, only one charging pump remains ON, Actual pressurizer pressure and level decrease, the reactor trips on TM/LP.
 - d. All heaters remain energized, letdown goes to minimum, actual pressurizer level and pressure increase, the reactor trips on High Pressurizer Pressure.

45. Which ONE of the following is the expected response of the Instrument Air System to a major Turbine Building Instrument Air header rupture on Unit 1?

- a. Station air compressor will automatically start at 85 psig.
- b. Instrument air cross-tie valve to Unit 2 will OPEN, then RECLOSE if the Unit 2 Instrument Air System pressure drops below 85 psig.
- c. Instrument air cross-tie valve to Unit 2 will CLOSE when Unit 1 Instrument Air System pressure drops below 75 psig.
- d. The Station Air System cross-tie valve will OPEN to supply the Unit 1 Instrument Air System when pressure drops below 85 psig.

46. The following Unit 2 plant conditions exist:

- Unit 2 is in MODE 4.
- Shutdown cooling is in service.

Which ONE of the following conditions will INITIATE automatic CLOSURE of shutdown cooling hot leg isolation valves V-3480, V-3481, V-3651, and V-3652?

- a. INDICATED RCS pressure exceeds 500 psia as read on pressurizer low range instruments (PI-1103 through PI-1106).
- b. INDICATED RCS pressure exceeds 300 psia as read on pressurizer low range instruments (PI-1103 and PI-1104).
- c. INDICATED shutdown cooling header pressure exceeds 300 psia as read on shutdown cooling header pressure instrument PI-3307.
- d. INDICATED shutdown cooling header pressure exceeds 200 psia as read on shutdown cooling header pressure instrument PI-3307.

47. The recirculation minimum flow isolation valves for Unit 1 LPSI pumps have key operated lockout power switches.

Which ONE of the following describes why these switches are NOT included on Unit 2?

- a. The recirculation line returns to the pump suction.
- b. The recirculation path does not return to the RWT.
- c. Each train of LPSI has a separate recirculation line.
- d. A relief valve on each LPSI discharge line provides recirculation.

Reactor Operator Examination

48. In accordance with NOP 1-0410022, "Shutdown Cooling," which ONE of the following describes the preferred method of controlling RCS cooldown while on shutdown cooling on Unit 1?
- Manually adjust the SDC heat exchanger bypass valve (FCV-3306) and manually adjust the SDC heat exchanger temperature control valve (HCV 3657) to attain the desired cooldown rate.
 - Manually adjust the SDC heat exchanger bypass valve (FCV-3306) and allow automatic control of the SDC heat exchanger temperature control valve (HCV-3657) to attain the desired cooldown rate.
 - Allow automatic control of the SDC heat exchanger bypass valve (FCV-3306) and manually adjust the SDC heat exchanger temperature control valve (HCV-3657) to attain the desired cooldown rate.
 - Allow automatic control of the SDC heat exchanger bypass valve (FCV-3306) and automatic control of the SDC heat exchanger temperature control valve (HCV 3657) to attain the desired cooldown rate.
49. During full power operations, a pump and breaker fault has occurred on the 1A Component Cooling Water (CCW) pump. The 1C CCW pump will be used as its replacement. Aside from valve realignment, which ONE of the following is the minimum actions that must be performed to ENSURE that 1C CCW pump will automatically start on receipt of a SIAS signal?
- The 1A CCW pump control switch must be in the "Pull-to-Lock" position, and the 1C CCW pump must be electrically aligned to the 1A3 4.16 kV bus.
 - The 1A CCW pump control switch must be in the "Pull-to-Lock" position.
 - The 1C CCW pump must be electrically aligned to the 1B3 4.16 kV bus.
 - The 1A CCW pump control switch must be in the "Pull-to-Lock" position, and the 1C CCW pump must be electrically aligned to the 1B3 4.16 kV bus.

50. Given the following conditions:

- An Unit 2 reactor startup is in progress.
- The CEA lead bank is being withdrawn in MANUAL SEQUENTIAL.
- CEA motion suddenly stops while the operator has the manual control switch in the WITHDRAW position.
- The core mimic and the CEAPDS indicates a dropped CEA from group 3.

Which ONE of the following interlocks has blocked the outward motion of the CEAs?

- a. IRG
- b. ISH
- c. Group Deviation
- d. LPD pre-trip

51. With one MG set running and the CEDM bus x-tie (TCB-9) closed, which ONE of the following lists the minimum number of TCBs which must open for a FULL reactor trip to occur?

- a. 1
- b. 2
- c. 4
- d. 8

52. If one RCP experiences increased bearing friction during normal full power operations, and RCS flow decreases by 0.5% as a result, which ONE of the following describes the result on RCS parameters?

- a. T-hot increases, Delta T increases, and Reactor power remains the same.
- b. T-hot increases, Delta T decreases, and Reactor power increases.
- c. T-hot decreases, Delta T increases, and Reactor power remains the same.
- d. T-hot decreases, Delta T decreases, and Reactor power decreases.

53. Which ONE of the following describes how NPSH for safeguards pumps is maintained during transfer of suctions upon receipt of a Recirculation Actuation Signal?

Containment sump outlet valves:

- a. will be fully OPEN before the RWT outlet valves begin to CLOSE.
- b. will be fully OPEN within 90 seconds and the RWT outlet valves will be fully CLOSED within 30 seconds.
- c. will not be fully OPEN until the RWT outlet valves are fully CLOSED.
- d. will be fully OPEN within 30 seconds and the RWT outlet valves will be fully CLOSED within 90 seconds.

54. The following plant conditions exist:

- Unit 2 is in MODE 1.
- VCT makeup is in AUTOMATIC.
- The HS-2500 (Automatic Divert) is in the "AUTO" position.
- VCT level transmitter LT-2226 channel fails LOW.
- No operator action is taken.
- VCT control room level indication supplied by LT-2227 is normal.

Which ONE of the following describes the system response?

- a. VCT Inlet/Divert valve AOV-2500 will open and divert flow to the radwaste system.
- b. VCT makeup bypass valve MV-2525 will close.
- c. Receipt of VCT Level LO LO annunciator.
- d. VCT relief valve will lift.

55. Unit 1 is at 7% power preparing to latch and roll the turbine. Feedwater control is in automatic using the 15% bypass valves.

Which ONE of the following describes the response of the 15% bypass valves to a reactor trip?

- a. Continue to feed the steam generator at its present position.
- b. Fully close to isolate flow to the steam generator.
- c. Reposition to provide flow equal to 5% of their capacity.
- d. Transfer to MANUAL control at its current position.



56. The Feedwater Control System is in manual with the plant holding at 80% power. The 15% feedwater regulating bypass valve for Steam Generator 2B drifts fully open.

Assuming no operator action, which ONE of the following will be the system response?

- a. Steam Generator level increases to the Hi Level Override, the feedwater regulating valve and bypass valve close, with SF>FF, a reactor trip from Low Steam Generator Level will occur.
- b. Steam Generator level will remain constant as the feedwater regulating valve closes to compensate for the increasing level.
- c. Steam Generator level increases to the Hi Level override and remains at that level as the feedwater regulating valve cycles open and closed.
- d. Steam Generator level increases to the Hi Hi-level trip setpoint closing the feedwater regulating valve and the bypass valve and causing a turbine trip on Hi Hi Steam Generator level.

57. The annunciator "START DC FAILURE/CS ISOLATED" has energized on the 1A Diesel Generator control panel.

Which ONE of the following describes the response of the diesel generator if a start signal is received?

The diesel generator will:

- a. start because only 2 of the 8 air start motors are affected by a loss of DC volts.
- b. start because backup power supplies will allow power to be supplied to all 8 of the air start motors.
- c. NOT start since DC power will only be supplied to 4 of the 8 air start motors.
- d. NOT start because DC power is unavailable to any of the air start motors.

58. Which ONE of the following is the source of control power for breakers on 4.16 kV bus 1A3?

- a. 125 V Non-Vital DC
- b. 125 V Vital DC
- c. 120 V Non-Vital AC
- d. 120 V Vital AC

59. Given the following conditions:

- Unit 1 CEDM fan HVE-21A is in AUTO after START.
- Unit 1 CEDM fan HVE-21B is in AUTO after STOP.
- Unit 1 CEDM fan HVE-21A trips on overcurrent.

Which ONE of the following lists the signals required by the logic needed to start HVE-21B?

- a. The trip signal from HVE-21A.
- b. The trip signal from HVE-21A concurrent with a low flow signal.
- c. A low flow signal.
- d. The trip signal from HVE-21A concurrent with a low flow signal and air inlet temperature signal to the cooling coils is greater than 100 ° F.

60. The static inverter section of #1 Static Uninterruptable Power Supply (SUPS) has failed.

Which ONE of the following identifies the source of power to #1A Vital Bus?

#1A Vital AC Bus will be:

- a. powered by MCC 1AB via the battery charger because the transfer to alternate power is automatic.
- b. powered by MCC 1AB via the SOLA transformer because the static switch will automatically transfer.
- c. powered by MCC 1AB via the battery charger because the inverter section is ONLY used by the battery as a backup to the AC input.
- d.- deenergized because the manual transfer switch would have to be aligned to the SOLA transformer.

61. Which ONE of the following describes the response of Unit 1 Shutdown Cooling (SDC) to a loss of instrument air to SDC instrument air operated valves?

All SDC flow will:

- a. be through both the SDC heat exchanger and bypass valves.
- b. be stopped.
- c. be through the SDC heat exchanger.
- d. bypass the SDC heat exchanger.

62. Unit 1 reactor power is 82%. Reactor Cavity Cooling fan HVS-2B is in service when it trips due to electrical fault.

Which ONE of the following describes the required operator actions, if any?

- a. HVS-2A will automatically start after 10 seconds. No operator action is required.
- b. HVS-2A must be started within 30 minutes or a reactor trip is required.
- c. HVS-2A must be started within 45 minutes or reactor power must be reduced to < 30%.
- d. HVS-2A must be started within 45 minutes or a reactor trip is required.

63. Given the following conditions:

- Unit 1 is operating at normal operating temperature and pressure.
- All systems are in automatic.
- Pressurizer Pressure Channel X is selected for control.
- Pressurizer Pressure Controller PIC-1100X is placed in MANUAL.
- PIC-1100X output is reduced to 10%.

With no further action, which ONE of the following describes the plant response?

- a. Proportional heater output increases causing pressure to increase until spray valves open.
- b. Proportional heater output decreases causing pressure to decrease until backup heaters energize.
- c. Proportional heater output increases causing pressure to increase until a reactor trip occurs.
- d. Proportional heaters will cycle at a lower setpoint.

64. Given the following:

- Reactor power at 100%
- A transient has caused pressurizer level to decrease 4.2% below the programmed level.

Which ONE of the following is the response of the pressurizer level control system?

- a. Both backup charging pumps will be running, with letdown flow isolated.
- b. No backup charging pumps will be running, with minimum letdown.
- c. Both backup charging pumps will be running, with minimum letdown.
- d. No backup charging pumps will be running, with letdown flow isolated.

65. Given the following conditions:

- The reactor has experienced a Steam Generator Tube Rupture.
- All systems responded as expected.
- The performance of EOP-04 is in progress.
- One steam generator has been isolated.
- RCS cooldown using natural circulation is in progress.

Which ONE of the following describes the concern associated with the affected SG pressure prior to placing the RCS on SDC?

- a. The SG pressure would be too low due to excessive cooldown causing RCS water to enter the SG and reducing RCS inventory.
- b. The SG pressure would be slightly less than RCS pressure causing water to enter the RCS resulting in a dilution.
- c. The SG temperature would be too high to allow for SG depressurization.
- d. The SG pressure would be too high due to thermal stratification of the secondary water.

66. Assuming no other indication is available, which ONE of the following describes how the required AFW flow rate of approximately 150 gpm can be obtained during a Station Blackout (SBO) event?

- a. Locally opening the AFW header isolation valves 6 turns from fully closed.
- b. Opening the AFW flow control valves for 6 seconds from fully closed.
- c. Observation of increasing SG level while varying the speed of the C AFW pump.
- d. Locally opening the AFW flow control valves 6 turns from fully closed.

67. In accordance with 1-EOP-03, "Loss of Coolant Accident", which ONE of the following is an alternate method of establishing hot leg injection during a LOCA event on Unit 1?

- a. Containment Spray pumps discharging to the pressurizer auxiliary spray line.
- b. Containment Spray pumps discharging to the hot legs via the shutdown cooling suction lines.
- c. HPSI pumps discharging to the normal pressurizer spray lines.
- d. HPSI pumps discharging to the hot legs via the shutdown cooling suction lines.

68. The following plant conditions exist:

- Unit 2 is at 100% power.
- All control systems are in AUTOMATIC.
- Pressurizer spray valve is stuck OPEN.
- NO operator action is taken.

Which ONE of the following describes the effect of RCS pressure DECREASING to 2210 psia?

- a. Pressurizer LOW PRESSURE alarm is energized.
- b. Proportional heaters are fully energized.
- c. Setpoint for backup heaters is reached.
- d. TM/LP SETPOINT HI/LO alarm is energized.

69. Unit 1 is at 100% power with Channel X PPCS as the controlling channel operating in AUTOMATIC. If the Channel Y controller pressure input fails low, which ONE of the following is the equipment response that would be observed?

- a. Pressure channel hi-lo alarm, proportional heater output remains the same, B/U heaters B3, B4, and B5 deenergize.
- b. Proportional output goes to 0%, all B/U heaters energize until all heaters de-energize at 2340 psia.
- c. Pressure channel hi-lo alarm, all proportional and B/U heaters remain the same.
- d. Press channel hi-lo alarm, proportional output goes to 100%, all B/U heaters on.

70. The following plant conditions exist:

- Reactor power is 77%
- CEA 55 Rod bottom light is lit
- Group 5 CEAs are at 128 inches.

In ONOP 2-0110030, "CEA Off-Normal Operation and Realignment", which ONE of the following describes the CEA recovery method ""?

- a. Increase turbine load to maintain Tave constant during CEA withdrawal.
- b. Borate to maintain reactor power constant during CEA withdrawal.
- c. Withdraw CEA slowly over a 10 minute period and maintain Tave constant with dilution.
- d. Withdraw CEA slowly over a 10 minute period and use Group 5 rods to maintain Tave and power constant.

71. When isolating a Unit 1 Steam Generator with a tube leak per EOP-99, "Appendix R", which ONE of the following normally maintained open valves is required to be CLOSED?
- Main Steam Isolation Valves bypass valves
 - 1C AFW Pump Steam Admission valve
 - 1C AFW Pump Steam Supply Warmup (Bypass) valves
 - 1C AFW Pump Trip and Throttle valve

72. Unit 1 is being shutdown to HOT STANDBY due to a Steam Generator Tube Leak.

Which ONE of the following indicates the TUBE LEAK has become a TUBE RUPTURE?

- When all available charging pumps are running, letdown has been isolated, and pressurizer level can no longer be controlled at setpoint.
- When all available charging pumps are running, and letdown flow has reached the minimum letdown limiter and has to be isolated to control pressurizer level.
- When letdown flow combined with the tube rupture flow exceeds 132 GPM with three (3) charging pumps running.
- When charging flow equals 132 GPM.

73. While troubleshooting a loss of letdown per ONOP 0210050, it was noticed when V2515 was opened, the valve immediately closed due to high letdown line temperature.

Which ONE of the following is the proper method to clear the high temperature condition so V2515 can be returned to the open position?

- Open the letdown level control valve until the temperature alarm clears.
- Increase cooling flow to the letdown heat exchanger.
- Cycle V2515 while opening the letdown level control valve.
- Cycle V2515 while increasing cooling flow to the letdown heat exchanger.

74. Which ONE of the following completes the statement?

Automatic operation of the CVCS isolates a letdown line rupture outside containment without a coincident SLAS or CIS by closure of:

- a. V2515 on high regenerative heat exchanger outlet temperature.
- b. V2516 on high differential pressure across the regenerative heat exchanger.
- c. V2516 on high regenerative heat exchanger outlet temperature.
- d. V2515 on high flow through the letdown heat exchanger.

75. Which ONE of the following statements is correct concerning the instrumentation to utilize when performing the actions of EOP-5 due to an ESDE in the steam trestle area.

- a. Use only the qualified White Bezel instruments.
- b. Use the White Bezel instruments as a primary source of information and safety related instruments to confirm these indications.
- c. Use all safety related instruments and use the White Bezel instruments if hostile environment is known to exist for greater than 15 minutes.
- d. Use all instruments because a hostile environment does not exist in containment.

76. Which ONE of the following states conditions requiring EOP-15 entry?

- a. If two or more Safety Functions are not met in EOP-01.
- b. If a Reactor Trip occurs with no apparent cause.
- c. If any event occurs in conjunction with a Loss of Off-Site Power.
- d. If a serious condition exists post-trip for which an optimal EOP cannot be identified.

77. Given the following conditions:

- Pressurizer level is 0
- Pressurizer pressure is 1200 psig
- Containment Pressure is 4 psig.
- Tcold is 380 ° F.

Which ONE of the following is the leak's location?

- a. On RCS inside containment.
- b. On a Main Steam Line inside containment.
- c. In a Steam Generator Tube.
- d. On a feedwater line inside containment upstream of the Feedwater check valve.

78. In accordance with 1-0310030, "Component Cooling Water Off-Normal," which ONE of the following CCW malfunctions would require the Reactor to be TRIPPED?

- a. Low level in the CCW Surge Tank.
- b. Rupture of the "N" CCW Header.
- c. Loss of the "A" CCW Pump.
- d. High CCW Temperature.

79. Unit 2 has been operating at 100% power when a load decrease to 50% is initiated. During the load decrease ONE CEA remains at its fully withdrawn position while the other CEAs in the Group are inserted.

Which ONE of the following annunciator alarms would provide indication the CEA was misaligned?

- a. L-24 REGULATING CEA SHORT TERM INSERTION.
- b. K-11 CEA MOTION INHIBIT.
- c. K-19 GROUP OUT OF SEQUENCE (DDPS).
- d. K-29 CEA POWER DEPENDENT INSERTION (ADS).

80. Given the following Unit 1 conditions:

- Steam Generator #1A has .35 gpm tube leak.
- RCS Identified leakage is 9.2 gpm.

Which ONE of the following is the maximum allowable leakage from #1B Steam Generator?

- a. .35 gpm
- b. .65 gpm
- c. .80 gpm
- d. 1.0 gpm

81. A loss of 1B 125 VDC bus has occurred. Without operator action, which ONE of the following will cause the SIAS initiation?

- a. Low pressurizer pressure due to loss of control power to pressurizer heaters.
- b. Low pressurizer pressure due to open PORVs.
- c. Low pressurizer level causing a loss of pressure control.
- d. Deenergizing ESFAS cabinets.

82. A fire has occurred in the cable spreading room of Unit 1 requiring evacuation of Unit 1 control room.

Which ONE of the following describes procedural requirements for control of reactor and other plant components?

- a.- Train A components must be used. Train B components can be used but are not reliable.
- b. Train A components must be used. Train B components cannot be used because they are not reliable.
- c. Train B components must be used. Train A components can be used but are not reliable.
- d. Train B components must be used. Train A components cannot be used because they are not reliable.

83. Given the following:

- Reactor power is 98%
- A fire has been detected in a panel in the control room
- The NPS has determined that the control room is to be evacuated
- All immediate actions of CONTROL ROOM INACCESSIBILITY procedures are performed
- Time did NOT permit performance of any EOP-1, "Standard Post Trip Actions." for Unit 1

Which ONE of the following describes the response of RCS temperature upon abandoning the control room?

- a. Temperature will be controlled at 525 ° F by SBCS.
- b. Temperature will be controlled at 525 ° F by ADVs.
- c. Temperature will be controlled by the MSSVs.
- d. Temperature will be controlled by AFW flow and ADVs operating in automatic control.

84. Given the following parameters following a loss of offsite power:

	0830	0845
Thot	482	482
Pzr Temp.	495	498
Tcold	467	466
RCS Pressure	675	690

QSPDS is NOT available.

Which ONE of the following describes the conclusion that can be made about single phase natural circulation?

Single phase natural circulation has:

- a. NOT been established because Thot is remaining constant.
- b. been established because the delta between Thot and Tcold is increasing.
- c. been established because Tcold adequate subcooled margin exists.
- d. NOT been established because the delta between Thot and Pzr temperature is too small.

85. A loss of condenser backpressure occurred Unit 1 with reactor power at 60% power. The operators are reducing power and maintaining condenser backpressure between 4 and 5 inches Hga.

In accordance with ONOP 1-0610031, "Loss of Condenser Vacuum", which ONE of the following is the power level at which the turbine will have to be tripped if vacuum is maintained between 4 and 5 inches while reducing power?

- a. 0 megawatts
- b. 20%.
- c. 30%.
- d. 50%

86. An air supply to one RCP component cooling water return line containment isolation valve has been broken while scaffolding was being erected.

Which ONE of the following describes the effect, if any, this will have on Reactor Coolant Pump operation?

- a. RCPs will have to be tripped immediately.
- b. RCP temperatures on only two of the four pumps will increase.
- c. RCPs will be able to operate for 10 minutes.
- d. RCP temperatures will be unaffected.

87. Which ONE of the following lists ALL RCP temperatures that can exceed 200 ° F and allow the RCP to continue to operate?

- a. Upper and lower guide bearing temperatures.
- b. Upper and downward thrust bearing temperatures.
- c. Upper and lower guide bearing and upper and downward thrust bearing temperatures.
- d. Controlled bleed off cavity temperatures.

88. Given the following conditions for RCP seals:

- Controlled bleedoff cavity temperature is 243 ° F.
- RCS pressure is 2250 psig
- The lower seal pressure is 2200 psig
- The middle seal pressure is 1050 psig
- The upper seal pressure is 975 psig.

Which ONE of the following describes the status of the RCP seals?

- a. Seal damage is NOT occurring.
 - b. Seal damage is occurring as indicated only by controlled bleedoff cavity temperature.
 - c. Seal damage is occurring as indicated by controlled bleedoff cavity temperature and delta P between the upper seal and bleedoff cavity.
 - d. Seal damage is occurring as indicated by controlled bleedoff cavity temperature and delta P between the middle and upper seal.
89. A loss of instrument air has occurred at 98% power. The need for a reactor shutdown is evaluated if instrument air pressure decreases below 75 psig because of the effect on controlling steam generator levels.

Which ONE of the following describes the how steam generator levels will respond as instrument air pressure decreases and the cause of that response?

Steam generator levels will:

- a. lower due to Feed Regulating valves closing.
 - b. lower due to Feed Pump Discharge Recirc valves opening.
 - c. raise due to Feed Regulating valves opening.
 - d. lower due to Main Feed Isolation valves closing.
90. A natural circulation cooldown is in progress. While cooling down with SBCS, which ONE of the following will cause the most restrictive limitation on cooldown rate?
- a. Isolating one steam generator.
 - b. Complying with Technical Specifications RCS cooldown restrictions.
 - c. Maintaining Steam Generator Tube differential temperature within limits.
 - d. Complying with Technical Specifications Pressurizer cooldown restrictions.



91. A Unit 1 gaseous release is in progress. The operator observes that the blue FAIL light on the Channel 42 ratemeter is de-energized.

Which ONE of the following describes status of the Gaseous Waste Monitor and V6565, Plant Vent from GST and GDT FCV?

- a. The monitor is working correctly and V6565 remains open.
 - b. A failure in the Gaseous Waste Monitor has occurred, however V6565 remains open and will only close if the monitor has failed upscale.
 - c. A failure in the Gaseous Waste Monitor has occurred and V6565 is open and must be manually closed.
 - d. A failure in the Gaseous Waste Monitor has occurred and V6565 is closed.
92. Which ONE of the following will be controlling Unit 1 RCS temperature following a complete loss of instrument air?
- a. ADVs in automatic mode.
 - b. ADVs in manual mode from the RTGB.
 - c. Main Steam Safety valves.
 - d. Steam bypass valves.
93. 120 VAC power to ESFAS panel MC has been lost.

Which ONE of the following signals will be operating in a 2/3 logic?

- a. SIAS
- b. CIS
- c. MSIS
- d. CSAS



94. A total loss of all AC has occurred on Unit 1. Unit 2 has one diesel generator running supplying bus 2A3.

Which ONE of the following describes how power would be supplied to Unit 1 from Unit 2?

- a. The Station Blackout Breaker on 1AB would be closed first then the Station Blackout Breaker on 2AB would be closed.
- b. The Station Blackout Breaker on 2AB would be closed first then the Station Blackout Breaker on 1AB would be closed.
- c. The Station Blackout Breaker on 1A3 would be closed first then the Station Blackout Breaker on 2A3 would be closed.
- d. The Station Blackout Breaker on 2A3 would be closed first then the Station Blackout Breaker on 1A3 would be closed.

95. Given the following conditions:

- A Unit 1 reactor trip occurred from 100% power.
- Ten minutes after the reactor trip the 1C Auxiliary Feedwater Pump tripped due to mechanical overspeed.

When resetting the 1C AFW pump, which ONE of the following describes when the 1C AFW pump will restart?

- a. As soon as the trip and throttle valve trip lever is reset.
- b. As soon as the trip and throttle valve trip lever is reset AND the AFAS AB Bypass switch is returned to the NORMAL position.
- c. As soon as the AFAS AB Bypass switch is placed in BYPASS AND the trip and throttle valve trip lever is reset.
- d. As soon as the trip and throttle valve trip lever is reset, the AFAS AB Bypass switch is returned to the NORMAL position AND the 1C Auxiliary Feedwater pump START/STOP switch is placed to START.

96. The 2A Main Feedwater Regulating valve (FRV) is being operated manually at the FRV when a reactor trip occurs.

Which ONE of the following describes the required action?

- a. Direct the operator to locally close the 2A FRV.
- b. Close the 2A Main Feedwater Block Valve.
- c. Direct the operator to position the 2A FRV to 5% open.
- d. Direct the operator to vent air from the 2A FRV.

97. Given the following conditions:

- Reactor power is 45% with both main feedwater pumps in service.
- 2A and 2B condensate pumps are in operation.
- The 2A Main Feedwater pump control switch is placed in to STOP.

Which ONE of the following describes the response of the feedwater system if the 2A Condensate pump is tripped?

2B Main Feedwater pump will:

- a. trip then the 2A pump will start on the trip signal from the 2B pump.
- b. remain in service.
- c. trip and 2A Main Feedwater Pump can be restarted.
- d. trip and 2A Main Feedwater Pump cannot be restarted.

98. Given the following conditions:

- Emergency boration is required for Unit 2.
- "Emergency Borate Valve", V2514 failed to open.
- VCT level is at its normal level.
- The operator places "Gravity Feed Valve" V2508 control switch to OPEN.
- "VCT Outlet" V2501 control switch was placed to CLOSE until the valve was fully closed.
- "VCT Outlet" V2501 control switch was allowed to return to AUTO after CLOSE indication was received.

Which ONE of the following describes whether or not adequate boration flow exists? Identify the reason boration flow is adequate or not adequate?

Boration flow will:

- a. be adequate because only one "Gravity Feed Valve" V2508 and V2509 is required to be open and the "VCT Outlet" V2501 will be closed.
- b. be adequate because only one "Gravity Feed Valve" V2508 or V2509 is required to be open and the "VCT Outlet" V2501 will be open.
- c. NOT be adequate because only one "Gravity Feed Valve" V2508 or V2509 is open.
- d. NOT be adequate because the "VCT Outlet" V2501 will be open.

99. Given the following conditions:

- A reactor heatup is in progress.
- Reactor pressure is 2000 psig.
- The acoustic monitor for a PORV indicates valve leakage.
- Quench tank pressure is 5 psig.

Which ONE of the following describes the expected tail pipe temperature and how tail pipe temperature will respond if RCS pressure decreases to 500 psig?

(Assume pressure downstream of the PORV remains constant.)

- a. Tail pipe temperature will be higher than if the PORV leaks at normal operating pressure. As pressure decreases tail pipe temperature will increase.
- b. Tail pipe temperature will be higher than if the PORV leaks at normal operating pressure. As pressure decreases tail pipe temperature will decrease.
- c. Tail pipe temperature will be lower than if the PORV leaks at normal operating pressure. As pressure decreases tail pipe temperature will increase.
- d. Tail pipe temperature will be lower than if the PORV leaks at normal operating pressure. As pressure decreases tail pipe temperature will decrease.

100. The following plant conditions exist:

- Group 5 CEAs are at 130 inches.
- CEA 7 is at 117 inches.
- CEA 9 Rod bottom light is lit.
- Pressurizer level decreases to 55%.
- Reactor power decreases from 100% to 85%.
- Pressurizer pressure decreases to 1890 psia.

Which ONE of the following is the minimum action required?

- a. Trip the reactor, trip the Turbine.
- b. Reduce Turbine load to match Reactor power.
- c. Commence a reactor shutdown to subcritical.
- d. Reduce power to less than 70% within 60 minutes.



Reactor Operator Answer Key

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

Reactor Operator Answer Key

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