NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-424, 50-425
License Nos.:	DPR-31, DPR-41
Report No.:	50-424/99-301, 50-425/99-301
Licensee:	Southern Nuclear Operating Company, Inc.
Facility:	Vogtle Electric Generating Plant Units 1 and 2
Location:	8805 River Road Waynesboro, GA 30830
Dates:	Operating Tests - December 13 - 16, 1999 Written Examination - December 21, 1999
Examiners:	R. Baldwin, Senior Operations Engineer B. Holbrook, Senior Project Engineer M. Sykes, Operations Engineer
Approved by:	G. Hopper, Acting Chief Operator Licensing and Human Performance Branch Division of Reactor Safety

Enclosure 1

EXECUTIVE SUMMARY

Vogtle Electric Generating Plant Units 1 and 2
NRC Examination Report 50-424/99-301, 50-425/99-301

This report documents the results of cooperative effort between the licensee and regional examiners to develop, validate and administer operator licensing initial examinations in accordance with the guidance of Examination Standards, NUREG-1021, Revision 8. This examination implemented the operator licensing requirements of 10 CFR §55.41, §55.43, and §55.45.

Four senior reactor operator candidates and one reactor operator candidate were administered the final, approved written examination and operating test. The NRC administered the operating tests during the week of December 13, 1999. The licensee and NRC administered the written examination on December 21, 1999.

Operations

- Four senior reactor operator (SRO) candidates and the one reactor operator (R0) candidate passed the examination. (Section O5.1)

- In general, candidate performance on the written examination and the operating test was good. Candidate knowledge, skill and ability weaknesses were limited and narrowly focused. Each candidate was well prepared for the operator licensing examination. (Section O5.1)

Report Details

Summary of Plant Status

During the period of the examinations, both units operated at 100 percent power.

I. Operations

O5 Operator Training and Qualifications

O5.1 Initial Operator Licensing Examinations

a. Examination Scope

NRC examiners administered regular, announced operator licensing examinations developed by the NRC and validated by the licensee in accordance with the guidelines of the Operator Licensing Examination Standards (ES) for Power Reactors, NUREG-1021, Revision 8 during the period December 13-16, 1999. The written examination was administered by the licensee and the NRC on December 21, 1999. Four senior reactor operator (SRO) and one reactor operator (RO) license applicants received the written examination and operating test. 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 job performance measures (JPMs).

b. Observations and Findings

The NRC developed the written examination, one administrative test set (six JPMs), one plant systems test set (10 JPMs), and three simulator scenarios which the licensee reviewed and validated. The examiners validated these test items during a site preparation visit the week of November 29, 1999.

Examination Results and Conclusions

All five candidates passed the examination. The average score of the written examination was 90.8 percent (80 percent was required for passing) which indicated that the candidates were well prepared. The licensee did not submit any formal post-examination comments on the written examination.

The NRC conducted a post-examination item analysis of the written examination. The examiners identified only two questions (#s SRO 29 (RO 25) and SRO 67 (RO 70)) which were answered incorrectly by 50 percent or more of the candidates. The examiners confirmed that each question adequately evaluated valid knowledge and ability areas. SRO Question #s, 29 and 67 (RO numbers 25 and 70) were missed by four of the five (80 percent) candidates and may indicate a generic weaknesses in the candidates' understanding of Source/Intermediate Nuclear Instruments and plant efficiency, respectively. The examiners noted that these questions, as written, did not warrant additional clarifying information.

The examiners noted one generic candidate performance weakness during administration of the operating examination (simulator scenarios). Two of two crews while removing a Nuclear Instrument from service did not use the CONTINUOUS USE procedure at the local panel but rather used handwritten steps on a piece of paper to identify the steps the operator was to accomplish.

Details of these and other discrepancies were described in each individual's examination report, Form ES-303-1, "Operator Licensing Examination Report," which have been forwarded under separate cover to the Training Manager. This will allow you to evaluate the weaknesses and provide appropriate feedback and/or remedial training as necessary. This information was also provided so you may evaluate whether a training program oversight in the above mentioned areas may be present.

c. Conclusions

The examiners concluded that overall candidate performance on the written examination and the operating test was good. Candidate knowledge, skill and ability weaknesses were few in number and narrow in scope. Each candidate was well prepared for the operator licensing examination.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the operating test findings to members of licensee management at the conclusion of the examination on December 17, 1999. The licensee acknowledged the findings presented.

The examiners asked the licensee whether any materials used during the examination should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

*B. Brown, Manager, Training and Emergency Preparedness
*D. Carter, Supervisor SAER
*S. Chesnut, Assistant General Manager, Operations
*G. Fredrick, Manager, Operations
*P. Rushton, Assistant General Manager, Support
*D. Scukanec, Operations Training Supervisor
*C. Tippins, Nuclear Specialist
*D. Vineyard, Supervisor ISEG

NRC

*D. Muller, HQ, OLB, Operations Engineer
K. O'Donohue, Resident Inspector
*G. Wilson, RIII, Operations Engineer
J. Zeiler, Senior Resident Inspector

*Attended Exit Meeting

INSPECTION PROCEDURES USED

NUREG-1021, Rev. 8: Operator Licensing Examination Standards for Power Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
ES	Examination Standard
JPM	Job Performance Measure
NRC	Nuclear Regulatory Commission
RO	Reactor Operator
SRO	Senior Reactor Operator

SIMULATION FACILITY REPORT

Facility Licensee: Vogtle Electric Generating Plant Units 1 and 2

Facility Docket Nos.: 50-424, 50-425

Operating Tests Administered on: December 13 - 16, 1999

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 item was observed:

ITEM	DESCRIPTION
NONE	

Enclosure 2

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

Applicant Information	
Name:	Region: I / II / III / IV
Date:	Facility/Unit: VOGTLE
License Level: RO / SRO	Reactor Type: W / CE / BW / GE
Start Time:	Finish Time:

Instructions

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

Name _____

1. [a] [b] [c] [d] ___	35. [a] [b] [c] [d] ___	69. [a] [b] [c] [d] ___
2. [a] [b] [c] [d] ___	36. [a] [b] [c] [d] ___	70. [a] [b] [c] [d] ___
3. [a] [b] [c] [d] ___	37. [a] [b] [c] [d] ___	71. [a] [b] [c] [d] ___
4. [a] [b] [c] [d] ___	38. [a] [b] [c] [d] ___	72. [a] [b] [c] [d] ___
5. [a] [b] [c] [d] ___	39. [a] [b] [c] [d] ___	73. [a] [b] [c] [d] ___
6. [a] [b] [c] [d] ___	40. [a] [b] [c] [d] ___	74. [a] [b] [c] [d] ___
7. [a] [b] [c] [d] ___	41. [a] [b] [c] [d] ___	75. [a] [b] [c] [d] ___
8. [a] [b] [c] [d] ___	42. [a] [b] [c] [d] ___	76. [a] [b] [c] [d] ___
9. [a] [b] [c] [d] ___	43. [a] [b] [c] [d] ___	77. [a] [b] [c] [d] ___
10. [a] [b] [c] [d] ___	44. [a] [b] [c] [d] ___	78. [a] [b] [c] [d] ___
11. [a] [b] [c] [d] ___	45. [a] [b] [c] [d] ___	79. [a] [b] [c] [d] ___
12. [a] [b] [c] [d] ___	46. [a] [b] [c] [d] ___	80. [a] [b] [c] [d] ___
13. [a] [b] [c] [d] ___	47. [a] [b] [c] [d] ___	81. [a] [b] [c] [d] ___
14. [a] [b] [c] [d] ___	48. [a] [b] [c] [d] ___	82. [a] [b] [c] [d] ___
15. [a] [b] [c] [d] ___	49. [a] [b] [c] [d] ___	83. [a] [b] [c] [d] ___
16. [a] [b] [c] [d] ___	50. [a] [b] [c] [d] ___	84. [a] [b] [c] [d] ___
17. [a] [b] [c] [d] ___	51. [a] [b] [c] [d] ___	85. [a] [b] [c] [d] ___
18. [a] [b] [c] [d] ___	52. [a] [b] [c] [d] ___	86. [a] [b] [c] [d] ___
19. [a] [b] [c] [d] ___	53. [a] [b] [c] [d] ___	87. [a] [b] [c] [d] ___
20. [a] [b] [c] [d] ___	54. [a] [b] [c] [d] ___	88. [a] [b] [c] [d] ___
21. [a] [b] [c] [d] ___	55. [a] [b] [c] [d] ___	89. [a] [b] [c] [d] ___
22. [a] [b] [c] [d] ___	56. [a] [b] [c] [d] ___	90. [a] [b] [c] [d] ___
23. [a] [b] [c] [d] ___	57. [a] [b] [c] [d] ___	91. [a] [b] [c] [d] ___
24. [a] [b] [c] [d] ___	58. [a] [b] [c] [d] ___	92. [a] [b] [c] [d] ___
25. [a] [b] [c] [d] ___	59. [a] [b] [c] [d] ___	93. [a] [b] [c] [d] ___
26. [a] [b] [c] [d] ___	60. [a] [b] [c] [d] ___	94. [a] [b] [c] [d] ___
27. [a] [b] [c] [d] ___	61. [a] [b] [c] [d] ___	95. [a] [b] [c] [d] ___
28. [a] [b] [c] [d] ___	62. [a] [b] [c] [d] ___	96. [a] [b] [c] [d] ___
29. [a] [b] [c] [d] ___	63. [a] [b] [c] [d] ___	97. [a] [b] [c] [d] ___
30. [a] [b] [c] [d] ___	64. [a] [b] [c] [d] ___	98. [a] [b] [c] [d] ___
31. [a] [b] [c] [d] ___	65. [a] [b] [c] [d] ___	99. [a] [b] [c] [d] ___
32. [a] [b] [c] [d] ___	66. [a] [b] [c] [d] ___	100. [a] [b] [c] [d] ___
33. [a] [b] [c] [d] ___	67. [a] [b] [c] [d] ___	
34. [a] [b] [c] [d] ___	68. [a] [b] [c] [d] ___	

Name: _____

1. Unit 1 has tripped due to an electrical fault and the following conditions are observed:

   - All Channel I trip status lights (except P-6, CNMT HI-3 and RWST LO-LO LEVEL) energized.

   - A loss of Intermidiate Range Channel N-35.

   Which one of the following describes the Source Range Channel(s) which will be available to monitor reactor power if no actions are taken?

   A. There will be no Source Range Channels available.

   B. N-31 only.

   C. N-32 only.

   D. Both N-31 and N-32.

2. An intermediate steamline break has occurred on Unit 2. The reactor can be maintained on line for about five minutes without an automatic trip. Which one of the following describes the expected plant response to an intermediate size steam line break prior to the reactor trip? Assume all control systems are in a normal automatic lineup.

A. Turbine load will drop and rods will step in.

B. Turbine load will drop. Rods will not move until the reactor trips.

C. Turbine load will not change until the reactor trips. Rods will step in.

D. Turbine load will not change until the reactor trips, rods will not move.

3. If RCS specific activity exceeds the limits established by Technical Specification 3.4.16, "RCS Specific Activity," the plant must be placed in HOT STANDBY with Tavg less than 500 degrees F. within 6 hours.

   Which one of the following is the reason for this cooldown to less than 500 degrees F.?

   A. To minimize containment pressure in the event of a LOCA.

   B. To limit containment radiation levels in the event of a LOCA.

   C. To maintain doses to the public within limits following a steam generator tube rupture.

   D. To reduce the radiological consequences of a faulted steam generator.

4. Which one of the following's instrumentation will be most reliable in the event that the control room is evacuated due to fire?

   A. Shutdown Panel A.

   B. Shutdown Panel B.

   C. Shutdown Panel C.

   D. TSC Plant Computer.

5. Unit 2 is operating at 95% RTP during a return to power when it is discovered that:

   - Rod B-6 is determined to be misaligned by 24 steps due to a blown lift coil fuse.

   Which one of the following is the required action?

   A. Reduce power to less than or equal to 75% RTP in 2 hours.

   B. Reduce power to less than or equal to 50% RTP in 2 hours.

   C. Be in mode 3 in 6 hours.

   D. Reevaluate safety analysis and confirm results remain for duration of operation under these conditions in 6 hours.

6. In step 27 of EOP 19000-C, "Reactor Trip or Safety Injection," you check to see is ECCS flow should be reduced. The following conditions exist on Unit 2:

- SG #1 level = 5% NR
- SG #2 level = 7% NR
- SG #3 level = 12% NR
- SG #4 level = 9% NR
- RCS subcooling = 40 deg F
- RCS Pressure is stable
- PRZR level = 35%
- Total AFW flow = 500 gpm
- Containment pressure = 1.8 psig

The USS should:

A. Transition directly to 19011-C, "ES -1.1 SI Termination."

B. Transition to 19012-C, "ES-1.2 Post LOCA Cooldown and Depressurization."

C. Initiate status tree monitoring and continue in 19000-C

D. Increase AFW flow to >570 gpm, then transition to 19001-C, "ES-0.1 Reactor Trip Response."

7. Given the following conditions:

- RCS pressure = 2335 psig
- RCS Tave = 588.3 deg F
- The reactor is not tripped
- The crew is currently in 19211-C, "FR-S.1, Response to Nuclear Power Generation/ATWT," step 5.

Which ONE of the following describes the reason why RCS pressure should be maintained less that 2335 psig?

A. Prevents the pressurizer relief tank from going solid (due to an open PORV or PRZR code safety valve) and blowing the rupture disc causing a LOCA inside containment.

B. To prevent the reactor from tripping on high RCS pressure.

C. To ensure a sufficient amount of boric acid is injected into the core to reduce reactor power.

D. To ensure pressurizer spray valves don't short cycle when the PORVs open to lower RCS pressure.

8. The crew is responding to a primary LOCA outside containment. The reactor was tripped and SI was manually actuated. They have completed procedure 19112-C, "LOCA Outside Containment," and transitioned to 19111-C, "Loss of Emergency Coolant Recirculation," since they were unable to isolate the leak.

   Which ONE of the following choices describes the correct actions to take in 19111-C under these conditions?

   A. Initiate RCS cooldown, verify containment cooling units running in low speed, minimize the number of CS pumps running based on containment and RWST conditions.

   B. Shift containment cooling units to fast speed, stop all containment spray pumps, and minimize ECCS flow to maintain at least 24 deg F subcooling.

   C. Initiate RCS cooldown, establish one train of ECCS flow to maintain subcooling >74 deg F, and start makeup to the RWST.

   D. Initiate RCS cooldown, minimize ECCS flow to keep RVLIS full range > 62% and start makeup to the RWST.

9. A loss of all AC has occurred. The control room operators have completed the immediate operator actions of 19100-C,"FR-S.1 Loss of All AC Power," and have attempted without success, to restore power. Per procedure 19100-C, the control switches for ESF 4160V loads are placed in the Pull-To-Lock position.

   Which one of the following describes the adverse effect which placing these loads in Pull -To- Lock is designed to prevent?

   A. Overloading of electrical buses.

   B. To prevent a jacket water temperature trip of the running EDG.

   C. An uncontrolled cooldown of the RCS and possible reactor startup.

   D. The unnecessary use of water that may be needed for long term cooldown.

10. Immediately following a loss of all onsite and offsite AC power, the reactor trips and the SSS reports the following critical safety function status:

- ORANGE path on core cooling
- RED path on heat sink
- YELLOW path on inventory

Which ONE of the following describes the proper procedural usage in this condition?

A. Loss of all AC Power, 19100-C

B. Reactor Trip or Safety Injection, 19000-C

C. Response to Degraded Core Cooling, 19221-C

D. Response to Loss of Secondary Heat Sink, 19231-C

11. A reactor trip following a spurious turbine runback occurred on Unit 1. The following plant conditions are observed:

- RCS Tavg = 557 degrees F
- RCS pressure = 2198 psig and slowly increasing
- PDP pump in service
- CCP "A" is OOS with suction and discharge valve tagged shut
- Control Rods are fully inserted except Rods H-8 and D-4 are at 24 and 6 steps respectfully.

Which one of the following describes the appropriate action for the RO to take?

A. Start CCP "B", open HV-112D and HV-112E, close HV-112B and HV-112C, verify at least 80 gpm charging flow through the normal charging flowpath.

B. Start CCP "B", start a BAT pump, open HV-8104, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

C. Start a BAT pump, open HV-8104, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

D. Start a BAT pump, open HV-110A and HV-110B, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

12. The following conditions exist on Unit 1:

- Reactor power is stable at 85%.
- RCS boron concentration is 900 ppm.
- Tavg and Tref are matched.
- Control rods are currently bank D at 210 .
- Control rods are in automatic.
- Burnup is 11000 MWD/MTU

The following events occur on Unit 1:

- Control rods begin to step in.
- The RO places the control rods in manual and notes the control rods stop with bank D at 190.
- Reactor power remains at 85%

Assuming Tref does not change, which ONE of the following is closest to the expected Tavg-Tref deviation?

A. 3.2 degrees F.

B. 5.4 degrees F.

C. 16.9 degrees F.

D. 29.1 degrees F.

13. Step 5 of procedure 19241-C, "Response to Imminent Pressurized Thermal Shock Condition," directs the operator to determine if ECCS flow can be terminated. Which one of the following describes the procedural action to be taken if termination criteria are NOT met?

A. Attempt to start one RCP in accordance with the Attachment only if subcooling requirements are satisfied.

B. Attempt to start one RCP in accordance with the Attachment regardless of subcooling requirements.

C. Depressurize the RCS by stopping one train of ECCS pumps.

D. Depressurize the RCS using PORV or Aux spray.

14. Given the following conditions:
- A total loss of ACCW has occurred at 0220 EST.

- The RCP temperatures are being monitored on the IPC.

- The RCP vibration is being monitored.
- Reactor power is 30%.
- The time is currently 0226 EST.

Which ONE of the following is the required action for the operator?

A. Trip the reactor then trip all RCP's before 0230 EST.

B. Trip any RCP if its #1 seal leakoff temperature exceeds 195 degrees F.

C. Trip any RCP that has its thermal barrier isolation valve shut.

D. Trip any RCP with shaft vibration in excess of 5 mils before 0230 EST.

15. Which one of the following conditions describes an INOPERABLE Containment per LCO 3.6.1?

A. The outer containment airlock door is found open in MODE 2.

B. The inner containment airlock door is left open while performing maintenance on its O-rings in MODE 3.

C. Both containment airlock doors are opened for maintenance in MODE 4.

D. A containment penetration exceeds Tech Spec leakage rate limits in MODE 5.

16. In accordance with 18038-C, "Operation From Remote Shutdown Panels," which one of the following is a mandatory requirement for fire in the Control Room, prior to leaving?

A. Stop RCPs #1 and #4.

B. Trip both MFPs.

C. Trip the reactor.

D. Shut all MSIVs and bypass valves.

17. Given the following Unit 1 conditions:

- Shutdown following a reactor trip crew is in E-0, Reactor Trip or Safety Injection.
- RCS pressure is 1720 and decreasing
- Steam Generator A level is 8% NR, pressure is 300 psig and increasing
- Steam Generator B level is 3% NR, pressure is 280 psig and increasing
- Steam Generator C level is 0% NR, 13% WR, pressure is 150 psig and decreasing
- Steam Generator D level is 4% NR, pressure is 310 psig and increasing
- Containment pressure is 16 psig
- All automatic features have actuated properly

Which one of the following contains the correct diagnosis and correct procedure path based on the above indications?

A. Feed header rupture outside of containment, transition from E-0 to, ECA-2.1, Uncontrolled Depressurization of all Steam Generators.

B. Only steam generator C is faulted, transition from E-0 to E-2, Faulted Steam Generator Isolation.

C. All steam generators are faulted transition from E-0 to ECA-2.1, Uncontrolled Depressurization of all Steam Generators.

D. All steam generators are faulted transition to E-0 to E-2

18. During recovery actions of a misaligned control bank or shutdown bank A or B rod, a Rod Control Urgent Failure is received. This alarm is the result of:

A. the Pulser/Oscillator being inhibited during recovery actions.

B. the Lift Coils being disconnected for the group with the misaligned rod.

C. the Lift Coils being disconnected for the unaffected group in the affected bank.

D. the multiplexing failure which was generated during withdrawal of the misaligned rod.

19. Given the following:

- Unit 1 tripped from 99.5% power due to a generator trip
- Both 13.8kV buses lose power when the generator trips and will not be restored for 4 days
- CST levels are at 90% and demin water make is available
- All plant parameters stabilize at no-load conditions without SI actuation

The crew responds to the trip without SI using EOP 19001, "ES-0.1 Reactor Trip Response."

Which ONE on the following describes how the crew should proceed?

A. Transition to UOP 12005, "Reactor Shutdown to Hot Standby (MODE 2 to MODE 3)," and maintain hot standby conditions.

B. Remain in 19001 until at least one RCP can be started.

C. Transition to 19002, "ES-0.2 Natural Circulation Cooldown," and establish natural circulation flow to maintain 557 deg F.

D. Transition to 19002-C to begin a cooldown to cold shutdown per LCO 3.4.5, "RCS Loops - MODE 3."

20. The unit 2 main generator has just been synchronized to the grid and power has been raised to 18% power. The BOP was preparing to swap feedwater flow from the Bypass Feed Regulation Valves (BFRV) to the Main Feed Requlation Valves (MFRV) when condenser vacuum decreased to 21.5 inches of water generating a turbine trip. Main feed pumps continue to run.

Which one of the following are the correct actions the crew should take in response to the turbine trip?

A. Enter 18011-C, "Turbine Trip below P9," and reduce reactor power below 5% and control Tave using steam dumps.

B. Trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection."

C. Enter 18016-C, "Condensate and Feedwater Malfunctions," start all available AFW pumps, and reduce reactor power to 10%.

D. Enter 18011-C "Turbine Trip below P9," reduce reactor power below 5%, and control Tave using atmospheric relief valves.

21. Unit 1 has had a loss of offsite power and is cooling down using 19002-C, Natural Circulation Cooldown. RCS temperature is 500 degrees. Power has just been restored to the CRDM fans. Which one of the following describes the effect of starting all CRDM fans will have on the cooldown?

A. The fans will contribute an additional 15-20 degrees per hour upper head cooldown. A GREATER amount of subcooling is procedurally required for cooldown.

B. The fans will contribute an additional 15-20 degrees per hour upper head cooldown. A SMALLER amount of subcooling is procedurally required for cooldown.

C. The fans will not significantly contribute to the overall upper head cooldown rate. A GREATER amount of subcooling is procedurally required for cooldown.

D. The fans will not significantly contribute to the overall upper head cooldown rate. A SMALLER amount of subcooling is procedurally required for cooldown.

22. Given the following conditions:

NSCW pumps 1,2,3, and 6 are in service
A loss of both RATs occurs
Both EDGs start and complete their UV sequence

Which one of the following choices correctly describes the expected response of the NSCW system to these conditions?

A. Pump 4 will start first and then pumps 1,2, and 3 will start when their discharge valves are fully closed.

B. Pumps 4 and 5 will start first and then pumps 1 and 2 will start when their discharge valves are fully closed.

C. Pumps 1,2,3, and 6 will start simultaneously.

D. Pumps 1,2,3, and 4 will start simultaneously.

23. The operating crew entered procedure 19221-C, FR-C.1, "Response to Inadequate Core Cooling." All attempts to establish high pressure Safety Injection flow were unsuccessful. RVLIS full range level is 28% and decreasing slowly, Core Exit Thermocouples are reading 820 degrees F and slowly increasing. Reactor Coolant pumps have been secured.

Which one of the following methods would be the NEXT step in mitigating the core cooling challenge?

A. Enter the Severe Accident Management Guidelines (SAMGs).

B. Open available pressurizer PORVs to allow RCS depressurization to the SI accumulator and SI injection pressures.

C. Depressurize all intact steam generators using Steam dumps or ARVs to 200 psig to allow RCS depressurization to the SI accumulator and SI injection pressures.

D. Restart one RCP in an idle loop to provide forced two-phase flow through the core.

24. Unit 2 is operating at 100% power. The RCP FRAME VIBRATION ALERT and RCP HI VIBRATION annunciators were received. Loop 3 RCP has a valid frame vibration of 5.2 mils.

Which ONE of the following is procedurally required?

A. Monitor vibrations and shut down the pump using the appropriate SOP if it exceeds the indicated rate of vibration increase.

B. Reduce power and shut down the RCP in accordance with the appropriate SOP.

C. Trip the reactor and trip the RCP.

D. Consult Westinghouse for guidance.

25. Given the following conditions:

- Leakage into #3 steam generator is determined to be .5 gpm.
- No leakage is detectable into the other steam generators.
- Other leakage which cannot be identified is determined to be .6 gpm.
- Leakage from known sources other than steam generator leakage is determined to be 4.0 gpm

Which ONE of the following identifies whether or not technical specification leakage limits are exceeded?

With these conditions in existence, Technical Specification leakage limits:

A. Are not exceeded.

B. Are exceeded due to the total leakage into the steam generator and unidentified leakage exceeding 1 gpm.

C. Are exceeded due to steam generator leakage exceeding limits for pressure boundary leakage.

D. Are exceeded due to excessive leakage into one steam generator.

26. In which one of the following situations would the RO require prior approval before shutting down the reactor?

A. Reactor power is 111%, no automatic trip.

B. Pressurizer level is decreasing rapidly for no apparent reason and cannot be restored using normal charging. Plant power is 100%.

C. The PZR RELIEF DISCH HI TEMP annunciator comes in, RCS pressure is stable.

D. Turbine trip occurs at 100% power, no automatic trip.

27. A loss of 1AD1 occurs during a surveillance test on Train "A" diesel generator. The diesel generator has been paralleled to AA02 and is sharing the load with the "A" RAT.

The loss of 1AD1 will result in which ONE of the following:

A. diesel trip due to underfrequency.

B. loss of control to the diesel generator output breaker only.

C. loss of speed and voltage control along with the ability to shutdown the diesel from the control room.

D. no effect - 1AD1 power only affects the ability to start the diesel.

28. Given the following information:

- Unit 2 is in Mode 6
- RCS drained to 188.6 feet
- RCS temperature is 125 degrees F
- RCS pressure is approximately atmospheric
- Reactor has been shut down for 21 days
- Core reload is complete, replacing 1/3 of core with new fuel
- A total loss of RHR cooling has occurred

Which ONE of the following is correct concerning the amount of time it will take to reach saturated conditions in the RCS?

(Use the attached figures from AOP-18019-C, "Loss of RHR")

A. 27 minutes

B. 38 minutes

C. 50 minutes

D. 62 minutes

29. I & C just completed a surveillance on the high voltage power supply to the Source Range/ Intermediate Range (SR/IR) Nuclear Instruments. Voltage was 750 vdc (normally 850 vdc).

Which one of the following describes the affect and the reason that this lower than normal voltage has on SR/IR performance?

A. Indicated power will not be affected because the high voltage only supplies power to the electronic circuitry for the amplifier.

B. Indicated power will increase because of the lowered preamplifier low noise current input pulse.

C. Indicated power will decrease because smaller pulses are generated by the alpha decay of U235, and even smaller pulses are generated by gamma interactions in the detector.

D. Indicated power will decrease because the reduced voltage in the high voltage power supply provides less biasing to sweep ions from the fission chamber.

30. Unit 1 is in MODE 2 with a reactor startup in progress (reactor trip breakers closed, rod withdrawal in progress) when source range nuclear channel "A" fails low. The crew suspends the startup in accordance with Technical Specification 3.3.1, "Reactor Trip Instrumentation."

Which ONE of the following describes the basis for the source range nuclear instrumentation for this LCO?

A. Two source range instrument channels are required to provide assurance that no random single failure will prevent a source range high flux trip in response to a continuous RCCA bank withdrawal event during startup.

B. Two source range instrument channels are required to provide assurance that no random single failure will prevent a source range high flux trip in response to reactivity anomalies associated with uncertainties in criticality calculations.

C. Two source range instrument channels are required to provide assurance that no random single failure will prevent a high flux at shutdown alarm in response to inadvertent dilution during startup.

D. Two source range instrument channels are required to provide assurance that no random single failure will prevent a high flux at shutdown alarm in response to inadvertent cooldown during startup.

31. Unit 2 is operating at 100% power with PZR level at 60% and both PZR spray valves in manual and shut while I&C is investigating erratic responses.

A main turbine control failure results in a rapid load reduction causing RCS temperature, PZR level, and PZR pressure to go up rapidly. The RO stabilizes RCS pressure at 2300 psig by manually cracking open one spray valve. Pressure is held constant at 2300 psig for an extended period of time. The RO then observes that PZR level is 68%, the pressurizer pressure master pressure controller output has increased to 95%, PORV 455 is shut, PORV 456 is shut, and the backup heaters are on.

Which one of the following describes the status of the Pressurizer Pressure Control system?

A. Functioning properly.

B. Malfunctioning because PORV 455 should be open.

C. Malfunctioning because PORV 456 should be open.

D. Malfunctioning because the backup heaters should be de-energized.

32. Due to a partial loss of power, Unit 2 RCPs 1 and 4 tripped, causing a reactor trip from 100% power. Assume no loss of RCS inventory. Which one of the following describes the expected readings on RVLIS for the reactor vessel upper range (Δpa); full range (Δpb); and dynamic head (Δpc)?

	upper range	full range	dynamic head
A.	100%	100%	off scale low
B.	100%	100%	47%
C.	120%	120%	off scale low
D.	120%	120%	47%

33. Unit 1 is in MODE 3. AOP 18009, "Steam Generator Tube Leakage," Section A, is being performed due to leakage in #3 SG. Per this AOP, which ONE of the following is the correct description of the actions (consider sequence also) required to reach MINIMUM break flow?

A. Cool down to 500 deg F, isolate #3 SG, depressurize the RCS to slightly below #3 SG pressure.

B. Isolate #3 SG, cool down to 500 deg F, depressurize the RCS to slightly below #3 SG pressure.

C. Isolate #3 SG, cool down to 500 deg F, depressurize the RCS to 25-50 psig greater than #3 SG pressure.

D. Cool down to 500 deg F, isolate #3 SG, depressurize the RCS to 25-50 psig greater than #3 SG pressure.

34. Which one of the following correctly lists radiation monitors that are readable from the Safety Related Display Console (SRDC)?

A. RE-2562C CNMT atmosphere
RE-2565 CNMT purge
RE-12116 Control Room Air Intake

B. RE-13121 MSL #2
RE-0724 N-16 Monitor
RE-12839 SJAE/SPE

C. RE-2532A FHB
RE-13121 MSL #2
RE-2562 CNMT atmosphere

D. RE-12442C Plant Vent
RE-002 CNMT low range
RE-2565C CNMT purge

35. Which ONE of the following would NOT be a reason to enter 19111-C, "ECA-1.1 Loss of Emergency Coolant Recirculation?"

A. loss of both RHR pumps.

B. failure of both RHR trains' loop suction valves to open.

C. inability to obtain emergency sump level.

D. train "A" RHR heat exchanger inoperable and a loss of BA03.

36. Unit 1 is in MODE 3 with the following conditions:

- Temperature = 360 deg F
- Pressure = 2200 psig
- PRT pressure = 35 psig

Which ONE of the following tailpipe temperatures would be indicative of a substantial PORV seat leak?

A. 281 deg F

B. 320 deg F

C. 260 deg F

D. 435 deg F

37. While performing the ECCS flow reduction sequence in 19012-C, "Post LOCA Cooldown and Depressurization," different values of subcooling must be met before stopping a pump. The basis for these subcooling requirements is to:

A. Ensure that the RCPs do not cavitate if they are operating.

B. Minimum subcooling is maintained after the pump is stopped and RCS pressure decreases as expected.

C. Final RCS pressure after the ECCS pump is stopped will remain above the ECCS accumulator injection pressure.

D. Ensures that the running ECCS pumps do not cavitate as RCS pressure decreases following the pump stops.

38. While at 100% power, a main feed water regulating valve fails open causing the affected SG level to exceed the hi-hi level setpoint. The reactor trips; however, no SG level drops below the lo-lo level setpoint. Assuming no operator action is taken, how many auxiliary feed water pumps will be running five (5) minutes after the trip?

A. none

B. one

C. two

D. three

39. Unit 1 was shutdown in MODE 5 for refueling when a fuel handling accident occurred in the FHB. A spent fuel bundle was smashed into the side of the canal and a section of its cladding was damaged.

- Your current annual dose is 4000 mrem TEDE
- Dose rate in the area of the refueling bridge controls is 1500 mr/hr
- HP has specified full PCs and a SCBA for entry.

Which one of the following represents the maximum stay time in the area of the fuel handling bridge controls prior to exceeding station administrative limits?

A. 20 minutes

B. 33 minutes

C. 40 minutes

D. 67 minutes

40. Given the following conditions on Unit 2:

- Reactor is at 100% power.
- RCS boron concentration is 600 ppm
- Slave Relay Testing results in an inadvertent opening of 2-LV-112D and closure of 2-LV-112B.
- Prior to this event, pressurizer level, and Tave were on program.

Which one of the following describes how VCT level and reactor power will respond?

A. Level will increase, power will remain the same.

B. Level will decrease, power will increase.

C. Level will increase, power decrease.

D. Level will decrease, power will remain the same.

41. Unit 1 was at 100 percent rated thermal power, when a loss of all AC occurred. The Turbine Driven AFW pump was lined up to the # 2 CST. Motor Driven Auxiliary Feed Water Pumps were aligned to the # 1 CST. All buses energized properly, with the exception of the following buses that did NOT re-energize.

1ABB
1AA02
1CD1M
1NA05
1NA01
1NA04

Which one of the following represents the auxiliary feed water flow path to the Steam Generators?

A. Motor Driven Auxiliary Feed water pump A through HV-5137 and HV-5139 to Steam Generators # 1 and # 4, respectively.

B. Motor Driven Auxiliary Feed water pump B through HV-5132 and HV-5134 to Steam Generators # 2 and # 3, respectively.

C. Turbine Driven Auxiliary Feed water pump through HV-5122 and HV-5120 to Steam Generators # 1 and # 4, respectively and through HV-5125 and HV-5127 to Steam Generators # 2 and # 3, respectively.

D. Turbine Driven Auxiliary Feed water pump through HV-5125 and HV-5127 to Steam Generators # 2 and # 3, respectively.

42. Which one of the following represents the Atmospheric Relief Valves that can be operated in the Fire Emergency mode?

A. PV-3000 and PV-3010

B. PV-3010 and PV-3020

C. PV-3020 and PV-3030

D. PV-3030 and PV 3000

43. Both units are in MODE 1 when high radiation alarms occur in the fuel handling building during the movement of irradiated fuel. The operator observes no bubbles from the pool and pool level is not lowering. Procedure 18006-C, "Fuel Handling Event," is entered.

Which ONE of the following is the correct action for the conditions stated?

A. Evacuate the fuel handling building.

B. Secure containment purge if in progress.

C. Enter 18030-C, "Loss of Spent Fuel Pool Cooling or Level," and 18004-C, "Reactor Coolant System Leakage."

D. Have HP determine the extent of damage to the fuel.

44. Unit 2 is in MODE 3 at 557 degrees and 2235 psig when a fault condition results in the loss of the 2NAB 13.8KV bus. In order to stabilize RCS pressure, the RO manually energizes the available backup heaters and attempts to control RCS pressure by manually operating the pressurizer spray valves.

Which ONE of the following statements best describes the required control board actions necessary to stabilize pressure?

A. Loop 1 spray valve, PV-455C, should be manually closed and loop 4 spray valve, PV-455B, must be used to control pressure.

B. Loop 4 spray valve, PV-455B, should be manually closed and loop 1 spray valve, PV-455C, must be used to control pressure.

C. The backup heaters should be deenergized because neither Loop 1 spray valve, PV-455C, nor Loop 4 spray valve, PV-455B, will be effective in controlling RCS pressure.

D. Either spray valve may be used to control pressure.

45. Unit 1 is at 100% RTP when Condensate Storage Tank (CST) #1 experiences a major structural failure. The control room operators swapped suction supply of the AFW pumps to CST #2.

Which one of the following, if anything, must be done to allow the motor driven AFW pumps to operate without an unnecessary loss of CST #2 volume?

A. MDAFW pumps must be cross connected by opening their discharge cross connect valves.

B. MDAFW pumps mini-flow valves must be locally manually aligned from CST #1 to CST #2.

C. MDAFW pumps MOV mini-flow valve must be deenergized in the shut position.

D. With the new MDAFW mini-flow modification no manual actions are required.

46. A plant startup is in progress at 18% power. Turbine load is at about 125 MW. A loss of control oil causes the "A" feed pump to coast down and feedwater discharge pressure falls below SG pressure.

Which ONE of the following describes the REQUIRED operator actions?

A. Ensure all AFW pumps supplying S/Gs, trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection."

B. Ensure all AFW pumps supplying S/Gs and reduce reactor power to less than 10%.

C. Restart the "A" feed pump using the manual potentiometer (GE pot).

D. Trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection," while continuing in 18016-C, "Condensate and Feed Malfunction."

47. A failure or malfunction of the ESF sequencers which results in delays in the energizing of ESF components has occurred. Which ONE of the following is correct concerning the effects on the fuel during a large-break LOCA?

A. Cladding failure can occur as the core experiences an uncontrolled cooling due to vaporization of reactor coolant.

B. Structural integrity can be lost as delayed cooling can lead to fuel temperatures in excess of ECCS acceptance criteria, resulting in excessive clad oxidation and weakening.

C. Minimal effects will be seen as reflux cooling is sufficient to cool the core for up to ten minutes after the onset of a large break LOCA.

D. A natural circulation cooldown of the fuel can be adversely impacted due to excessive reactor coolant blowdown.

48. Given the following conditions:

- Unit 2 is at 100% power
- CCP "A" is in service providing normal charging flow
- An inadvertent "B" train SI was generated by I&C
- "A" train SI signal is NOT present
- No operator action has been taken

Which ONE of the following is correct?

A. Normal mini-flow path for both CCPs is isolated, CCP "A" alternate mini-flow path is isolated, CCP "B" alternate mini-flow is available.

B. CCP "A" normal mini-flow path is available, CCP "A" alternate mini-flow path is isolated, CCP "B" alternate mini-flow path is available.

C. Normal mini-flow path for both CCPs isolated, alternate mini-flow path for both CCPs is available.

D. Normal mini-flow paths for both CCPs isolated, alternate mini-flow paths for both CCPs isolated.

49. Given the following plant conditions:

- The RCS is on RHR and solid
- RCS pressure is 350 psig
- RCS temperature is stable
- HC-128 RHR to LETDOWN Flow, controller setting is at 40% demand
- PV-131, LETDOWN PRESSURE Controller, is in AUTO
- The Reactor operator adjusts HC-128 controller to 80% demand

Which ONE (1) of the following statements is correct?

A. Letdown pressure increases, PV-131 automatically, throttles SHUT to restore letdown pressure to its original value, and RCS pressure DECREASES.

B. Letdown pressure increases, PV-131 automatically, throttles OPEN to restore letdown pressure to its original value, and RCS pressure DECREASES.

C. Letdown pressure increases, PV-131 automatically, throttles SHUT to restore letdown pressure to its original value, and RCS pressure INCREASES.

D. Letdown pressure increases, PV-131 automatically, throttles OPEN to restore letdown pressure to its original value, and RCS pressure INCREASES.

50. Which ONE of the following is an indication of an RCP #1 seal failure?

A. Affected RCP #1 seal delta P increase.

B. Affected RCP #1 seal leakoff increase.

C. Excess letdown header pressure decrease.

D. Affected RCP seal injection flow decrease.

51. The following conditions exit for Unit 1:

- EDG-1A is OOS for repairs
- A large primary LOCA and a loss of both RATs has occurred
- CNMT pressure is 37 psig and rising
- CS pump 'B' tripped and cannot be restarted
- EOP 19251-C, "FR-Z.1, Response to CNMT High Pressure" is being implemented

Which one of the following is the correct action to take?

A. No additional actions are necessary, CNMT pressure will be maintained less than 52 psig with the currently running equipment.

B. CNMT coolers on train B should be shifted to high speed to provide additional cooling.

C. Energize 1AA02 from the SAT and start train A CNMT coolers in low speed. CS pumps are not necessary for this type of accident.

D. Energize 1AA02 from the SAT and start train A CNMT coolers in low speed. Train A CS pump should be also started for this type of accident.

52. Unit 1 is critical in MODE 2 below the P-6 interlock when BOTH Source Range Nuclear Instrumentation channels fail. What immediate actions are required by Technical Specifications?

A. Immediately stabilize power and verify that power is indicated by two channels of Intermediate Range Nuclear Instrumentation.

B. Immediately suspend operations involving the addition of positive reactivity until one Source Range Nuclear Instrumentation channel is returned to service.

C. Immediately open the reactor trip breakers.

D. Initiate actions within 1 hour to be MODE 3 within 7 hours.

53. The unit is operating at 100% RTP when the B MFP tripped. The BOP immediately started the third condensate pump. How does the condensate demineralizer bypass valve operate under these conditions?

A. Slow open to protect demineralizer elements from high differential pressure.

B. Fast open to increase Main Feed pump NPSH.

C. Slow open to prevent condensate system water hammer.

D. Fast open to provide constant steam packing exhaust condenser cooling flow.

54. Which of the following is a containment ventilation interlock?

A. Control Rod Drive Mechanism Cooling Fans are interlocked to prevent operating two fans per train.

B. Preaccess Main Purge is interlocked to prevent simultaneous operations with the Mini purge system.

C. Reactor Cavity Cooling low temperature and low flow interlocks are enabled when the control switch is in the ON position.

D. Post LOCA Cavity Purge is interlocked with main purge to prevent simultaneous operation.

55. Which one of the following is the length of time the ESF batteries are sized for at full load?

A. 1.25 hours

B. 2.00 hours

C. 2.75 hours

D. 4.00 hours

56. Given the following information:

- Reactor Power is 100% RTP
- All Control Rods are at 228 steps
- Rod bank selector switch in manual
- The in-hold-out switch is held in the "IN" position until the step counters count 5 steps IN
- DRPI indication does not change

Which ONE of the following statements is true?

A. Rods definitely moved inward as indicated by the step counter change even though DRPI did not indicate rods moved.

B. Since rods did not move when 4 steps of rod movement was demanded, AOP 18003-C, "Rod Control System Malfunction," must be entered.

C. Rods probably moved inward as indicated by the step counter change. Rods will have to move in another step before DRPI indication will change.

D. Since DRPI indication did not change as expected when 4 steps of rod movement was demanded, operations should perform the control rod operability surveillance test.

57. The plant Safety Monitoring System (PSMS) calculates RCS subcooling by using which one of the following instrument inputs?

A. Pressurizer pressure and RCS WR Thot.

B. Pressurizer pressure and core exit thermocouples.

C. RCS WR pressure and RCS WR Thot.

D. RCS WR pressure and core exit thermocouples.

58. Unit 2 is in a refueling outage. RCS Pressure Isolation Valve Inservice Leak Test was started and then stopped to perform ILRT testing on critical path. The ILRT test took 27 hours to complete.

Which ONE of the following correctly states the required actions to be taken in order to restart the RCS Pressure Isolation Valve Inservice Leak Test test?

A. The section of the test that was in progress must be performed over again.

B. The initial conditions must be reverified and then the procedure may be restarted at the section where suspended if desired.

C. Since the control room personnel agree that nothing has changed that affects the test being run, the test must be restarted at the same place where it was suspended.

D. Tests cannot be suspended. The test must be started over from the beginning and run to completion.

59. A waste gas decay tank release is in progress. Which ONE of the following malfunctions occurring during the release could result in a release outside of permitted limits assuming no operator action?

A. Loss of instrument air to RV-14, waste gas effluent isolation valve.

B. FI-14, waste gas flow indicator, fails low.

C. RE-14, waste gas processing rad monitor, fails low.

D. Loss of power to RV-14, waste gas effluent isolation valve.

60. With Unit 1 at 100% power, the RO takes the following data from the power range NIs. Assume the normalization factor for all detectors is 1.0.

Detector	N-41	N-42	N-43	N-44
Upper	337	360	367	355
Lower	370	360	365	360

Which ONE of the following is correct?

A. QPTR is 1.017

B. QPTR is 1.028

C. QPTR is 1.034

D. QPTR is 1.062

61. Unit 1 is operating at 100% power when a large break LOCA occurs, followed immediately by a loss of offsite power. Which ONE of the following describes the response of the containment coolers to this event?

A. Four containment coolers start in fast speed approximately 30 seconds after the closure of diesel generator output breakers, followed by the start of four additional coolers in fast speed 20 seconds later.

B. Four containment coolers start in slow speed approximately 30 seconds after the closure of diesel generator output breakers, followed by the start of four additional coolers in slow speed 20 seconds later.

C. Eight containment coolers start in fast speed approximately 30 seconds after the closure of diesel generator output breakers.

D. Eight containment coolers start in slow speed approximately 30 seconds after the closure of diesel generator output breakers.

62. Given the following sequence of events:

- A reactor trip occurred on Unit 1 causing levels in all S/Gs to drop to between 33 and 36%, narrow range
- All AFW pumps start with discharge valves full open
- Level has returned to 60-70% NR level in all S/Gs 10 minutes after the trip
- The BOP throttles AFW flow on all discharge valves

THEN:

- Both MFPs trip

Which ONE of the following states the position of the discharge valves?

A. The MDAFW and the TDAFW discharge valve positions would not change.

B. The TDAFW valves would stay as they are and the MDAFW valves would stroke full open.

C. The MDAFW valves would stay as they are and the TDAFW valves would stroke full open.

D. The MDAFW and TDAFW valves would stroke to full open position.

63. Unit 1 is shutdown for a refueling outage. A service air header rupture occurs and the service air system completely depressurizes. Valve PV-9375, Service Air Header Isolation valve, was open at the time of the rupture. What effect does a total loss of the service air system have on the instrument air system?

A. Valve PV-9375 will auto-close as instrument header pressure decreases below 100 psig and a standby air compressor will start automatically to maintain instrument air header pressure.

B. Valve PV-9375 will auto-close as instrument header pressure decreases below 80 psig and the swing air compressor must be manually started to maintain instrument air header pressure.

C. Valve PV-9375 will auto-close as instrument air header pressure decreases below 80 psig and a standby air compressor will operate to maintain instrument header pressure.

D. Valve PV-9375 will auto-close and the instrument air header will completely depressurize.

64. A condenser circulating water pump develops a slight vibration and it is determined that maintenance must be performed on the pump. You are directed to establish a Circulating Water Pump level of 29 to 31.5 feet, prior to stopping the pump. What is the basis for this action?

A. To ensure the remaining Circulating Water Pump has sufficient NPSH.

B. To prevent over flowing the Cooling Water Basin.

C. To allow the discharge permissive to be bypassed.

D. To minimize the buildup of ice on the cooling tower fill plates.

65. Which one of the following describes the effect if the gate between the Spent Fuel Pool and the Transfer Canal were opened with the SFP full and the canal empty?

A. SFP level would drop below the TS minimum and there would NOT be adequate radiation shielding of the spent fuel.

B. SFP level would NOT drop below the TS minimum.

C. SFP level would drop below the TS minimum however, there would be adequate radiation shielding of the spent fuel.

D. SFP level would drop only to the level of the suction strainers and there would be adequate radiation shielding of the spent fuel.

66. Unit 1 is operating at 100% power when the following parameters are noted:

- "RCP LOOP 1 LOW FLOW ALERT" annunciator is received
- Reactor coolant loop 1 flow indicator 1-FI-0414 indicates 100%
- Reactor coolant loop 1 flow indicator 1-FI-0415 indicates 100%
- Reactor coolant loop 1 flow indicator 1-FI-0416 indicates 100%
- Bistable FB414A (7300 NSSS channel I) has tripped
- Tavg, and loop delta T are normal for 100% reactor power

Which ONE of the following is the most probable cause for the alarm condition and what are the operational implications?

A. At least two loop 1 flow indicators have failed as-is while loop flow has reduced to at least 90%. 18005-C, "Partial Loss of Flow," must be entered.

B. At least two loop 1 flow indicators have failed as-is while loop flow has reduced to at least 90%. 18001-C, "Primary Systems Instrument Malfunction," must be entered.

C. Bistable FB414A has malfunctioned. The affected channel may be bypassed indefinitely while repairs are made, however, the loop 1 low flow trip is now subject to a 2-out-of-2 trip logic on the remaining low flow channels.

D. Bistable FB414A has malfunctioned. The affected channel bistable must be placed in trip within 6 hours. Operations may continue indefinitely, however, the loop 1 low flow trip is now subject to a 1-out-of-2 trip logic on the remaining low flow channels.

67. Unit 1 is operating at 50% power with normal operating equipment in service. Circulating water pump # 1 has just tripped due to a fault. Given the current plant conditions what is the effect on the main condenser dT and plant efficiency?

	dT	Plant Efficiency
A.	Increase	Increase
B.	Decrease	Increase
C.	Increase	Decrease
D.	Decrease	Decrease

68. An inadvertent Safety Injection occurred on Unit 1. Pressurizer level got as low as 22% but is currently increasing. Which one of the following describes the response of letdown flow in this event?

A. Letdown flow went to zero the CIA signal was received.

B. Letdown flow went to zero when the low pressurizer level was received.

C. Letdown flow continued for a short time after the CIA signal then went to zero

D. Letdown flow continued for a short time after the low pressurizer level was received then went to zero.

69. Which ONE of the following is the preferred method of cooling the spent fuel pool on a loss of CCW to both trains of spent fuel pool cooling (SFPC)?

A. Feed and Bleed using Train "A" SFPC.

B. Feed and bleed using Train "B" SFPC.

C. Feed and Bleed using SFP purification pump.

D. Feed and bleed using the recycle evaporator feed pump.

70. Containment spray is operating (and is required) after a large break LOCA in containment. Cold leg recirculation alignment per 19013, "Transfer to Cold Leg Recirculation," for the ECCS pumps has been performed. The "RWST Empty" alarm is received and you verify RWST level is 9% and decreasing. Which ONE of the following actions should you perform?

A. Stop the containment spray pumps when RWST level is less than 5% if auto swapover to sump suction did not occur at the 9% RWST level.

B. Minimize containment spray flow by stopping one of the containment spray pumps after verifying at least 4 containment coolers are running in slow speed. When RWST level lowers to less than 5%, stop the remaining pump.

C. Realign the containment spray suction to the containment sump while allowing the pumps to continue to run.

D. Stop the containment spray pumps, realign containment spray suction to the containment sump, then restart the containment spray pumps.

71. Which one of the following describes the Primary to Secondary Leakage Detection Radiation Monitor(s)?

A. A single detector located in the TB steam chase between the steam lines which looks for N-16.

B. A single detector located in the TB steam chase between the steam lines which looks for long lived fission products.

C. Four detectors, one attached to each steam line which look for N-16.

D. Four detectors, one attached to each steam line which look for long lived fission products.

72. The normal full open pressure setpoint for the pressurizer spray valves is:

A. 2260 psig

B. 2310 psig

C. 2315 psig

D. 2330 psig

73. Given the following conditions on Unit 1:

- Unit 1 at 14% reactor power after a trip from 320 days on line
- Rod control in manual
- Main turbine rollup completed at 1800 rpm
- MFP A operating with all BFRVs in AUTO
- RCS Tavg is at 561.5 degrees F.
- Steam dump pressure controller PIC-507 in AUTO

If main steam line pressure transmitter PT-507 fails high, which one of the following is CORRECT?

A. All steam dumps remain closed.

B. Steam header pressure cannot be controlled in the steam pressure mode and the main turbine must be tripped.

C. All of the steam dumps fully open, an RCS uncontrolled cooldown condition continues.

D. All steam dumps fully open and RCS cooldown stops at 550 degrees F.

74. Which one of the following describes the operation of the Standby Auxiliary Transformer?

A. An automatic interlock prevents aligning the SAT to its associated 1E bus if the supply breakers from the RAT are open. The SAT capacity provides adequate shutdown capability for both safety busses.

B. A Kirk key interlock prevents aligning the SAT to its associated 1E bus at the same time the RAT is aligned to the bus. The SAT capacity provides adequate shutdown capability for both safety busses.

C. An automatic interlock prevents aligning the SAT to its associated 1E bus if the supply breakers from the RAT are open. The SAT capacity provides adequate shutdown capability for only one safety bus.

D. A Kirk key interlock prevents aligning the SAT to its associated 1E bus at the same time the RAT is aligned to the bus. The SAT capacity provides adequate shutdown capability for only one safety bus.

75. Which one of the following describes the two reactor cavity cooling units?

A. They are normally cooled by Normal Chilled Water but the B unit can also be supplied by NSCW. Both fan units are needed to maintain the primary shield and reactor cavity concrete < 200 degrees.

B. They are normally cooled by Normal Chilled Water but the B unit can also be supplied by NSCW. Each fan unit is independently able to maintain the primary shield and reactor cavity concrete < 200 degrees.

C. They are normally cooled by NSCW but the B unit can also be supplied by Normal Chilled Water. Both fan units are needed to maintain the primary shield and reactor cavity concrete < 200 degrees.

D. They are normally cooled by NSCW but the B unit can also be supplied by Normal Chilled Water. Each fan unit is independently able to maintain the primary shield and reactor cavity concrete < 200 degrees.

76. With the plant operating at 70% power, a significant leak develops in the variable leg of the channel #1 S/G level detector which is selected for S/G water level control.

If NO operator action is taken, which ONE of the following statements correctly describes one of the effects on the affected steam generator?

A. Loop 1 feed regulating valve will open.

B. Steam flow will initially be higher than feed flow.

C. Level will equalize at some value significantly lower than original.

D. Indicated steam generator level will increase on the affected channel.

77. A fire team consisting of at least _____ members (including a team leader) shall be maintained on site at all times. The fire team leader is designated by _____, per procedure.

A. 4, the Shift Superintendent.

B. 5, the Shift Superintendent.

C. 4, the C & T Supervisor.

D. 5, the C & T Supervisor.

78. The 2A EDG is running. The lead Fuel Oil Transfer pump starts in response to low level in the Fuel Oil Day Tank. This pump fails to develop adequate discharge pressure but continues to run.

Which one of the following correctly describes the operation of the 2A EDG?

A. The second Fuel Oil Transfer pump will NOT start due to the lead pump's breaker being shut.

B. The second Fuel Oil Transfer pump will NOT start unless the alternator circuit is manually reset.

C. The second Fuel Oil Transfer pump will start if in AUTO.

D. The second Fuel Oil Transfer pump will start when the engine driven fuel oil pump discharge pressure begins to decrease.

79. The following indications exist in the control room with the unit at 45% power, all control systems are in AUTO:

- TAVG/TREF DEVIATION annunciator
- AMSAC TROUBLE annunciator
- TURB PWR P13 CHII PB-506A status light illuminated (CHI PB-505A off)

The FIRST action required of the operator in accordance with the appropriate AOP is:

A. Verify no rod motion.

B. Verify a runback is required.

C. Check no runback is in progress.

D. Place rods in MANUAL.

80. Given the following information:

- Unit 1 is in Mode 4 with RHR train "A" in service
- RHR Pump "B" is out of service for maintenance
- The "B" train of SFPC is in service
- CCW TRAIN A SURGE TK HI/LO LVL annunciator is received and it is confirmed that surge tank level is increasing
- RE-017A, CCW train "A" radiation monitor, indicates increasing radiation levels in the CCW system

Which ONE of the following most correctly describes the cause and operator response for the plant conditions above?

A. The "A" RHR pump seal cooler has developed a leak. CCW can be isolated to the seal cooler so long as RHR temperature does not exceed 150 degrees.

B. The "A" RHR heat exchanger has developed a tube leak. The "A" train of RHR must be shut down and AOP 18019-C, "Loss of Residual Heat Removal," must be entered.

C. The "A" RHR heat exchanger has developed a tube leak. The "A" train of CCW must be shut down; however, operation of the "A" train of RHR may continue.

D. The "A" CCW heat exchanger has developed a tube leak. Operation of the "A" train of CCW may continue.

81. Unit 1 is operating at 8% power and preparing continue the increase load after a startup. Which one of the following conditions/signals will generate a main turbine trip signal directly?

A. # 1 S/G level = 87%.

B. Pressurizer Pressure = 1945 psig.

C. Pressurizer level = 93%

D. Loss of the # 1 and # 3 RCPs.

82. Given the following information:

- Unit 1 is entering MODE 4
- RHR train "A" and CCP "A" are in service
- Various train "A" CCW annunciators are in alarm
- All train "A" CCW pumps are running with discharge pressure at 75 psig
- CCW train "A" surge tank level is decreasing
- The crew enters AOP 18020-C, "Loss of CCW"

Which ONE of the following is the correct action to take per 18020-C?

A. Place CCW train "A" in single pump operation after verifying that NSCW train "A" is in service.

B. Stop CCW train "A" pumps and place non-affected CCP "B" in service after verifying that CCW Train "B" is in service.

C. Stop CCW train "A" pumps and stop train "A" NSCW pumps after verifying that CCW train "B" is in service.

D. Stop CCW train "A" pumps and place non-affected RHR train "B" in service after verifying that CCW train "B" is in service.

83. A power operated relief valve fails open while Unit 1 is at 100% power. Due the increasing pressure in the PRT the common relief valve inlet pipe to the PRT fails at a flange immediately upstream of he PRT, with the ends offset by one pipe diameter.

Which ONE of the following best describes the INITIAL response to the pipe break?

A. PRT pressure increasing, containment radiation levels increasing.

B. PRT pressure increasing, containment radiation levels constant.

C. PRT pressure decreasing, containment radiation levels increasing.

D. PRT pressure decreasing, containment radiation levels constant.

84. Maintenance would like to remove the clearance on a breaker so they can cycle it in the TEST position.

Which ONE of the following correctly describes how this should be accomplished?

A. The hold tags must be temporarily removed and a hold tag must be placed on the racking device.

B. The hold tags must be remain on the breaker and a caution tag must be placed on the racking device.

C. The hold tags must be removed via a clearance release or functional release.

D. The hold tags can only be removed by closing out the clearance.

85. A plant procedure is not marked to indicate if it is "Reference Use" or "Continuous Use". Which one of the following represents the required method for implementing this procedure?

A. The procedure must be open and readily available. The operator does NOT need to follow it step by step, but he is accountable for successful task completion.

B. The procedure does NOT need to be open and readily available. The operator does NOT need to follow it step by step, but he is accountable for successful task completion.

C. The procedure must be open and readily available. The operator must follow it step by step.

D. This is an example of an "Incorrect Procedure" and must be reported to the Shift Supervisor prior to continuing.

86. Given the following Unit 1 plant conditions:

-The plant is in Mode 6.
-Refueling operations are in progress.
-A Containment -Purge is in progress.
-The Balance of Plant Operator (BOP) reports1-RE-12442C indicates "BAD" and is magenta in color.
-Chemistry confirms that 1-RE-12442C has failed.

Which one of the following describes the appropriate response to this situation?

A. Refueling Operations may continue and the Containment Purge may continue as long as 1-RE-12444C remains operable.

B. Refueling Operations may continue and the Containment Purge may continue as long as 1-RE-12444C remains operable and 1-RE-12442C is returned to service within 4 hours.

C. Immediately close the Containment Purge supply and exhaust valves. Refueling Operations must be suspended until 1-RE-12442C is returned to service.

D. Immediately close the Containment Purge supply and exhaust valves. Refueling may continue.

87. The # 1 Waste Gas Decay Tank (WGDT) requires release. Which one of the following sequences is required to perform a gaseous release?

A. Chemistry obtains and analyzes a gas sample, Chemistry generates a gaseous effluent permit, Operations reviews release permit information and gives chemistry permission to commence the release.

B. Chemistry obtains and analyzes a gas sample, Operations verifies the sample is within existing batch release permit, and commences release.

C. Chemistry obtains and analyzes a gas sample, Chemistry generates a gaseous effluent permit, Operations reviews release permit after the permit is received in the control room and commences release.

D. Chemistry obtains and analyzes a gas sample, Operations generates the gaseous effluent permit then commences the release.

88. A Unit 1 Refueling outage was scheduled to begin on December 16th. The following are the sequence of events as they took place:

-12/16 / 0900	Turbine tripped, breaker open
-12/16 / 1030	Mode 2 entered
-12/16 / 1200	Mode 3 entered
-12/16 / 1400	All rods in

Which one of the following is the earliest time the movement of fuel in the reactor vessel can commence?

A. 12/18 / 1100

B. 12/19 / 1600

C. 12/20 / 1600

D. 12/21 / 1100

89. Unit 1 has just completed a shutdown to mode 5 with both RHR trains in service. The RCS is at midloop.

Which one of the following conditions would be an adequate reactor coolant vent path into containment to mitigate the consequences of a loss of RHR cooling?

A. An open reactor head vent will provide and adequate vent path in mode 5.

B. An open S/G cold leg manway with the hot leg nozzle dam installed, and the cold leg nozzle dam not installed will provide an adequate vent path.

C. An open S/G hot leg manway with the hot leg nozzle dam not installed will provide and adequate vent path.

D. An adequate vent path is not required until the reactor head is removed in mode 6.

90. Which one of the following correctly describes the Steady State Activity/Chemistry Limits for the RCS in mode 1?

A. Dose Equivalent I-131 - 1.0 μci/gm
Chloride and Fluoride - 0.15 ppm
Dissolved Oxygen - 0.10 ppm

B. Dose Equivalent I-131 - 0.1 μci/gm
Chloride and Fluoride - 0.15 ppm
Dissolved Oxygen - 1.0 ppm

C. Dose Equivalent I-131 - 1.0 μci/gm
Chloride and Fluoride - 1.5 ppm
Dissolved Oxygen - 1.0 ppm

D. Dose Equivalent I-131 - 0.1 μci/gm
Chloride and Fluoride - 0.15 ppm
Dissolved Oxygen - 0.10 ppm

91. A Site Area Emergency was declared due to a LOCA on Unit 1. The emergency plan implementing procedures (EPIPs) are being implemented. The Plant manager has assumed the duties of Emergency Director. Which ONE of the following has approval authority for changes to the EPIPs?

A. any licensed SRO.

B. the Shift Supervisor.

C. the Emergency Director.

D. NRC.

92. The plant has experienced a large break LOCA. The crew has transitioned from 19000-C, "E-0 Reactor Trip or Safety Injection," to 19010-C, "E-1 Loss of Reactor or Seconday Coolant." The following conditions exist:

- "A" S/G N/R level is 31%, AFW flow is 120 gpm.
- "B" S/G N/R level is 24%, AFW flow is 110 gpm.
- "C" S/G N/R level is 29%, AFW flow is 110 gpm.
- "D" S/G N/R level is 30%, AFW flow is 110 gpm.
- S/G pressure in all S/Gs 1035 psig.
- RCS pressure is 100 psig and decreasing.
- NO RCPs are running
- Core Exit T/C are 705 degrees F.
- RVLIS Full Range Level is 53%.
- Containment pressure is 37 psig.

Using the attached procedure what is the correct procedure to use for these conditions?

A. Transition to 19223-C, "FR-C.3, Response to Saturated Core Cooling."

B. Transition to 19231-C, "FR-H.1, Response to Loss of Secondary Heat Sink."

C. Transition to 19235-C, "FR-H.5, Response to Steam Generator Low Level."

D. Transition to 19251-C, "FR-Z.1, Response to High Containment Pressure."

93. Which ONE of the following is a NON-DELEGATABLE duty of the Emergency Director?

A. Deploying radiological emergency teams.

B. Requesting OSC support for emergency maintenance.

C. Deciding to request assistance from federal support groups.

D. Coordinating VEGP emergency operations.

94. Which one of the following defines Exposure Margin, as described in VEGP Radiation Limits and Administrative Guidelines?

A. The amount of exposure an individual has remaining before he/she will exceed an annual or lifetime dose limit.

B. The amount of exposure remaining before reaching collective dose limits to the general public.

C. The amount of exposure an individual has remaining before he/she will exceed Emergency Dose Limits.

D. The amount of exposure remaining before reaching alarm limits of their Electronic Direct Reading Dosimeter (EDRD).

95. Given the following conditions at a work site:

- Airborne activity - 3 DAC
- Radiation level - 40 mrem/hr.
- Radiation level with shielding - 10 mrem/hr.
- Time to place shielding - 15 minutes.
- Time to conduct task WITH respirator - 1 hour.
- Time to conduct task WITHOUT respirator - 30 minutes.

Assumptions:

- The airborne dose with a respirator will be zero.
- A dose rate of 40 mrem/hr will be received while placing the shielding.
- All tasks will performed by one worker.
- Sheilding can be placed in 15 minutes with or without a respirator.

Which ONE of the following would result in the lowest whole body dose?

A. Conduct task WITHOUT respirator or shielding.

B. Conduct task WITH respirator and WITHOUT shielding.

C. Place shielding while wearing respirator and conduct task WITH respirator.

D. Place shielding while wearing respirator and conduct task WITHOUT respirator.

96. Why is the differential temperature between the pressurizer steam space and the loop 4 hot leg maintained less than 320 degrees F during unit heatup?

A. Ensures there is adequate driving force for pressurizer spray.

B. Ensures adequate NPSH for the start of the loop 4 RCP.

C. Ensures a reduction in the number of thermal cycles on the system.

D. Ensures the RCS is isothermal for a uniform heatup.

97. A main control room annunciator, AUX BLDG LOW dP, has sounded on the HVAC panel repeatedly over the past several hours. You eventually determine that it is a nuisance alarm. All compensatory actions have been taken. Which one of the following is the action(s) can you take to disable this alarm until it can be repaired?

A. Follow procedure 00304C, "Equipment Clearance and Tagging", and have the annunciator disabled by removing it's card.

B. Follow procedure 00307C, "Temporary Modifications", Issue a temporary modification to disable the annunciator by removing it's card.

C. Have the Unit SS authorize the annunciator card be removed.

D. Issue a maintenance work order to have the annunciator card removed.

98. During core off-load, the refueling team identifies that refueling cavity level is decreasing in an uncontrolled manner. RWST level is 30%. Which one of the following identifies the PRIORITY of aligning a makeup flowpath?

A. Gravity drain from the RWST.

B. Gravity drain from the RMWST.

C. Demineralized Water system.

D. Fire Protection System.

99. Engineering has developed a graph of VCT level versus VCT pressure that will be used as an operator aid. Which one of the following positions represents the MINIMUM level of approval for posting this as an operator aid?

A. An individual holding a Senior Reactor Operator license.

B. Shift Superintendent.

C. Manager of Operations.

D. Plant Manager.

100. Which one of the following describes the requirement for making Protective Action Recommendations (PARs)?

A. Required on the initial message for a General Emergency.

B. Must be made on either the initial message or the first followup message for a General Emergency.

C. Must be made as soon as the dose assessment manager determines the Protective Action Recommendation.

D. There is no mandatory time frame requirements for issuing PARs.

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

Applicant Information	
Name:	Region: I / (II) / III / IV
Date:	Facility/Unit: VOGTLE
License Level (RO) / SRO	Reactor Type: (W) / CE / BW / GE
Start Time:	Finish Time:

Instructions

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

Name _____

1.	[a]	[b]	[c]	[d] ___	35.	[a]	[b]	[c]	[d] ___	69.	[a]	[b]	[c]	[d] ___
2.	[a]	[b]	[c]	[d] ___	36.	[a]	[b]	[c]	[d] ___	70.	[a]	[b]	[c]	[d] ___
3.	[a]	[b]	[c]	[d] ___	37.	[a]	[b]	[c]	[d] ___	71.	[a]	[b]	[c]	[d] ___
4.	[a]	[b]	[c]	[d] ___	38.	[a]	[b]	[c]	[d] ___	72.	[a]	[b]	[c]	[d] ___
5.	[a]	[b]	[c]	[d] ___	39.	[a]	[b]	[c]	[d] ___	73.	[a]	[b]	[c]	[d] ___
6.	[a]	[b]	[c]	[d] ___	40.	[a]	[b]	[c]	[d] ___	74.	[a]	[b]	[c]	[d] ___
7.	[a]	[b]	[c]	[d] ___	41.	[a]	[b]	[c]	[d] ___	75.	[a]	[b]	[c]	[d] ___
8.	[a]	[b]	[c]	[d] ___	42.	[a]	[b]	[c]	[d] ___	76.	[a]	[b]	[c]	[d] ___
9.	[a]	[b]	[c]	[d] ___	43.	[a]	[b]	[c]	[d] ___	77.	[a]	[b]	[c]	[d] ___
10.	[a]	[b]	[c]	[d] ___	44.	[a]	[b]	[c]	[d] ___	78.	[a]	[b]	[c]	[d] ___
11.	[a]	[b]	[c]	[d] ___	45.	[a]	[b]	[c]	[d] ___	79.	[a]	[b]	[c]	[d] ___
12.	[a]	[b]	[c]	[d] ___	46.	[a]	[b]	[c]	[d] ___	80.	[a]	[b]	[c]	[d] ___
13.	[a]	[b]	[c]	[d] ___	47.	[a]	[b]	[c]	[d] ___	81.	[a]	[b]	[c]	[d] ___
14.	[a]	[b]	[c]	[d] ___	48.	[a]	[b]	[c]	[d] ___	82.	[a]	[b]	[c]	[d] ___
15.	[a]	[b]	[c]	[d] ___	49.	[a]	[b]	[c]	[d] ___	83.	[a]	[b]	[c]	[d] ___
16.	[a]	[b]	[c]	[d] ___	50.	[a]	[b]	[c]	[d] ___	84.	[a]	[b]	[c]	[d] ___
17.	[a]	[b]	[c]	[d] ___	51.	[a]	[b]	[c]	[d] ___	85.	[a]	[b]	[c]	[d] ___
18.	[a]	[b]	[c]	[d] ___	52.	[a]	[b]	[c]	[d] ___	86.	[a]	[b]	[c]	[d] ___
19.	[a]	[b]	[c]	[d] ___	53.	[a]	[b]	[c]	[d] ___	87.	[a]	[b]	[c]	[d] ___
20.	[a]	[b]	[c]	[d] ___	54.	[a]	[b]	[c]	[d] ___	88.	[a]	[b]	[c]	[d] ___
21.	[a]	[b]	[c]	[d] ___	55.	[a]	[b]	[c]	[d] ___	89.	[a]	[b]	[c]	[d] ___
22.	[a]	[b]	[c]	[d] ___	56.	[a]	[b]	[c]	[d] ___	90.	[a]	[b]	[c]	[d] ___
23.	[a]	[b]	[c]	[d] ___	57.	[a]	[b]	[c]	[d] ___	91.	[a]	[b]	[c]	[d] ___
24.	[a]	[b]	[c]	[d] ___	58.	[a]	[b]	[c]	[d] ___	92.	[a]	[b]	[c]	[d] ___
25.	[a]	[b]	[c]	[d] ___	59.	[a]	[b]	[c]	[d] ___	93.	[a]	[b]	[c]	[d] ___
26.	[a]	[b]	[c]	[d] ___	60.	[a]	[b]	[c]	[d] ___	94.	[a]	[b]	[c]	[d] ___
27.	[a]	[b]	[c]	[d] ___	61.	[a]	[b]	[c]	[d] ___	95.	[a]	[b]	[c]	[d] ___
28.	[a]	[b]	[c]	[d] ___	62.	[a]	[b]	[c]	[d] ___	96.	[a]	[b]	[c]	[d] ___
29.	[a]	[b]	[c]	[d] ___	63.	[a]	[b]	[c]	[d] ___	97.	[a]	[b]	[c]	[d] ___
30.	[a]	[b]	[c]	[d] ___	64.	[a]	[b]	[c]	[d] ___	98.	[a]	[b]	[c]	[d] ___
31.	[a]	[b]	[c]	[d] ___	65.	[a]	[b]	[c]	[d] ___	99.	[a]	[b]	[c]	[d] ___
32.	[a]	[b]	[c]	[d] ___	66.	[a]	[b]	[c]	[d] ___	100.	[a]	[b]	[c]	[d] ___
33.	[a]	[b]	[c]	[d] ___	67.	[a]	[b]	[c]	[d] ___					
34.	[a]	[b]	[c]	[d] ___	68.	[a]	[b]	[c]	[d] ___					

Name: _____

1. The unit 2 main generator has just been synchronized to the grid and power has been raised to 18% power. The BOP was preparing to swap feedwater flow from the Bypass Feed Regulation Valves (BFRV) to the Main Feed Requlation Valves (MFRV) when condenser vacuum decreased to 21.5 inches of water generating a turbine trip. Main feed pumps continue to run.

   Which one of the following are the correct actions the crew should take in response to the turbine trip?

   A. Enter 18011-C, "Turbine Trip below P9," and reduce reactor power below 5% and control Tave using steam dumps.

   B. Trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection."

   C. Enter 18016-C, "Condensate and Feedwater Malfunctions," start all available AFW pumps, and reduce reactor power to 10%.

   D. Enter 18011-C "Turbine Trip below P9," reduce reactor power below 5%, and control Tave using atmospheric relief valves.

2. A reactor trip following a spurious turbine runback occurred on Unit 1. The following plant conditions are observed:

- RCS Tavg = 557 degrees F
- RCS pressure = 2198 psig and slowly increasing
- PDP pump in service
- CCP "A" is OOS with suction and discharge valve tagged shut
- Control Rods are fully inserted except Rods H-8 and D-4 are at 24 and 6 steps respectfully.

Which one of the following describes the appropriate action for the RO to take?

A. Start CCP "B", open HV-112D and HV-112E, close HV-112B and HV-112C, verify at least 80 gpm charging flow through the normal charging flowpath.

B. Start CCP "B", start a BAT pump, open HV-8104, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

C. Start a BAT pump, open HV-8104, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

D. Start a BAT pump, open HV-110A and HV-110B, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

3. Step 5 of procedure 19241-C, "Response to Imminent Pressurized Thermal Shock Condition," directs the operator to determine if ECCS flow can be terminated. Which one of the following describes the procedural action to be taken if termination criteria are NOT met?

   A. Attempt to start one RCP in accordance with the Attachment only if subcooling requirements are satisfied.

   B. Attempt to start one RCP in accordance with the Attachment regardless of subcooling requirements.

   C. Depressurize the RCS by stopping one train of ECCS pumps.

   D. Depressurize the RCS using PORV or Aux spray.

4. Which one of the following's instrumentation will be most reliable in the event that the control room is evacuated due to fire?

   A. Shutdown Panel A.

   B. Shutdown Panel B.

   C. Shutdown Panel C.

   D. TSC Plant Computer.

5. Which one of the following conditions describes an INOPERABLE Containment per LCO 3.6.1?

   A. The outer containment airlock door is found open in MODE 2.

   B. The inner containment airlock door is left open while performing maintenance on its O-rings in MODE 3.

   C. Both containment airlock doors are opened for maintenance in MODE 4.

   D. A containment penetration exceeds Tech Spec leakage rate limits in MODE 5.

6. Unit 2 is operating at 95% RTP during a return to power when it is discovered that:

   - Rod B-6 is determined to be misaligned by 24 steps due to a blown lift coil fuse.

   Which one of the following is the required action?

   A. Reduce power to less than or equal to 75% RTP in 2 hours.

   B. Reduce power to less than or equal to 50% RTP in 2 hours.

   C. Be in mode 3 in 6 hours.

   D. Reevaluate safety analysis and confirm results remain for duration of operation under these conditions in 6 hours.

7. A loss of all AC has occurred. The control room operators have completed the immediate operator actions of 19100-C,"FR-S.1 Loss of All AC Power," and have attempted without success, to restore power. Per procedure 19100-C, the control switches for ESF 4160V loads are placed in the Pull-To-Lock position.

   Which one of the following describes the adverse effect which placing these loads in Pull -To- Lock is designed to prevent?

   A. Overloading of electrical buses.

   B. To prevent a jacket water temperature trip of the running EDG.

   C. An uncontrolled cooldown of the RCS and possible reactor startup.

   D. The unnecessary use of water that may be needed for long term cooldown.

8. Unit 2 is operating at 100% power with PZR level at 60% and both PZR spray valves in manual and shut while I&C is investigating erratic responses.

A main turbine control failure results in a rapid load reduction causing RCS temperature, PZR level, and PZR pressure to go up rapidly. The RO stabilizes RCS pressure at 2300 psig by manually cracking open one spray valve. Pressure is held constant at 2300 psig for an extended period of time. The RO then observes that PZR level is 68%, the pressurizer pressure master pressure controller output has increased to 95%, PORV 455 is shut, PORV 456 is shut, and the backup heaters are on.

Which one of the following describes the status of the Pressurizer Pressure Control system?

A. Functioning properly.

B. Malfunctioning because PORV 455 should be open.

C. Malfunctioning because PORV 456 should be open.

D. Malfunctioning because the backup heaters should be de-energized.

9. Unit 1 has had a loss of offsite power and is cooling down using 19002-C, Natural Circulation Cooldown. RCS temperature is 500 degrees. Power has just been restored to the CRDM fans. Which one of the following describes the effect of starting all CRDM fans will have on the cooldown?

   A. The fans will contribute an additional 15-20 degrees per hour upper head cooldown. A GREATER amount of subcooling is procedurally required for cooldown.

   B. The fans will contribute an additional 15-20 degrees per hour upper head cooldown. A SMALLER amount of subcooling is procedurally required for cooldown.

   C. The fans will not significantly contribute to the overall upper head cooldown rate. A GREATER amount of subcooling is procedurally required for cooldown.

   D. The fans will not significantly contribute to the overall upper head cooldown rate. A SMALLER amount of subcooling is procedurally required for cooldown.

10. An intermediate steamline break has occurred on Unit 2. The reactor can be maintained on line for about five minutes without an automatic trip. Which one of the following describes the expected plant response to an intermediate size steam line break prior to the reactor trip? Assume all control systems are in a normal automatic lineup.

A. Turbine load will drop and rods will step in.

B. Turbine load will drop. Rods will not move until the reactor trips.

C. Turbine load will not change until the reactor trips. Rods will step in.

D. Turbine load will not change until the reactor trips, rods will not move.

11. Given the following conditions:

NSCW pumps 1,2,3, and 6 are in service
A loss of both RATs occurs
Both EDGs start and complete their UV sequence

Which one of the following choices correctly describes the expected response of the NSCW system to these conditions?

A. Pump 4 will start first and then pumps 1,2, and 3 will start when their discharge valves are fully closed.

B. Pumps 4 and 5 will start first and then pumps 1 and 2 will start when their discharge valves are fully closed.

C. Pumps 1,2,3, and 6 will start simultaneously.

D. Pumps 1,2,3, and 4 will start simultaneously.

12. Unit 2 is operating at 100% power. The RCP FRAME VIBRATION ALERT and RCP HI VIBRATION annunciators were received. Loop 3 RCP has a valid frame vibration of 5.2 mils.

Which ONE of the following is procedurally required?

A. Monitor vibrations and shut down the pump using the appropriate SOP if it exceeds the indicated rate of vibration increase.

B. Reduce power and shut down the RCP in accordance with the appropriate SOP.

C. Trip the reactor and trip the RCP.

D. Consult Westinghouse for guidance.

13. If RCS specific activity exceeds the limits established by Technical Specification 3.4.16, "RCS Specific Activity," the plant must be placed in HOT STANDBY with Tavg less than 500 degrees F. within 6 hours.

Which one of the following is the reason for this cooldown to less than 500 degrees F.?

A. To minimize containment pressure in the event of a LOCA.

B. To limit containment radiation levels in the event of a LOCA.

C. To maintain doses to the public within limits following a steam generator tube rupture.

D. To reduce the radiological consequences of a faulted steam generator.

14. The operating crew entered procedure 19221-C, FR-C.1, "Response to Inadequate Core Cooling." All attempts to establish high pressure Safety Injection flow were unsuccessful. RVLIS full range level is 28% and decreasing slowly, Core Exit Thermocouples are reading 820 degrees F and slowly increasing. Reactor Coolant pumps have been secured.

Which one of the following methods would be the NEXT step in mitigating the core cooling challenge?

A. Enter the Severe Accident Management Guidelines (SAMGs).

B. Open available pressurizer PORVs to allow RCS depressurization to the SI accumulator and SI injection pressures.

C. Depressurize all intact steam generators using Steam dumps or ARVs to 200 psig to allow RCS depressurization to the SI accumulator and SI injection pressures.

D. Restart one RCP in an idle loop to provide forced two-phase flow through the core.

15. Given the following conditions:
- A total loss of ACCW has occurred at 0220 EST.

- The RCP temperatures are being monitored on the IPC.

- The RCP vibration is being monitored.
- Reactor power is 30%.
- The time is currently 0226 EST.

Which ONE of the following is the required action for the operator?

A. Trip the reactor then trip all RCP's before 0230 EST.

B. Trip any RCP if its #1 seal leakoff temperature exceeds 195 degrees F.

C. Trip any RCP that has its thermal barrier isolation valve shut.

D. Trip any RCP with shaft vibration in excess of 5 mils before 0230 EST.

16. Unit 1 has tripped due to an electrical fault and the following conditions are observed:

- All Channel I trip status lights (except P-6, CNMT HI-3 and RWST LO-LO LEVEL) energized.

- A loss of Intermidiate Range Channel N-35.

Which one of the following describes the Source Range Channel(s) which will be available to monitor reactor power if no actions are taken?

A. There will be no Source Range Channels available.

B. N-31 only.

C. N-32 only.

D. Both N-31 and N-32.

17. While performing the ECCS flow reduction sequence in 19012-C, "Post LOCA Cooldown and Depressurization," different values of subcooling must be met before stopping a pump. The basis for these subcooling requirements is to:

A. Ensure that the RCPs do not cavitate if they are operating.

B. Minimum subcooling is maintained after the pump is stopped and RCS pressure decreases as expected.

C. Final RCS pressure after the ECCS pump is stopped will remain above the ECCS accumulator injection pressure.

D. Ensures that the running ECCS pumps do not cavitate as RCS pressure decreases following the pump stops.

18. Given the following conditions:

- RCS pressure = 2335 psig
- RCS Tave = 588.3 deg F
- The reactor is not tripped
- The crew is currently in 19211-C, "FR-S.1, Response to Nuclear Power Generation/ATWT," step 5.

Which ONE of the following describes the reason why RCS pressure should be maintained less that 2335 psig?

A. Prevents the pressurizer relief tank from going solid (due to an open PORV or PRZR code safety valve) and blowing the rupture disc causing a LOCA inside containment.

B. To prevent the reactor from tripping on high RCS pressure.

C. To ensure a sufficient amount of boric acid is injected into the core to reduce reactor power.

D. To ensure pressurizer spray valves don't short cycle when the PORVs open to lower RCS pressure.

19. Which one of the following correctly lists radiation monitors that are readable from the Safety Related Display Console (SRDC)?

A. RE-2562C CNMT atmosphere
RE-2565 CNMT purge
RE-12116 Control Room Air Intake

B. RE-13121 MSL #2
RE-0724 N-16 Monitor
RE-12839 SJAE/SPE

C. RE-2532A FHB
RE-13121 MSL #2
RE-2562 CNMT atmosphere

D. RE-12442C Plant Vent
RE-002 CNMT low range
RE-2565C CNMT purge

20. Unit 1 was shutdown in MODE 5 for refueling when a fuel handling accident occurred in the FHB. A spent fuel bundle was smashed into the side of the canal and a section of its cladding was damaged.

- Your current annual dose is 4000 mrem TEDE
- Dose rate in the area of the refueling bridge controls is 1500 mr/hr
- HP has specified full PCs and a SCBA for entry.

Which one of the following represents the maximum stay time in the area of the fuel handling bridge controls prior to exceeding station administrative limits?

A. 20 minutes

B. 33 minutes

C. 40 minutes

D. 67 minutes

21. Due to a problem on train "B" RHR, cold leg recirculation cannot be realigned to hot leg recirculation.

Which ONE of the following is the proper course of action?

A. maintain/realign both trains to cold leg recirculation.

B. place train "A" in hot leg recirculation and maintain/realign train "B" to cold leg recirculation.

C. place train "A" in hot leg recirculation and shut down train "B".

D. maintain/realign both trains for cold leg recirculation and begin a dilution within SDM constraints to minimize boron plating on the fuel assembly heat transfer surfaces.

22. Emergency procedure 19030-C, "Steam Generator Tube Rupture," step 13 states, "Check Ruptured S/G Pressure - Greater than 290 psig." Subsequent steps direct the operator to dump steam from the intact S/Gs as rapidly as possible in order to establish adequate subcooling margin.

Which ONE of the following statements correctly describes the reason for checking ruptured S/G pressure greater than 290 psig?

A. To ensure that the ruptured S/G is not faulted and that a PTS condition will not be developed on the cooldown.

B. To ensure that RCS pressure will be less than the ruptured S/G pressure after the cooldown to stop primary to secondary leakage.

C. To ensure that the operator blocks the low steam line pressure SI signal, which would actuate below 290 psig.

D. To ensure an optimal RCS temperature is established which would preclude a return to criticality during the rapid RCS cooldown.

23. Given the following conditions on Unit 2:

- Reactor is at 100% power.
- RCS boron concentration is 600 ppm
- Slave Relay Testing results in an inadvertent opening of 2-LV-112D and closure of 2-LV-112B.
- Prior to this event, pressurizer level, and Tave were on program.

Which one of the following describes how VCT level and reactor power will respond?

A. Level will increase, power will remain the same.

B. Level will decrease, power will increase.

C. Level will increase, power decrease.

D. Level will decrease, power will remain the same.

24. Unit 1 is in MODE 3. AOP 18009, "Steam Generator Tube Leakage," Section A, is being performed due to leakage in #3 SG. Per this AOP, which ONE of the following is the correct description of the actions (consider sequence also) required to reach MINIMUM break flow?

A. Cool down to 500 deg F, isolate #3 SG, depressurize the RCS to slightly below #3 SG pressure.

B. Isolate #3 SG, cool down to 500 deg F, depressurize the RCS to slightly below #3 SG pressure.

C. Isolate #3 SG, cool down to 500 deg F, depressurize the RCS to 25-50 psig greater than #3 SG pressure.

D. Cool down to 500 deg F, isolate #3 SG, depressurize the RCS to 25-50 psig greater than #3 SG pressure.

25. I & C just completed a surveillance on the high voltage power supply to the Source Range/ Intermediate Range (SR/IR) Nuclear Instruments. Voltage was 750 vdc (normally 850 vdc).

Which one of the following describes the affect and the reason that this lower than normal voltage has on SR/IR performance?

A. Indicated power will not be affected because the high voltage only supplies power to the electronic circuitry for the amplifier.

B. Indicated power will increase because of the lowered preamplifier low noise current input pulse.

C. Indicated power will decrease because smaller pulses are generated by the alpha decay of U235, and even smaller pulses are generated by gamma interactions in the detector.

D. Indicated power will decrease because the reduced voltage in the high voltage power supply provides less biasing to sweep ions from the fission chamber.

26. During recovery actions of a misaligned control bank or shutdown bank A or B rod, a Rod Control Urgent Failure is received. This alarm is the result of:

A. the Pulser/Oscillator being inhibited during recovery actions.

B. the Lift Coils being disconnected for the group with the misaligned rod.

C. the Lift Coils being disconnected for the unaffected group in the affected bank.

D. the multiplexing failure which was generated during withdrawal of the misaligned rod.

27. Given the following information:

- Unit 2 is in Mode 6
- RCS drained to 188.6 feet
- RCS temperature is 125 degrees F
- RCS pressure is approximately atmospheric
- Reactor has been shut down for 21 days
- Core reload is complete, replacing 1/3 of core with new fuel
- A total loss of RHR cooling has occurred

Which ONE of the following is correct concerning the amount of time it will take to reach saturated conditions in the RCS?

(Use the attached figures from AOP-18019-C, "Loss of RHR")

A. 27 minutes

B. 38 minutes

C. 50 minutes

D. 62 minutes

28. In which one of the following situations would the RO require prior approval before shutting down the reactor?

A. Reactor power is 111%, no automatic trip.

B. Pressurizer level is decreasing rapidly for no apparent reason and cannot be restored using normal charging. Plant power is 100%.

C. The PZR RELIEF DISCH HI TEMP annunciator comes in, RCS pressure is stable.

D. Turbine trip occurs at 100% power, no automatic trip.

29. The following conditions exist on Unit 1:

- Reactor power is stable at 85%.
- RCS boron concentration is 900 ppm.
- Tavg and Tref are matched.
- Control rods are currently bank D at 210 .
- Control rods are in automatic.
- Burnup is 11000 MWD/MTU

The following events occur on Unit 1:

- Control rods begin to step in.
- The RO places the control rods in manual and notes the control rods stop with bank D at 190.
- Reactor power remains at 85%

Assuming Tref does not change, which ONE of the following is closest to the expected Tavg-Tref deviation?

A. 3.2 degrees F.

B. 5.4 degrees F.

C. 16.9 degrees F.

D. 29.1 degrees F.

30. Due to a partial loss of power, Unit 2 RCPs 1 and 4 tripped, causing a reactor trip from 100% power. Assume no loss of RCS inventory. Which one of the following describes the expected readings on RVLIS for the reactor vessel upper range (Δpa); full range (Δpb); and dynamic head (Δpc)?

	upper range	full range	dynamic head
A.	100%	100%	off scale low
B.	100%	100%	47%
C.	120%	120%	off scale low
D.	120%	120%	47%

31. The crew is responding to a LOCA using 19012-C, "Post-LOCA Cooldown and Depressurization." SI has been reset. A loss of power then occurs on 1BA03 and the 1B EDG and sequencer responds properly. Which ONE of the following correctly applies to the conditions described?

A. SIP B and CCP B will both automatically start.

B. SIP B and CCP B should both be placed in pull-to-lock to prevent their starting automatically.

C. CCP B will start automatically, but SIP B must be started using the individual pump hand switch if it is needed.

D. SIP B and CCP should be started by initiating a manual SI.

32. A leaking Pressurizer code safety valve is suspected. Pressurizer code safety valve tailpipe temperatures are all reading 260 degrees. What other method can be used to identify the specific code safety that is leaking?

A. Pressurizer code safety valve sonic flow indication on the PSMS.

B. Pressurizer code safety valve position indication on the PSMS.

C. PRT temperature and pressure trends on the IPC.

D. Pressurizer code safety valve position indication on the main control board.

33. The crew is responding to a primary LOCA outside containment. The reactor was tripped and SI was manually actuated. They have completed procedure 19112-C, "LOCA Outside Containment," and transitioned to 19111-C, "Loss of Emergency Coolant Recirculation," since they were unable to isolate the leak.

    Which ONE of the following choices describes the correct actions to take in 19111-C under these conditions?

    A. Initiate RCS cooldown, verify containment cooling units running in low speed, minimize the number of CS pumps running based on containment and RWST conditions.

    B. Shift containment cooling units to fast speed, stop all containment spray pumps, and minimize ECCS flow to maintain at least 24 deg F subcooling.

    C. Initiate RCS cooldown, establish one train of ECCS flow to maintain subcooling >74 deg F, and start makeup to the RWST.

    D. Initiate RCS cooldown, minimize ECCS flow to keep RVLIS full range > 62% and start makeup to the RWST.

34. Unit 1 was at 100 percent rated thermal power, when a loss of all AC occurred. The Turbine Driven AFW pump was lined up to the # 2 CST. Motor Driven Auxiliary Feed Water Pumps were aligned to the # 1 CST. All buses energized properly, with the exception of the following buses that did NOT re-energize.

1ABB
1AA02
1CD1M
1NA05
1NA01
1NA04

Which one of the following represents the auxiliary feed water flow path to the Steam Generators?

A. Motor Driven Auxiliary Feed water pump A through HV-5137 and HV-5139 to Steam Generators # 1 and # 4, respectively.

B. Motor Driven Auxiliary Feed water pump B through HV-5132 and HV-5134 to Steam Generators # 2 and # 3, respectively.

C. Turbine Driven Auxiliary Feed water pump through HV-5122 and HV-5120 to Steam Generators # 1 and # 4, respectively and through HV-5125 and HV-5127 to Steam Generators # 2 and # 3, respectively.

D. Turbine Driven Auxiliary Feed water pump through HV-5125 and HV-5127 to Steam Generators # 2 and # 3, respectively.

35. Which one of the following represents the Atmospheric Relief Valves that can be operated in the Fire Emergency mode?

A. PV-3000 and PV-3010

B. PV-3010 and PV-3020

C. PV-3020 and PV-3030

D. PV-3030 and PV 3000

36. Both units are in MODE 1 when high radiation alarms occur in the fuel handling building during the movement of irradiated fuel. The operator observes no bubbles from the pool and pool level is not lowering. Procedure 18006-C, "Fuel Handling Event," is entered.

Which ONE of the following is the correct action for the conditions stated?

A. Evacuate the fuel handling building.

B. Secure containment purge if in progress.

C. Enter 18030-C, "Loss of Spent Fuel Pool Cooling or Level," and 18004-C, "Reactor Coolant System Leakage."

D. Have HP determine the extent of damage to the fuel.

37. Unit 1 is critical in MODE 2 below the P-6 interlock when BOTH Source Range Nuclear Instrumentation channels fail. What immediate actions are required by Technical Specifications?

A. Immediately stabilize power and verify that power is indicated by two channels of Intermediate Range Nuclear Instrumentation.

B. Immediately suspend operations involving the addition of positive reactivity until one Source Range Nuclear Instrumentation channel is returned to service.

C. Immediately open the reactor trip breakers.

D. Initiate actions within 1 hour to be MODE 3 within 7 hours.

38. The plant Safety Monitoring System (PSMS) calculates RCS subcooling by using which one of the following instrument inputs?

A. Pressurizer pressure and RCS WR Thot.

B. Pressurizer pressure and core exit thermocouples.

C. RCS WR pressure and RCS WR Thot.

D. RCS WR pressure and core exit thermocouples.

39. A failure or malfunction of the ESF sequencers which results in delays in the energizing of ESF components has occurred. Which ONE of the following is correct concerning the effects on the fuel during a large-break LOCA?

A. Cladding failure can occur as the core experiences an uncontrolled cooling due to vaporization of reactor coolant.

B. Structural integrity can be lost as delayed cooling can lead to fuel temperatures in excess of ECCS acceptance criteria, resulting in excessive clad oxidation and weakening.

C. Minimal effects will be seen as reflux cooling is sufficient to cool the core for up to ten minutes after the onset of a large break LOCA.

D. A natural circulation cooldown of the fuel can be adversely impacted due to excessive reactor coolant blowdown.

40. A reactor trip has occurred on Unit 2 but the Train B Reactor Trip Breaker did not open. Which one of the following describes the feedwater system response as RCS temperature lowers?

A. Both Train A and Train B FWI signals will be generated and all FWI valves will close when RCS temperature lowers to 564 degrees F.

B. Only Train A FWI signal will be generated and all FWI valves will close when RCS temperature lowers to 564 degrees.

C. Only Train A FWI signal will be generated and only the FWI valves for loops 1 and 4 will close when RCS temperature lowers to 564 degrees.

D. No FWI signal will be generated when RCS temperature lowers to 564 degrees F.

41. Given the following:

- A spurious Unit 2 trip/SI was actuated from 99% power.
- SI has NOT be reset
- Containment radiation on RE-002 and RE-003 indicate 15 mr/hr.

Which one of the following is true?

A. CIA can be reset with the SI signal present.

B. The SI signal must be reset before CIA can be reset.

C. CIA should not have activated.

D. CIA HI-rad must be reset; Then reset CIA

42. Unit 1 is at 100% RTP when Condensate Storage Tank (CST) #1 experiences a major structural failure. The control room operators swapped suction supply of the AFW pumps to CST #2.

Which one of the following, if anything, must be done to allow the motor driven AFW pumps to operate without an unnecessary loss of CST #2 volume?

A. MDAFW pumps must be cross connected by opening their discharge cross connect valves.

B. MDAFW pumps mini-flow valves must be locally manually aligned from CST #1 to CST #2.

C. MDAFW pumps MOV mini-flow valve must be deenergized in the shut position.

D. With the new MDAFW mini-flow modification no manual actions are required.

43. Given the following plant conditions:

- The RCS is on RHR and solid
- RCS pressure is 350 psig
- RCS temperature is stable
- HC-128 RHR to LETDOWN Flow, controller setting is at 40% demand
- PV-131, LETDOWN PRESSURE Controller, is in AUTO
- The Reactor operator adjusts HC-128 controller to 80% demand

Which ONE (1) of the following statements is correct?

A. Letdown pressure increases, PV-131 automatically, throttles SHUT to restore letdown pressure to its original value, and RCS pressure DECREASES.

B. Letdown pressure increases, PV-131 automatically, throttles OPEN to restore letdown pressure to its original value, and RCS pressure DECREASES.

C. Letdown pressure increases, PV-131 automatically, throttles SHUT to restore letdown pressure to its original value, and RCS pressure INCREASES.

D. Letdown pressure increases, PV-131 automatically, throttles OPEN to restore letdown pressure to its original value, and RCS pressure INCREASES.

44. Unit 1 is operating at 100% power when a large break LOCA occurs, followed immediately by a loss of offsite power. Which ONE of the following describes the response of the containment coolers to this event?

A. Four containment coolers start in fast speed approximately 30 seconds after the closure of diesel generator output breakers, followed by the start of four additional coolers in fast speed 20 seconds later.

B. Four containment coolers start in slow speed approximately 30 seconds after the closure of diesel generator output breakers, followed by the start of four additional coolers in slow speed 20 seconds later.

C. Eight containment coolers start in fast speed approximately 30 seconds after the closure of diesel generator output breakers.

D. Eight containment coolers start in slow speed approximately 30 seconds after the closure of diesel generator output breakers.

45. Given the following conditions:

- Unit 2 is at 100% power
- CCP "A" is in service providing normal charging flow
- An inadvertent "B" train SI was generated by I&C
- "A" train SI signal is NOT present
- No operator action has been taken

Which ONE of the following is correct?

A. Normal mini-flow path for both CCPs is isolated, CCP "A" alternate mini-flow path is isolated, CCP "B" alternate mini-flow is available.

B. CCP "A" normal mini-flow path is available, CCP "A" alternate mini-flow path is isolated, CCP "B" alternate mini-flow path is available.

C. Normal mini-flow path for both CCPs isolated, alternate mini-flow path for both CCPs is available.

D. Normal mini-flow paths for both CCPs isolated, alternate mini-flow paths for both CCPs isolated.

46. The unit is operating at 100% RTP when the B MFP tripped. The BOP immediately started the third condensate pump. How does the condensate demineralizer bypass valve operate under these conditions?

A. Slow open to protect demineralizer elements from high differential pressure.

B. Fast open to increase Main Feed pump NPSH.

C. Slow open to prevent condensate system water hammer.

D. Fast open to provide constant steam packing exhaust condenser cooling flow.

47. A plant startup is in progress at 18% power. Turbine load is at about 125 MW. A loss of control oil causes the "A" feed pump to coast down and feedwater discharge pressure falls below SG pressure.

Which ONE of the following describes the REQUIRED operator actions?

A. Ensure all AFW pumps supplying S/Gs, trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection."

B. Ensure all AFW pumps supplying S/Gs and reduce reactor power to less than 10%.

C. Restart the "A" feed pump using the manual potentiometer (GE pot).

D. Trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection," while continuing in 18016-C, "Condensate and Feed Malfunction."

48. Given the following sequence of events:

- A reactor trip occurred on Unit 1 causing levels in all S/Gs to drop to between 33 and 36%, narrow range
- All AFW pumps start with discharge valves full open
- Level has returned to 60-70% NR level in all S/Gs 10 minutes after the trip
- The BOP throttles AFW flow on all discharge valves

THEN:

- Both MFPs trip

Which ONE of the following states the position of the discharge valves?

A. The MDAFW and the TDAFW discharge valve positions would not change.

B. The TDAFW valves would stay as they are and the MDAFW valves would stroke full open.

C. The MDAFW valves would stay as they are and the TDAFW valves would stroke full open.

D. The MDAFW and TDAFW valves would stroke to full open position.

49. Unit 2 is in MODE 3 at 557 degrees and 2235 psig when a fault condition results in the loss of the 2NAB 13.8KV bus. In order to stabilize RCS pressure, the RO manually energizes the available backup heaters and attempts to control RCS pressure by manually operating the pressurizer spray valves.

Which ONE of the following statements best describes the required control board actions necessary to stabilize pressure?

A. Loop 1 spray valve, PV-455C, should be manually closed and loop 4 spray valve, PV-455B, must be used to control pressure.

B. Loop 4 spray valve, PV-455B, should be manually closed and loop 1 spray valve, PV-455C, must be used to control pressure.

C. The backup heaters should be deenergized because neither Loop 1 spray valve, PV-455C, nor Loop 4 spray valve, PV-455B, will be effective in controlling RCS pressure.

D. Either spray valve may be used to control pressure.

50. Following a small steam leak in containment, one channel of containment pressure reads 4.0 psig, the remaining channels read 3.6 psig. The power supply for area radiation monitor RE-002 begins acting erratic and generates a HI alarm. What automatic action(s) will occur?

A. A safety injection will be initiated.

B. All 8 containment coolers will start in slow speed.

C. All 8 containment coolers will start in fast speed.

D. Containment ventilation isolation (CVI) signal will be generated.

51. During a waste gas tank release RE-13, waste gas process radiation monitor fails low. Which one of the following are the potential consequences?

A. Waste gas compressor trips

B. High radiation levels could be released.

C. Gaseous waste release would be secured.

D. This would have no effects on the release.

52. Which ONE of the following is an indication of an RCP #1 seal failure?

A. Affected RCP #1 seal delta P increase.

B. Affected RCP #1 seal leakoff increase.

C. Excess letdown header pressure decrease.

D. Affected RCP seal injection flow decrease.

53. Unit 1 is operating at 100% power with bank "D" rods at 218 steps when an electrical failure deenergizes the "1CY1A" 120V AC vital instrument bus. You have noted that the rods cannot be withdrawn. Which ONE of the following is preventing rod motion?

A. C-1, IR over-power rod stop.

B. C-2, power range high flux rod stop.

C. C-3, over-temperature delta-T rod stop.

D. C-4, over-power delta-T rod stop.

54. Unit 1 is stable at full power. Which ONE of the following would be the first indication of a failure of multiple nuclear service cooling water tubes in a containment cooler?

A. "CNMT HI MSTR" annunciator.

B. "CNMT HI TEMP" annunciator.

C. "CNMT CLR COND LEAK" annunciator.

D. "CNMT HI-1 PRESS ALERT ADVERSE CNMT" annunciator.

55. Which of the following is a containment ventilation interlock?

A. Control Rod Drive Mechanism Cooling Fans are interlocked to prevent operating two fans per train.

B. Preaccess Main Purge is interlocked to prevent simultaneous operations with the Mini purge system.

C. Reactor Cavity Cooling low temperature and low flow interlocks are enabled when the control switch is in the ON position.

D. Post LOCA Cavity Purge is interlocked with main purge to prevent simultaneous operation.

56. With Unit 1 at 100% power, the RO takes the following data from the power range NIs. Assume the normalization factor for all detectors is 1.0.

Detector	N-41	N-42	N-43	N-44
Upper	337	360	367	355
Lower	370	360	365	360

Which ONE of the following is correct?

A. QPTR is 1.017

B. QPTR is 1.028

C. QPTR is 1.034

D. QPTR is 1.062

57. Unit 2 is in Mode 3 during a reactor startup. Charging and letdown are in their normal alignment when a loss of Instrument Air occurs. Which one of the following describes the effect of the loss of air on pressurizer level and VCT level?

A. Pressurizer level and VCT level are slowly decreasing.

B. Pressurizer level and VCT level are slowly increasing.

C. Pressurizer level is slowly decreasing and VCT level is slowly increasing.

D. Pressurizer level is slowly increasing and VCT level is slowly decreasing.

58. 1-RE0018 has failed and will be out of service for 6 days. Due to operational transients, the Liquid Waste System has no remaining storage capacity. Which one of the following is the correct course of action?

A. Shutdown to Mode 3 using control rods until Rod Bank LO-LO Limit and then trip the reactor.

B. Draw and analyze one sample before the release and then one sample after the release is terminated.

C. Draw and analyze two independent samples prior to commencing the release.

D. Commence release and at least once per 4 hours, collect and analyze grab samples.

59. A waste gas decay tank release is in progress. Which ONE of the following malfunctions occurring during the release could result in a release outside of permitted limits assuming no operator action?

A. Loss of instrument air to RV-14, waste gas effluent isolation valve.

B. FI-14, waste gas flow indicator, fails low.

C. RE-14, waste gas processing rad monitor, fails low.

D. Loss of power to RV-14, waste gas effluent isolation valve.

60. With the plant operating at 70% power, a significant leak develops in the variable leg of the channel #1 S/G level detector which is selected for S/G water level control.

If NO operator action is taken, which ONE of the following statements correctly describes one of the effects on the affected steam generator?

A. Loop 1 feed regulating valve will open.

B. Steam flow will initially be higher than feed flow.

C. Level will equalize at some value significantly lower than original.

D. Indicated steam generator level will increase on the affected channel.

61. The following indications exist in the control room with the unit at 45% power, all control systems are in AUTO:

- TAVG/TREF DEVIATION annunciator
- AMSAC TROUBLE annunciator
- TURB PWR P13 CHII PB-506A status light illuminated (CHI PB-505A off)

The FIRST action required of the operator in accordance with the appropriate AOP is:

A. Verify no rod motion.

B. Verify a runback is required.

C. Check no runback is in progress.

D. Place rods in MANUAL.

62. Which one of the following is the length of time the ESF batteries are sized for at full load?

A. 1.25 hours

B. 2.00 hours

C. 2.75 hours

D. 4.00 hours

63. The loop 3 narrow range cold leg RTD fails high while at 100% power. Which ONE of the following describes how loop 3 Delta T indication will react?

A. increases

B. decreases

C. remains the same

D. decreases then slowly returns to normal

64. Unit 1 is shutdown for a refueling outage. A service air header rupture occurs and the service air system completely depressurizes. Valve PV-9375, Service Air Header Isolation valve, was open at the time of the rupture. What effect does a total loss of the service air system have on the instrument air system?

A. Valve PV-9375 will auto-close as instrument header pressure decreases below 100 psig and a standby air compressor will start automatically to maintain instrument air header pressure.

B. Valve PV-9375 will auto-close as instrument header pressure decreases below 80 psig and the swing air compressor must be manually started to maintain instrument air header pressure.

C. Valve PV-9375 will auto-close as instrument air header pressure decreases below 80 psig and a standby air compressor will operate to maintain instrument header pressure.

D. Valve PV-9375 will auto-close and the instrument air header will completely depressurize.

65. The pressure in main steam supply header used as primary source of steam to Steam Jet Air Ejector slowly drops by about 5 % due to a small steam leak. This causes a reduction in the effectiveness of the Steam Jet Air Ejector. As vacuum decreases:

A. Psat increases, Tsat increases, and enthalpy change across turbine decreases.

B. Psat decreases, Tsat decreases, and enthalpy change across turbine decreases.

C. Psat increases, Tsat increases, and enthalpy change across turbine increases.

D. Psat decreases, Tsat decreases, and enthalpy change across turbine increases.

66. Which one of the following describes the operation of the Standby Auxiliary Transformer?

A. An automatic interlock prevents aligning the SAT to its associated 1E bus if the supply breakers from the RAT are open. The SAT capacity provides adequate shutdown capability for both safety busses.

B. A Kirk key interlock prevents aligning the SAT to its associated 1E bus at the same time the RAT is aligned to the bus. The SAT capacity provides adequate shutdown capability for both safety busses.

C. An automatic interlock prevents aligning the SAT to its associated 1E bus if the supply breakers from the RAT are open. The SAT capacity provides adequate shutdown capability for only one safety bus.

D. A Kirk key interlock prevents aligning the SAT to its associated 1E bus at the same time the RAT is aligned to the bus. The SAT capacity provides adequate shutdown capability for only one safety bus.

67. The following conditions exit for Unit 1:

- EDG-1A is OOS for repairs
- A large primary LOCA and a loss of both RATs has occurred
- CNMT pressure is 37 psig and rising
- CS pump 'B' tripped and cannot be restarted
- EOP 19251-C, "FR-Z.1, Response to CNMT High Pressure" is being implemented

Which one of the following is the correct action to take?

A. No additional actions are necessary, CNMT pressure will be maintained less than 52 psig with the currently running equipment.

B. CNMT coolers on train B should be shifted to high speed to provide additional cooling.

C. Energize 1AA02 from the SAT and start train A CNMT coolers in low speed. CS pumps are not necessary for this type of accident.

D. Energize 1AA02 from the SAT and start train A CNMT coolers in low speed. Train A CS pump should be also started for this type of accident.

68. The normal full open pressure setpoint for the pressurizer spray valves is:

A. 2260 psig

B. 2310 psig

C. 2315 psig

D. 2330 psig

69. A spent fuel pool low level alarm is received . Which one of the following describes the impact of a continued loss of SFP level?

A. At 22 feet above the assemblies, a loss of NPSH to SFP cooling pumps occurs.

B. At 21 feet above the assemblies, a loss of adequate shielding over spent fuel occurs.

C. At 20 feet above the assemblies a loss of suction to the SFP cooling pumps occurs.

D. At 19 feet above the assemblies, a loss of adequate volume to remove 99% of the assumed 10% gap activity released from the rupture of an SFA occurs.

70. Unit 1 is operating at 50% power with normal operating equipment in service. Circulating water pump # 1 has just tripped due to a fault. Given the current plant conditions what is the effect on the main condenser dT and plant efficiency?

	dT	Plant Efficiency
A.	Increase	Increase
B.	Decrease	Increase
C.	Increase	Decrease
D.	Decrease	Decrease

71. Given the following information:

- Reactor Power is 100% RTP
- All Control Rods are at 228 steps
- Rod bank selector switch in manual
- The in-hold-out switch is held in the "IN" position until the step counters count 5 steps IN
- DRPI indication does not change

Which ONE of the following statements is true?

A. Rods definitely moved inward as indicated by the step counter change even though DRPI did not indicate rods moved.

B. Since rods did not move when 4 steps of rod movement was demanded, AOP 18003-C, "Rod Control System Malfunction," must be entered.

C. Rods probably moved inward as indicated by the step counter change. Rods will have to move in another step before DRPI indication will change.

D. Since DRPI indication did not change as expected when 4 steps of rod movement was demanded, operations should perform the control rod operability surveillance test.

72. Containment spray is operating (and is required) after a large break LOCA in containment. Cold leg recirculation alignment per 19013, "Transfer to Cold Leg Recirculation," for the ECCS pumps has been performed. The "RWST Empty" alarm is received and you verify RWST level is 9% and decreasing. Which ONE of the following actions should you perform?

A. Stop the containment spray pumps when RWST level is less than 5% if auto swapover to sump suction did not occur at the 9% RWST level.

B. Minimize containment spray flow by stopping one of the containment spray pumps after verifying at least 4 containment coolers are running in slow speed. When RWST level lowers to less than 5%, stop the remaining pump.

C. Realign the containment spray suction to the containment sump while allowing the pumps to continue to run.

D. Stop the containment spray pumps, realign containment spray suction to the containment sump, then restart the containment spray pumps.

73. Unit 1 is operating at 100% power when the following parameters are noted:

- "RCP LOOP 1 LOW FLOW ALERT" annunciator is received
- Reactor coolant loop 1 flow indicator 1-FI-0414 indicates 100%
- Reactor coolant loop 1 flow indicator 1-FI-0415 indicates 100%
- Reactor coolant loop 1 flow indicator 1-FI-0416 indicates 100%
- Bistable FB414A (7300 NSSS channel I) has tripped
- Tavg, and loop delta T are normal for 100% reactor power

Which ONE of the following is the most probable cause for the alarm condition and what are the operational implications?

A. At least two loop 1 flow indicators have failed as-is while loop flow has reduced to at least 90%. 18005-C, "Partial Loss of Flow," must be entered.

B. At least two loop 1 flow indicators have failed as-is while loop flow has reduced to at least 90%. 18001-C, "Primary Systems Instrument Malfunction," must be entered.

C. Bistable FB414A has malfunctioned. The affected channel may be bypassed indefinitely while repairs are made, however, the loop 1 low flow trip is now subject to a 2-out-of-2 trip logic on the remaining low flow channels.

D. Bistable FB414A has malfunctioned. The affected channel bistable must be placed in trip within 6 hours. Operations may continue indefinitely, however, the loop 1 low flow trip is now subject to a 1-out-of-2 trip logic on the remaining low flow channels.

74. The 2A EDG is running. The lead Fuel Oil Transfer pump starts in response to low level in the Fuel Oil Day Tank. This pump fails to develop adequate discharge pressure but continues to run.

Which one of the following correctly describes the operation of the 2A EDG?

A. The second Fuel Oil Transfer pump will NOT start due to the lead pump's breaker being shut.

B. The second Fuel Oil Transfer pump will NOT start unless the alternator circuit is manually reset.

C. The second Fuel Oil Transfer pump will start if in AUTO.

D. The second Fuel Oil Transfer pump will start when the engine driven fuel oil pump discharge pressure begins to decrease.

75. A condenser circulating water pump develops a slight vibration and it is determined that maintenance must be performed on the pump. You are directed to establish a Circulating Water Pump level of 29 to 31.5 feet, prior to stopping the pump. What is the basis for this action?

A. To ensure the remaining Circulating Water Pump has sufficient NPSH.

B. To prevent over flowing the Cooling Water Basin.

C. To allow the discharge permissive to be bypassed.

D. To minimize the buildup of ice on the cooling tower fill plates.

76. You are an extra RO on shift but not part of the Fire Brigade. An alarm is received on the Fire Alarm Console and you are dispatched to the scene to investigate. You discover that an actual fire condition exists. Which one of the following should you do after informing the USS?

A. Announce the fire location over the page system.

B. Enter the room and secure ventilation to the room if you think you can do so safely.

C. Search for and evacuate personnel from room.

D. Attempt to extinguish fire using methods commensurate with your training if you think you can do so safely.

77. An inadvertent Safety Injection occurred on Unit 1. Pressurizer level got as low as 22% but is currently increasing. Which one of the following describes the response of letdown flow in this event?

A. Letdown flow went to zero the CIA signal was received.

B. Letdown flow went to zero when the low pressurizer level was received.

C. Letdown flow continued for a short time after the CIA signal then went to zero

D. Letdown flow continued for a short time after the low pressurizer level was received then went to zero.

78. Given the following conditions on Unit 1:

- Unit 1 at 14% reactor power after a trip from 320 days on line
- Rod control in manual
- Main turbine rollup completed at 1800 rpm
- MFP A operating with all BFRVs in AUTO
- RCS Tavg is at 561.5 degrees F.
- Steam dump pressure controller PIC-507 in AUTO

If main steam line pressure transmitter PT-507 fails high, which one of the following is CORRECT?

A. All steam dumps remain closed.

B. Steam header pressure cannot be controlled in the steam pressure mode and the main turbine must be tripped.

C. All of the steam dumps fully open, an RCS uncontrolled cooldown condition continues.

D. All steam dumps fully open and RCS cooldown stops at 550 degrees F.

79. Which one of the following describes the Primary to Secondary Leakage Detection Radiation Monitor(s)?

A. A single detector located in the TB steam chase between the steam lines which looks for N-16.

B. A single detector located in the TB steam chase between the steam lines which looks for long lived fission products.

C. Four detectors, one attached to each steam line which look for N-16.

D. Four detectors, one attached to each steam line which look for long lived fission products.

80. A loss of instrument air occurred on Unit 1. In accordance with AOP 18028-C, Loss of Instrument Air, the Unit 2 instrument air header has been cross-tied. Unit 2 instrument air pressure begins to lower as well. In accordance with 18028-C, which one of the following is the Unit 2 instrument air header pressures should the operators re-isolate the headers?

A. 100 psig

B. 90 psig

C. 80 psig

D. 70 psig

81. A power operated relief valve fails open while Unit 1 is at 100% power. Due the increasing pressure in the PRT the common relief valve inlet pipe to the PRT fails at a flange immediately upstream of he PRT, with the ends offset by one pipe diameter.

Which ONE of the following best describes the INITIAL response to the pipe break?

A. PRT pressure increasing, containment radiation levels increasing.

B. PRT pressure increasing, containment radiation levels constant.

C. PRT pressure decreasing, containment radiation levels increasing.

D. PRT pressure decreasing, containment radiation levels constant.

82. Given the following information:

- Unit 1 is entering MODE 4
- RHR train "A" and CCP "A" are in service
- Various train "A" CCW annunciators are in alarm
- All train "A" CCW pumps are running with discharge pressure at 75 psig
- CCW train "A" surge tank level is decreasing
- The crew enters AOP 18020-C, "Loss of CCW"

Which ONE of the following is the correct action to take per 18020-C?

A. Place CCW train "A" in single pump operation after verifying that NSCW train "A" is in service.

B. Stop CCW train "A" pumps and place non-affected CCP "B" in service after verifying that CCW Train "B" is in service.

C. Stop CCW train "A" pumps and stop train "A" NSCW pumps after verifying that CCW train "B" is in service.

D. Stop CCW train "A" pumps and place non-affected RHR train "B" in service after verifying that CCW train "B" is in service.

83. Unit 1 is operating at 8% power and preparing continue the increase load after a startup. Which one of the following conditions/signals will generate a main turbine trip signal directly?

A. # 1 S/G level = 87%.

B. Pressurizer Pressure = 1945 psig.

C. Pressurizer level = 93%

D. Loss of the # 1 and # 3 RCPs.

84. Which one of the following describes the two reactor cavity cooling units?

A. They are normally cooled by Normal Chilled Water but the B unit can also be supplied by NSCW. Both fan units are needed to maintain the primary shield and reactor cavity concrete < 200 degrees.

B. They are normally cooled by Normal Chilled Water but the B unit can also be supplied by NSCW. Each fan unit is independently able to maintain the primary shield and reactor cavity concrete < 200 degrees.

C. They are normally cooled by NSCW but the B unit can also be supplied by Normal Chilled Water. Both fan units are needed to maintain the primary shield and reactor cavity concrete < 200 degrees.

D. They are normally cooled by NSCW but the B unit can also be supplied by Normal Chilled Water. Each fan unit is independently able to maintain the primary shield and reactor cavity concrete < 200 degrees.

85. Given the following information:

- Unit 1 is in Mode 4 with RHR train "A" in service
- RHR Pump "B" is out of service for maintenance
- The "B" train of SFPC is in service
- CCW TRAIN A SURGE TK HI/LO LVL annunciator is received and it is confirmed that surge tank level is increasing
- RE-017A, CCW train "A" radiation monitor, indicates increasing radiation levels in the CCW system

Which ONE of the following most correctly describes the cause and operator response for the plant conditions above?

A. The "A" RHR pump seal cooler has developed a leak. CCW can be isolated to the seal cooler so long as RHR temperature does not exceed 150 degrees.

B. The "A" RHR heat exchanger has developed a tube leak. The "A" train of RHR must be shut down and AOP 18019-C, "Loss of Residual Heat Removal," must be entered.

C. The "A" RHR heat exchanger has developed a tube leak. The "A" train of CCW must be shut down; however, operation of the "A" train of RHR may continue.

D. The "A" CCW heat exchanger has developed a tube leak. Operation of the "A" train of CCW may continue.

86. Which one of the following describes the effect if the gate between the Spent Fuel Pool and the Transfer Canal were opened with the SFP full and the canal empty?

A. SFP level would drop below the TS minimum and there would NOT be adequate radiation shielding of the spent fuel.

B. SFP level would NOT drop below the TS minimum.

C. SFP level would drop below the TS minimum however, there would be adequate radiation shielding of the spent fuel.

D. SFP level would drop only to the level of the suction strainers and there would be adequate radiation shielding of the spent fuel.

87. Given the following conditions:

- A large break LOCA has occurred 3 hours ago on Unit 1
- Containment pressure is 46 psig
- Containment H2 concentration is 5% per the H2 monitors
- DG1A is supplying 1AA02

Which ONE of the following is correct concerning post-accident hydrogen control using the attached procedure 13130-C, "Post Accident Hydrogen Control?"

A. Dilute the containment hydrogen concentration using the service air system.

B. The "A" train post-LOCA electric hydrogen recombiner can be placed in service if 1AA02 bus loading is monitored.

C. The "A" train post-LOCA electric hydrogen recombiner can NOT be placed in service due to DG1A carrying the 1AA02 bus.

D. The hydrogen monitors are unreliable at this point. Three more hours must pass and another hydrogen sample taken.

88. During a declared "GENERAL EMERGENCY" you volunteer to perform an action to minimize equipment damage. While briefing with the Dose Assessment Manager, you are informed you will exceed your normal exposure limits.

Which one of the following individuals can approve use of Emergency Exposure limits?

A. EOF Manager.

B. Dose Assessment Manager.

C. Accident Unit SRO.

D. Emergency Director.

89. During Refueling operations the Reactor Operator:

A. makes final decision concerning deviations from fuel loading sequence or assembly substitutions.

B. may perform as second person who verifies correct manipulation of fuel assemblies and fuel inserts.

C. is responsible for signing Fuel Handling Data Sheets.

D. gives permission for disengagement of fuel bundles in the core.

90. You have entered a Technical Specification LCO which prohibits core alterations. Which of the following activities would NOT be allowed to continue?

A. Movement of the core upper internals and the reactor vessel head in the storage location.

B. Movement of an RCCA within the reactor vessel.

C. Movement of a fuel assembly within the fuel storage area.

D. Movement of the refueling machine mast above the reactor vessel.

91. Which one of the following conditions would require the Reactor Operator to shut the main steamline isolation valves following a reactor trip as an Immediate Operator Action in accordance with 19100-C, "Loss of all AC Power?"

A. The turbine control valves do not close when the turbine trips.

B. Steam line pressure on the #1 Steam line decreased to 578 psig.

C. The turbine stop valves do not close and the turbine could not be run back.

D. The cause of the trip was a sustained loss of all 4160 AC IE buses.

92. Given the following conditions at a work site:

- Airborne activity - 3 DAC
- Radiation level - 40 mrem/hr.
- Radiation level with shielding - 10 mrem/hr.
- Time to place shielding - 15 minutes.
- Time to conduct task WITH respirator - 1 hour.
- Time to conduct task WITHOUT respirator - 30 minutes.

Assumptions:

- The airborne dose with a respirator will be zero.
- A dose rate of 40 mrem/hr will be received while placing the shielding.
- All tasks will performed by one worker.
- Sheilding can be placed in 15 minutes with or without a respirator.

Which ONE of the following would result in the lowest whole body dose?

A. Conduct task WITHOUT respirator or shielding.

B. Conduct task WITH respirator and WITHOUT shielding.

C. Place shielding while wearing respirator and conduct task WITH respirator.

D. Place shielding while wearing respirator and conduct task WITHOUT respirator.

93. Following entry of an LCO if a subsequent train, subsystem, component, or variable expressed in the Condition is discovered to be inoperable or not within limits, the Completion Time(s) may be extended. To apply this Completion Time extension what criteria must be met?

The subsequent inoperability: Must exist concurrent with the first inoperability;

A. and Must remain inoperable or NOT within limits after the first inoperability is resolved.

B. and Must NOT remain inoperable or NOT within limits after the first inoperability is resolved.

C. and Must NOT remain inoperable or be within limits before the first inoperability is resolved.

D. and Must remain inoperable or be within limits before the first inoperability is resolved.

94. The plant has experienced a large break LOCA. The crew has transitioned from 19000-C, "E-0 Reactor Trip or Safety Injection," to 19010-C, "E-1 Loss of Reactor or Seconday Coolant." The following conditions exist:

- "A" S/G N/R level is 31%, AFW flow is 120 gpm.
- "B" S/G N/R level is 24%, AFW flow is 110 gpm.
- "C" S/G N/R level is 29%, AFW flow is 110 gpm.
- "D" S/G N/R level is 30%, AFW flow is 110 gpm.
- S/G pressure in all S/Gs 1035 psig.
- RCS pressure is 100 psig and decreasing.
- NO RCPs are running
- Core Exit T/C are 705 degrees F.
- RVLIS Full Range Level is 53%.
- Containment pressure is 37 psig.

Using the attached procedure what is the correct procedure to use for these conditions?

A. Transition to 19223-C, "FR-C.3, Response to Saturated Core Cooling."

B. Transition to 19231-C, "FR-H.1, Response to Loss of Secondary Heat Sink."

C. Transition to 19235-C, "FR-H.5, Response to Steam Generator Low Level."

D. Transition to 19251-C, "FR-Z.1, Response to High Containment Pressure."

95. Maintenance would like to remove the clearance on a breaker so they can cycle it in the TEST position.

Which ONE of the following correctly describes how this should be accomplished?

A. The hold tags must be temporarily removed and a hold tag must be placed on the racking device.

B. The hold tags must be remain on the breaker and a caution tag must be placed on the racking device.

C. The hold tags must be removed via a clearance release or functional release.

D. The hold tags can only be removed by closing out the clearance.

96. In accordance with 10004-C, "Shift Relief," when they have completed shift relief and assumed the duties of their position non-licensed operators shall:

A. Review narrative logs, round sheets and check list for his station.

B. Make a report to the control room.

C. Discuss relevant items affecting plant operations with off-going counterpart.

D. Complete and sign his relief checklist.

97. You are making rounds in the Auxiliary Building when you come to a room posted "Locked High Radiation Area." Which one of the following describes the minimum additional requirements needed to enter the room?

A. RWP/SRWP only.

B. RWP/SRWP and a survey instrument.

C. RWP/SRWP, survey instrument and an alarming dosimeter.

D. RWP/SRWP, survey instrument, and an HP technician.

98. Why is the differential temperature between the pressurizer steam space and the loop 4 hot leg maintained less than 320 degrees F during unit heatup?

A. Ensures there is adequate driving force for pressurizer spray.

B. Ensures adequate NPSH for the start of the loop 4 RCP.

C. Ensures a reduction in the number of thermal cycles on the system.

D. Ensures the RCS is isothermal for a uniform heatup.

99. A main control room annunciator, AUX BLDG LOW dP, has sounded on the HVAC panel repeatedly over the past several hours. You eventually determine that it is a nuisance alarm. All compensatory actions have been taken. Which one of the following is the action(s) can you take to disable this alarm until it can be repaired?

A. Follow procedure 00304C, "Equipment Clearance and Tagging", and have the annunciator disabled by removing it's card.

B. Follow procedure 00307C, "Temporary Modifications", Issue a temporary modification to disable the annunciator by removing it's card.

C. Have the Unit SS authorize the annunciator card be removed.

D. Issue a maintenance work order to have the annunciator card removed.

100. A plant procedure is not marked to indicate if it is "Reference Use" or "Continuous Use". Which one of the following represents the required method for implementing this procedure?

A. The procedure must be open and readily available. The operator does NOT need to follow it step by step, but he is accountable for successful task completion.

B. The procedure does NOT need to be open and readily available. The operator does NOT need to follow it step by step, but he is accountable for successful task completion.

C. The procedure must be open and readily available. The operator must follow it step by step.

D. This is an example of an "Incorrect Procedure" and must be reported to the Shift Supervisor prior to continuing.

Name RO KEY

1. [a] [b] [c] [d]	35. [a] [b] [c] [d]	69. [a] [b] [c] [d]	
2. [a] [b] [c] [d]	36. [a] [b] [c] [d]	70. [a] [b] [c] [d]	
3. [a] [b] [c] [d]	37. [a] [b] [c] [d]	71. [a] [b] [c] [d]	
4. [a] [b] [c] [d]	38. [a] [b] [c] [d]	72. [a] [b] [c] [d]	
5. [a] [b] [c] [d]	39. [a] [b] [c] [d]	73. [a] [b] [c] [d]	
6. [a] [b] [c] [d]	40. [a] [b] [c] [d]	74. [a] [b] [c] [d]	
7. [a] [b] [c] [d]	41. [a] [b] [c] [d]	75. [a] [b] [c] [d]	
8. [a] [b] [c] [d]	42. [a] [b] [c] [d]	76. [a] [b] [c] [d]	
9. [a] [b] [c] [d]	43. [a] [b] [c] [d]	77. [a] [b] [c] [d]	
10. [a] [b] [c] [d]	44. [a] [b] [c] [d]	78. [a] [b] [c] [d]	
11. [a] [b] [c] [d]	45. [a] [b] [c] [d]	79. [a] [b] [c] [d]	
12. [a] [b] [c] [d]	46. [a] [b] [c] [d]	80. [a] [b] [c] [d]	
13. [a] [b] [c] [d]	47. [a] [b] [c] [d]	81. [a] [b] [c] [d]	
14. [a] [b] [c] [d]	48. [a] [b] [c] [d]	82. [a] [b] [c] [d]	
15. [a] [b] [c] [d]	49. [a] [b] [c] [d]	83. [a] [b] [c] [d]	
16. [a] [b] [c] [d]	50. [a] [b] [c] [d]	84. [a] [b] [c] [d]	
17. [a] [b] [c] [d]	51. [a] [b] [c] [d]	85. [a] [b] [c] [d]	
18. [a] [b] [c] [d]	52. [a] [b] [c] [d]	86. [a] [b] [c] [d]	
19. [a] [b] [c] [d]	53. [a] [b] [c] [d]	87. [a] [b] [c] [d]	
20. [a] [b] [c] [d]	54. [a] [b] [c] [d]	88. [a] [b] [c] [d]	
21. [a] [b] [c] [d]	55. [a] [b] [c] [d]	89. [a] [b] [c] [d]	
22. [a] [b] [c] [d]	56. [a] [b] [c] [d]	90. [a] [b] [c] [d]	
23. [a] [b] [c] [d]	57. [a] [b] [c] [d]	91. [a] [b] [c] [d]	
24. [a] [b] [c] [d]	58. [a] [b] [c] [d]	92. [a] [b] [c] [d]	
25. [a] [b] [c] [d]	59. [a] [b] [c] [d]	93. [a] [b] [c] [d]	
26. [a] [b] [c] [d]	60. [a] [b] [c] [d]	94. [a] [b] [c] [d]	
27. [a] [b] [c] [d]	61. [a] [b] [c] [d]	95. [a] [b] [c] [d]	
28. [a] [b] [c] [d]	62. [a] [b] [c] [d]	96. [a] [b] [c] [d]	
29. [a] [b] [c] [d]	63. [a] [b] [c] [d]	97. [a] [b] [c] [d]	
30. [a] [b] [c] [d]	64. [a] [b] [c] [d]	98. [a] [b] [c] [d]	
31. [a] [b] [c] [d]	65. [a] [b] [c] [d]	99. [a] [b] [c] [d]	
32. [a] [b] [c] [d]	66. [a] [b] [c] [d]	100. [a] [b] [c] [d]	
33. [a] [b] [c] [d]	67. [a] [b] [c] [d]		
34. [a] [b] [c] [d]	68. [a] [b] [c] [d]		

Test Name: RO99VG.TST
Test Date: Monday, December 20, 1999

		Question ID		Type	Pts	Answer(s) 0	1	2	3	4	5	6	7	8	9
1:	1	051AA2.02 30	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	2	024AK3.02 11	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	3	WE08EK1.11 3	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	4	068AK2.03 4	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	5	069AA2.01 15	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	6	005AK1.02 5	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	7	055EK3.02 9	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	8	027AG2.1.7 31	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	9	WE09EA2.1 7	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	10	040EA1.18 2	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	11	062AK3.02 22	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	12	015AA1.23 24	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	13	076AK3.05 3	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	14	074EK2.1 ONLY ?	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	15	026AK3.03 14	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	16	057AA2.18 1	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	17	WE03EK2.2 17	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	18	029EK3.12 7	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	19	WE16EK1.3 34	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	20	061AA2.05 39	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	21	WE11EA2.1 ONLY	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	22	038AG2.4.48 ONLY	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	23	022AA1.11 40	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	24	037AA2.11 ONLY	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	25	033AK1.01 29	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	26	003AK2.05 18	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	27	025AK1.01 28	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	28	007G2.4.49 26	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	29	001AK2.06 12	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	30	009EA2.38 32	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	31	011EA1.13 ONLY	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	32	008AA1.07 ONLY	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	33	WE04EK3.3 8	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	34	056AA1.01 41	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	35	WE13 EK 2.1 42	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	36	036AK1.01 45	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	37	015G2.1.11 52	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	38	017K4.01 53	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	39	013K3.01 39	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	40	059K4.19 ONLY	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	41	013K5.02 ONLY	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	42	061K4.08 45	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	43	004A1.03 49	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	44	022A3.01 60	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	45	004A2.12 48	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	46	056K1.03 53	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	47	059K3.03 46	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	48	061K1.01 47	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	49	003K2.01 44	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	50	072A2.01 ONLY	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A

Test Name: RO99VG.TST
Test Date: Monday, December 20, 1999

	Question ID		Type	Pts	Answer(s) 0	1	2	3	4	5	6	7	8	9
1: 51	071A4.13	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 52	003A1.09 50	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 53	015K2.01	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 54	022K3.02	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 55	072K4.01 54	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 56	001A3.04 60	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 57	004K1.14	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 58	068K5.03	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 59	071A2.02 59	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 60	035K6.03 74	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 61	016A2.03 77	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 62	063A1.01 55	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 63	002K5.12	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 64	079A.401 63	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 65	055K3.01	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 66	062A4.01 71	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 67	026K3.01 51	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 68	010A4.01 72	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 69	033A2.03	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 70	075A2.02 67	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 71	014K5.01 56	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 72	006A4.07 70	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 73	012A2.01 66	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 74	064K6.08 78	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 75	075G2.1.32 64	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 76	086G2.4.27	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 77	011A4.05 68	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 78	039A2.04 73	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 79	073K1.01 71	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 80	078K4.02	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 81	007K3.01 83	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 82	008A2.02 82	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 83	045K4.11 81	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 84	103G2.1.28 75	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 85	005K6.03 80	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 86	034A1.02 65	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 87	028A2.02	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 88	G2.3.4	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 89	G2.2.30	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 90	G2.1.8	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 91	G2.4.1	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 92	G2.3.10 95	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 93	G2.1.33	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 94	G2.4.21 92	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 95	G2.2.13 84	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 96	G2.1.3	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 97	G2.3.10 95	002	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 98	G2.2.1 96	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 99	G2.4.10 97	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 100	G2.1.20 85	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D

REACTIVITY CURVES

TAB 1.5.1-T4
ROD WORTH (MOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B
Moving with 113 Step Overlap at MOL, HFP, HFP-Eq-Xe
(Applicable for Burnups > 6500 and ≤ 14000 MWD/MTU)

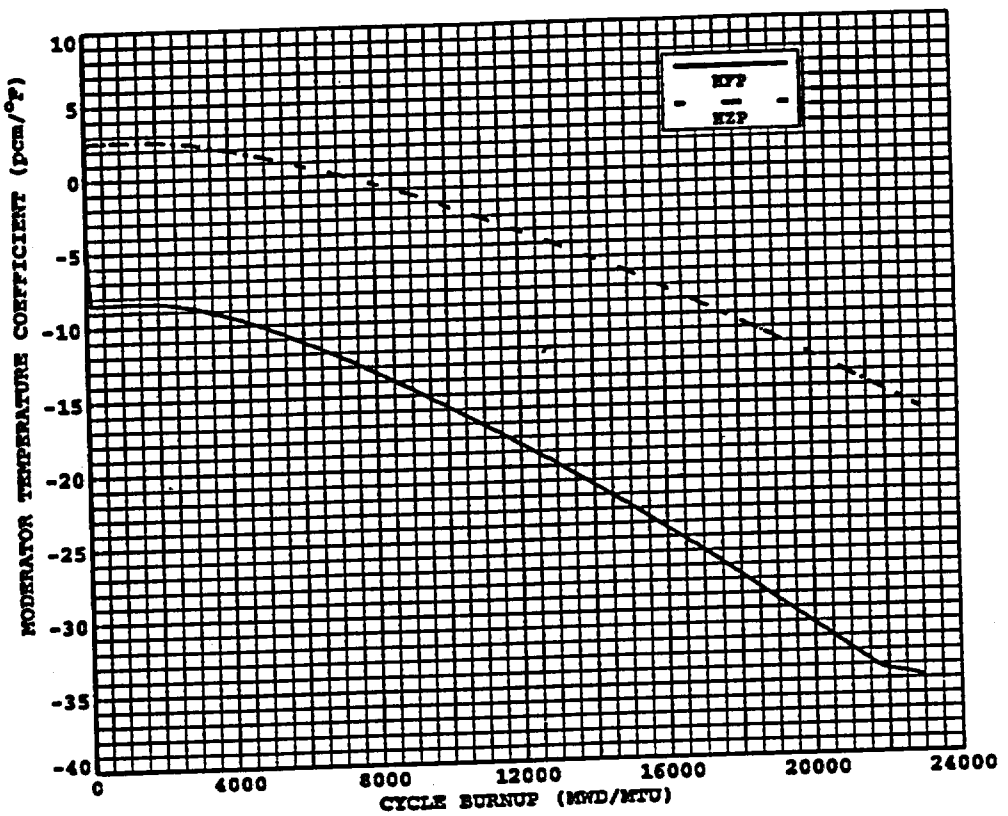
Steps Withdrawn Control Bank			Differential Worth	Integral Worth
D	C	B	(pcm/step)	(pcm)
228	228	228	0.20	0
220	228	228	1.00	5
210	228	228	2.08	20
200	228	228	2.77	45
190	228	228	3.07	74
180	228	228	3.14	105
170	228	228	3.10	136
160	228	228	3.03	167
150	228	228	2.95	197
140	228	228	2.89	226
130	228	228	2.84	255
120	228	228	2.80	283
110	225	228	3.15	313
100	215	228	4.79	353
90	205	228	5.87	407
80	195	228	6.55	469
70	185	228	6.96	537
60	175	228	7.26	608
50	165	228	7.56	683
40	155	228	7.85	760
30	145	228	8.06	840
20	135	228	7.95	920
10	125	228	7.32	997
0	115	228	6.24	1065
0	110	225	5.02	1093
0	100	215	6.32	1150
0	90	205	7.32	1218
0	80	195	8.12	1296
0	70	185	8.80	1381
0	60	175	9.49	1473
0	50	165	10.24	1572
0	40	155	10.96	1678
0	30	145	11.41	1790
0	20	135	11.10	1903
0	10	125	9.64	2007
0	0	115	7.45	2093

Reviewed By 12/19/99 Date

MODERATOR TEMPERATURE COEFFICIENT (MTC)

CYCLE 9

Moderator Temperature Coefficient versus Burnup at HFP, ARO, Equilibrium Xenon Conditions, and HZP, ARO, No Xenon Conditions



Burnup (MWD/MTU)	HFP	HZP*
0	-4.9*	2.3
150	-8.5	2.6
1000	-8.4	2.6
2000	-8.4	2.6
3000	-8.8	2.3
4000	-9.4	1.9
5000	-10.2	1.4
7000	-12.3	0.1
9000	-14.6	-1.4
11000	-17.1	-3.2
13000	-19.9	-5.1
15000	-22.8	-7.0
17000	-26.0	-9.3
18349+	-28.3	-10.9
19000	-29.4	-11.7
21000	-32.8	-14.1
21800	-34.2	-15.1
23000	-34.9	-16.6

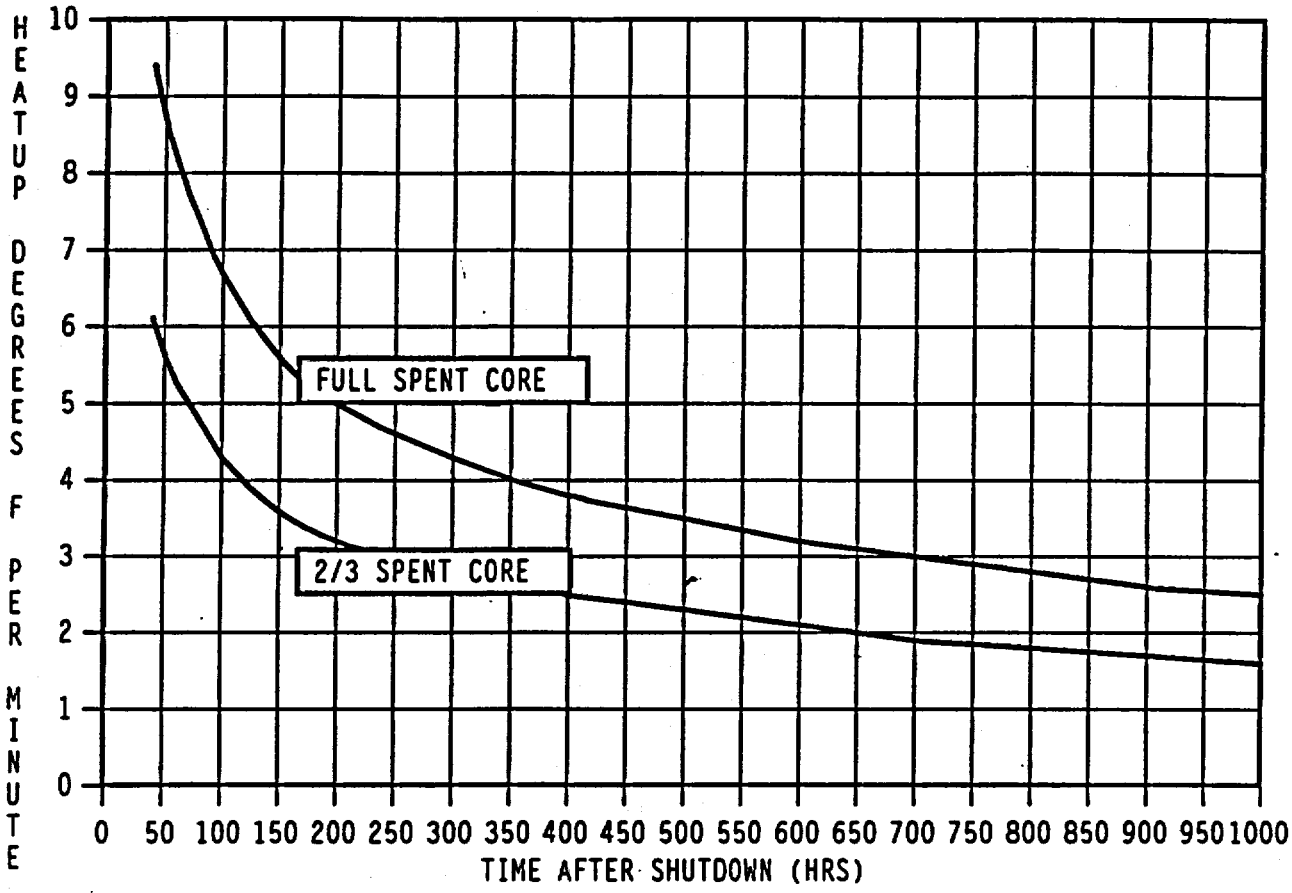
* Burnup at 300 ppm

+ No Xenon Conditions

Reviewed By 1/3/99 Date

Sheet 1 of 1

RCS HEAT-UP RATE



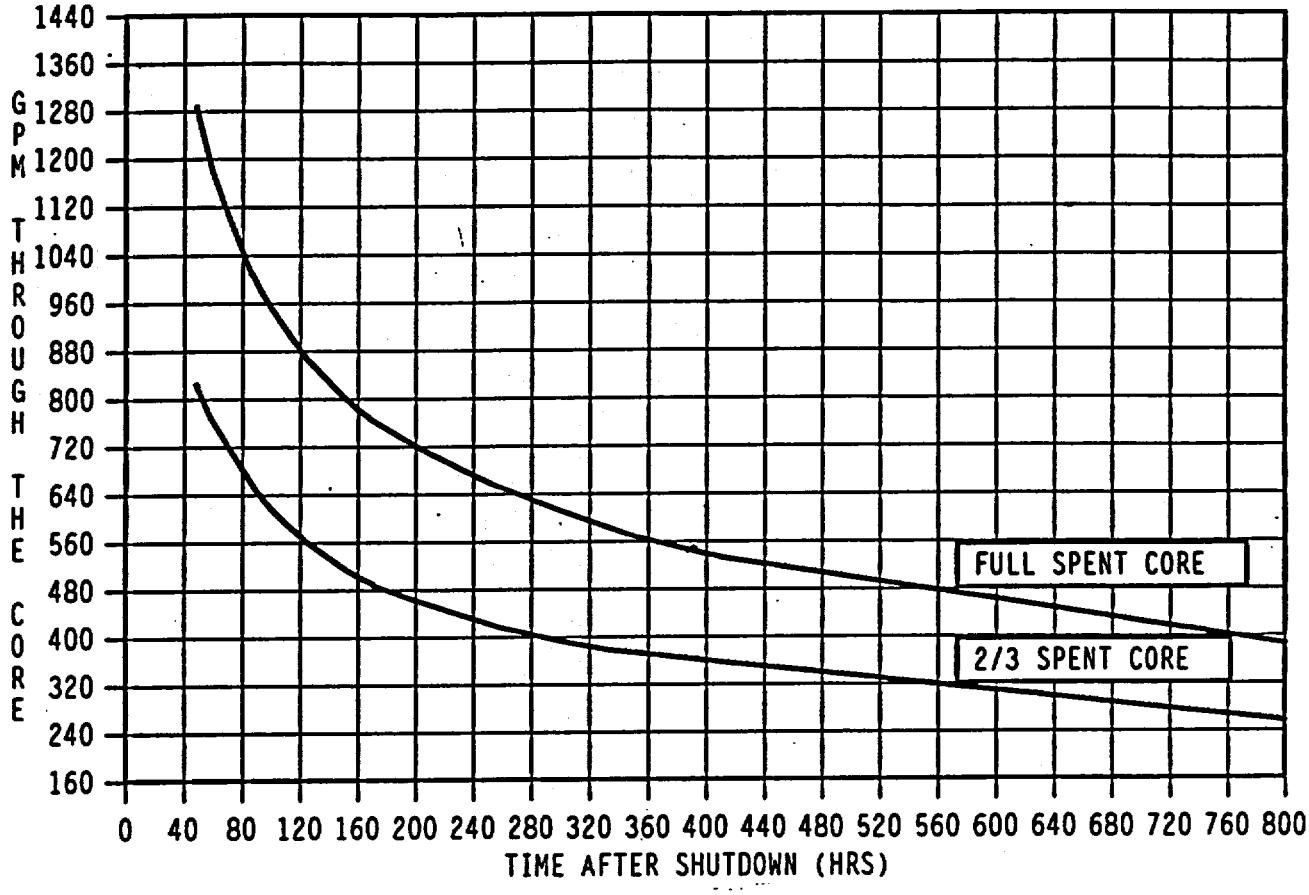
Assumptions:

1) Mid Loop Conditions
2) RCS Vented To Atmosphere With or Without Loop Dams

FIGURE 1

Sheet 1 of 1

**CORE FLOW TO MAINTAIN 195 Deg F vs.
TIME AFTER REACTOR SHUTDOWN**



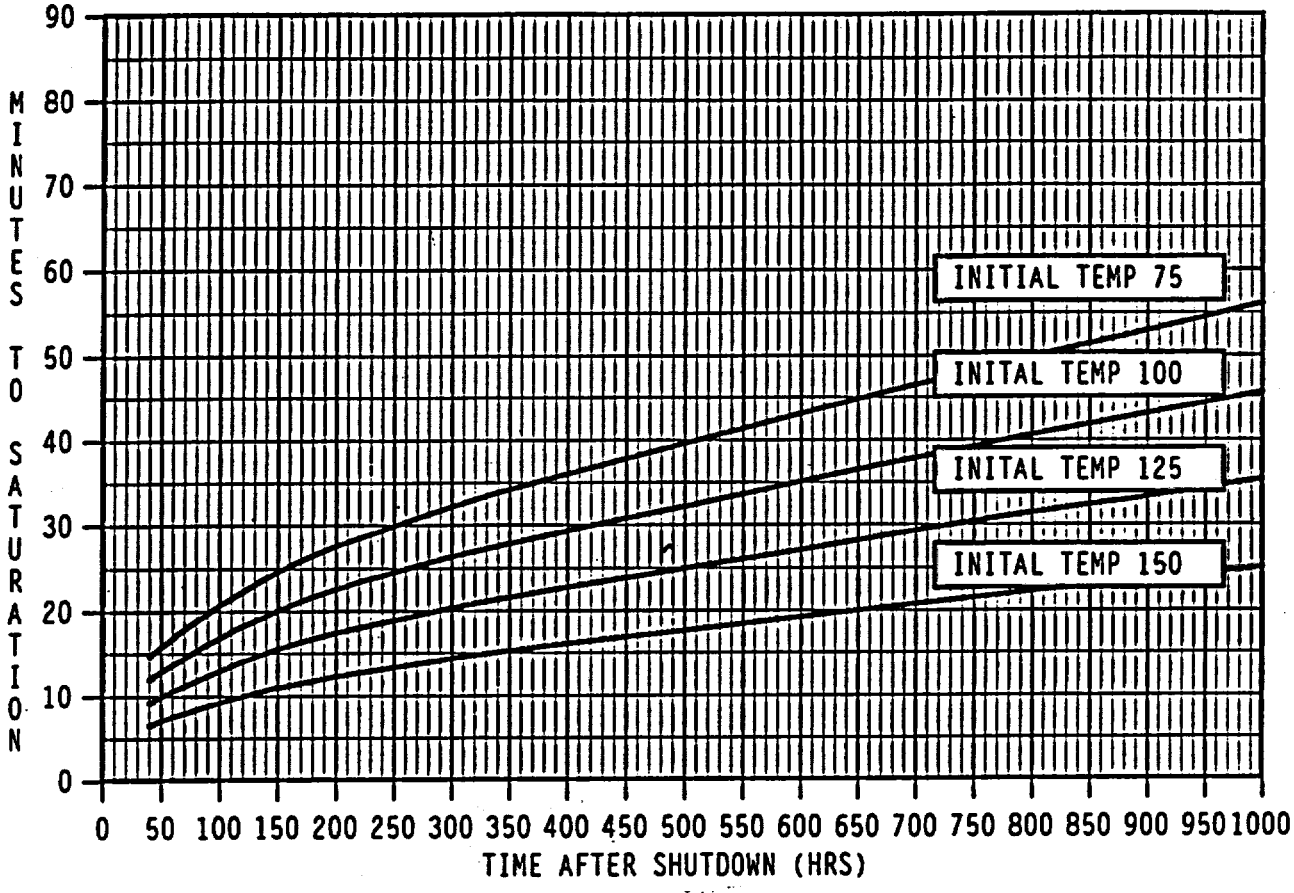
Assumptions:

1) Mid Loop Conditions
2) RCS Vented To Atmosphere
3) Injection Flow Assumed a 100 Degrees F From RWST

FIGURE 2

Sheet 1 of 1

RCS TIME TO SATURATION
(FULL SPENT CORE)



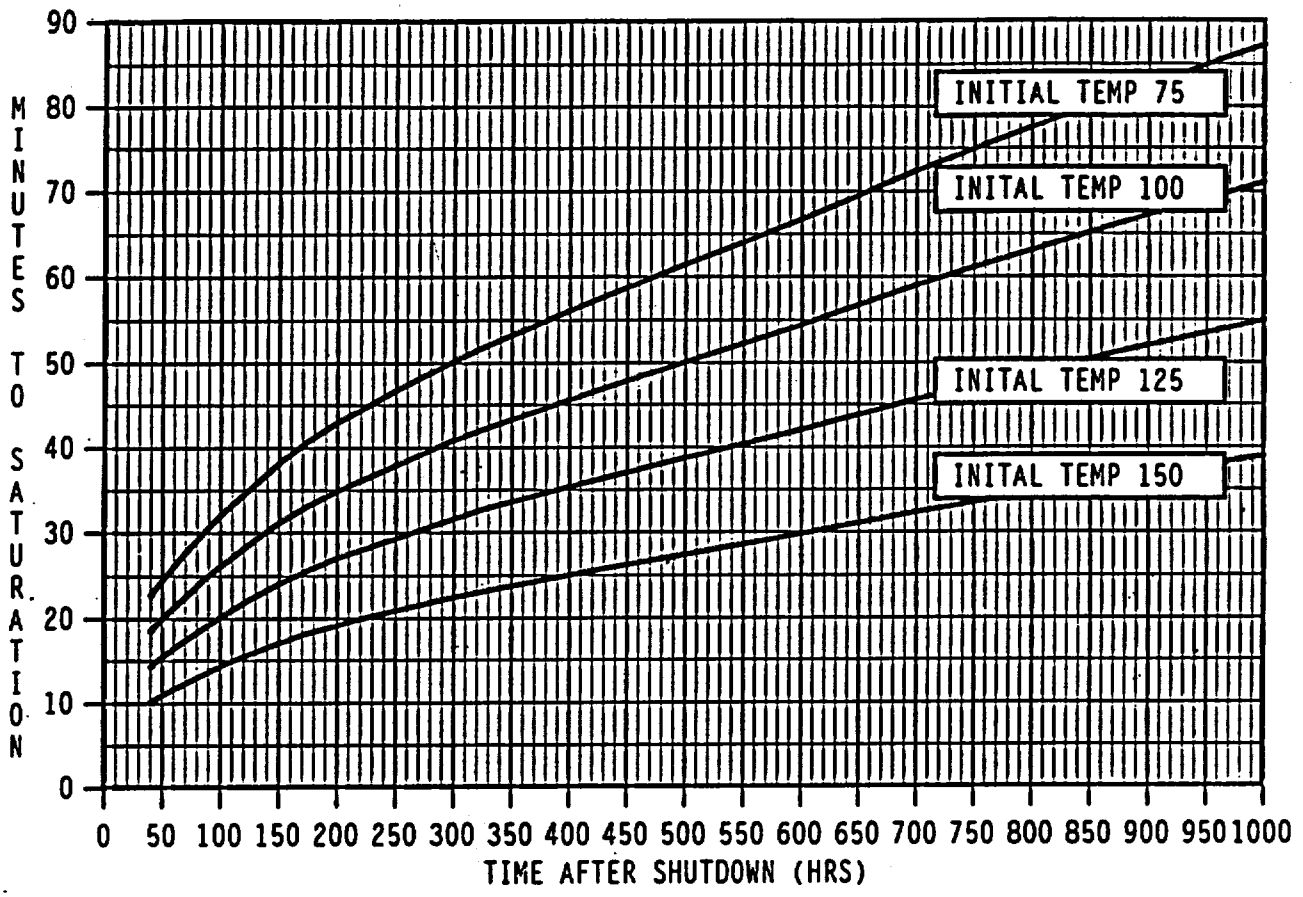
Assumptions:

1) Full Spent Core Heat Load Assumes 193 Assemblies at 40,000 MWD/MTU are Residing in the Core
2) Mid Loop Conditions
3) RCS Vented To Atmosphere With or Without Loop Dams

FIGURE 3

Sheet 1 of 1

RCS TIME TO SATURATION
(2/3 SPENT CORE)



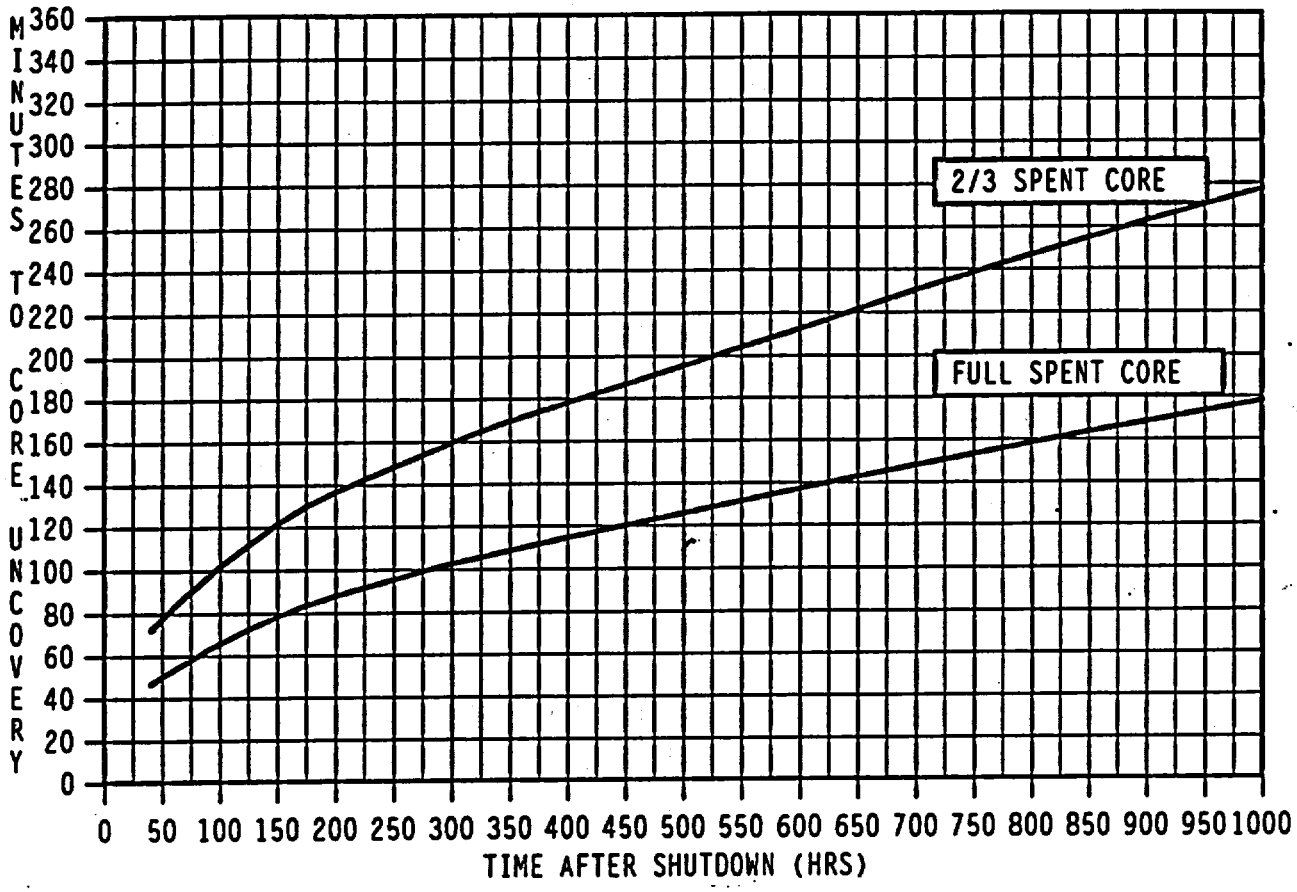
Assumptions:

1) 2/3 Spent Core Heat Load Assumes 125 Assemblies at 35,000 MWD/MTU are Residing in the Core
2) Mid Loop Conditions
3) RCS Vented To Atmosphere With or Without Loop Dams

FIGURE 4 - TIME TO BOILING

Sheet 1 of 1

TIME TO CORE UNCOVERY
(RCS TEMPERATURE AT SATURATION)



Assumptions:

1) Initial RCS Temperature is 212 Degrees F
2) Initial RCS Level at Mid-Loop
3) RCS Vented to Atmosphere With or Without Loop Dams

FIGURE 5

1.0 **PURPOSE**

This procedure provides instructions for operation of the Containment Hydrogen Monitoring System, the Electric Hydrogen Recombiners, the Post-LOCA Cavity Purge System, and the Post-LOCA Containment Hydrogen Purge System during normal and post-LOCA conditions. Instructions are provided in the following sections.

If entering this procedure for Post-Accident Containment Hydrogen reduction, then initiate Section 4.4.1.

4.1.1 Placing The Containment Hydrogen Monitoring System In Standby

4.1.2 Placing The Electric Hydrogen Recombiners In Standby

4.1.3 Placing The Post-LOCA Cavity Purge And Post-LOCA Containment Hydrogen Purge Systems In Standby

4.2.1 Containment Hydrogen Monitor 1-1513-P5-HMA Operation (Hydrogen Measurement)

4.2.2 Containment Hydrogen Monitor 1-1513-P5-HMB Operation (Hydrogen Measurement)

4.4.1 Post-LOCA Electric Hydrogen Recombiner Operation

4.4.2 Diluting Containment Hydrogen Concentration Using The Service Air System

4.4.3 Post-LOCA Containment Hydrogen Purge System Operation

2.0 **PRECAUTIONS AND LIMITATIONS**

2.1 **PRECAUTIONS**

2.1.1 Adhere to all applicable radiological controls.

2.1.2 Train A Hydrogen Monitor Supply Valves 1-HV-2792A, 1-HV-2792B, 1-HV-2791B, and Return Valve 1-HV-2793B may be opened in Modes 1, 2, 3, and 4 under administrative control as described in the basis for Technical Specification LCO 3.6.3.

2.1.3 Train B Hydrogen Monitor Supply Valves 1-HV-2790A, 1-HV-2790B, 1-HV-2791A, and Return Valve 1-HV-2793A may be opened in Modes 1, 2, 3, and 4 under administrative control as described in the basis for Technical Specification LCO 3.6.3.

2.1.4 This procedure does not administratively control opening of both IRC and ORC Hydrogen Monitor Valves (on the same penetration) as allowed in Technical Specification LCO 3.6.3 Note 1.

2.2 **LIMITATIONS**

2.2.1 Technical Specifications require the Hydrogen Monitors and the Electrical Hydrogen Recombiners to be operable as follows:

a. Per Technical Specification LCO 3.3.3, as part of the Post Accident Monitoring Instrumentation in Modes 1, 2 and 3,

b. Per Technical Specification LCO 3.6.7, two Hydrogen Recombiner Systems in Modes 1 and 2.

2.2.2 When first energized, the Hydrogen Monitors require a 6 hour warm-up period in standby before accurate readings may be obtained.

2.2.3 Hydrogen Recombiners should not be operated if containment hydrogen concentration is greater than 6% in dry air.

2.2.4 In Analyze Mode, Low Analyzer Flow, Analyzer Cell Failure, Low Calibration Gas Pressure, Low Reagent Gas Pressure, Low Hot Box Temperature and switching between Standby and Analyze Modes will generate a Common Failure Alarm. In Standby Mode, low analyzer flow and analyzer cell failure are bypassed.

3.0 **PREREQUISITES OR INITIAL CONDITIONS**

3.1 Hydrogen Monitor sample line heat tracing is operating.

4.0 **INSTRUCTIONS**

4.1 **STARTUP**

4.1.1 **Placing The Containment Hydrogen Monitoring System In Standby**

4.1.1.1 PERFORM Section A of 11130-1, "Post-Accident Hydrogen Control Alignment", if required.

4.1.1.2 PERFORM Checklist 1 to align Containment Hydrogen Monitoring System remote - operated components for system startup.

NOTE

The Hydrogen Monitors require a 6 hour warm-up period in STANDBY before accurate readings may be obtained.

4.1.1.3 On Control Room Panel QPCP, PLACE OFF/STAND BY/ANALYZE 1-HS-22900 in STANDBY and VERIFY SYSTEM ON light illuminates.

4.1.1.4 At local Containment Hydrogen Monitor Panel 1-1513-P5-HMA (Auxiliary Building Level B), PERFORM the following:

a. If no lights are lit, PRESS the Circuit Breaker ON Pushbutton located inside the panel,

b. ENSURE FUNCTION SELECTOR Switch 1-HS-22902 in SAMPLE,

c. If Common Failure Light is lit, RESET by depressing RESET Button 1-HS-22955.

4.1.1.5 On Control Room Panel QPCP, PLACE OFF/STAND BY/ANALYZE 1-HS-22901 in STANDBY and VERIFY SYSTEM ON light illuminates.

4.1.1.6 At local Containment Hydrogen Monitor Panel 1-1513-P5-HMB (Fuel Handling Building Level A), PERFORM the following:

a. If no lights are lit, PRESS the Circuit Breaker ON Pushbutton located inside the panel,

b. ENSURE FUNCTION SELECTOR Switch 1-HS-22903 in SAMPLE,

c. If Common Failure Light is lit, RESET by depressing RESET Button 1-HS-22956.

4.1.2 **Placing The Electric Hydrogen Recombiners In Standby**

4.1.2.1 ENSURE both Electric Hydrogen Recombiners are off at their local Control Panels in Control Building Level B:

a. ENSURE OFF Power Out Switch on 1-1513-P5-ERA,

b. ENSURE OFF Power Out Switch on 1-1513-P5-ERB.

4.1.2.2 PERFORM Section B of 11130-1, "Post-Accident Hydrogen Control Alignment" if required.

4.1.2.3 At 480V AC Switchgear 1AB05, CLOSE the Electric Hydrogen Recombiner 1-1513-P5-ERA Feeder Breaker 1AB05-08; independent verification required.

4.1.2.4 At 480V AC Switchgear 1BB07, CLOSE the Electric Hydrogen Recombiner 1-1513-P5-ERB Feeder Breaker 1BB07-08; independent verification required.

4.1.3 **Placing The Post-LOCA Cavity Purge And Post-LOCA Containment Hydrogen Purge Systems In Standby**

4.1.3.1 PERFORM Section C of 11130-1, "Post-Accident Hydrogen Control Alignment" if required.

4.1.3.2 PERFORM Checklist 2 to align the Post-LOCA Containment Hydrogen Purge System remote - operated valves for standby.

4.2 **SYSTEM OPERATION**

4.2.1 **Containment Hydrogen Monitor A 1-1513-P5-HMA Operation (Hydrogen Measurement)**

CAUTION

The Hydrogen Monitor Isolation Valves must remain closed except during Hydrogen Monitor operation while in Modes 5 or 6 or during post accident conditions to ensure containment integrity is maintained.

NOTE

The Hydrogen Monitors require a 6 hour warm-up period in STANDBY before accurate readings may be obtained.

4.2.1.1 If the following conditions exist then notify maintenance to implement 28834-1 to provide power to Containment Isolation Valves 1-HV-2791B and 1-HV-2793B:

a. A post accident condition (LOCA) exist AND,

b. 125 VDC Bus 1BD11 is not available AND,

c. Containment Hydrogen Concentration is required.

4.2.1.2 ENSURE the Hydrogen Monitor A sample line heat tracing temperature is greater than 260°F.

a. At Heat Tracing Panel 1-1817-U3-007B, READ the temperature for circuit C1-7 and C1-8,

b. If less than 260°F, NOTIFY the Control Room immediately.

4.2.1.3 OPEN the H2 MONITOR A SPLY ISO IRC:

a. 1-HV-2792A,

b. 1-HV-2792B.

4.2.1.4 OPEN H2 MONITOR A SPLY ISO ORC 1-HV-2791B.

4.2.1.5 OPEN H2 MONITOR A RTN ISO ORC 1-HV-2793B.

4.2.1.6 PLACE OFF/STAND BY/ANALYZE 1-HS-22900 in ANALYZE.

4.2.1.7 ENSURE Function Selector Switch 1-HS-22904 in Sample position.

4.2.1.8 Momentarily DEPRESS Remote Control Selector Pushbutton 1-HS-22944 and VERIFY Sample Light LIT.

NOTE

Indication of hydrogen concentration is available within 30 minutes of initiating flow through the monitors. This is accomplished by operating the monitors in Standby during normal plant operation. (CO 2999)

4.2.1.9 NOTE containment hydrogen concentration as indicated by CONTAIN H2 MONITOR TRN A 1-AI-12979 on QMCB when indications stabilize.

4.2.1.10 When hydrogen monitoring is no longer desired, PLACE OFF/STAND BY/ANALYZE 1-HS-22900 in STAND BY.

4.2.1.11 CLOSE the Hydrogen Monitor A Isolations by placing their control switches to CLOSE:

a. 1-HV-2792A,

b. 1-HV-2792B,

c. 1-HV-2791B,

d. 1-HV-2793B.

4.2.2 **Containment Hydrogen Monitor B 1-1513-P5-HMB Operation (Hydrogen Measurement)**

CAUTION

The Hydrogen Monitor Isolation Valves must remain closed except during Hydrogen Monitor operation while in Modes 5 or 6 or during post accident conditions to ensure containment integrity is maintained.

NOTE

The Hydrogen Monitors require a 6 hour warm-up period in STANDBY before accurate readings may be obtained.

4.2.2.1 If the following conditions exist then notify maintenance to implement 28834-1 to provide power to Containment Isolation Valves 1-HV-2791A and 1-HV-2793A:

a. A post accident condition (LOCA) exist AND,

b. 125 VDC Bus 1AD11 is not available AND,

c. Containment Hydrogen Concentration is required.

4.2.2.2 ENSURE the Hydrogen Monitor B sample line heat tracing temperature is greater than 260°F.

a. At Heat Tracing Panel 1-1817-U3-007A, READ the temperature for circuit C1-1 and C1-2,

b. If less than 260°F, NOTIFY the Control Room immediately.

4.2.2.3 OPEN the Hydrogen Monitor Supply Isolations Inside Reactor Containment:

a. 1-HV-2790A,

b. 1-HV-2790B.

4.2.2.4 OPEN H2 MONITOR B SPLY ISO ORC 1-HV-2791A.

4.2.2.5 OPEN H2 MONITOR B RTN ISO ORC 1-HV-2793A.

4.2.2.6 PLACE OFF/STAND BY/ANALYZE 1-HS-22901 in ANALYZE.

4.2.2.7 ENSURE Function Selector Switch 1-HS-22905 in Sample position.

4.2.2.8 Momentarily DEPRESS Remote Control Selector Pushbutton 1-HS-22945 and VERIFY Sample Light LIT.

NOTE

Indication of hydrogen concentration is available within 30 minutes of initiating flow through the monitors. This is accomplished by operating the monitors in Standby during normal plant operation. (CO 2999)

4.2.2.9 NOTE containment hydrogen concentration as indicated by CONTAIN H2 MONITOR TRN B 1-AI-12980 on QMCB when indications stabilize.

4.2.2.10 PLACE OFF/STAND BY/ANALYZE 1-HS-22901 in STAND BY.

4.2.2.111 CLOSE the Hydrogen Monitor B Isolations by placing their control switches to CLOSE:

a. 1-HV-2790A,

b. 1-HV-2790B,

c. 1-HV-2791A,

d. 1-HV-2793A.

4.3 **SHUTDOWN**

NONE

4.4 **NON PERIODIC OPERATION**

4.4.1 **Post-LOCA Electric Hydrogen Recombiner Operation** (CO 5757)

CAUTION

An Electric Hydrogen Recombiner may require up to 75 kilowatts of power during post-LOCA operation. If emergency power is being supplied by the Emergency Diesel Generators, ensure their loading is maintained within limits.

NOTE

Hydrogen Recombiners should not be operated if containment hydrogen concentration is greater than 6% in dry air.

4.4.1.1 NOTE pre-LOCA containment temperature from 14000-1, "Operations Shift And Daily Surveillance Logs".

4.4.1.2 NOTE and RECORD post-LOCA containment pressure from 1-PI-0934, 1-PI-0935, 1-PI-0936, and 1-PI-0937.

4.4.1.3 DETERMINE and NOTE the Recombiner pressure factor using Figure 1.

4.4.1.4 START one Electric Hydrogen Recombiner at its local Control Panel:

a. VERIFY the POWER IN AVAILABLE light is ON,

b. ENSURE POWER ADJUST Potentiometer is set to zero.

c. PLACE POWER OUT SWITCH in ON,

d. VERIFY the pilot light above the switch comes on,

NOTE

POWER OUT Meter response will lag POWER ADJUST Potentiometer adjustments.

e. MONITOR POWER OUT Meter and slowly RAISE POWER ADJUST to obtain between 4 and 6 kilowatts,

f. MAINTAIN between 4 and 6 kilowatts for 10 minutes by adjusting POWER ADJUST as required,

g. MONITOR POWER OUT and slowly RAISE POWER ADJUST to obtain between 9 and 11 kilowatts,

h. MAINTAIN between 9 and 11 kilowatts for 10 minutes by adjusting POWER ADJUST as required,

i. MONITOR POWER OUT and slowly RAISE POWER ADJUST to obtain between 18 and 22 kilowatts,

j. MAINTAIN between 18 and 22 kilowatts for 5 minutes by adjusting POWER ADJUST as required,

k. OBTAIN the current Hydrogen Recombiner Reference Power (kw) from PTDB Tab 13 and MULTIPLY by the pressure factor determined in Step 4.4.1.3 to obtain the post-LOCA power setting,

CAUTION

Do not exceed 75 kilowatts power output.

l. MONITOR POWER OUT and slowly RAISE POWER ADJUST to obtain the post-LOCA power setting,

m. MAINTAIN the post-LOCA power setting by adjusting POWER ADJUST as required.

4.4.1.5 MEASURE and RECORD containment hydrogen concentration through sampling per Section 4.2.1 and/or 4.2.2 of this procedure.

4.4.1.6 WARMUP the second electric Hydrogen Recombiner at its local Control Panel:

a. VERIFY the POWER IN AVAILABLE light is ON,

b. ENSURE POWER ADJUST Potentiometer is set to zero.

c. PLACE POWER OUT SWITCH in ON,

d. VERIFY the red pilot light above the switch comes on,

NOTE

POWER OUT Meter response will lag POWER ADJUST Potentiometer adjustments.

e. MONITOR POWER OUT Meter and slowly RAISE POWER ADJUST to obtain between 4 and 6 kilowatts,

f. MAINTAIN between 4 and 6 kilowatts for 10 minutes by adjusting POWER ADJUST as required,

g. MONITOR POWER OUT and slowly RAISE POWER ADJUST to obtain between 9 and 11 kilowatts,

h. MAINTAIN between 9 and 11 kilowatts for 10 minutes by adjusting POWER ADJUST as required.

4.4.1.7 Periodically MONITOR the power output of each electric hydrogen recombiner and ADJUST as required:

a. MAINTAIN the warmup Recombiner output between 9 and 11 kilowatts,

CAUTION

Do not exceed 75 kilowatts power output.

b. MAINTAIN the operating Recombiner output greater than or equal to the post-LOCA power setting.

4.4.1.8 Periodically MONITOR all three temperature channels of each Recombiner using the TEMPERATURE CHANNEL SELECTOR Switch and the TEMPERATURE Meter.

NOTE

Recombiner temperatures should rise and then stabilize between 4 and 5 hours after startup.

4.4.1.9 When the operating Recombiner temperatures begin to stabilize, DETERMINE the difference between the reading of each channel with the reading of each of the other two channels:

a. If the smallest temperature difference is greater than or equal to 60°F, temperature indication is unreliable. PROCEED to 4.4.1.11,

b. If one temperature channel differs from both of the other two by 60°F or more, this channel is considered unreliable. DELETE this channel when determining average Recombiner temperature.

4.4.1.10 MAINTAIN the average temperature of the operating Recombiner between 1250 and 1450°F by adjusting POWER ADJUST if required.

4.4.1.11 About 24 hours after startup of the first Electric Hydrogen Recombiner:

a. NOTE and RECORD containment pressure from 1-PI-0934, 1-PI-0935, 1-PI-0936, and 1-PI-0937,

b. MEASURE containment hydrogen concentration through sampling per Section 4.2.1 and/or 4.2.2 of this procedure.

4.4.1.12 If containment hydrogen concentration is greater than 3.5 percent or has risen by more than 0.5 percent above the previous value, RAISE Recombiner output:

a. If the present power output of the operating electric Hydrogen Recombiner is less than 71 kilowatts, RAISE its output by 4 kilowatts,

b. If the present power output of the operating Recombiner is greater than or equal to 71 kilowatts, PLACE the warmup Recombiner in full operation as follows:

(1) NOTE pre-LOCA containment temperature from 14000-1, "Operations Shift And Daily Surveillance Logs",

(2) NOTE current containment pressure on 1-PI-0934, 1-PI-0935, 1-PI-0936, and 1-PI-0937,

(3) DETERMINE and NOTE the Recombiner pressure factor using Figure 1,

(4) OBTAIN the current Hydrogen Recombiner Reference Power (kw) from PTDB Tab 13 and MULTIPLY by the pressure factor to obtain the post-LOCA power setting,

CAUTION

Do not exceed 75 kilowatts power output.

NOTE

POWER OUT Meter response will lag POWER ADJUST Potentiometer adjustments.

(5) MONITOR warmup Recombiner POWER OUT and slowly RAISE POWER ADJUST to obtain the post-LOCA power setting,

(6) MAINTAIN the post-LOCA power setting by adjusting POWER ADJUST as required.

4.4.1.13 If containment hydrogen concentration has risen less than 0.5 percent above the previous value, PROCEED to 4.4.1.15.

4.4.1.14 If containment hydrogen concentration has fallen or remained constant over the 24 hour period since last measurement:

a. NOTE the containment pressure recorded 24 hours ago,

b. NOTE the containment pressure recorded in 4.4.1.11a,

c. If containment pressure has changed over the past 24 hours, ADJUST operating Recombiner power output:

(1) DETERMINE and NOTE the new Recombiner pressure factor using Figure 1,

(2) MULTIPLY the reference power setting (PTDB Tab 13) by the new pressure factor to obtain the new post-LOCA power setting,

NOTE

- POWER OUT Meter response will lag POWER ADJUST Potentiometer adjustments.

(3) MONITOR POWER OUT Meter and slowly ADJUST POWER ADJUST to obtain the new post-LOCA power setting,

(4) MAINTAIN the new post-LOCA power setting by adjusting POWER ADJUST as required.

4.4.1.15 Periodically MONITOR and ADJUST the Recombiners per 4.4.1.7 through 4.4.1.10.

4.4.1.16 About every 24 hours, MEASURE containment hydrogen concentration and ADJUST the Recombiners per 4.4.1.11 through 4.4.1.14.

4.4.1.17 REPEAT 4.4.1.15 and 4.4.1.16 throughout the remainder of the Recombiner operating period.

4.4.1.18 When Electric Hydrogen Recombiner operation is no longer required (containment hydrogen concentration at less than 0.5%), SHUT DOWN each Recombiner at its local Control Panel as follows:

a. LOWER POWER ADJUST Potentiometer setting to zero,

b. PLACE POWER OUT SWITCH in OFF,

c. VERIFY the red pilot light above the switch turns off.

4.4.2 **Diluting Containment Hydrogen Concentration Using The Service Air System**

CAUTION

Do not perform this section if containment pressure is greater than 40 psig unless so directed by the Emergency Director.

NOTES

a. Containment design pressure is 52 psig.

b. Containment Isolation Phase A Train A and Train B signals must be reset to open 1-HV-9385.

4.4.2.1 OPEN SERVICE AIR CNMT HDR ISOL 1-HV-9385 as follows:

a. PLACE 1-HS-9385A on Main Control Room Panel QPCP to OPEN,

b. HOLD 1-HS-9385B on Panel QPCP in OPEN until 1-HV-9385 is fully open.

4.4.2.2 OPEN one SERVICE AIR CNMT POST LOCA PURGE using its Control Switch on QPCP:

a. 1-HV-9380A,

b. 1-HV-9380B.

4.4.2.3 CHECK Service Air Header 1-PI-9377 and Instrument Air Dryer To SCS Equipment 1-PI-9361 pressures on Main Control Room Panel QMCB.

4.4.2.4 If air pressures fall to 80 psig or less, SERVICE AIR DRYER SUPPLY OUTLET ISO 1-PV-9375 isolates service air to dryers; RESTORE purge air flow as follows:

a. UNLOCK and CLOSE Service Air Containment Building Supply Header Isolation 1-2401-U4-056,

b. RESET 1-PSL-9375 on Instrument Rack 15 on Turbine Building Level 1 near the powdex vessels to restore Service Air Supply,

c. THROTTLE OPEN 1-2401-U4-056 to maintain air pressures 1-PI-9377 and 1-PI-9361 greater than 85 psig.

4.4.2.5 MONITOR containment hydrogen concentration through sampling and per Section 4.2.1 and/or 4.2.2 of this procedure.

4.4.2.6 MONITOR containment pressure 1-PI-0934, 1-PI-0935, 1-PI-0936, and 1-PI-0937. If pressure rises to 40 psig or to the value specified by the Emergency Director, TERMINATE dilution per Step 4.4.2.7.

4.4.2.7 When containment hydrogen concentration falls to 3.5%, TERMINATE dilution as follows:

a. CLOSE SERVICE AIR CNMT HDR ISOL 1-HV-9385 using 1-HS-9385A or 1-HS-9385B on Control Room Panel QPCP,

b. ENSURE CLOSED both Service Air Containment Post-LOCA Purge Valves using their Control Switches on Panel QPCP:

(1) 1-HV-9380A,

(2) 1-HV-9380B.

4.4.2.8 Periodically MONITOR containment hydrogen concentration and REPEAT this section as required to maintain the concentration below 4.0%. (CO 0033)

4.4.3 **Post-LOCA Containment Hydrogen Purge System Operation** (CO 2998, 4320)

CAUTIONS

a. The Post-LOCA Containment Hydrogen Purge System is to be operated only if the containment hydrogen concentration cannot be maintained below 4% by other means.

b. The Post-LOCA Containment Hydrogen Purge System is designed to operate with a maximum pressure of 3 psi downstream of CNMT POST LOCA PURGE EXH DUCT CONTROL VLV 1-FV-2693.

NOTE

If plant conditions warrant, the Emergency Director may waive the Gaseous Release Permit requirement.

4.4.3.1 INITIATE a Gaseous Release Permit.

4.4.3.2 ENSURE containment atmosphere is sampled and analyzed.

4.4.3.3 ENSURE the Service Air System is operating.

4.4.3.4 ENSURE compliance with the ODCM Section 3.1.1 Table 3-1 for the gaseous effluent monitoring requirements.

4.4.3.5 ENSURE the Auxiliary Building Heating Ventilation And Air Conditioning System is operating.

4.4.3.6 PLACE disconnect switch at local Heater Control Panel 1-1508-N7-001-H01 to on.

4.4.3.7 PUSH RESET button at local Heater Control Panel 1-1508-N7-001-H01 and VERIFY that reset red light is ON.

CAUTION

Due to high radiation area potential, ensure Containment Inside Isolation Valves 1-HV-2624A and 1-HV-2624B are closed and remain closed during the performance of the next step and until personnel have exited the area.

4.4.3.8 UNLOCK and OPEN POST LOCA PURGE CTB ISO VALVE 1-1508-U4-012.

4.4.3.9 ENSURE all conditions of the Gaseous Release Permit that must be satisfied prior to the release are met, unless the permit requirement has been waived by the Emergency Director.

NOTE

The Containment Ventilation Isolation Train A signal must be reset to open 1-HV-2624A. The Train B signal must be reset to open 1-HV-2624B.

4.4.3.10 OPEN one CTB POST LOCA PURGE EXH IRC ISO VLV using its Control Switch on Main Control Room Panel QHVC:

a. 1-HV-2624A,

b. 1-HV-2624B.

4.4.3.11 PLACE CNMT POST LOCA PURGE EXH DUCT CONTROL VLV 1-HS-2693 to the MOD position to initiate containment venting.

4.4.3.12 VERIFY Post-LOCA Purge flow rises to between 450 and 500 standard cubic feet per minute using 1-UI-2693.

4.4.3.13 MONITOR plant vent stack flow using 1-UI-2693, and vent stack radiation and ENSURE compliance with the Gaseous Release Permit, if required.

NOTE

Containment Isolation Phase A Train A and Train B signals must be reset to open 1-HV-9385.

4.4.3.14 OPEN SERVICE AIR CNMT HDR ISOL 1-HV-9385 as follows:

a. PLACE 1-HS-9385A on Main Control Room Panel QPCP to OPEN,

b. HOLD 1-HS-9385B on Panel QPCP in OPEN until 1-HV-9385 is fully open.

4.4.3.15 OPEN one SERVICE AIR CNMT POST LOCA PURGE Valve using its Control Switch on QPCP:

a. 1-HV-9380A,

b. 1-HV-9380B.

4.4.3.16 CHECK Compressed Air Header 1-PI-9377 and Instrument Air Dryer Outlet Header 1-PI-9361 pressures on Main Control Room Panel QMCB.

4.4.3.17 If air pressures fall to 80 psig or less, SERVICE AIR DRYER SUPPLY INLET ISO 1-PV-9375 isolates service air to dryers; RESTORE purge air flow as follows:

a. UNLOCK and CLOSE Service Air Containment Building Supply Header Isolation 1-2401-U4-056,

b. RESET 1-PSL-9375 on Instrument Rack 15 on Turbine Building Level 1 near the powdex vessels to restore Service Air Supply,

c. THROTTLE OPEN 1-2401-U4-056 to maintain air pressures 1-PI-9377 and 1-PI-9361 greater than 85 psig.

4.4.3.18 When containment hydrogen concentration falls to 3.5%, TERMINATE the purge as follows:

a. CLOSE SERVICE AIR CNMT HDR ISOL 1-HV-9385 using 1-HS-9385A or 1-HS-9385B on Control Room Panel QPCP,

b. ENSURE CLOSED both SERVICE AIR CNMT POST LOCA PURGE Valves using their Control Switches on Panel QPCP:

(1) 1-HV-9380A,

(2) 1-HV-9380B,

c. ENSURE CLOSED both CTB POST LOCA PURGE EXH IRC ISOL Valves using their Control Switches on Control Room Panel QHVC:

(1) 1-HV-2624A,

(2) 1-HV-2624B,

d. CLOSE CNMT POST LOCA PURGE EXH DUCT CONTROL VLV 1-FV-2693 using 1-HS-2693,

e. PLACE disconnect switch at local HEATER CONTROL PANEL 1-1508-N7-001-H01 to OFF.

f. CLOSE and LOCK POST LOCA PURGE CTB ISO VALVE 1-1508-U4-012,

g. COMPLETE processing of the Gaseous Release Permit if initiated.

4.4.3.19 Periodically MONITOR containment hydrogen concentration and MAINTAIN it less than 4.0%.

5.0 REFERENCES

5.1 VEGP FSAR Section 6.2.5

5.2 **PROCEDURES**

5.2.1	13305-1,	"Auxiliary Building Heating, Ventilation, And Air Conditioning System"
5.2.2	13710-1,	"Service Air System"
5.2.3	13901-1,	"Heat Tracing"

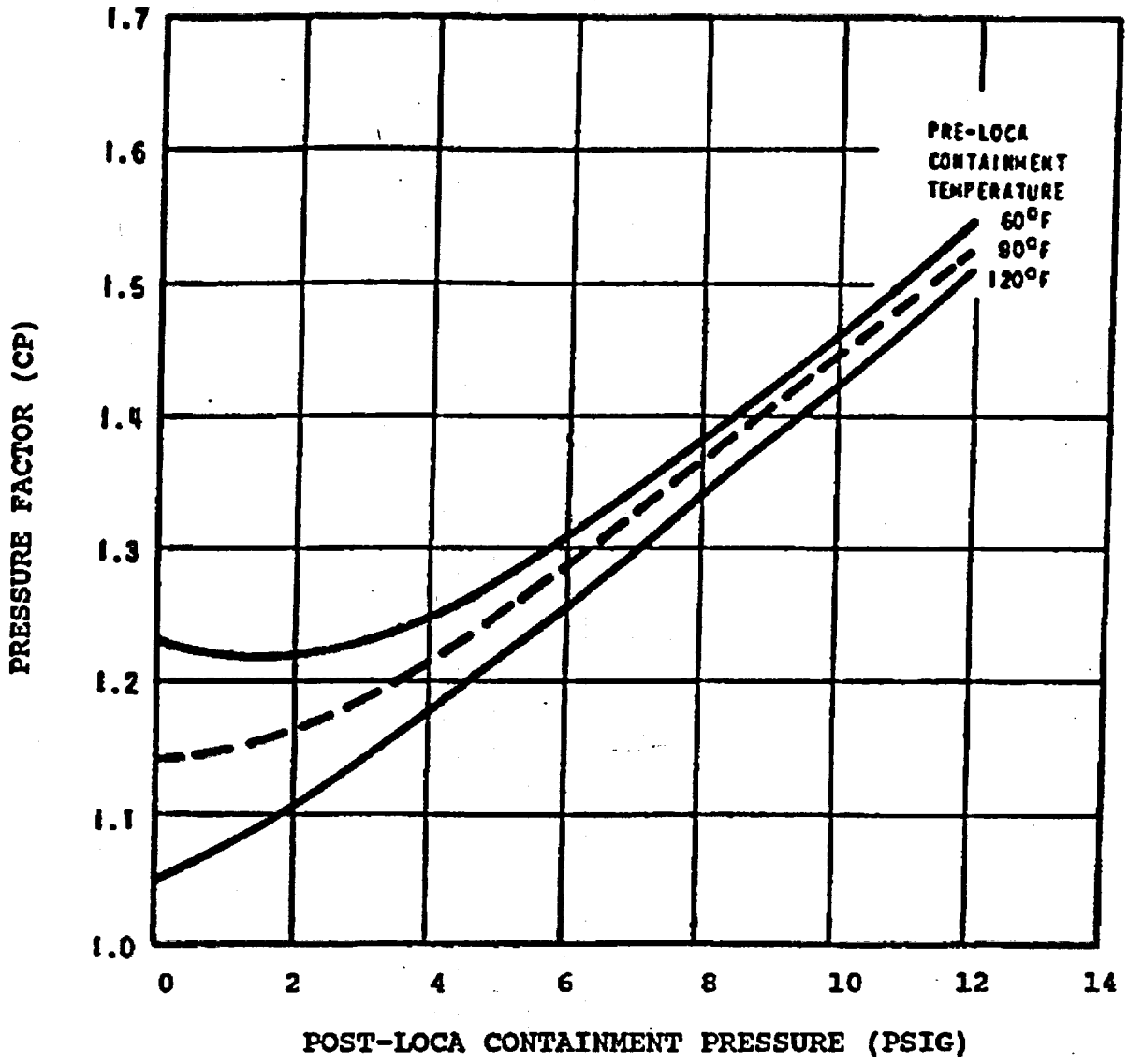
5.3 **P&ID's**

5.3.1	1X4DB213-1	Purification And Clean-up System
5.3.2	1X4DB213-2	Purification And Clean-up System
5.3.3	1X4DB214-2	Containment, Control Rod Drive Mechanism, Cavity, And Reactor Support Cooling System
5.3.4	1X4DB203	Equipment Building Heating, Ventilation, And Air Conditioning System
5.3.5	1X4DB186-1	Service Air System
5.3.6	1X4DB175-2	Instrument And Service Air System

5.4	**ELEMENTARY DIAGRAMS**	
5.4.1	1X3D-BG-B02U	Purification And Clean-up System: Hydrogen Recombiner
5.4.2	1X3D-BG-B02V	Purification And Clean-up System: Hydrogen Recombiner
5.4.3	1X3D-BG-B02X	Containment, Control Rod Drive Mechanism, Cavity And Reactor Support Cooling System
5.4.4	1X3D-BG-B02Y	Containment, Control Rod Drive Mechanism, Cavity And Reactor Support Cooling System
5.4.5	1X3D-BG-B04A	Purification And Clean-up System: 1-HV-2624A
5.4.6	1X3D-BG-B04B	Purification And Clean-up System: 1-HV-2624B
5.4.7	1X3D-BG-B05B	Purification And Clean-up System: 1-HV-2790A, B, 2791B And 2793B
5.4.8	1X3D-BG-B05E	Purification And Clean-up System: 1-HV-2791A, 2792A, B And 2793A
5.4.9	1X3D-BG-B05F	Containment Building Electrical Hydrogen Recombiner System: 1-HV-2793A
5.4.10	1X3D-BG-B05G	Containment Building Electrical Hydrogen Recombiner System: 1-HV-2793B
5.4.11	1X3D-BG-B05M	Containment Building Electrical Hydrogen Recombiner System: 1-HV-2790B
5.4.12	1X3D-BG-B06F	Purification And Clean-up System: 1-HV-1508-012
5.4.13	1X3D-BG-B06H	Containment Post-LOCA Purge Exhaust Duct Isolation Valves
5.4.14	1X3D-BH-R01D	Service Air System 1-HV-9380A
5.4.15	1X3D-BH-R01E	Service Air System 1-HV-9380B
5.4.16	1X3D-BH-R01H	Containment Service Air Header Isolation 1-HV-9385
5.5	**TECHNICAL MANUALS**	
5.5.1	AX5AA05-43	Containment Hydrogen Monitor
5.5.2	1X6AE01-38	Electric Hydrogen Recombiner

END OF PROCEDURE TEXT

Figure 1 - Dry Containment Recombiner Power Correction Factor Versus Containment Pressure, 0.0 psig Initial Pressure



Sheet 1 of 1

CHECKLIST 1

CONTAINMENT H2 MONITORING SYSTEM

REMOTE-OPERATED COMPONENTS

ALIGNMENT FOR SYSTEM STARTUP

COMPONENT	DESCRIPTION	CONDITION REQUIRED	LINEUP (INITIALS)	VERIFICATION (INITIALS)
1-HS-22900	H2 MONITOR HMA FUNCTION SELECT	OFF	_____	_____
1-HV-2792A	H2 MONITOR A SPLY ISO IRC	CLOSED	_____	_____
1-HV-2792B	H2 MONITOR A SPLY ISO IRC	CLOSED	_____	_____
1-HV-2791B	H2 MONITOR A SPLY ISO ORC	CLOSED	_____	_____
1-HV-2793B	H2 MONITOR A RTN ISO ORC	CLOSED	_____	_____
1-HS-22901	H2 MONITOR HMB FUNCTION SELECT	OFF	_____	_____
1-HV-2790A	H2 MONITOR B SPLY ISO IRC	CLOSED	_____	_____
1-HV-2790B	H2 MONITOR B SPLY ISO IRC	CLOSED	_____	_____
1-HV-2791A	H2 MONITOR B SPLY ISO ORC	CLOSED	_____	_____
1-HV-2793A	H2 MONITOR B RTN ISO ORC	CLOSED	_____	_____
1-HV-8221	CNMT ATMOSPHERE PASS SAMPLE ISOLATION	CLOSED	_____	_____

Reviewed By: _____ _____
Date

Sheet 1 of 1

CHECKLIST 2

POST-LOCA CONTAINMENT HYDROGEN

PURGE SYSTEM REMOTE-OPERATED VALVE

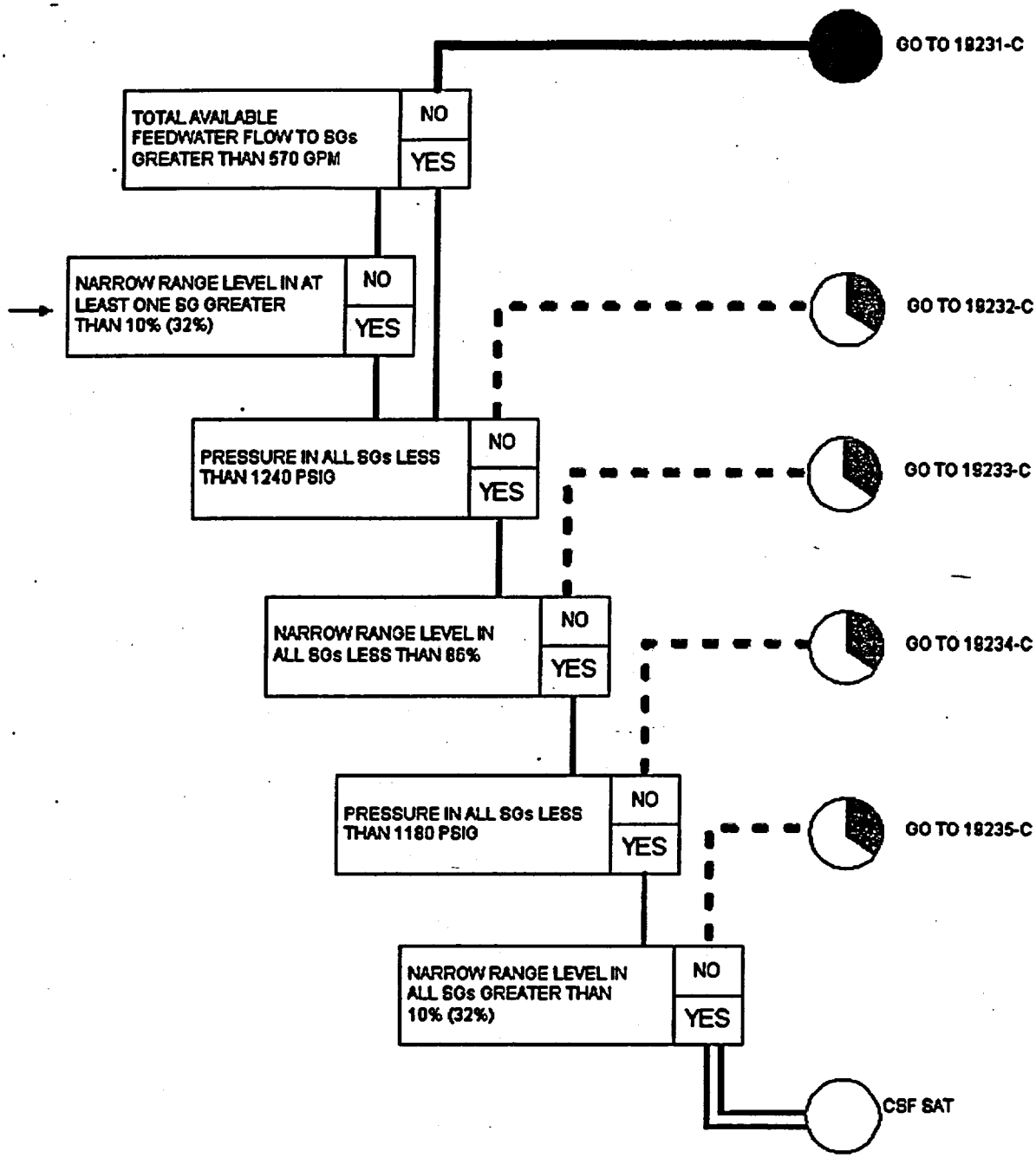
ALIGNMENT FOR STANDBY

COMPONENT	DESCRIPTION	CONDITION REQUIRED	LINEUP (INITIALS)	VERIFICATION (INITIALS)
1-HV-2624A	CTB POST LOCA PURGE EXH IRC ISO VLV	CLOSED	_____	_____
1-HV-2624B	CTB POST LOCA PURGE EXH IRC ISOLATION	CLOSED	_____	_____
1-FV-2693	CNMT POST LOCA PURGE EXH DUCT CONTROL VLV	CLOSED	_____	_____
1-HV-9385	SERVICE AIR CONTAINMENT HEADER ISOLATION	CLOSED	_____	_____
1-HV-9380A	SERVICE AIR CNMT POST LOCA PURGE	CLOSED	_____	_____
1-HV-9380B	SERVICE AIR CNMT POST LOCA PURGE	CLOSED	_____	_____

Reviewed By: _____ _____
Date

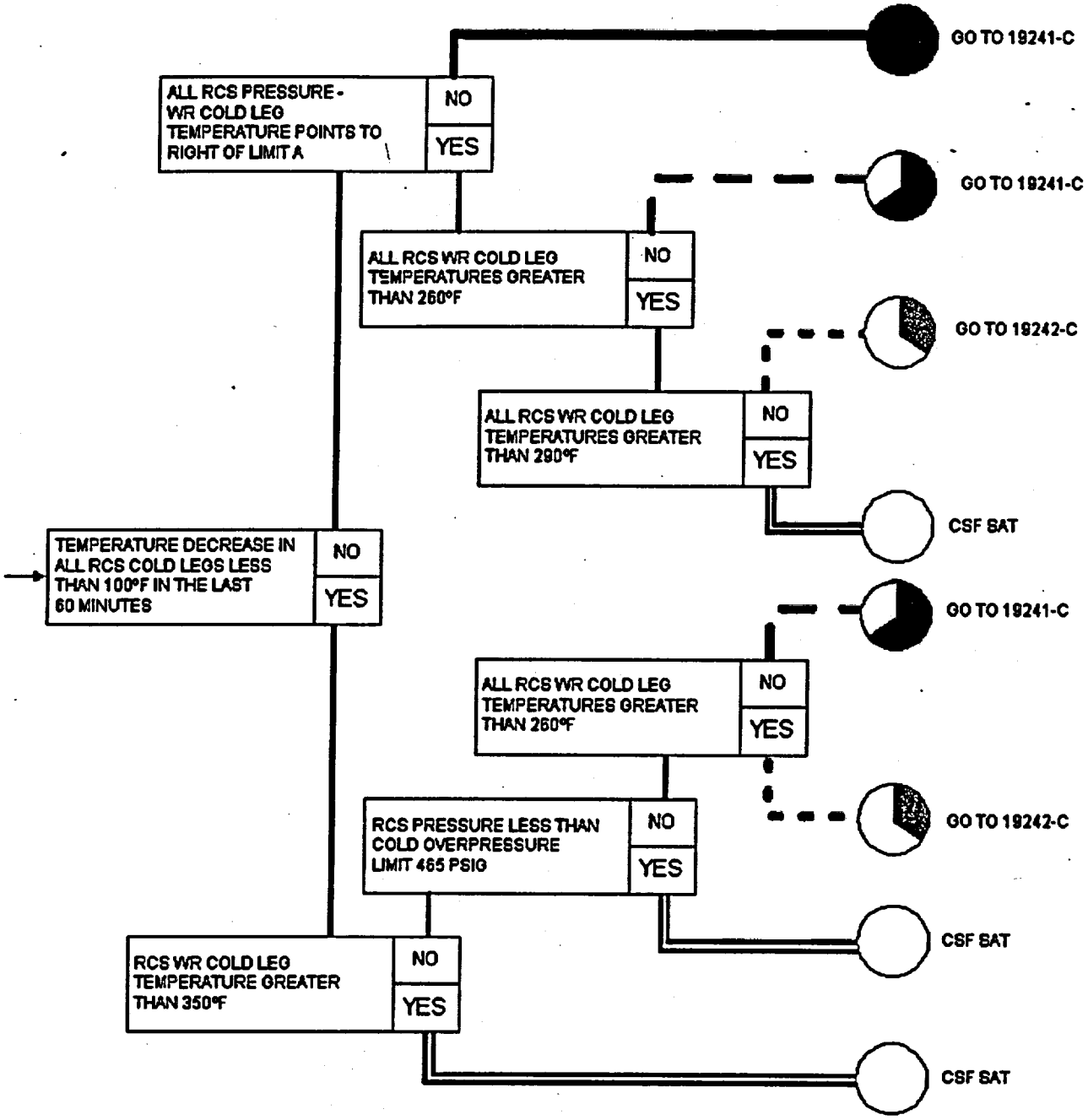
Sheet 1 of 1

F- 0.3
HEAT SINK



Sheet 1 of 1

F- 0.4
INTEGRITY



Sheet 1 of 1

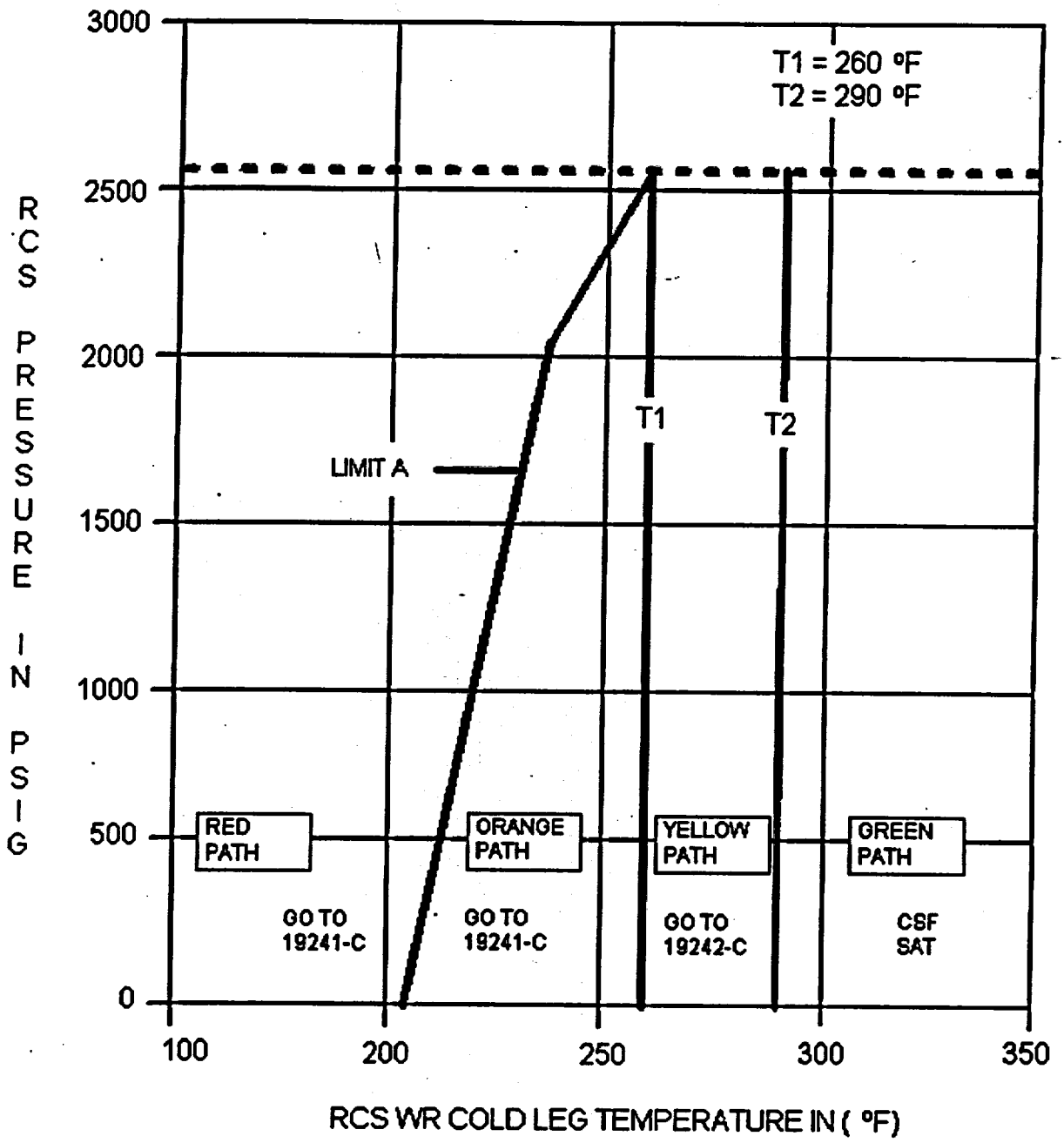
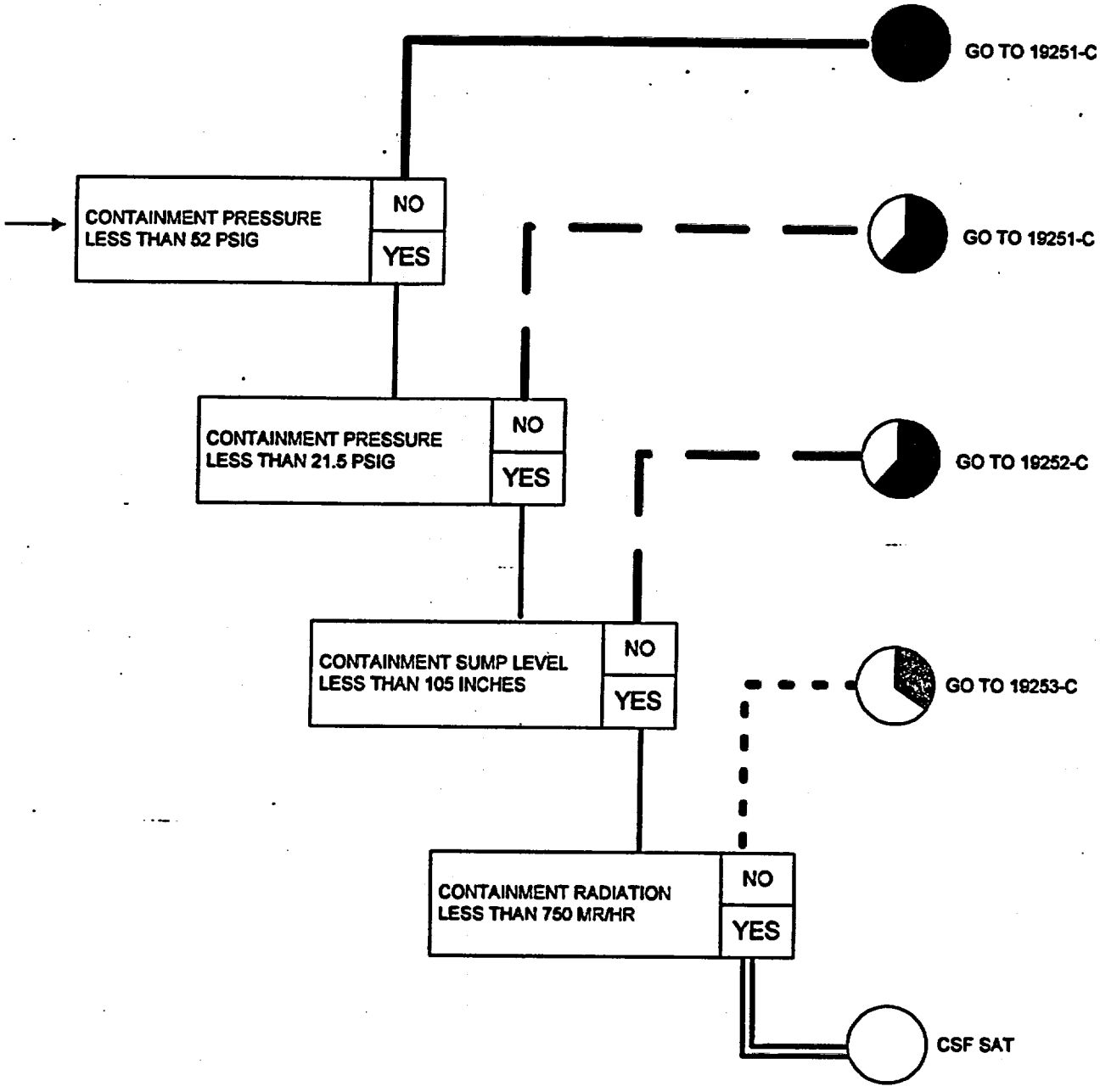


FIGURE 1

Sheet 1 of 1

F-0.5
CONTAINMENT



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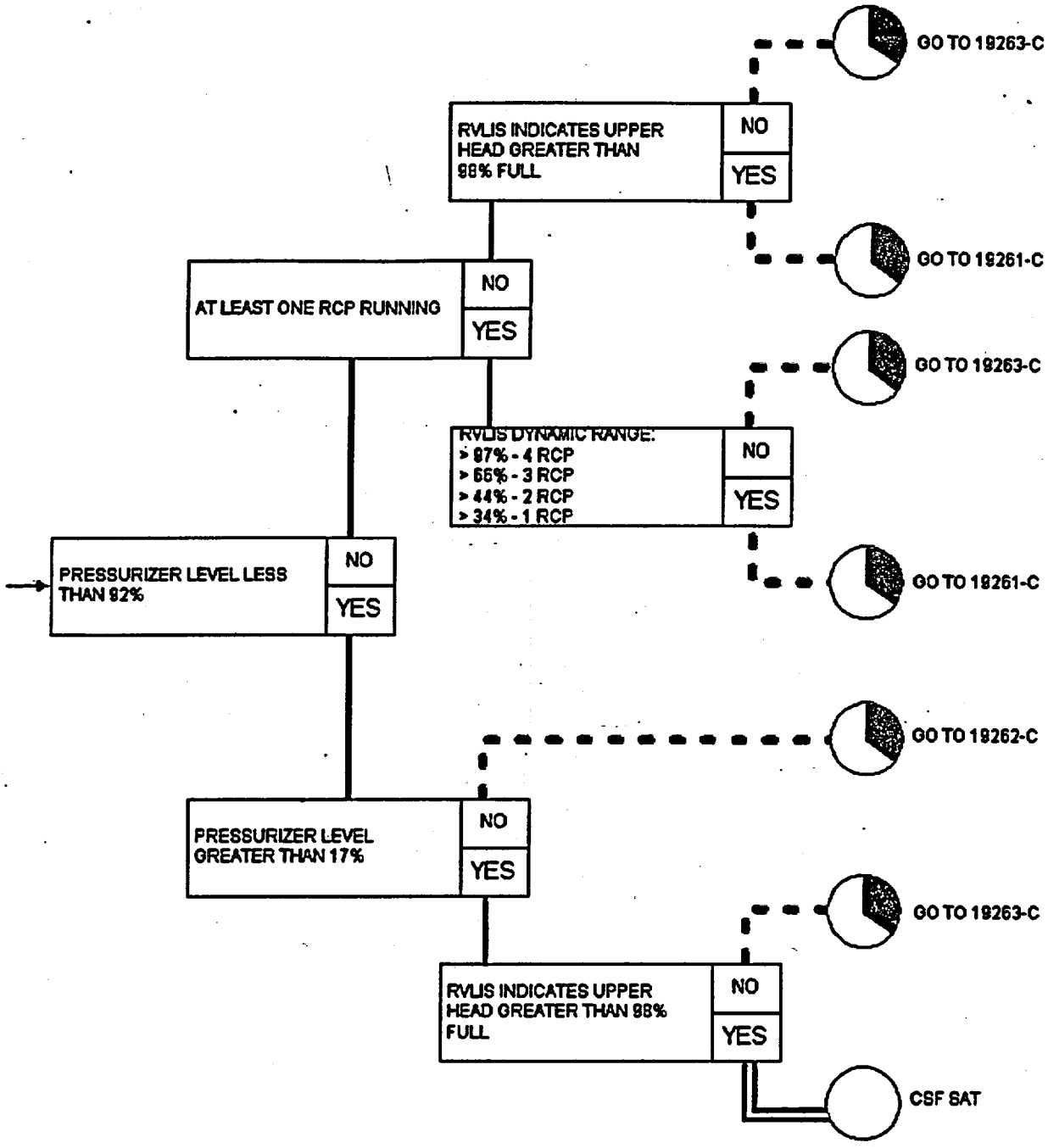
F- 0.6
INVENTORY



Test Name: SRO99VG.TST
Test Date: Monday, December 20, 1999

		Question ID		Type	Pts	Answer(s) 0	1	2	3	4	5	6	7	8	9
1:	1	057AA2.18 16	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	2	040EA1.18 10	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	3	076AK3.05 13	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	4	068AK2.03 4	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	5	005AK1.02 6	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	6	011EA2.11 ___	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	7	029EK3.12 18	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	8	WE04EK3.3 53	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	9	055EK3.02 7	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	10	055EG2.1.20	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	11	024AK3.02 2	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	12	001AK2.06 29	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	13	WE08EK1.13	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	14	026AK3.03 15	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	15	069AA2.01 5	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	16	067G2.4.27 ___	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	17	WE12K1.2 ___	001	MC-SR	1										
1:	18	003AK2.05 26	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	19	WE09EA2.2	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	20	051AA2.02 1	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	21	WE09EA2.1 9	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	22	062AK3.02 11	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	23	074EK2.1 ___	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	24	015AA1.23 17	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	25	037AA2.10 ___	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	26	007G2.4.49 28	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	27	058AK3.01 ___	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	28	025AK1.01 27	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	29	033AK1.01 25	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	30	032AK3.01 ___	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	31	027AG2.1.7 8	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	32	009EA2.38 30	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	33	037AA2.11 ___	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	34	WE16EK1.3 19	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	35	WE11EA2.2 ___	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	36	008AK1.01 ___	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	37	WE03EK2.2 17	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	38	054AA2.03 ___	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1:	39	061AA2.05 20	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	40	022AA1.11 23	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1:	41	056AA1.01 34	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	42	WE13 EK 2.1 35	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	43	036AK1.01 36	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	44	003K2.01 49	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	45	061K4.08 42	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	46	059K3.03 47	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	47	013K3.01 39	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	48	004A2.12 45	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1:	49	004A1.03 43	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1:	50	003A1.09 52	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C

Test Name: SRO99VG.TST
Test Date: Monday, December 20, 1999

	Question ID		Type	Pts	Answer(s) 0	1	2	3	4	5	6	7	8	9
1: 51	026K3.01 67	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 52	015G2.1.11 57	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 53	056K1.03 46	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 54	072K4.01 55	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 55	063A1.01 62	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 56	014K5.01 71	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 57	017K4.01 58	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 58	013G2.1.20	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 59	071A2.02 59	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 60	001A3.04 56	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 61	022A3.01 44	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 62	061K1.01 48	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 63	079A.401 64	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 64	075G2.1.32 75	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 65	034A1.02 86	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 66	012A2.01 73	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 67	075A2.02 70	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 68	011A4.05 77	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 69	033A2.02	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 70	006A4.07 72	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 71	073K1.01 79	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 72	010A4.01 68	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 73	039A2.04 76	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 74	062A4.01 66	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 75	103G2.1.28 84	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 76	035K6.03 60	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 77	086G2.4.26 61	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 78	064K6.08 74	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 79	016A2.03	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 80	005K6.03 85	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 81	045K4.11 83	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 82	008A2.02 82	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 83	007K3.01 81	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 84	G2.2.13 95	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 85	G2.1.20 100	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 86	G2.3.9	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 87	G2.3.6	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 88	G2.2.26	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 89	G2.4.9	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 90	G2.1.34	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 91	G2.2.6	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 92	G2.4.21 94	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 93	G2.4.38	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 94	G2.3.2	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 95	G2.3.10 92/97 ?	001	MC-SR	1	D	A	B	C	D	A	B	C	D	A
1: 96	G2.2.1 98	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 97	G2.4.10 99	001	MC-SR	1	C	D	A	B	C	D	A	B	C	D
1: 98	G2.2.28	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B
1: 99	G2.1.1	001	MC-SR	1	B	C	D	A	B	C	D	A	B	C
1: 100	G2.4.44	001	MC-SR	1	A	B	C	D	A	B	C	D	A	B

Name SRO KEY

1.	[a]	[b]	[d]	35.	[a]	[c]	[d]	69.	[a]	[c]	[d]
2.	[a]	[c]	[d]	36.	[b]	[c]	[d]	70.	[a]	[b]	[d]
3.	[a]	[b]	[d]	37.	[a]	[c]	[d]	71.	[b]	[c]	[d]
4.	[a]	[c]	[d]	38.	[a]	[b]	[c]	72.	[a]	[c]	[d]
5.	[b]	[c]	[d]	39.	[b]	[c]	[d]	73.	[a]	[b]	[c]
6.	[b]	[c]	[d]	40.	[a]	[b]	[d]	74.	[a]	[b]	[c]
7.	[a]	[b]	[d]	41.	[a]	[c]	[d]	75.	[a]	[b]	[c]
8.	[a]	[b]	[c]	42.	[a]	[c]	[d]	76.	[b]	[c]	[d]
9.	[b]	[c]	[d]	43.	[b]	[c]	[d]	77.	[a]	[c]	[d]
10.	[b]	[c]	[d]	44.	[a]	[c]	[d]	78.	[a]	[b]	[d]
11.	[a]	[b]	[c]	45.	[a]	[c]	[d]	79.	[b]	[c]	[d]
12.	[b]	[c]	[d]	46.	[a]	[c]	[d]	80.	[a]	[c]	[d]
13.	[b]	[c]	[d]	47.	[a]	[c]	[d]	81.	[b]	[c]	[d]
14.	[b]	[c]	[d]	48.	[b]	[c]	[d]	82.	[a]	[b]	[c]
15.	[a]	[b]	[d]	49.	[a]	[c]	[d]	83.	[a]	[b]	[d]
16.	[a]	[b]	[d]	50.	[a]	[c]	[d]	84.	[a]	[b]	[d]
17.	[a]	[c]	[d]	51.	[a]	[b]	[c]	85.	[a]	[b]	[d]
18.	[a]	[b]	[d]	52.	[a]	[b]	[d]	86.		[b]	[c] [d]
19.	[a]	[c]	[d]	53.	[a]	[c]	[d]	87.	[a]	[b]	[d]
20.	[a]	[b]	[c]	54.	[a]	[c]	[d]	88.	[a]	[b]	[d]
21.	[a]	[c]	[d]	55.	[a]	[b]	[d]	89.	[a]	[b]	[d]
22.	[a]	[b]	[c]	56.	[a]	[b]	[d]	90.		[b]	[c] [d]
23.	[a]	[b]	[d]	57.	[a]	[b]	[c]	91.	[a]	[b]	[d]
24.	[a]	[b]	[d]	58.	[a]	[c]	[d]	92.	[a]	[c]	[d]
25.	[a]	[b]	[c]	59.	[a]	[b]	[d]	93.	[a]	[b]	[d]
26.	[a]	[b]	[d]	60.	[a]	[b]	[d]	94.		[b]	[c] [d]
27.	[a]	[b]	[d]	61.	[a]	[b]	[c]	95.	[a]	[b]	[c]
28.	[a]	[c]	[d]	62.	[a]	[c]	[d]	96.	[a]	[b]	[d]
29.	[a]	[b]	[c]	63.	[a]	[b]	[d]	97.	[a]	[b]	[d]
30.	[b]	[c]	[d]	64.	[a]	[c]	[d]	98.	[b]	[c]	[d]
31.	[a]	[c]	[d]	65.	[a]	[b]	[d]	99.	[a]	[c]	[d]
32.	[a]	[b]	[c]	66.	[a]	[b]	[c]	100.	[b]	[c]	[d]
33.	[a]	[b]	[d]	67.	[a]	[b]	[d]				
34.	[a]	[b]	[d]	68.	[a]	[b]	[d]				

Name SKO

1.	[a]	[b]	[c]	[d]		35.	[a]	[b]	[c]	[d]		69.	[a]	[b]	[c]	[d]	
2.	[a]	[c]	[c]	[d]		36.	[a]	[b]	[c]	[d]		70.	[a]	[b]	[c]	[d]	
3.	[a]	[b]	[c]	[d]		37.	[a]	[b]	[c]	[d]		71.	[a]	[b]	[c]	[d]	
4.	[a]	[b]	[c]	[d]		38.	[a]	[b]	[c]	[d]		72.	[a]	[b]	[c]	[d]	
5.	[a]	[b]	[c]	[d]		39.	[a]	[b]	[c]	[d]		73.	[a]	[b]	[c]	[d]	
6.	[a]	[b]	[c]	[d]		40.	[a]	[b]	[c]	[d]		74.	[a]	[b]	[c]	[d]	
7.	[a]	[b]	[c]	[d]		41.	[a]	[b]	[c]	[d]		75.	[a]	[b]	[c]	[d]	
8.	[a]	[b]	[c]	[d]		42.	[a]	[b]	[c]	[d]		76.	[a]	[b]	[c]	[d]	
9.	[a]	[b]	[c]	[d]		43.	[a]	[b]	[c]	[d]		77.	[a]	[b]	[c]	[d]	
10.	[a]	[b]	[c]	[d]		44.	[a]	[b]	[c]	[d]		78.	[a]	[b]	[c]	[d]	
11.	[a]	[b]	[c]	[d]		45.	[a]	[b]	[c]	[d]		79.	[a]	[b]	[c]	[d]	
12.	[a]	[b]	[c]	[d]		46.	[a]	[b]	[c]	[d]	40	80.	[a]	[b]	[c]	[d]	
13.	[a]	[b]	[c]	[d]	60%	47.	[a]	[b]	[c]	[d]		81.	[a]	[b]	[c]	[d]	
14.	[a]	[b]	[c]	[d]		48.	[a]	[b]	[c]	[d]		82.	[a]	[b]	[c]	[d]	
15.	[a]	[b]	[c]	[d]		49.	[a]	[b]	[c]	[d]		83.	[a]	[b]	[c]	[d]	
16.	[a]	[b]	[c]	[d]		50.	[a]	[b]	[c]	[d]		84.	[a]	[b]	[c]	[d]	
17.	[a]	[b]	[c]	[d]		51.	[a]	[b]	[c]	[d]		85.	[a]	[b]	[c]	[d]	
18.	[a]	[b]	[c]	[d]		52.	[a]	[b]	[c]	[d]		86.	[a]	[b]	[c]	[d]	
19.	[a]	[b]	[c]	[d]	40	53.	[a]	[b]	[c]	[d]		87.	[a]	[b]	[c]	[d]	
20.	[a]	[b]	[c]	[d]		54.	[a]	[b]	[c]	[d]		88.	[a]	[b]	[c]	[d]	
21.	[a]	[b]	[c]	[d]		55.	[a]	[b]	[c]	[d]		89.	[a]	[b]	[c]	[d]	
22.	[a]	[b]	[c]	[d]	40	56.	[a]	[b]	[c]	[d]		90.	[a]	[b]	[c]	[d]	
23.	[a]	[b]	[c]	[d]		57.	[a]	[b]	[c]	[d]		91.	[a]	[b]	[c]	[d]	
24.	[a]	[b]	[c]	[d]		58.	[a]	[b]	[c]	[d]		92.	[a]	[b]	[c]	[d]	
25.	[a]	[b]	[c]	[d]		59.	[a]	[b]	[c]	[d]		93.	[a]	[b]	[c]	[d]	
26.	[a]	[b]	[c]	[d]		60.	[a]	[b]	[c]	[d]		94.	[a]	[b]	[c]	[d]	
27.	[a]	[b]	[c]	[d]		61.	[a]	[b]	[c]	[d]	40	95.	[a]	[b]	[c]	[d]	
28.	[a]	[b]	[c]	[d]		62.	[a]	[b]	[c]	[d]		96.	[a]	[b]	[c]	[d]	
29.	[a]	[b]	[c]	[d]	80 (25)	63.	[a]	[b]	[c]	[d]		97.	[a]	[b]	[c]	[d]	
30.	[a]	[b]	[c]	[d]		64.	[a]	[b]	[c]	[d]		98.	[a]	[b]	[c]	[d]	
31.	[a]	[b]	[c]	[d]	40	65.	[a]	[b]	[c]	[d]		99.	[a]	[b]	[c]	[d]	
32.	[a]	[b]	[c]	[d]		66.	[a]	[b]	[c]	[d]	80% (70)	100.	[a]	[b]	[c]	[d]	
33.	[a]	[b]	[c]	[d]		67.	[a]	[b]	[c]	[d]							
34.	[a]	[b]	[c]	[d]		68.	[a]	[b]	[c]	[d]							