Draft Submittal
(Pink Paper)

SURRY EXAM 2002-301

50-280, 281/2002-301
MARCH 18 - 28, 2002

1. Combined Written Exam

Surry Initial Combined Exam 03/2002

QUESTIONS REPORT
for Surry2002

1. 001A1.01 001/T2G2/T2G1/S/G LEVEL/M 3.8/4.2/N/SR02301/R/RLM
2. 001AA1.01 001/T1G2/T1G1/BANK SELECT/M 3.5/3.2/M/SR02301/C/RLM
3. 001AA2.03 001/T1G2/T1G1/CONTINUOUS ROD WITHD/C/A 4.5/4.8/B/SR02301/S/RLM
4. 001K3.01 001/T2G1/T2G1/LETDOWN FLOW/C/A 2.9/3.0/N/SR02301/C/RLM
5. 002K6.03 001/T2G2/T2G2/RVLIS/CA 3.1/3.6/N/SR02301/C/RLM
6. 003A3.02 001/T2G2/T2G1/RCP PUMP AMPS/M 2.6/2.5/M/SR02301/C/RLM
7. 003AK2.05 001/T1G2/T1G1/POWER SUPPLIES/M 2.5/2.8/N/SR02301/C/RLM
8. 003K4.07 001/T2G1/T2G1//M 3.2/3.4/B/SR02301/R/GWL
9. 004K2.04 001/T2G1/T2G1//M 2.6/2.7/B/SR02301/C/GWL
10. 004K6.17 001/T2G1/T2G1//C/A 4.4/4.6/N/SR02301/R/GWL
11. 005A2.03 001/T2G3/T2G3/CAVITATION/C/A 2.9/3.1/N/SR02301/S/RLM
12. 005AK1.02 001/T1G1/T1G1/FLUX TILT/M 3.1/3.9/B/SR02301/C/RLM
13. 005K6.03 001/T2G3/T2G3//M 2.5/2.6/N/SR02301/R/GWL
14. 006K5.10 001/T2G2/T2G2/THERMAL STRESS/C/A 2.5/2.9/N/SR02301/C/RLM
15. 007A2.02 001/T2G3/T2G3/HI PRT PRESSURE/C/A 2.6/3.2/N/SR02301/R/RLM
16. 007G2.4.47 001/T1G2/T1G2/COOLDOWN/C/A 3.4/3.7/N/SR02301/C/RLM
17. 008A1.04 001/T2G3//T2G3/C/A 3.1/3.2/B/SR02301/R/GWL
18. 008A2.01 001/T2G3/T2G3/PUMP/C/A 3.3/3.6/N/SR02301/S/RLM
19. 008AA2.19 001/T1G2/T1G2/STUCK SPRAY VALVE/M 3.4/3.6/B/SR02301/S/RLM
20. 009EA2.04 001/T1G2/T1G2//M 3.8/4.0/B/SR02301/S/RLM
21. 010A2.03 001/T2G2/T2G2//C/A 4.1/4.2/M/SR02301/R/GWL
22. 010A2.03 002/T2G2/T2G2/RCS LEAKAGE/C/A 4.1/4.2/B/SR02301/S/RLM
23. 011EK3.03 001/T1G2/T1G1/AFW/C/A 4.1/4.3/N/SR02301/C/RLM
24. 011K3.02 001/T2G2/T2G2/PZR PRESSURE CONTROL/C/A 3.2/3.7/M/SR02301/C/RLM

25. 012A2.02 001/T2G2/T2G2//M 3.6/3.9/B/SR02301/S/GWL
26. 012K4.06 003/T2G2/T2G2//C/A 3.2/3.5/B/SR02301/R/GWL
27. 013G2.4.4 001/T2G1/T2G1//C/A 4.0/4.3/M/SR02301/C/GWL
28. 013K5.02 001/T2G1/T2G1//M 2.9/3.3/B/SR02301/R/GWL
29. 014K3.02 001/T2G2/T2G1//C/A 3.4/3.5/N/SR02301/C/GWL
30. 015A3.03 001/T2G1/T2G1//C/A 3.96/3.9/M/SR02301/R/GWL
31. 015AK2.10 001/T1G1/T1G1/RCP INDICATORS/C/A 2.8/2.8/B/SR02301/C/GWL
32. 015K4.08 001/T2G1/T2G1//C/A 3.4/3.7/B/SR02301/C/GWL
33. 016K4.03 001/T2G2/T2G2/AMSAC/M 2.8/2.9/B/SR02301/R/RLM
34. 017A3.01 001/T2G1/T2G1//C/A 3.6/3.8/B/SR02301/C/GWL
35. 017K1.01 001/T2G1/T2G1/COMPUTER/M / 3.2/3.2/N/SR02301/C/GWL
36. 022A4.05 001/T2G1/T2G1//M 3.8/3.8/M/SR02301/R/GWL
37. 022K4.05 001/T2G1/T2G1//M 2.6/2.7/N/SR02301/C/GWL
38. 024AK1.04 001/T1G1/T1G1//C/A 2.8/3.6/N/SR02301/C/GWL
39. 025AK1.01 001/T1G2/T1G2/VAPOR ENTRAINMENT/M 3.9/4.3/B/SR02301/C/RLM
40. 026A1.01 002/T2G2/T2G1/CONTAINMENT SPRAY/M 3.9/4.2/B/SR02301/C/RLM
41. 026AA2.01 001/T1G1/T1G1/CCWS LEAK/C/A 2.9/3.5/B/SR02301/S/RLM
42. 027AK3.01 001/T1G1/T1G2//C/A 3.5/3.8/N/SR02301/C/GWL
43. 028AK2.03 001/T1G3/T1G3//C/A 2.6/2.9/M/SR02301/C/GWL
44. 029A3.01 001/T2G2/T2G2/PURGE ISOLATION/C/A 3.8/4.0/N/SR02301/C/RLM
45. 029G2.4.21 001/T1G2/T1G1/EVALUATE PERFORMANCE/C/A 3.7/4.3/B/SR02301/S/RLM
46. 029G2.4.49 001/T1G2/T1G1//C/A 4.0/4.0/M/SR02301/R/GWL
47. 032AK2.01 001/T1G2/T1G2/SR & IR/C/A 2.7/3.1/M/SR02301/C/GWL
48. 033G2.4.21 001/T1G2/T1G2//C/A 3.7/4.3/N/SR02301/S/GWL

49. 033K1.05 001/T2G2/T2G2/RWST/C/A 2.7/2.8/N/SR02301/C/RLM
50. 034G2.1.27 001/T2G3/T2G2/UPENDER/M 2.8/2.9/N/SR02301/C/RLM
51. 035A1.01 001/T2G2/T2G2/S/G LEVEL/C/A 3.6/3.8/N/SR02301/C/RLM
52. 037AA2.10 001/T1G2/T1G2/T S LEAKAGE/C/A 3.2/4.1/M/SR02301/S/RLM
53. 038EK3.02 001/T1G2/T1G2/SECONDARY PORV/C/A 4.4/4.5/N/SR02301/C/RLM
54. 039A4.04 001/T2G2/T2G2/TDAFW PUMP/C/A 3.8/3.9/B/SR02301/C/RLM
55. 040AK2.02 001/T1G1/T1G1/MAIN STEAM BYPASS/M 2.6/2.6/B/SR02301/C/RLM
56. 041K5.07 001/T2G3/T2G3/REACTIVITY EFFECTS/C/A 3.1/3.6/N/SR02301/C/RLM
57. 045A3.11 001/T2G3/T2G3/EXCITER/M 2.6/2.9/B/SR02301/C/RLM
58. 051AK3.01 001/T1G1/T1G1/STEAM DUMP INTERLOCK/M 2.8/3.1/B/SR02301/C/RLM
59. 054AA1.02 001/T1G2/T1G2/AFW/C/A 4.4/4.4/N/SR02301/C/RLM
60. 055EK3.02 001/T1G1/T1G1//M 4.3/4.6/B/SR02301/C/RLM
61. 055G2.1.28 001/T2G2/T2G2/AIR EJECTORS/C/A 3.2/3.3/N/SR02301/C/RLM
62. 056AK3.01 001/T1G3/T1G3/LOAD SEQUENCE/C/A 3.5/3.9/N/SR02301/C/RLM
63. 056G2.1.32 001/T2G1/T2G1/CONDENSATE LIMITS/M 3.4/3.8/N/SR02301/C/RLM
64. 057AA1.06 001/T1G1/T1G1/RHR FLOW CONTROL/M 3.5/3.5/N/SR02301/C/RLM
65. 059AK3.03 001/T1G2/T1G1/INOPERABLE RM/M 3.0/3.7/N/SR02301/C/RLM
66. 059G2.4.31 001/T2G1/T2G1/FEED PUMP/C/A 3.3/3.4/N/SR02301/C/RLM
67. 059K3.03 001/T2G1/T2G1//C/A 3.5/3.7/M/SR02301/R/GWL
68. 060AK2.02 001/T1G2/T1G2/VENTILLATION/M 2.7/3.1/B/SR02301/C/RLM
69. 061K2.02 001/T2G1/T2G1/LOSS OF POWER/C/A 3.7/3.7/M/SR02301/C/RLM
70. 062A2.04 001/T2G2/T2G2/LOSS OF BUS/M 3.4/3.1/B/SR02301/S/RLM
71. 062AA1.05 001/T1G1/T1G1/SURGE TANK/C/A 3.1/3.1/N/SR02301/C/RLM
72. 062K1.02 001/T2G2/T2G2//C/A 4.1/4.4/B/SR02301/R/GWL

73. 063A2.01 001/T2G2/T2G1/D C/C/A 2.5/3.2/N/SR02301/C/RLM

74. 063A4.02 001/T2G2/T2G1//M 2.8/2.9/B/SR02301/C/GWL

75. 064A2.06 001/T2G2/T2G2//C/A 2.9/3.3/N/SR02301/C/GWL

76. 065AA2.01 001/T1G3/T1G2/PRESSURE SWITCH/C/A 2.9/3.2/N/SR02301/S/RLM

77. 067AK1.02 001/T1G1/T1G1//M 3.1/3.2/B/SR02301/C/GWL

78. 068AK2.03 001/T1G1/T1G1//M 2.9/3.1/B/SR02301/C/GWL

79. 068K6.10 001/T2G1/T2G1//C/A 2.5/2.9/B/SR02301/C/GWL

80. 069AA2.01 001/T1G1/T1G1/CONTAINMENT INTEGRIT/M 3.7/4.3/B/SR02301/R/RLM

81. 071A2.09 001/T2G1/T2G1//C/A 3.0/3.5/B/SR02301/R/GWL

82. 071A4.07 001/T2G1/T2G1/FLOW CONTROLLER/C/A 3.0/3.0/N/SR02301/C/RLM

83. 072A2.02 001/T2G1/T2G1/DETECTOR FAILURE/C/A 2.8/2.9/N/SR02301/C/RLM

84. 072K5.02 001/T2G1/T2G1/AREA RAD MONITOR/C/A 2.5/3.2/N/SR02301/C/RLM

85. 073G2.1.32 001/T2G2/T2G2/PRECAUTIONS/M 3.4/3.8/N/SR02301/C/RLM

86. 074EA2.01 001/T1G1/T1G1/SUBCOOLING/C/A 4.6/4.9/B/SR02301/R/RLM

87. 075K1.08 001/T2G2/T2G2/SWS TO CW/M 3.2/3.2/N/SR02301/C/RLM

88. 076AA1.04 001/T1G1/T1G1//M 3.2/3.4/M/SR02301/C/GWL

89. 076K3.01 001/T2G3/T2G3/SERVICE WATER FOULIN/C/A 3.4/3.6/N/SR02301/R/RLM

90. 079G2.4.49 001/T2G2/T2G2/SERVICE AIR/C/A 4.0/4.0/B/SR02301/C/RLM

91. 103A2.05 001/T2G3/T2G2//C/A 2.9/3.9/N/SR02301/S/GWL

92. 103A4.09 001/T2G3/T2G2//M 3.1/3.7/B/SR02301/R/GWL

93. G2.1.1 001/T3/T3/SHIFT TURNOVER/M 3.7/3.8/B/SR02301/C/GWL

94. G2.1.12 001/T3/T3//C/A 4.3/4.2/M/SR02301/C/GWL

95. G2.1.34 001/T3/T3/PRIMARY CHEMISTRY/C/A 2.3/2.9/B/SR02301/S/RLM

96. G2.1.4 001/T3/T3/STAFFING/M 2.5/3.3/B/SR02301/S/RLM

97. G2.2.12 001/T3/T3/SURVEILLANCE USAGE/M 3.0/3.4/N/SR02301/C/RLM
98. G2.2.13 001/T3/T3/TAGGING/M 3.6/3.8/B/SR02301/C/RLM
99. G2.2.30 001/T3/T3/COMMUNICATIONS/M 3.5/3.3/N/SR02301/C/RLM
100. G2.2.6 001/T3/T3/PROCEDURE CHANGE/M 2.3/3.3/N/SR02301/S/RLM
101. G2.3.1 001/T3/T3/PLANNNED SPECIAL EXP/M 2.6/3.0/N/SR02301/C/RLM
102. G2.3.10 001/T3/T3/TEMP SHIELDING/M 2.1/3.1/B/SR02301/S/RLM
103. G2.3.2 001/T3/T3//C/A 2.5/2.9/M/SR02301/C/GWL
104. G2.3.4 001/T3/T3//M 2.5/3.1/M/SR02301/C/GWL
105. G2.4.12 001/T3/T3/EMERG STAFFING/M 3.4/3.9/N/SR02301/C/RLM
106. G2.4.14 001/T3/T3//M 3.3/3.9/N/SR02301/C/GWL
107. G2.4.20 001/T3/T3//C/A 4.0/4.3/M/SR02301/C/GWL
108. G2.4.39 001/T3/T3//M 3.3/3.1/B/SR02301/C/GWL
109. G2.4.5 001/T3/T3//M 2.9/3.6/B/SR02301/C/GWL
110. WE01G2.4.5 001/T1G2/T1G1//M 2.9/3.6/B/SR02301/R/GWL
111. WE02G2.4.6 001/T1G2/T1G1//C/A 4.0/4.0/M/SR02301/S/GWL
112. WE03G2.4.4 002/T1G2/T1G2//C/A 4.0/4.3/B/SR02301/R/GWL
113. WE03G2.4.6 001/T1G2/T1G2//C/A 3.1/4.0/B/SR02301/S/GWL
114. WE04G2.4.5 001/T1G2/T1G1/PROCEDURE USAG/C/A 2.9/3.6/B/SR02301/S/RLM
115. WE04G2.4.9 001/T1G2/T1G1//C/A 3.3/3.9/B/SR02301/R/GWL
116. WE05EA2.1 001/T1G2/T1G2//C/A 3.4/4.4/B/SR02301/S/GWL
117. WE05EK2.1 002/T1G2/T1G2//M 3.7/3.9/N/SR02301/R/GWL
118. WE06EA2.1 001/T1G1/T1G1//C/A 3.4/4.2/B/SR02301/S/GWL
119. WE08EA2.1 001/T1G1/T1G1//C/A 3.4/4.2/B/SR02301/S/GWL
120. WE08EK3.3 001/T1G1/T1G1//C/A 3.4/3.9/B/SR02301/R/GWL

121. WE09G2.4.4 001/T1G1/T1G1//C/A 4.0/4.3/M/SR02301/C/GWL
122. WE11EA1.1 001/T1G2/T1G2//C/A 3.9/4.0/N/SR02301/C/GWL
123. WE13G2.4.4 001/T1G3/T1G3//M 4.0/4.3/M/SR02301/C/GWL
124. WE14EA2.1 001/T1G1/T1G1//C/A 3.3/3.8/B/SR02301/S/GWL
125. WE16EK1.3 001/T1G2/T1G2//M 3.0/3.3/B/SR02301/C/GWL

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QUESTIONS REPORT

for Surry2002

1. 001A1.01 001/T2G1/T2G1//3.8/4.2//SR02301/R/

2. 001AA1.06 001/T1G2/T1G1/ROD XFER SWITCH/3.0/2.9//SR02301/C/

3. 001AA2.03 001/T1G2/T1G1//4.5/4.8//SR02301/S/ Ability to determine & interpret the proper actions to be taken in AP & onto ~~[illegible]~~ safety functions for Continuous CR withdrawal AP1.01

4. 001K3.01 001/T2G1///2.9/3.0//SR02301/C/ Effect that malfunction of CRDS will have on CVCS

5. 002K6.03 001/T2G2/T2G2//3.1/3.6//SR02301/C/ [illegible]

6. 003A3.02 001/T2G2/T2G1//2.6/2.5//SR02301/C/ Ability to monitor automatic operation of the RCP system including motor current — Jay Jones 766 1414

1167 1168

7. 003AK2.05 001/T1G2/T1G1/DROPPED ROD/2.5/2.8//SR02301/C/ — 822 5201
Knowledge of the interrelations between the Dropped Rod and Control Rod Drive pwr supplies & logic circuits (196) 1847

8. 003K4.07 001/T2G1/T2G1//3.2/3.4//SR02301/R/

9. 004K2.04 001/T2G1/T2G1//2.6/2.7//SR02301/C/ (MCC 1H1-2 (1-CH-P-2A BATP)
If we change to 004K2.01, will be BAT pumps
LP 90-03-07

10. 004K6.17 001/T2G1/T2G1//4.4/4.6//SR02301/R/

11. 005A2.03 001/T2G3/T2G3//2.9/3.1//SR02301/S/
Ability to predict the impact or malfunction of an RHR pump/motor on RHRS, and on those predictions, use procedures to correct, control or mitigate the consequences of these malfunctions.

12. 005AK1.02 001/T1G1/T1G1/FLUX TILT/3.1/3.9//SR02301/C/
Knowledge of the operational implications of a flux tilt as it applies to an inoperable/stuck rod.

13. 005K6.03 001/T2G3/T2G3//2.5/2.6//SR02301/R/
[illegible] malfunction on the

14. 006K5.10 001/T2G2/T2G2//2.5/2.9//SR02301/C/
Knowledge of the ~~operational~~ [illegible] of the theory of thermal stress as it applies to ECCS.

15. 007A2.02 001/T2G3/T2G3//2.6/3.2//SR02301/R/
Ability to predict the impacts of abnormal pressure in the PRT upon the PRT system & use procedures to correct control or mitigate abnormal PRT press

16. 007G2.4.47 001/T1G2/T1G2//3.4/3.7//SR02301/C/
Ability to ~~diagnose~~ recognize trends in an accurate & timely manner utilizing the appropriate control room reference material.

17. 008A1.04 001/T2G3//T2G3/3.1/3.2//SR02301/R/

18. 008A2.01 001/T2G3/T2G3//3.3/3.6//SR02301/S/ 417, 1945
Ability to predict the impacts of the loss of a CCW pump on the CCW sys, and based on that prediction, use procedures to correct, control or mitigate the consequences of the loss of the CCW pump.

19. 008AA2.19 001/T1G2/T1G2//3.4/3.6//SR02301/S/

20. 009EA2.04 001/T1G2/T1G2//3.8/4.0/B/SR02301/S/

21. 010A2.03 001/T2G2/T2G2//4.1/4.2//SR02301/S/
Ability to predict the impacts of a PORV malfunction or operation on the pressure control system & based on those predictions use procedures to correct, control or mitigate the consequences of the malfunction.

22. 010A2.03 002/T2G2/T2G2//4.1/4.2//R/

23. 011EK3.03 001/T1G2/T1G1/STARTING/4.1/4.3//SR02301/C/

24. 011K3.02 001/T2G2/T2G2//3.5/3.7//SR02301/C/ 1612

75 C
26 RO
27 SRO

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25. 012A2.02 001/T2G2/T2G2//3.2/3.5//SR02301/S/

26. 012K4.06 001/T2G2/T2G2//3.2/3.5//SR02301/**R**/

27. 013G2.4.4 001/T2G1/T2G1//4.0/4.3//SR02301/C/

28. 013K5.02 001/T2G1/T2G1//2.9/3.3//SR02301/**R**/

29. 014K3.02 001/T2G2/T2G1//2.5/2.8//SR02301/C/

30. 015A3.03 001/T2G1/T2G1//3.96/3.9//SR02301/**R**/

31. 015AK2.10 001/T1G1/T1G1/RCP INDICATORS/2.8/2.8//SR02301/C/

32. 015K4.08 001/T2G1/T2G1//3.4/3.7//SR02301/C/

33. 016K4.03 001/T2G2/T2G2//2.8/2.9//SR02301/**R**/

34. 017A3.01 001/T2G1/T2G1//3.6/3.8//SR02301/C/

Need to finish LXR entry & update SRO sample plan

35. 017K1.01 001/T2G1/T2G1//3.2/3.2//SR02301/C/

36. 022A4.05 001/T2G1/T2G1//3.8/3.8//SR02301/**R**/

37. 022K4.05 001/T2G1/T2G1//2.6/2.7//SR02301/C/

38. 024AK1.04 001/T1G1/T1G1//2.8/3.6//SR02301/C/

39. 025AK1.01 001/T1G2/T1G2//3.9/4.3//SR02301/C/

40. 026A1.01 001/T2G2/T2G1//3.9/4.2//SR02301/C/ ←

41. 026AA2.01 001/T1G1/T1G1//2.9/3.5//SR02301/S/

42. 027AK3.01 001/T1G1/T1G2//3.5/3.8//SR02301/C/

43. 028AK2.03 001/T1G3/T1G3//2.6/2.9//SR02301/C/

44. 029A3.01 001/T2G2/T2G2//3.8/4.0//SR02301/C/

45. 029G~~2.2.25~~ 2.1.7 001/T1G2/T1G1//2.5/3.7//SR02301/S/ ATWS/ ~~Knowledge of bases in TS for LCO for operating & safety~~
885, 2701, 2727

46. 029G2.4.49 001/T1G2/T1G1//4.0/4.0//SR02301/**R**/

47. 032AK2.01 001/T1G2/T1G2//2.7/3.1//SR02301/C/

48. 033G2.4.~~22~~ 21 001/T1G2/T1G2//3.0/4.0//SR02301/S/

QUESTIONS REPORT

for Surry2002

49. 033K1.05 001/T2G2/T2G2//2.7/2.8//SR02301/C/
Physical connection between SFP cooling system & the RWST or cause of ...
50. 034G2.1.27 001/T2G3/T2G2//2.8/2.9//SR02301/C/ 1880, 1882
Knowledge of the system function and/or purpose of fuel handling equipment

51. 035A1.01 001/T2G2/T2G2//3.6/3.8//SR02301/C/ 1654,

52. 037AA2.10 001/T1G2/T1G2//3.2/4.1//SR02301/S/
Ability to determine and interpret tech spec RCS leakage as they apply to S/G tube leaks
53. 038EK3.02 001/T1G2/T1G2//4.4/4.5//SR02301/C/
Knowledge of the reasons for preventing secondary PORV cycling during a SGTR

54. 039A4.04 001/T2G2/T2G2//3.8/3.9//SR02301/C/
Ability to manually operate and/or monitor in the control room

55. 040AK2.02 001/T1G1/T1G1//2.6/2.8//SR02301/C/

56. 041K5.02 001/T2G3/T2G3//2.5/2.8//SR02301/C/ Couldn't get steam table question

57. 045A3.11 001/T2G3/T2G3//2.6/2.9//SR02301/C/

58. 051AK3.01 001/T1G1/T1G1//2.8/3.1//SR02301/C/

59. 054AA1.02 001/T1G2/T1G2//4.4/4.4//SR02301/C/

60. 055E~~A2.03~~ K3.02 001/T1G1/T1G1//4.3/4.6//SR02301/C/

61. 055G2.1.28 001/T2G2/T2G2//3.2/3.3//SR02301/C/ 532, 1579
Knowledge of the purpose & function of major system components & controls for the condenser air removal system
62. 056AK3.01 001/T1G3/T1G3//3.5/3.9//SR02301/C/

63. 056G2.1.32 001/T2G1/T2G1//3.4/3.8//SR02301/C/
Ability to explain & apply all system limits + precautions condensate
64. 057AA1.06 001/T1G1/T1G1//4.0/4.3//SR02301/C/

65. 059AK3.03 001/T1G2/T1G1//3.0/3.7//SR02301/C/
Knowledge of the reasons for the declaration that a liquid effluent rad monitor is inoperable as it applies to the accidental rad waste release.
66. 059G2.4.31 001/T2G1/T2G1//3.3/3.4//SR02301/C/
Knowledge of MFW annunciator alarms & indications & the use of ARPs
67. 059K3.03 001//T2G1//3.5/3.7//SR02301/R/
Knowledge of the effect that a loss or malfunction of the MFW system will have on the S/GS.
68. 060AK2.02 001/T1G2/T1G2//2.7/3.1//SR02301/C/
Knowledge of interrelation between accidental gas release & Aux Bldg vent

69. 061K2.02 001/T2G1/T2G1//3.7/3.7//SR02301/C/ 167 168,

70. 062A2.04 001/T2G2/T2G2//3.4/3.1//SR02301/S/ 216, 221, 224
Ability to predict the impact on the plant of deenergizing a bus on the AC system & based on the prediction use procedures to correct, control or mitigate the consequences of the ... operation
71. 062AA1.05 001/T1G1/T1G1//3.1/3.1//SR02301/C/

72. 062K1.02 001/T2G2/T2G2//4.1/4.4//SR02301/R/

QUESTIONS REPORT
for Surry2002

73. 063A2.01 001/T12G2/T2G1//2.5/3.2//SR02301/S/ only on SRO exam Could swap these two to make 73 RO & make 76 SRO

74. 063A4.02 001/T2G2/T2G1//2.8/2.9//SR02301/C/

75. 064A2.06 001/T2G2/T2G2//2.9/3.3//SR02301/C/

76. 065AA2.01 001/T1G3/T1G2//2.9/3.2//SR02301/S/ Loss of Instrument Air / Cause of low air pressure
3.56

77. 067AK1.02 001/T1G1/T1G1//3.1/3.2//SR02301/C/ Plant Fire / Fire fighting

78. 068AK2.03 001/T1G1/T1G1//2.9/3.1//SR02301/C/

79. 068K6.10 001/T2G1/T2G1//2.5/2.9//SR02301/C/

80. 069AA2.01 001/T1G1/T1G1//3.7/4.3//SR02301/R/

81. 071A2.09 001/T2G1/T2G1//3.3/3.6//SR02301/R/

82. 071A4.07 001/T2G1/T2G1//3.0/3.0//SR02301/C/ Waste Gas disposal / WG release flow monitor

83. 072A2.02 001/T2G1/T2G1//2.8/2.9//SR02301/C/ Area Rad monitoring / Detector failure

84. 072K5.02 001/T2G1/T2G1//2.5/3.2//SR02301/C/ " " " / Rad intensity changes / source distance

85. 073G2.1.32 001/T2G2/T2G2//3.4/3.8//SR02301/C/ Process rad monitoring / Ability to explain ... system limits + precautions

86. 074EA2.01 001/T1G1/T1G1//4.6/4.9//SR02301/R/

K1.08 → ESW pumps are diesel driven
87. 075~~K2.03~~ 001/T2G2/T2G2//2.6/2.7//SR02301/C/ Circ Water / Emergency / essential SWS pumps
No other K2s ≥ 2.5

88. 076AA1.04 001/T1G1/T1G1//3.2/3.4//SR02301/C/ High Rx coolant activity / failed fuel monitoring equip

89. 076K3.01 001/T2G3/T2G3//3.4/3.6//SR02301/R/ Service water / Closed cooling water
3.14

90. 079G2.4.49 001/T2G2/T2G2//4.0/4.0//SR02301/C/ Station air / immediate operator actions w/o reference to procedures

91. ~~086A3.01 001/T2G2/T2G2//2.9/3.3//SR02301/R/~~ deleted

92. 103A2.05 001/T2G3/T2G2//2.9/3.9//SR02301/S/ Containment / Emergency CTMT entry

93. 103A4.09 001/T2G3/T2G2//3.1/3.7//SR02301/R/

94. G2.1.1 001/T3/T3//3.7/3.8//SR02301/C/

2.1.4 Miles' wrote
95. G2.1.14 001/T3/T3//2.5/4.0//SR02301/S/ Knowledge of system status criteria which require notification of plant personnel

2.1.12 Miles wrote
96. G2.1.20 001/T3/T3//4.3/4.2//SR02301/C/ Ability to execute procedure steps

QUESTIONS REPORT
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✓97. G2.1.34 001/T3/T3//2.3/2.9//SR02301/S/ Need. Action procedure for chem limits violations

✓98. G2.2.12 001/T3/T3//3.0/3.4//SR02301/C/ Knowledge of surveillance procedures

✓99. G2.2.13 001/T3/T3//3.6/3.8//SR02301/C/ 3, 7, 21, 27, 29, 30, 34, 41, 41, 90, 128 Personnel Safety

✓100. G2.2.30 001/T3/T3//3.5/3.3//SR02301/C/

✓101. G2.2.6 001/T3/T3//2.3/3.3//SR02301/S/ 2, 33,

✓102. G2.3.1 001/T3/T3//2.6/3.0//SR02301/C/ ~~+33, 136~~, 59

✓103. G2.3.~~11~~ 4 001/T3/T3//2.7/3.2//SR02301/C/ DF QQ Ability to control rad release

✓104. G2.3.2 001/T3/T3//2.5/2.9//SR02301/C/

✓105. G2.3.~~6~~ 10 001/T3/T3//2.1/3.1//SR02301/S/ DF/0 QQ Knowledge of requirements to review/approve release permits

✓106. G2.4.14 001/T3/T3//3.3/3.9//SR02301/C/

✓107. G2.4.~~7~~ 12 001/T3/T3//3.5/3.8//SR02301/C/ Inadequate documentation to find Ability to identify post accident instrumentation

✓108. G2.4.39 001/T3/T3//3.3/3.1//SR02301/C/

✓109. G2.4.~~4~~ 20 001/T3/T3//4.0/4.3//SR02301/C/ G2.4.4 used several times w/ specific accidents/Add EIP topic recognize parameters that lead to EC or AP entry conditions

✓110. G2.4.5 001/T3/T3//2.9/3.6//SR02301/C/

✓111. WE01G2.4.49 001/T1G2/T1G1/IMMEDIATE ACTIONS/4.0/4.0//SR02301/S/ Immediate actions of E01 + E02

✓112. WE01G2.4.5 001/T1G2/T1G1//2.9/3.6//SR02301/R/

✓113. ~~WE03G2.4.4 0~~01/T1G2/T1G2//4.0/4.3//SR02301/S/ WE03 2.4.6

✓114. WE03G2.4.4 002/T1G2/T1G2//4.0/4.3//SR02301/R/

✓115. WE04G2.~~2.22 0~~01/T1G2/T1G1/SAFETY FUNCTION/3.0/4.0//SR02301/S/ 2.4.5 Difficulty finding/developing quality question LOCA outside CTMT/basis for prioritizing Safety functions during accident

✓116. WE04G2.4.9 001/T1G2/T1G1//3.3/3.9//SR02301/R/

✓117. WE05EA2.1 001/T1G2/T1G2//3.4/4.4//SR02301/S/

✓118. WE05EK2.01 002/T1G2/T1G2//3.7/3.9//SR02301/R/

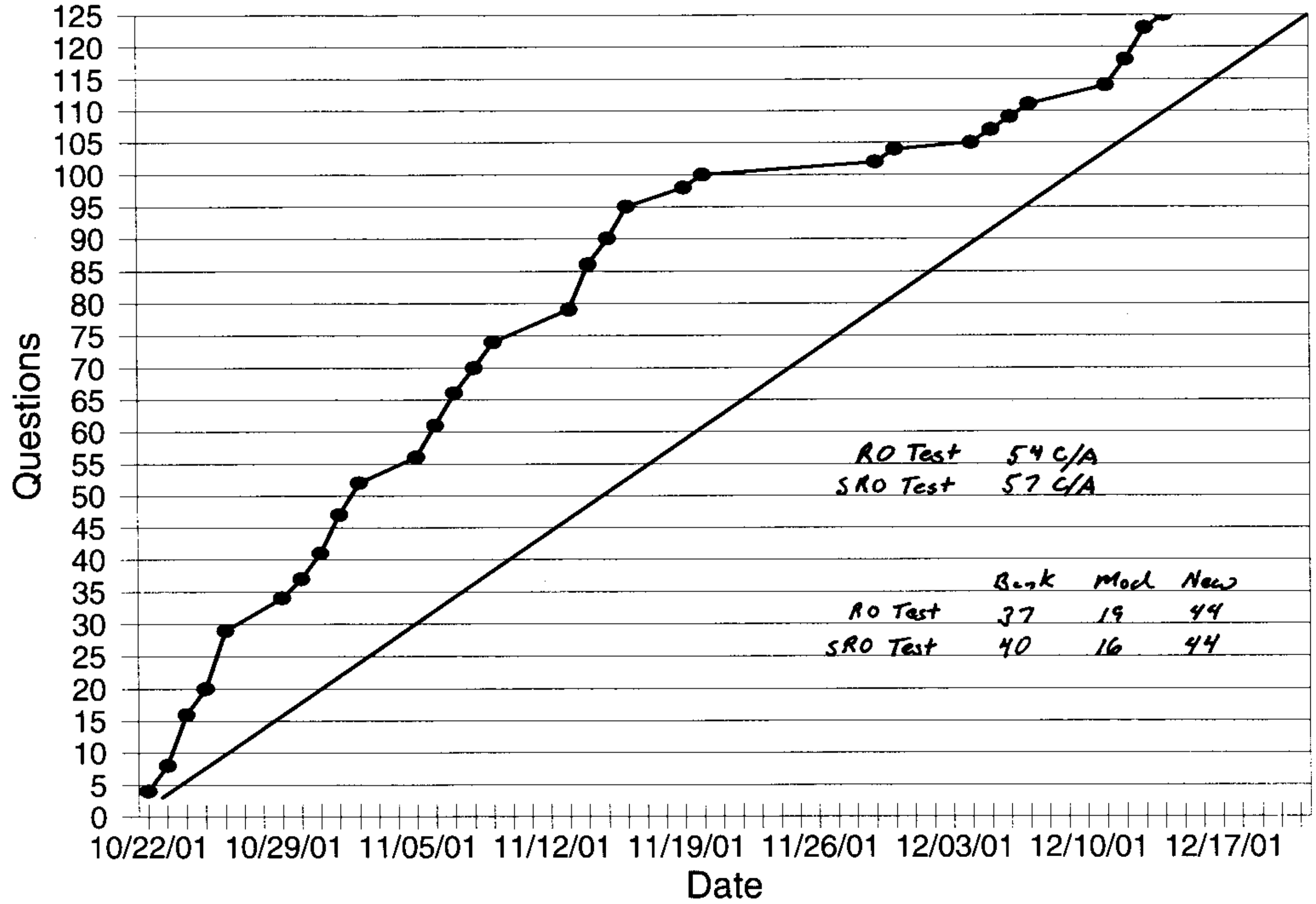
✓119. WE06EA2.1 001/T1G1/T1G1//3.4/4.2//SR02301/S/

✓120. WE08EA2.1 001/T1G1/T1G1//3.4/4.2//SR02301/S/

QUESTIONS REPORT
for Surry2002

121. WE08EK3.1 001/T1G1/T1G1//3.4/3.9//SR02301/R/
122. WE09G2.4.4 001/T1G1/T1G1//4.0/4.3//SR02301/C/
123. WE11EA1.1 001/T1G2/T1G2//3.9/4.0//SR02301/C/
124. WE13G2.4.4 ~~2.4.15~~ 001/T1G3/T1G3//3.0/3.5//SR02301/C/
125. WE14EA2.1 001/T1G1/T1G1//3.3/3.8//SR02301/S/
126. WE16EK1.3 001/T1G2/T1G2//3.0/3.3//SR02301/C/

Surry Written Exam Development



Date	Number of Questions	
10/22/01	4	4
10/23/01	4	8
10/24/01	8	16
/25/01	4	20
/26/01	9	29
10/27/01		
10/28/01		
10/29/01	5	34
10/30/01	3	37
10/31/01	4	41
11/01/01	6	47
11/02/01	5	52
11/03/01		
11/04/01		
11/05/01	4	56
11/06/01	5	61
11/07/01	5	66
11/08/01	4	70
11/09/01	4	74
11/10/01		
11/11/01		
11/12/01		
11/13/01	5	79
11/14/01	7	86
11/15/01	4	90
11/16/01	5	95
11/17/01		
11/18/01		
11/19/01	3	98
11/20/01	2	100
/21/01		
/22/01		
11/23/01		
11/24/01		
11/25/01		
11/26/01		
11/27/01		
11/28/01		
11/29/01	2	102
11/30/01	2	104
12/01/01		
12/02/01		
12/03/01		
12/04/01	1	105
12/05/01	2	107
12/06/01	2	109
12/07/01	2	111
12/08/01		
12/09/01		
12/10/01		
12/11/01	3	114
12/12/01	4	118
12/13/01	5	123
12/14/01	2	125
12/15/01		
12/16/01		
/17/01		
2/18/01		
12/19/01		
12/20/01		
12/21/01		
12/22/01		

Facility: Surry Date of Exam: 3/02 Exam Level: SRO

Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	3	4	4				4	5			4	24
	2	2	2	2				2	5			3	16
	3	0	1	1				0	0			1	3
	Tier Totals	5	7	7				6	10			8	43
2. Plant Systems	1	1	2	2	2	1	1	1	2	2	2	3	19
	2	2	0	1	0	1	1	1	5	1	1	4	17
	3	0	0	0	0	1	0	0	2	1	0	0	4
	Tier Totals	3	2	3	2	3	2	2	9	4	3	7	40
3. Generic Knowledge and Abilities					Cat 1		Cat 2		Cat 3		Cat 4		17
					4		4		4		5		

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1	X				X		AA2.03 Proper actions to be taken if automatic safety functions have not taken place (SRO Only) AA1.01Bank Select Switch	4.5/4.8 3.5/3.2	2
000003 Dropped Control Rod / 1		X					AK2.05 Control rod drive power supplies and logic circuits	2.5/2.8	1
000005 Inoperable/Stuck Control Rod / 1	X						AK1.02 Flux tilt	3.1/3.9	1
000011 Large Break LOCA / 3			X				EK3.03 Starting auxiliary feed pumps and flow, ED/G, and service water pumps	4.1/4.3	1
W/E04 LOCA Outside Containment / 3						X	2.4.5 Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions. (SRO only)	2.9/3.6	1
W/EO1 & E02 Rediagnosis & SI Termination / 3						X	2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (SRO only)	4.0/4.0	1
000015/17 RCP Malfunctions / 4		X					AK2.10 RCP indicators and controls	2.8/2.8	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4						X	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0/4.3	1
000024 Emergency Boration / 1	X						AK1.04 Low temperature limits for boron concentration	2.8/3.6	1
000026 Loss of Component Cooling Water / 8					X		AA2.01 Location of a leak in the CCWS (SRO Only)	2.9/3.5	1
000029 Anticipated Transient w/o Scram / 1						X	2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions including:Reactivity control Core cooling and heat removal Reactor coolant system integrity Containment conditions Radioactivity release control.(SRO only)	3.7/4.3	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4		X					AK2.02 Sensors and detectors	2.6/2.6	1
CE/A11; W/E08 RCS Overcooling - PTS / 4					X		EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations: (SRO only)	3.4/4.2	1
000051 Loss of Condenser Vacuum / 4			X				AK3.01 Loss of steam dump capability upon loss of condenser vacuum	2.8/3.1	1
000055 Station Blackout / 6			X				EK3.02 Actions contained in EOP for loss of offsite and onsite power	4.3/4.6	1
000057 Loss of Vital AC Elec. Inst. Bus / 6				X			A1.06 Manual control of components for which automatic control is lost	4.0/4.3	1
000059 Accidental Liquid RadWaste Rel. / 9			X				AK3.03 Declaration that a radioactive-liquid monitor is inoperable	3.0/3.7	1
000062 Loss of Nuclear Service Water / 4				X			AA1.05 The CCWS surge tank, including level control and level alarms and radiation alarm	3.1/3.1	1
000067 Plant Fire On-site / 9	X						AK1.02 Fire fighting	3.1/3.2	1

000068 (BW/A06) Control Room Evac. / 8		X					AK2.03 Controllers and positioners	2.9/3.1	1
000069 (W/E14) Loss of CTMT Integrity / 5					X		EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (SRO only)	3.3/3.8	1
000074 (W/**E06**&E07) Inad. Core Cooling / 4					X		EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (SRO only)	3.4/4.2	1
BW/E03 Inadequate Subcooling Margin / 4							N/A		
000076 High Reactor Coolant Activity / 9				X			AA1.04 Failed fuel-monitoring equipment	3.2/3.4	1
BW/A02&A03 Loss of NNI-X/Y / 7							N/A		
K/A Category Totals:	3	4	4	4	5	4	Group Point Total:		24

Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1						X	2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	3.4/3.7	1
BW/A01 Plant Runback / 1							N/A		
BW/A04 Turbine Trip / 4							N/A		
000008 Pressurizer Vapor Space Accident / 3					X		AA2.19 PZR spray valve failure, using plant parameters (SRO Only)	3.4/3.6	1
000009 Small Break LOCA / 3					X		EA2.04 PZR level (SRO Only)	3.8/4.0	1
BW/E08; W/E03 LOCA Cooldown - Depress. / 4						X	2.4.6 Knowledge symptom based EOP mitigation strategies. (SRO only)	3.1/4.0	1
W/E11 Loss of Emergency Coolant Recirc. / 4				X			EA1.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.94.0	1
000022 Loss of Reactor Coolant Makeup / 2									
000025 Loss of RHR System / 4	X						AK1.01 Loss of RHRS during all modes of operation.	3.9/4.3	1
000027 Pressurizer Pressure Control System Malfunction / 3			X				AK3.01 Isolation of PZR spray following loss of PZR heaters.	3.5/3.8	1
000032 Loss of Source Range NI / 7		X					AK2.01 Power supplies, including proper switch positions	2.7/3.1	1
000033 Loss of Intermediate Range NI / 7						X	2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions including: Reactivity control(SRO Only)	3.7/4.3	1
000037 Steam Generator Tube Leak / 3					X		AA2.10 Tech-Spec limits for RCS leakage (SRO Only)	3.2/4.1	1
000038 Steam Generator Tube Rupture / 3			X				EK3.02 Prevention of secondary PORV cycling.	4.4/4.5	1
000054 (CE/E06) Loss of Main Feedwater / 4				X			AA1.02 Manual startup of electric and steam-driven AFW pumps.	4.4/4.4	1
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					X		EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (SRO only)	3.4/4.4	1
000058 Loss of DC Power / 6									
000060 Accidental Gaseous Radwaste Rel. / 9		X					AK2.02 Auxiliary building ventilation system	2.7/3.1	1
000061 ARM System Alarms / 7									
W/E16 High Containment Radiation / 9	X						EK1.3 Annunciators and conditions indicating signals, and remedial actions associated with the (High Containment Radiation).	3.0/3.3	1
000065 Loss of Instrument Air / 8					X		AA2.01 Cause and effect of low-pressure instrument air alarm (SRO Only)	2.9/3.2	1

CE/E09 Functional Recovery							N/A		
K/A Category Point Totals:	2	2	2	2	5	3	Group Point Total:		16

ES-401

PWR SRO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

Form ES-401-3 (R8, S1)

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2		X					AK2.03 Controllers and positioners	2.6/2.9	1
000036 (BW/A08) Fuel Handling Accident / 8									
000056 Loss of Off-site Power / 6			X				AK3.01 Order and time to initiation of power for the load sequencer	3.5/3.9	1
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2									
W/E13 Steam Generator Over-pressure / 4						X	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)	4.0/4.3	1
W/E15 Containment Flooding / 5									
K/A Category Point Totals:	0	1	1	0	0	1	Group Point Total:		3

Plant Systems - Tier 2/Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive			X									K3.01 CVCS	2.9/3.0	1
003 Reactor Coolant Pump									X			A3.02 Motor current	2.6/2.5	1
004 Chemical and Volume Control		X										K2.04 BWST tank heaters	2.6/2.7	1
013 Engineered Safety Features Actuation											X	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0/4.3	1
014 Rod Position Indication			X									K3.02 Plant Computer	2.5/2.8	1
015 Nuclear Instrumentation				X								K4.08 Automatic rod motion on demand signals	3.4/3.7	1
017 In-core Temperature Monitor	X								X			K1.01 Plant computer A3.01 Indications of normal, natural and interrupted circulation of RCS	3.2/3.2 3.6/3.8	2
022 Containment Cooling				X								K4.05 Containment cooling after LOCA destroys ventilation ducts	2.6/2.7	1
025 Ice Condenser												N/A		
026 Containment Spray							X					A1.01 Containment pressure	3.9/4.2	1
056 Condensate											X	2.1.32 Ability to explain and apply all system limits and precautions.	3.4/3.8	1
059 Main Feedwater											X	2.4.31 Knowledge of annunciators alarms and indications, and use of the response instructions.	3.3/3.4	1
061 Auxiliary/Emergency Feedwater		X										K2.02 AFW electric drive pumps	3.7/3.7	1
063 DC Electrical Distribution								X		X		A2.01 Grounds A4.02 Battery voltage indicator	2.5/3.2 2.8/2.9	2
068 Liquid Radwaste						X						K6.10 Radiation Monitors	2.5/2.9	1
071 Waste Gas Disposal										X		A4.07 Waste Gas release flow meter	3.0/3.0	2
072 Area Radiation Monitoring					X			X				K5.02 Radiation intensity changes with source distance A2.02 Detector Failure	2.5/3.2 2.8/2.9	2
K/A Category Point Totals:	1	2	2	2	1	1	1	2	2	2	3	Group Point Total:		19

ES-401 PWR SRO Examination Outline Form ES-401-3 (R8, S1)

Plant Systems - Tier 2/Group 2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant						X						K6.03 Rx Vessel Level Indication	3.1/3.6	1
006 Emergency Core Cooling					X							5.10 Theory of thermal stress	2.5/2.9	1
010 Pressurizer Pressure Control								X				A2.03 PORV failures (SRO only)	4.1/4.2	1
011 Pressurizer Level Control			X									K3.02 RCS	3.5/3.7	1
012 Reactor Protection								X				A2.02 Loss of instrument power (SRO only)	3.6/3.9	1
016 Non-nuclear Instrumentation												No K/A's		0
027 Containment Iodine Removal												No K/A's		0
028 Hydrogen Recombiner and Purge Control												No K/A's		0
029 Containment Purge									X			A3.01 CPS isolation	3.8/4.0	1
033 Spent Fuel Pool Cooling	X											K1.05 RWST	2.7/2.8	1
034 Fuel Handling Equipment											X	2.1.27 Knowledge of system purpose and or function.	2.8/2.9	1
035 Steam Generator							X					A1.01 S/G Wide & Narrow Range during startup, shutdown and normal operation	3.6/3.8	1
039 Main and Reheat Steam										X		A4.04 Emergency Feedwater pump turbine	3.8/3.9	1
055 Condenser Air Removal											X	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	3.2/3.3	1
062 AC Electrical Distribution								X				A2.04 Effect on plant of de-energizing a bus (SRO only)	3.4/3.1	1
064 Emergency Diesel Generator								X				A2.06 Operating unloaded, lightly loaded and highly loaded time limit	2.9/3.3	1
073 Process Radiation Monitoring											X	2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	3.4/3.8	1
075 Circulating Water	X											K1.08 Emergency/essential SWS pumps	2.6/2.7	1
079 Station Air											X	2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)	4.0/4.0	1
086 Fire Protection												None		

103 Containment								X				A2.05 Emergency containment entry (SRO only)	2.9/3.9	1
K/A Category Point Totals:	2	0	1	0	1	1	1	5	1	1	4	Group Point Total:		17

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal								X				A2.03 RHR pump/motor malfunction (SRO only)	2.9/3.1	1
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water								X				A2.01 Loss of CCW pump(SRO only)	3.3/3.6	1
041 Steam Dump/Turbine Bypass Control					X							K5.07 Reactivity feedback effects	3.1/3.6	1
045 Main Turbine Generator									X			A3.11 Generator trip	2.6/2.9	1
076 Service Water														
078 Instrument Air														
K/A Category Point Totals:	0	0	0	0	1	0	0	2	1	0	0	Group Point Total:		4

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

ES-401 Generic Knowledge and Abilities Outline (Tier 3) Form ES-401-5 (R8, S1)

Facility: Surry		Date of Exam: 3/02	Exam Level: RO/SRO	
Category	**K/A #**	**Topic**	**Imp.**	**Points**
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.7/3.8	1/1
	2.1.4	Knowledge of shift staffing requirements.	2.3/3.4	0/1
	2.1.12	Ability to apply technical specifications for a system.	2.9/4.0	1/1
	2.1.34	Ability to maintain primary and secondary plant chemistry within allowable limits.	2.3/2.9	0/1
	2.1.			
	2.1.			
	Total			
Equipment Control	2.2.6	Knowledge of the process for making changes in procedures as described in the safety analysis report.	2.3/3.3	0/1
	2.2.13	Knowledge of tagging and clearance procedures.	3.6/3.8	1/1
	2.2.30	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.5/3.3	1/1
	2.2.12	Knowledge of surveillance procedures.	3.0/3.4	1/1
	2.2.			
	2.2.			
	Total			
Radiation Control	2.3.2	Knowledge of facility ALARA program.	2.5/2.9	1/1
	2.3.10	2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.1/3.1	0/1
	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6/3.0	1/1
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5/3.1	1/1
	2.3.			
	2.3.			
	Total			
Emergency Procedures/ Plan	2.4.20	Knowledge of operational implications of EOP warnings, cautions, and notes.	3.3/4.0	1/1
	2.4.5	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.	2.9/3.6	1/1
	2.4.14	Knowledge of crew roles and responsibilities during EOP flowchart use.	3.3/3.9	1/1
	2.4.12	Knowledge of general operating crew responsibilities during emergency operations.	3.4/3.9	1/1
	2.4.39	Knowledge of the RO's responsibilities in emergency plan implementation.	3.3/3.1	1/1
	2.4.			
	Total			
Tier 3 Point Total (RO/SRO)				13/17

Facility: Surry Date of Exam: 3/02 Exam Level: RO

Tier	Group	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G *	Point Total
1. Emergency & Abnormal Plant Evolutions	1	3	3	4				3	2			1	16
	2	2	4	3				3	0			5	17
	3	0	1	1				0	0			1	3
	Tier Totals	5	8	8				6	2			7	36
2. Plant Systems	1	1	2	2	3	2	2	1	2	3	2	3	23
	2	3	0	2	2	1	1	2	3	1	2	3	20
	3	0	0	1	0	1	1	1	1	1	1	1	8
	Tier Totals	4	2	5	5	4	4	4	6	5	5	7	51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	Point Total
	4	3	2	4	13

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1	Form ES-401-4 (R8, S1)

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1	X						AK1.02 Flux tilt	3.1/3.9	1
000015/17 RCP Malfunctions / 4		X					AK2.10 RCP indicators and controls	2.8/2.8	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4						X	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0/4.3	1
000024 Emergency Boration / 1	X						AK1.04 Low temperature limits for boron concentration	2.8/3.6	1
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3			X				AK3.01 Isolation of PZR spray following loss of PZR heaters.	3.5/3.8	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4		X					AK2.02 Sensors and detectors	2.6/2.6	1
CE/A11; W/E08 RCS Overcooling - PTS / 4			X				EK3.3 Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations. (RO only)	3.7/3.8	1
000051 Loss of Condenser Vacuum / 4			X				AK3.01 Loss of steam dump capability upon loss of condenser vacuum	2.8/3.1	1
000055 Station Blackout / 6			X				EK3.02 Actions contained in EOP for loss of offsite and onsite power	4.3/4.6	1
000057 Loss of Vital AC Elec. Inst. Bus / 6				X			A1.06 Manual control of components for which automatic control is lost	4.0/4.3	1
000062 Loss of Nuclear Service Water / 4				X			AA1.05 The CCWS surge tank, including level control and level alarms and radiation alarm	3.1/3.1	1
000067 Plant Fire On-site / 9	X						AK1.02 Fire fighting	3.1/3.2	1
000068 (BW/A06) Control Room Evac. / 8		X					AK2.03 Controllers and positioners	2.9/3.1	1
000069 (W/E14) Loss of CTMT Integrity / 5					X		AA2.01 Loss of containment integrity (RO only)	3.7/4.3	1
000074 (W/**E06**&E07) Inad. Core Cooling / 4					X		EA2.01 Subcooling margin (RO only)	4.6/4.9	1
BW/E03 Inadequate Subcooling Margin / 4							N/A		
000076 High Reactor Coolant Activity / 9				X			AA1.04 Failed fuel-monitoring equipment	3.2/3.4	1
BW/A02&A03 Loss of NNI-X/Y / 7							N/A		
K/A Category Totals:	3	3	4	3	2	1	Group Point Total:		16

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2								Form ES-401-4 (R8, S1)
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1				X			AA1.01Bank Select Switch	3.5/3.2	1
000003 Dropped Control Rod / 1		X					AK2.05 Control rod drive power supplies and logic circuits	2.5/2.8	1
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1						X	2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	3.4/3.7	1
BW/A01 Plant Runback / 1							N/A		
BW/A04 Turbine Trip / 4							N/A		
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3			X				EK3.03 Starting auxiliary feed pumps and flow, ED/G, and service water pumps	4.1/4.3	1
W/E04 LOCA Outside Containment / 3						X	2.4.9 Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies. (RO only)	3.3/3.9	1
BW/E08; W/E03 LOCA Cooldown/Depress. / 4						X	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (RO only)	4.0/4.3	1
W/E11 Loss of Emergency Coolant Recirc. / 4				X			EA1.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.9/4.0	1
W/EO1 & E02 Rediagnosis & SI Termination / 3						X	2.4.5 Knowledge of the organization of the operating procedures network for normal, abnormal and emergency evolutions. (R0 only)	2.9/3.6	1
000022 Loss of Reactor Coolant Makeup / 2									
000025 Loss of RHR System / 4	X						AK1.01 Loss of RHRS during all modes of operation.	3.9/4.3	1
000029 Anticipated Transient w/o Scram / 1						X	2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (RO only)	4.0/4.0	1
000032 Loss of Source Range NI / 7		X					AK2.01 Power supplies, including proper switch positions	2.7/3.1	1
000033 Loss of Intermediate Range NI / 7									
000037 Steam Generator Tube Leak / 3									
000038 Steam Generator Tube Rupture / 3			X				EK3.02 Prevention of secondary PORV cycling.	4.4/4.5	1
000054 (CE/E06) Loss of Main Feedwater / 4				X			AA1.02 Manual startup of electric and steam-driven AFW pumps.	4.4/4.4	1
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4		X					EK2.01 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. (RO only)	3.7/3.9	1
000058 Loss of DC Power / 6									
000059 Accidental Liquid RadWaste Rel. / 9			X				AK3.03 Declaration that a radioactive-liquid monitor is inoperable	3.0/3.7	1

000060 Accidental Gaseous Radwaste Rel. / 9		X					AK2.02 Auxiliary building ventilation system	2.7/3.1	1
000061 ARM System Alarms / 7									
W/E16 High Containment Radiation / 9	X						EK1.3 Annunciators and conditions indicating signals, and remedial actions associated with the (High Containment Radiation).	3.0/3.3	1
CE/E09 Functional Recovery							N/A		
K/A Category Point Totals:	2	4	3	3	0	5	Group Point Total:		17

ES-401

PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

Form ES-401-4 (R8, S1)

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2		X					AK2.03 Controllers and positioners	2.6/2.9	1
000036 (BW/A08) Fuel Handling Accident / 8									
000056 Loss of Off-site Power / 6			X				AK3.01 Order and time to initiation of power for the load sequencer	3.5/3.9	1
000065 Loss of Instrument Air / 8									
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2									
W/E13 Steam Generator Over-pressure / 4						X	**2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.** (CFR: 41.10 / 43.2 / 45.6)	4.0/4.3	1
W/E15 Containment Flooding / 5									
K/A Category Point Totals:	0	1	1	0	0	1	Group Point Total:		3

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 1	Form ES-401-4 (R8, S1)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive			X				X					K3.01 CVCS A1.01 T-ave. and no-load T-ave(RO only)	2.9/3.0 3.8/4.2	2
003 Reactor Coolant Pump				X					X			K4.07 Minimizing RCS leakage (mechanical seals) (RO Only) A3.02 Motor current	3.2/3.4 2.6/2.5	2
004 Chemical and Volume Control		X				X						K2.04 BWST tank heaters K6.17 Flow paths for emergency boration (RO Only)	2.6/2.7 4.4/4.6	2
013 Engineered Safety Features Actuation					X						X	K5.02 Safety system logic and reliability (RO Only) 2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	2.9/3.3 4.0/4.3	2
015 Nuclear Instrumentation				X					X			K4.08 Automatic rod motion on demand signals A3.03 Verification of proper functioning/operability (RO Only)	3.4/3.7 3.9/3.9	2
017 In-core Temperature Monitor	X								X			K1.01 Plant computer A3.01 Indications of normal, natural and interrupted circulation of RCS	3.2/3.2 3.6/3.8	2
022 Containment Cooling				X						X		K4.05 Containment cooling after LOCA destroys ventilation ducts A4.05 Containment readings of temperature, pressure, and humidity system (RO Only)	2.6/2.7 3.8/3.8	2
025 Ice Condenser												N/A		
056 Condensate											X	2.1.32 Ability to explain and apply all system limits and precautions.	3.4/3.8	1
059 Main Feedwater			X								X	K3.03 S/G's (RO Only) 2.4.31 Knowledge of annunciators alarms and indications, and use of the response instructions.	3.5/3.7 3.3/3.4	2
061 Auxiliary/Emergency Feedwater		X										K2.02 AFW electric drive pumps	3.7/3.7	1
068 Liquid Radwaste						X						K6.10 Radiation Monitors	2.5/2.9	1
071 Waste Gas Disposal								X		X		A2.09 Stuck open relief valve (RO Only) A4.07 Waste gas release flow meter	3.0/3.5 3.0/3.0	2
072 Area Radiation Monitoring					X			X				K5.02 Radiation intensity changes with source distance A2.02 Detector failure	2.5/3.2 2.8/2.9	2

K/A Category Point Totals:	1	2	2	3	2	2	1	2	3	2	3	Group Point Total:	23

Plant Systems - Tier 2/Group 2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant						X						K6.03 Reactor vessel level indication	3.1/3.6	1
006 Emergency Core Cooling					X							K5.10 Theory of thermal stress	2.5/2.9	1
010 Pressurizer Pressure Control								X				A2.03 PORV failures (RO only)	4.1/4.2	1
011 Pressurizer Level Control			X									K3.02 RCS	3.5/3.7	1
012 Reactor Protection				X								K4.06 Automatic or manual enable/disable of RPS trips (RO only)	3.2/3.5	1
014 Rod Position Indication			X									K3.02 Plant Computer	2.5/2.8	1
016 Non-nuclear Instrumentation				X								K4.03 Input to control systems (RO Only)	2.8/2.9	1
026 Containment Spray							X					A1.01 Containment pressure	3.9/4.2	1
029 Containment Purge									X			A3.01 CPS isolation	3.8/4.0	1
033 Spent Fuel Pool Cooling	X											K1.05 RWST	2.7/2.8	1
035 Steam Generator							X					A1.01 S/G wide and narrow range level during startup, shutdown, and normal operations	3.6/3.8	1
039 Main and Reheat Steam										X		A4.04 Emergency feedwater pump turbines	3.8/3.9	1
055 Condenser Air Removal											X	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	3.2/3.3	1
062 AC Electrical Distribution	X											K1.02 ED/G (RO only)	4.1/4.4	1
063 DC Electrical Distribution								X		X		A2.01 Grounds A4.02 Battery voltage indicator	2.5/3.2 2.8/2.9	2
064 Emergency Diesel Generator								X				A2.06 Operating unloaded, lightly loaded, and highly loaded time limit	2.9/3.3	1
073 Process Radiation Monitoring											X	2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	3.4/3.8	1
075 Circulating Water	X											K1.08 Emergency/essential SWS pumps	2.6/2.7	1

079 Station Air											X	2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)	4.0/4.0	1
086 Fire Protection														
K/A Category Point Totals:	3	0	2	2	1	1	2	3	1	2	3	Group Point Total:		20

ES-401 | PWR RO Examination Outline
Plant Systems - Tier 2/Group 3 | Form ES-401-4 (R8, S1)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal						X						K6.03 RHR Hx (RO only)	2.5/2.6	1
007 Pressurizer Relief/Quench Tank								X				A2.02 Abnormal pressure in the PRT(RO Only)	2.6/3.2	1
008 Component Cooling Wate							X					A1.04 Surge tank level (RO only)	3.1/3.2	1
027 Containment Iodine Removal												No K/A's		0
028 Hydrogen Recombiner and Purge Control												No K/A's		0
034 Fuel Handling Equipment											X	2.1.27 Knowledge of system purpose and or function.	2.8/2.9	1
041 Steam Dump/Turbine Bypass Control					X							K5.07 Reactivity feedback effects	3.1/3.6	1
045 Main Turbine Generator									X			A3.11 Generator trip	2.6/2.9	1
076 Service Water			X									K3.01 Closed cooling water (RO Only)	3.4/3.6	1
078 Instrument Air														0
103 Containment										X		A4.09 Containment Vacuum System (RO only)	3.1/3.7	1
K/A Category Point Totals:	0	0	1	0	1	1	1	1	1	1	1	Group Point Total:		8

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

QUESTIONS REPORT
for Surry2002

1

1. 001AA1.01 001/T1G2/T1G1/BANK SELECT/3.5/3.2/M/SR02301/C/RLM

The following conditions exist:

The plant is operating at 80 %, STEDY STATE.
The Rod Control Selector Switch is in Automatic
Control Bank "D" starts to step in continuously

Which ONE of the following actions must the operator take in response to these conditions.

A. Place the Rod Control Mode Selector Switch in Bank "D"
B. Place the Rod Control Mode Selector Switch in Manual
C. Place the Rod Control Mode Selector Switch in either S/D Bank position
D. Manually trip the reactor

Ref: SR EB #1858
Surry 0-AP-1.00, Step 2.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B C A D D D B C C A Scramble Range: A - D

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: The minimum temperature for criticality is 522°F. If Tave decreases below this temperature, Tech Spec 3.1.e must be reviewed.

* *

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
[1]	__CHECK FOR EITHER OF THE FOLLOWING: • Continuous rod withdrawal • Continuous rod insertion	GO TO Step 4.
[2]	__STOP ROD MOTION:	
	a) Put ROD CONT MODE SEL switch in MANUAL	
	b) Verify rod motion - STOPPED	b) Trip Reactor and GO TO ()-E-0, REACTOR TRIP OR SAFETY INJECTION.
3.	__GO TO STEP 13	

1. 001K3.01 001/T2G1/T2G1/LETDOWN FLOW/C/A 2.9/3.0/N/SR02301/C/RLM

Which ONE of the following describes the initial response of the unit to a dropped rod at 100% reactor power assuming the unit does not trip?

A. Pressurizer level increases and letdown flow decreases.
B. Pressurizer level decreases and letdown flow decreases.
C. Pressurizer level increases and letdown flow increases.
D. Pressurizer level decreases and letdown flow increases.

Could find no learning objective that directly supports this KA. Lesson Plan ND-93.1-LP-1 provides an example of the effect on flow when d/p is changed.

Answer B is correct because the initial response of the plant to a dropped rod is for pressure, temperature and power to decrease. The decrease in reactor pressure will cause a reduction in d/p across the letdown orifices and hence a decrease in flowrate.
Answers A, C, and D have one component in the AND statement that is incorrect based on plant response described above.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B A C C C C D D A A Scramble Range: A - D

LESSON PLAN

Introduction

The power station control systems utilize a variety of sensors to detect operating conditions. This section presents the theory of operation of most of these sensors, including: flow, level, pressure, position, and neutron detection. Some sensors are peculiar to a specific system and are excluded from this lesson plan. These include electrical transducers, fire, and smoke detectors. The specific detector will be covered in the system specific lesson plans.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the theory of operation of pressure monitoring devices.

B. Describe the theory of operation of flow measuring devices.

C. Describe the theory of operation of level measuring devices.

D. Describe the theory of operation of temperature measuring devices.

E. Describe the theory of operation of position detectors.

F. Describe the theory of operation of acoustical monitors.

G. Describe the theory of operation of neutron detectors.

H. Describe the theory of operation of speed and vibration detectors.

Answer: A factor of 4.

4. The ΔP across an orifice plate increases by a factor of 2, by how much will the indicated flowrate change?

Answer: By the square root of 2.

5. On a ramp from 25% to 100% power, the density compensator in a steam flow transmitter sticks at the 25% power value. What effect will this have on indicated flow as power continues to increase?

Answer: Indicated flow will be greater than actual.

6. At 100% power, the density compensator on a steam flow channel fails high. What effect will this have on indicated flowrate?

Answer: Indicated flowrate increases.

7. What is the principle of operation of a magnetic flow detector?

Answer: A conductor moving through a magnetic field will have a potential induced into it in direct proportion to the relative motion between the conductor and the magnetic field.

8. A D/P type detector is connected across an orifice place in order to monitor liquid flow. What effect will void formation in the fluid have on the indicated flow?

Answer: Indicated flow will be erratic.

9. In a dry leg level detection system, vented to atmosphere, what effect will increasing ambient pressure have on indicated level?

1. 002K6.03 001/T2G2/T2G2/RVLIS/CA 3.1/3.6/N/SR02301/C/RLM

Reactor Vessel Level Indication System (RVLIS) RTD T1 (RCS Head vent capillary tube) electrically fails open. What is the effect on indicated RCS level?

A. The indicated Upper Range Level reads higher than actual.
✓B. The indicated Upper Range Level reads lower than actual.
C. The indicated Dynamic Range Level reads lower than actual.
D. The indicated Upper Range and Dynamic Range levels are unaffected.

Ref: Surry lesson plan ND-93.4-LP-3 rev 9, objectives A and C
Surry lesson plan ND-93.4-LP-3 rev 9, p. 6
Answer A is correct because:
If RTD T1 fails open (high indicated temp), indicated level increases. Therefore the compensation circuit will electrically "buck" (ie. subtract from) the d/p cell output. This will cause the indicated level to read lower than actual. All three ranges are affected the same.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B C A B B C C A D D Scramble Range: A - D

Replace? Too Hard. Ask Mike.

LESSON PLAN

Introduction

The objective of the emergency procedures is to prevent or mitigate damage to the three barriers which exist between the fission fragments in the fuel and the general population in the surrounding counties.

In order to evaluate the successfulness of the procedures in keeping the core cool, the operator must observe the plant indications of RCS pressure, temperature, vessel level, and subcooling individually and remember the trends of each. During high stress periods, such as an emergency, the operator needs an instrumentation tool which will combine these plant parameters into one "user-friendly" system and provide the required information and trends.

The Inadequate Core Cooling Monitor (ICCM) System is designed to do just that: provide "user-friendly" controls to access reactor vessel level, subcooling margin and core exit thermocouple readings in an easily read and understood display.

During this session, the subsystems that supply information to the ICCM system, the resulting information displays and the system procedures for the operator's use will be discussed.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the Inadequate Core Cooling Monitor (ICCM) System, including the following:
   - RVLIS inputs and outputs
   - CETC inputs and outputs
   - Subcooling Margin Monitor inputs and outputs

B. Explain the technical specifications associated with the ICCM System.

C. Operate the ICCM System under all plant conditions to determine reactor vessel level, subcooling margin, thermocouple temperatures and input signal reliability.

<u>Presentation</u>

Distribute all handouts. Refer to/display H/T-3.1, Objectives, and review with trainees.

A. ICCM System

The Westinghouse Electric Corporation Inadequate Core Cooling Monitor (ICCM) System is a redundant, self-contained monitoring device made up of two identical microprocessor based monitoring channels. The system performs three functions:

- Assists in detecting the presence of a gas bubble or void in the Reactor vessel by calculating and displaying Rx vessel level during static conditions.

- Assists in the detection of the approach to inadequate core cooling by utilizing Core Exit Thermocouple (CETC) and Subcooling Margin monitoring and display.

- Indicates the formation of voids in the RCS during forced flow conditions by use of the RVLIS Dynamic Head monitoring and display.

1. Reactor Vessel Level Indication Subsystem (RVLIS)

Refer to/display H/T-3.2, RVLIS System.

(b) This detector output is also valid only when RCPs are OFF.

(3) Dynamic range

(a) This cell measures the ΔP from the Rx vessel head vent to the Incore instrumentation seal table (bottom of vessel).

(b) The ΔP cell measures the pressure drop across the core under all combinations of RCP operations. It is not valid with all RCP's OFF (except with the reactor vessel empty).

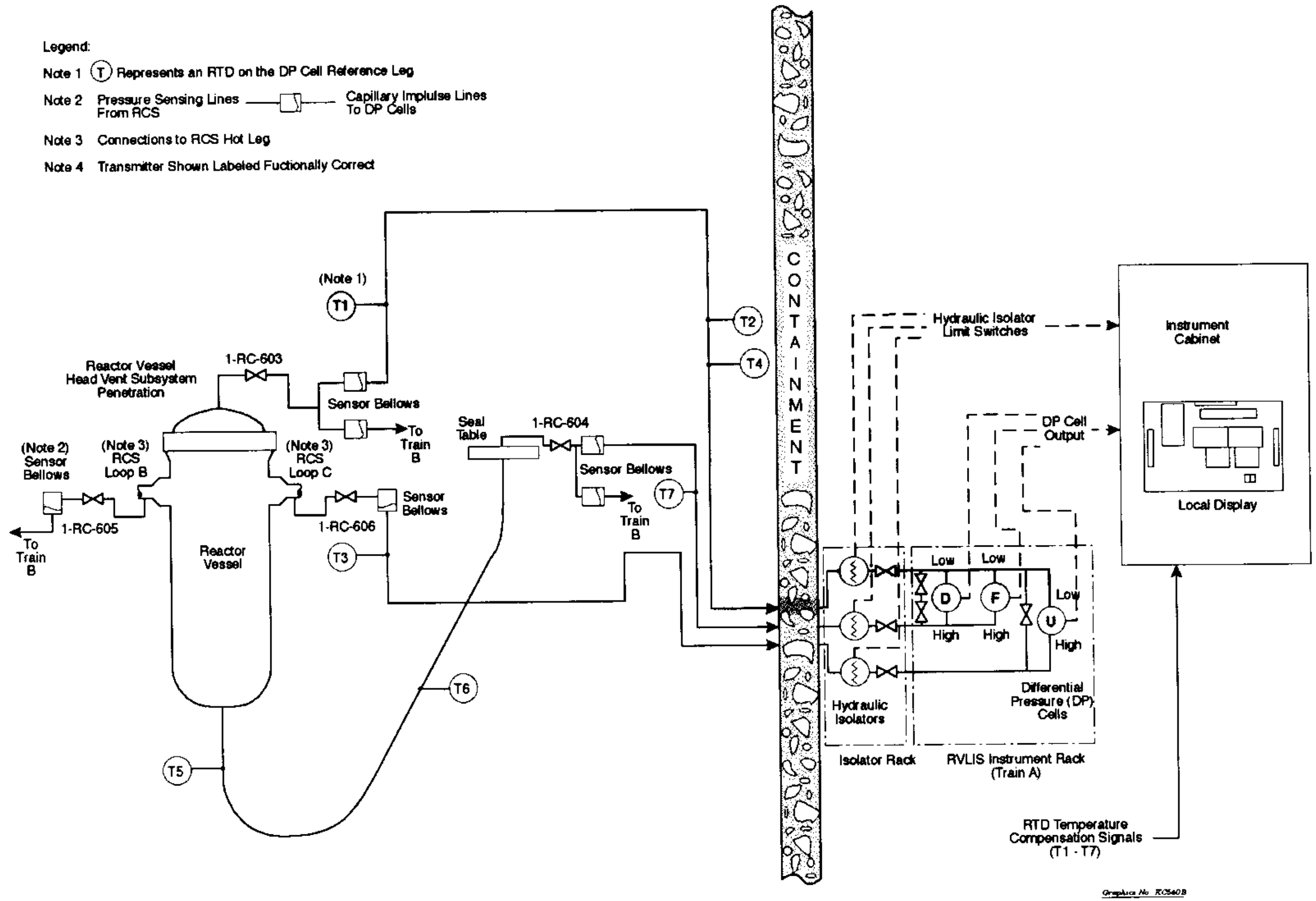
(4) **There are seven (7) RTDs strategically located in the separated, vertical runs of the capillary lines. These RTDs provide temperature input to the microprocessor in order to provide density compensation for temperature differences between the lines.**

(5) The RVLIS ΔP cells are located on the 13' level of the Auxiliary Building, on the Unit 1 and sides of IX Alley..

Ask trainees: Where are the RVLIS ΔP cells located? Answer: on the 13' level of the Aux. Building, on the Unit 1 and 2 side of IX alley.

2. RVLIS Inputs to the ICCM System

RVLIS inputs to the ICCM system are provided from the ΔP cells, the hydraulic isolators, and the RTDs.



RVLIS SYSTEM

1. 003A3.02 001/T2G2/T2G1/RCP PUMP AMPS/2.6/2.5/M/SR02301/C/

Which ONE of the following completes the statement below?

Reactor coolant pump motor amps will (1) if the rotor is locked, and the motor amps will (2) if the pump shaft shears.

A. (1) decrease; (2) decrease
B. (1) increase; (2) decrease
C. (1) increase; (2) increase
D. (1) decrease; (2) increase
Ref: Surry EB # 1171
ND-80-LP-7 objective D
MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B D A C C B D A A A Scramble Range: A - D

Question 1170 Details

Question Type:	Multiple Choice
Topic:	ET00079
System ID:	73751
User ID:	ET00079
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-80-LP-7D and F [S99-0292], [S97-0297]

1171 **ID: ET00080** **Points: 1.00**

Which ONE of the following completes the statement below?

Reactor coolant pump motor amps will (1) if the rotor is locked, and the motor speed will (2) if the rotor shears.

A. (1) decrease; (2) decrease

B. (1) increase; (2) decrease

C. (1) increase; (2) increase

D. (1) decrease; (2) increase

Answer: C

original question

LESSON PLAN

Introduction

This section provides the trainee with the operational theory of alternating current motors. The alternating current motor is a device which converts electrical energy to mechanical energy.

Also discussed is the theory of operation of both AC synchronous and induction motors.

This will enhance your understanding of the relationship between electricity and magnetism and the interaction of magnetic fields.

Objectives

After receiving this instruction, the trainee will be able to:

A. Explain motor action, including application of the Right Hand Rule.

B. Explain the operation of an AC synchronous motor.

C. Explain the operation of an AC induction motor.

D. List three (3) causes of high motor amps.

E. Briefly explain starting duty limitations for AC motors.

F. Explain the operation of AC motors.

Note: There was nothing directly in the lesson plan about the effects of shaft shears. However, the do talk about no-load on motors being minimum

D. Causes of High Motor Amps

1. Overloading the motor

Remember that as the load on the motor increases, the current drawn by the motor will also increase. Thus one cause of high motor amps is an excessively large load on the motor. This can be shown in two plant applications:

a. The exhaust fan on the Gland Seal Condenser Exhaust Fan and the Main Lube Oil Reservoir Vacuum Fan. Opening the damper too far will cause the motor to trip the breaker.

b. A pipe break downstream of the Motor Driven Aux Feed Pumps will cause the pumps to either overspeed or overload (runout). The high flowrate causes an excessive current to be drawn by the motor. Although not their intended function, the cavitating venturis are given credit for preventing MD AFP overspeed.

2. Stalling or locking up of the rotor

If the pump stalls or locks up, then the motor will draw a high current. The reason for this high current is analogous to the current drawn by the motor when starting. As the rotor slows, (or stops) from the rotor's point of view, it now has little or no relative motion compared to the stator. In effect, the motor is grossly inefficient and draws high amps to try to develop torque to make the rotor spin.

3. Electrical malfunctions

a. A short circuit will cause a motor (one phase of a three-phase motor) to draw a high current. This will cause the breaker to trip. Motors are periodically meggered to check for grounds.

1. 003AK2.05 001/T1G2/T1G1/POWER SUPPLIES/M 2.5/2.8/N/SR02301/C/RLM

Unit is operating at 100% power.
Annunciator 1G-D6, "ROD CONT SYS NON-URGENT FAILURE" alarms. It is determined that the alarm is due to a loss of the 120 VAC main power supply.

Which ONE of the following will occur if outward control rod motion is demanded?

A. Control rods in the affected group will not step inward or outward.
B. Control rods in the affected group will only step inward.
C. Control rods can the affected group will only step outward.
D. Control rods in the affected group will drop into the core.

Ref: Surry lesson plan ND-93.3-LP-3, Rev. 14 objectives D and F
Annunciator Response Procedure 1G-D6
Answer D correct based on ARP and Lesson plan references.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: D A B B A B B D D A Scramble Range: A - D

Too Hard !!

d. AP-1.00, Rod Control Malfunction, provides guidance for responding to and recovering from a rod urgent failure event.

(1) Upon receipt of the urgent failure alarm, the rods are placed in MANUAL and are not to be moved (until the cabinet with the failure has been identified).

(2) Reactor and turbine power are matched and stabilized using turbine controls. If power cannot be controlled, the Rx is tripped by initiating E-0.

(3) The location of the urgent failure is determined and as long as it is not in the logic cabinet or the 1BD or 2BD Power Cabinets, the D bank may be operated in bank select. If the failure is in one of these cabinets, then DO NOT move rods until repaired.

e. The Rod Control Urgent Failure Alarm is an expected alarm during a reactor trip. An Urgent Failure will be generated on each Power Cabinet because the stationary gripper coil will not have the required current applied. This alarm will also occur anytime both MG sets are tripped.

2. Non-Urgent Failures

a. A "ROD CONTROL SYSTEM NON-URGENT FAILURE" (G-D-6) alarm warns the operator of a failure of one of the redundant power supply modules (six in the logic cabinet and four in the power cabinet) supplied from main or auxiliary control power. Failure of a redundant power supply will have no immediate effect on operations. However, loss of main control power to the system causes a Non-Urgent failure that can cause rods to drop if withdrawn.

C. Reproducing a simplified one-line diagram from memory, explain the operation, including interrelationships, of the following Reactor Control Unit components:

- Bank Select
- Rod Stop Relays
- In-Hold-Out Switch
- Pulser
- Master Cycler
- Bank Overlap Unit
- Slave Cyclers

D. Reproducing a simplified one-line diagram from memory, explain the operation, including interrelationships, of the following Rod Control Power Supply components:

- Motor-Generator Sets
- Reactor Trip Breakers/Bypass Breakers
- Power Cabinets
- DC Hold Cabinet
- CRDMs

E. Explain the dynamics of a control rod movement, including one insertion and one withdrawal step sequence.

F. Explain the resulting actions from an "Urgent Failure" or "Non-urgent Failure" alarm, including the meaning of the alarm and the necessary recovery tasks.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: No maintenance may be performed on the Rod Control System without prior approval from the Assistant Station Manager O & M, or his designee. This restriction should not prevent visual inspection of the Rod Control cabinets by the Maintenance Department.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	__LOCALLY VERIFY ALARM AT ROD CONTROL LOGIC CABINET OR POWER CABINETS - NON-URGENT FAILURE LIGHT LIT	Initiate a Work Request AND GO TO Step 6.

NOTE: **Loss of 120 VAC main power supply, as indicated by no group select light lit, will cause a group of rods in that group to drop if out motion is demanded.**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	__CHECK GROUP SELECT LIGHTS ON EACH POWER CABINET - ONE LIT	Do not move rods in the affected bank.
3.	__CONTACT INSTRUMENTATION DEPT	
4.	__MONITOR ROD CONTROL LOGIC CABINET AND POWER CABINETS FOR ADDITIONAL ALARMS	
5.	__RECORD STATUS OF CABINETS IN SERVICE BUILDING LOGS ONCE PER SHIFT	
6.	__NOTIFY SHIFT SUPERVISOR	

- END -

QUESTIONS REPORT
for Surry2002

1. 004K2.04 001
Which one of the following identifies the BAST heating arrangement?

A. One Station Service bus powered immersion heater with an emergency bus powered immersion heater as backup.

B. Two station service bus powered immersion heaters.

C. One emergency bus powered immersion heater with a station service bus powered immersion heater as backup.

D. Two emergency bus powered immersion heaters.

Surry Exam bank question # 469.
Lesson Plan ND-88.3-LP-9B.

A,B, and C, Incorrect, Power is from two emergency bus powered immersion heaters.

D. Correct, Power is from two emergency bus powered immersion heaters.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: D A D D C B D D D B Scramble Range: A - D

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:		Cog Level:	2.6/2.7
Source:	B	Exam:	SR02301
Test:	C	Misc:	GWL

468 **ID: CH00068** **Points: 1.00**

Which ONE of the following systems utilizes the seal return filter?

A. Reactor cavity purification

B. RHR

C. Charging pump mini-flow recircs

D. Excess letdown

Answer: D

Question 468 Details

Question Type:	Multiple Choice
Topic:	CH00068
System ID:	72831
User ID:	CH00068
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-88.3-LP-2B

469 **ID: CH00069** **Points: 1.00**

Which ONE of the following identifies the BAST heating arrangement?

A. One emergency bus powered immersion heater with a Station Service bus powered immersion heater backup.

B. Two emergency bus powered immersion heaters.

C. One Station Service bus powered immersion heater with an emergency bus powered immersion heater backup.

D. Two Station Service bus powered immersion heaters.

Answer: B

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the Primary Grade Water System including the following:

- function/systems supplied
- capacity of PG tanks and pumps
- method of system pressure control

B. Describe the Boric Acid Transfer and Storage System including the following:

- function/systems supplied
- capacity of tanks and pumps
- methods of system temperature control
- component power supplies

C. Using a sketch of the system drawn from memory, describe the flowpaths into and out of the blender.

D. Describe the operation of the blender control system during all modes of operation.

E. Describe in detail the operation of the blender control system and associated subsystems.

Presentation

Distribute all handouts. Refer to/display H/T-9.1, Objectives, and review with class.

(c) Low Low level annunciator BA TK 1A Lo-Lo LVL CH 1 (DA-2) (DB-2 for Tank A channel 2) (DC-2/DD-2 for Tank B channels 1 and 2 respectively) at ≤ 81% decreasing.

(d) Low Low level indicates level is approaching the Tech. Spec. minimum value of 6000 gallons which is 79%.

(3) Temperature Indication

(a) Each BAST has two heater elements which are powered from the emergency bus MCCs.

(b) Each BAST has two temperature detectors which indicate locally under each tank. The setpoint for the tank can be adjusted locally in the indicator controller.

(c) Temperature annunciators BA TK 1A Hi-Lo TEMP CH 1 (DA-3) (DB-3 for Tank A channel 2) (DC-3/DD-3 for Tank B channel 1/2):

High Temperature	155 °F
Low Temperature	135 °F

Redisplay H/T-9.3, Boric Acid Transfer and Storage Typical System Lineup.

(4) Tank Recirculation

(a) Each tank has a mini-flow recirc orifice to ensure a minimum of 5 GPM recirc flow.

QUESTIONS REPORT
for Surry2002

1. 005AK1.02 001/T1G1/T1G1/FLUX TILT/3.1/3.9/B/SR02301/C/RLM

The reactor is operating at 80% power during a load decrease to 60% when a control rod becomes stuck during insertion of the rest of its group.

Sets of limits Combination

Which ONE of the following will be adversely affected, if group control rod insertion continues? (Assume the stuck control rod is trippable)

A. Power distribution and shutdown margin
B. Power defect and critical heatflux
C. Critical heat flux and power distribution
D. Shutdown margin and power defect

Ref: SR EB # 2444
Surry Lesson Plan ND 86.3-LP-2, objective E
Surry Lesson Plan ND 86.3-LP-3, objective F

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: C D B B C D C D B A Scramble Range: A - D

D. State the core location (bottom, top, or middle) where the minimum CHF and DNBR occur.

E. Describe how heat is transferred from the fuel rod surface to the coolant, including the factors which affect the heat transfer rate.

Presentation

Distribute all handouts. Refer to/display H/T-2.1, Objectives, and review objectives with trainees.

A. Pool Boiling

1. Boiling heat transfer may be observed by performing a simple experiment. Consider a heated surface at temperature T_s, immersed in a pool of water.

This experiment may also be related to a pot of water on a stove.

2. In the experiment, the temperature of the heated surface is increased, and the heat transfer rate per unit area is measured.

Ask the trainees: What is the term for heat transfer rate per unit area? Answer: Heat flux.

F. **Define each of the following reactor thermal limits, explaining the bases for each:**

- **$F_Q(Z)$**
- **$F^N_{\Delta H}$**
- **Reactor Core Safety Limit**

Presentation

Distribute all handouts.
Refer to/display H/T-3.1, Objectives, and review with trainees.
PowerPoint Presentation 86-03-03 FQZ and F delta H PPT may be used to supplement this LP, slide numbers are listed prior to material.

A. $F_Q(Z)$ - Heat Flux Hot Channel Factor at Elevation (Z)

Slides 2 and 3 are for the objectives.
Slide 4 is for the purpose.

The purpose of this restriction placed on the core power distribution is to prevent fuel damage during an accident. If the maximum heat flux during normal operation or transients is sufficiently limited, then an accident will not cause fuel damage in excess of the limits in 10 CFR 50.46. To accomplish this, a limit is placed on the heat flux hot channel factor to ensure PCTs (Peak Clad Temperatures) remain less than 2200°F.

Slide 5 is for FQZ description.

1. F(Z)

QUESTIONS REPORT
for Surry2002

1. 006K5.10 001/T2G2/T2G2/THERMAL STRESS/C/A 2.5/2.9/N/SR02301/C/RLM

Unit 1 is at 100% power
A non-licensed operator, making plant rounds reports that he hears what appears to be an intermittant flow noise from MOV-1867C, HHSI to Cold Legs, and that the local indicator on the MOV indicates that it is closed.

Which ONE of the following is a probable consequence if this valve is intermittantly leaking by the seat?

A. The RCS leakrate surveillance will yield non-conservative leakrate calculations.
B. The leakage will adversely affect the valve stroke time due to thermal binding.
C. The leakage will cause increased gas accumulation in the ESF system.
D. The leakage will induce thermal stresses on the SI cold leg injection lines. added At the RCS Penetration.

Ref: Surry lesson plan ND-91-LP-2, objective E
SOER (later)
Answer A is incorrect because it doesn't matter whether the water goes through the cold leg injection line or the normal charging line (parallel path) as it relates to RCS inventory.
Answer B is incorrect because the water temperature coming out of the charging pump is approximately VCT temperature and then there are ambient losses between the charging pump and the injection valve. Therefore, the valve will remain close to ambient. Back leakage of hot RCS water cannot occur, because charging pressure on the upstream side of the valve is greater than RCS pressure.
Answer C is incorrect because the pressure in the cold leg injection line is much higher than in the suction of the charging pump. Therefore, it is unlikely that any gas will come out of solution in the high pressure side of the piping system.
Answer D is correct based on plant events where cracking of SI injection lines has occurred as noted in SOER (later).

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	D A C D C D A A A B	Scramble Range: A - D

F. Explain the general operation of the Safety Injection System components during a Unit startup from Cold Shutdown conditions and a Unit shutdown to CSD conditions.

G. **Explain the overall integrated operation of the Safety Injection System in response to both normal and abnormal operating conditions.**

Presentation

Distribute all handouts. Refer to/display H/T-3.1, Objectives, and review with trainees.

A. Safety Injection Actuation Signals

1. Once Safety Injection (SI) has been actuated, there are two SI time delay relays (SI timers), one for each SI train, that prevent the reset of SI for 60 seconds.

   a. The actual time required for engineered safeguards actuation is 22 seconds.

   b. The use of a 60-second (1 minute) timer to prevent repositioning of SI components until after all SI actions are completed is conservative.

   c. These relay timers, 2-SI-A and 2-SI-B, are located in the Safeguards Train A and B Racks, Channels I and III and are powered from the respective DC buses.

2. MANUAL Initiation

   a. The purpose of the manual SI initiation is to provide LOCA protection during heat-up and/or cooldown while SI is blocked. It also provides backup initiation capability for the other SI actuation signals.

1. 007G2.4.47 001/T1G2/T1G2/COOLDOWN/C/A 3.4/3.7/N/SR02301/C/RLM

Unit 1 was at 100% power when a tagging error caused the 1A RCP to trip.

Plant conditions:
-Unit 1 tripped
-All automatic systems functioned as expected.
-All Steam Generator levels are less than 11% narrow range and trending up
-Tavg is at 542 degrees F when the Reactor Operator notes that steam dump 105A is open

Which ONE of the following is the MOST effective means of stabilizing RCS temperature?

A. Verifying closed or closing Steam Generator Blowdown TV's
B. Reducing total AFW flow to no more than 540 gpm
C. Closing the MSTV's
D. Starting the 1A RCP

Surry lesson plan ND-95.3-LP-4, objective C
Surry lesson plan ND-93.3-LP-9, objective C
Answers A and B are incorrect because even though they are in the RNO column of the procedure, they will not effect stabilization of the RCS because the dump continues to draw energy from the system.
Answer D is not proceduralized, and would be ineffective for the same reasons as A & B.
Answer C is correct, because it is the only action that will isolate the heat loss component.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: C C D D C C B C D D Scramble Range: A - D

RO Tier:	T1G2	SRO Tier:	T1G2
Keyword:	COOLDOWN	Cog Level:	C/A 3.4/3.7
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 1.	__MONITOR RCS AVERAGE TEMPERATURE • STABLE AT 547°F OR • TRENDING TO 547°F	IF temperature less than 547°F AND decreasing, THEN do the following: a) Stop dumping steam. b) Verify closed or close SG Blowdown TVs. c) IF cooldown continues, THEN control total feed flow. Maintain total AFW flow greater than 540 gpm (350 gpm w/o RCPs) until narrow range level in at least one SG greater than 11%. d) IF cooldown continues, THEN close MSTVs. IF temperature greater than 547°F and increasing, THEN do the following: • Dump steam to condenser. OR • Dump steam with SG PORVs.

LESSON PLAN

Introduction

The Steam Dump Control System provides both rapid steam relief capability in response to plant transients and plant cooling for startup/shutdown operations. This system provides steam relief capability to prevent challenging the secondary steam safeties and PORVs. This allows the plant to recycle this steam and lessens the chances of releasing radioactive material to the environment. By understanding the operation and controls of the Steam Dump Control System, the operator will have a powerful tool at his disposal for controlling primary plant temperatures and preventing unnecessary challenges to secondary safety valves.

Objectives

After receiving this instruction, the trainee will be able to:

A. Using a simplified one-line diagram reproduced from memory, explain the signals, including functions, setpoints, and coincidence, for the Turbine First Stage Impulse Pressure Channels (P_{imp}).

B. Explain the function of the Steam Dump Control Select Switch and the Steam Dump Mode Select Switch.

C. Using a simplified one-line diagram reproduced from memory, explain the Steam Dump Arming signals, including all necessary interlocks to allow the system to operate when above and below 543°F T_{avg}.

D. Using a simplified one-line diagram reproduced from memory, explain the three modes of steam dump operation (Steam Pressure Mode, Load Reject Mode, and Turbine Trip Mode).

C. Steam Dump Arming

Refer to/display H/T-9.6, Steam Dump Solenoids, and show that arming means to energize the A and B solenoids to pass inst. air to the dump valves.

1. Steam Dump "arming" means that instrument air has been made available to operate the dump valves when a demand signal is generated.

Alternately refer to/display H/T-9.7, Steam Dump Arming Circuit, and H/T-9.8, Steam Dump Permissives.

2. There are three interlocks which must be satisfied in order to arm the dumps when an arming signal is activated. These are the "condenser available" interlock, the "condenser cooling" interlock, and the "RCS temperature" interlock.

    a. The **condenser available interlock** is satisfied by 2/2 condenser pressure transmitters sensing condenser vacuum at > 25 inches Hg.

    b. The **condenser cooling interlock** is satisfied by 1/4 condenser circulating water outlet MOVs being NOT fully closed.

    c. The **RCS temperature interlock** is satisfied by 2/3 loops T_{avg} protection being > 543°F. This interlock is designed to prevent an inadvertent excessive cooldown event. This temperature interlock can also be satisfied for the cooldown dump valves (105 A & B), if 2/3 T_{avg} are < 543°F and the Steam Dump Control Switch is momentarily placed to the BYPASS-INTERLOCK position.

Objectives

After receiving this instruction, the trainee will be able to:

A. Given the major action categories associated with ES-0.1, Reactor Trip Response, explain the purpose of ES-0.1, the transition criteria for entering and exiting ES-0.1 and the types of operator actions that will occur within each category.

B. Given a copy of ES-0.1, Reactor Trip Response, explain the basis of each step of the procedure.

C. Given actual or simulated plant conditions requiring implementation of ES-0.1, Reactor Trip Response, successfully transition through the procedure, applying step background knowledge as required, to safely place the plant in the required optimal recovery condition.

Presentation

Distribute all handouts. Refer to/display H/T-4.1, Objectives. Review objectives with trainees.

A. Major Actions of ES-0.1

1. ES-0.1 Purpose

The purpose of ES-0.1, Reactor Trip Response, is to provide guidance to stabilize and control the plant following a reactor trip without safety injection.

(1) If the RCS cooldown is excessive, then steam dump should be stopped.

(2) Excessive feed to the SGs can also result in RCS cooldown.

(a) It is recommended that AFW flow be reduced to the minimum required of 540 gpm, 350 gpm without RCPs for decay heat removal until at least one SG NR level is restored to greater than 11%. This will limit the RCS cooldown due to FW addition. The 540 gpm minimum flow requirement with RCPs operating is based on sufficient flow to provide adequate heat removal capability. With no heat input from the RCPs (RCPs off), the minimum allowed flow changes to 350 gpm since heat removal capability is ensured at this lower flowrate. In other EOPs, a minimum flowrate of 350 gpm with RCPs running and SI in service is specified since the cold SI flow will aid the AFW flow in ensuring an adequate heat removal capability.

(b) Once 11% SG NR level is reached in at least one SG, total flow can be controlled as necessary to maintain SG level.

(3) If the cooldown continues, the MSTVs are closed to stop any steam leakage downstream, such as a stuck open steam dump valve.

(4) If RCS temperature is greater than no-load and increasing, then steam dump must be increased for decay heat removal.

c. The trend of RCS Tavg indicates the amount of heatup or cooldown occurring and the types of actions required.

12

1. 011EK3.03 001/T1G2/T1G1/AFW/C/A 4.1/4.3/N/SR02301/C/RLM
- A large break LOCA has occurred.
- ~~The team is responding IAW 1-E-0, Reactor Trip or Safety Injection.~~
- ~~No RNO actions have been performed.~~
- The team has just transitioned to 1-E-1, Loss of Reactor or Secondary Coolant ~~at Step 23 of E-0~~.
- ~~Containment pressure reached 29 psia.~~
- All Steam Generator pressures are stable at 450 psig.
- RCS pressure is stable at 25 psig.
- Steam Generators levels are being maintained at approximately 23% with Aux Feed water flow.

Which ONE of the following is the reason to for maintaining Steam Generator inventories?

A. To provide the ability to remove heat from the RCS.
B. To provide the ability to remove heat from the Containment Atmosphere.
C. To provide the ability to remove heat from the Steam Generators.
D. To protect the integrity of the of the U bend region of the tube bundles.

Ref: Surry Lesson Plan ND-95.3-LP-7, Rev. 13, objective C
ND-95.3-LP-7, Rev. 13, p. 31
WOG backgroud document E-1, Rev. 1A, p. 76

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: C A D A C B D A C D Scramble Range: A - D

LESSON PLAN

Introduction

Guideline E-1 provides actions to start recovery from a loss of reactor or secondary coolant while maintaining the core covered and minimizing atmospheric releases.

This lesson on the procedure for Loss of Reactor or Secondary Coolant will present both an "overview" format and an "in-depth" format so that operational understanding of the procedure background and design can be maximized.

Objectives

After receiving this instruction, the trainee will be able to:

A. Given the major action categories associated with E-1, Loss of Reactor or Secondary Coolant, explain the purpose of E-1, the transition criteria for entering and exiting E-1 and the types of operator actions that will occur within each category.

B. Given a copy of E-1, Loss of Reactor or Secondary Coolant, explain the basis of each procedural step.

C. Given actual or simulated plant conditions requiring implementation of E-1, Loss of Reactor or Secondary Coolant, successfully transition through the procedure, applying step background knowledge as required, to safely place the plant in the required optimal recovery condition.

b. At this point, RCS pressure is low and the plant is on cold leg recirc. However, the secondary side may still be relatively hot and at a pressure higher than the RCS. If this is the case, the secondary side should be cooled and depressurized by dumping of steam from intact SGs.

c. To minimize offsite doses, do not dump steam from a SG with high radioactivity levels.

d. **As a general rule if fuel damage is suspected (either from indications or samples), it is advantageous to keep the secondary side pressure above the primary side pressure in order to minimize potential releases. (rk)**

32. **STEP 24: CONSULT WITH TSC TO DETERMINE IF RX VESSEL HEAD SHOULD BE VENTED.**

a. The purpose of this step is to determine if the reactor vessel head should be vented.

b. The possibility exists for a hydrogen bubble to form in the reactor head during LOCA events. The head might have to be vented to prevent the hydrogen bubble from growing to the extent that core cooling is impaired.

c. The plant engineering department should be involved in the determination of whether or not the upper head region needs to be vented.

d. **FR-I.3, Response to Voids in Reactor Vessel, provides guidance on venting the upper head region to control non-condensibles if the RCS has the required subcooling and SI is terminated. (rk)**

STEP: Check If Intact SGs Should Be Depressurized To RCS Pressure

PURPOSE: To cool down and depressurize the secondary side if intact SG pressures are greater than RCS pressure

BASIS:

At this point the RCS pressure is low (below the low-head SI pump shutoff head pressure) and the plant is on cold leg recirculation. However, the secondary side may still be relatively hot and at a pressure significantly higher than the RCS. If this is the case, the operator should cool down and depressurize the secondary side by dumping steam from any intact SGs to aid in further cooldown and depressurization of the RCS. Steam should be dumped to the condenser, if possible, or directly to atmosphere using intact SG PORVs. To minimize offsite radiation doses the operator is instructed not to dump steam from a SG with high radioactivity.

ACTIONS:

- Determine if RCS pressure is less than intact SG pressures
- Determine if SGs radiation is normal
- Isolate feed flow to a SG with high radioactivity
- Dump steam to condenser from intact SGs until RCS pressure is less than intact SG pressures
- Dump steam to atmosphere using intact SG PORVs until RCS pressure is less than intact SG pressures

INSTRUMENTATION:

- RCS pressure indication
- SG pressure indication
- Plant specific instrumentation to indicate SG radiation (e.g., blowdown radiation monitors, condenser offgas radiation monitors)

CONTROL/EQUIPMENT:

- Steam dump to condenser controls
- SG PORV switches
- Plant specific controls to isolate feed flow

QUESTIONS REPORT
for Surry2002

1. 011K3.02 001/T2G2/T2G2/PZR PRESSURE CONTROL/C/A 3.2/3.7/M/SR02301/C/RLM

R 2- RC- 2- RC-

PRZ level transmitter LT-459 is currently the controlling upper channel and LT-461 is the controlling lower channel.

Which ONE of the following would occur if no operator action is taken and pressurizer level transmitter LT-459 fails HIGH?

2-RC-

A. Pressurizer pressure will increase to a steady state value.
B. Pressurizer pressure will decrease to a steady state value.
C. Pressurizer pressure will increase and then decrease and become cyclic.
D. Pressurizer pressure will decrease then increase and become cyclic.

Ref: SR EB #1633
Lesson Plan ND-93.3-LP-7, objective C
Lesson Plan DN-93.3-LP-7, p. 8

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: D B A A A D A B B B Scramble Range: A - D

LESSON PLAN

Introduction

The liquid level of the pressurizer must be carefully controlled and monitored in order to provide the correct liquid-to-vapor ratio for proper pressure control during normal and transient plant operations. Improper control of pressurizer level can result in damage to pressurizer heaters, stuck open pressurizer safeties, and/or unstable RCS pressure control. The role of the operator is to verify proper system operations and to take manual level control during a system malfunction. This lesson will present an introduction to the Pressurizer Level Control System, discuss the pressurizer level program, and present a one-line diagram for system operations.

Objectives

After receiving this instruction, the trainee will be able to:

A. Explain the generation of the Pressurizer Water Level Program Setpoints, including the HZP and HFP values.

B. Reproducing a one-line diagram from memory, explain the operation, including interrelationships, of the Pressurizer Level Control circuitry components.

C. Summarize the operator actions necessary to mitigate the consequences of a failure of a pressurizer level channel, including the effects on the RCS if NO actions are taken.

D. Using a one-line diagram for explanatory purposes, explain the integrated operation of the Pressurizer Level Control System, including level program parameters and control circuitry components.

3. A control channel failing **<u>HIGH</u>** does not affect the **<u>lower control channel</u>**. The lower control circuit B/S only actuates on an indicated low level of < or = 14.4%.

4. The **<u>upper control channel</u>** failing high results in a **high level alarm and energizing of all heaters**. It also causes a high level signal to be input into the Pzr Level Controller. This controller then sees "actual" level much greater than programmed level, which causes charging flow to go to minimum and pressurizer level decreases.

   a. When pzr level reaches 14.4%, the lower level channel will cause letdown to isolate (this is a different channel than the one to upper circuitry). LCV-1460B closes and the heaters trip.

   b. Now, with letdown isolated and charging flow at a minimum (25 gpm), plus approximately 15 gpm from seal injection, pzr level will slowly begin to increase until it reaches the high level trip setpoint, and the reactor is tripped.

   c. The reactor trips and level drops due to the RCS shrink associated with the trip. Following the shrink, the level will once again rise until the pzr is taken solid. RCS pressure then increases and will steady out and cycle around the pzr PORV setpoint (2335 psig). If the PORVs are not working, then the pressure will increase and cause the pzr safeties to lift.

5. With the lower controlling channel failing **<u>LOW</u>**, the end result is much the same as when it fails high. The lower control channel causes letdown to isolate when it receives the low level signal. Charging will go to a minimum as pzr level increases. The Rx trips at 88% level followed by the RCS going solid and pressure increasing.

1. 013G2.4.4 001

-Unit 1 is Shutdown proceeding to CSD.
-Train "A" RHR is in operation.
-Train "B" RHR is in standby.
-Pressurizer level is 65%; and lowering rapidly.
-RCS pressure is 300 psig and lowering.
-RCS temperature is 210 degrees F.
-Accumulators are Isolated.
-Containment Sump Level is rising.

Which one of the following procedures should be implemented for the above conditions?

A. Excessive RCS Leakage, AP-16.00

B. Loss of Decay Heat Removal Capability, AP-27.00

C. Reactor Trip or Safety Injection, E-0.

D. Shutdown LOCA, AP- 16.01.

Modified from Surry bank question #838
REF: ND-95.2LP-12 objectives D and E; AP-16.01.
Answer: D

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: D C B B D A A A D B Scramble Range: A - D

RO Tier: T2G1
Keyword:
Source: MODIFIED
Test: C

SRO Tier: T2G1
Cog Level: 4.0/4.3 C/A
Exam: SR02301
Misc: GWL

D. [For each of the major categories of Loss of RHR events, explain how Surry's Abnormal Procedures direct the operator to respond to the events, including the importance of proper procedural sequence where applicable. SOER 85-04, Rec. 1; SOER 88-03, Rec. 3.]

E. Given a loss of RCS inventory with RCS pressure less than 1000 psig (SI Accumulators isolated) and RCS temperature greater than 200°F, describe the use of AP-16.01 to address this event.

F. **Given either hypothetical or actual situations involving a loss of RHR event (or the potential thereof), differentiate between appropriate and inappropriate operator actions, including why certain actions would aggravate a Loss of Decay Heat Removal event.**

Presentation

Distribute all handouts and AIAs. Refer to/display H/T-12.1, Objectives, and discuss with the trainees.

A. Event Synopses, Lessons Learned, Procedural and Design Features

Refer to AIA-12.1, INPO 88-018, Case Study on Loss of Decay Heat Removal. Have the trainees discuss the conditions and factors which caused the event and contributed to the severity of the event. Add any of the following as necessary to enhance the discussion and to ensure all areas are discussed.

1. The following is a summary of the events that took place at San Onofre.

a. Initial plant conditions

EXAMINATION ANSWER KEY

RO/SRO Exam Bank

← ORIGINAL →

838 **ID: EOP0087** **Points: 1.00**

The following plant conditions exist:

- ~~CSD 3 weeks after plant shutdown.~~ Plant s/o Proceeding to CSD
- Train "A" RHR operating.
- Train "B" RHR in standby.
- Pressurizer level ~~100% (solid plant).~~ 65%
- RCS pressure 300 psig.
- RCS temperature ~~180°F.~~ 210°F

Which ONE of the following procedures provides the guidance in event of a LOCA while operating in this condition?

A. Reactor Trip or Safety Injection, E-0.

B. Loss of Decay Heat Removal Capability, AP-27.00.

C. Shutdown LOCA, AP-16.01.

D. Excessive RCS Leakage, AP-16.00.

Answer: B

Question 838 Details

Question Type:	Multiple Choice
Topic:	EOP0087
System ID:	73377
User ID:	EOP0087
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.2-LP-12D; ND-95.3-LP-2E; AP-27.00 [S96-0965], [S94-1087]

(13)

1. 014K3.02 001 2

A+B

Unit ~~one~~ 1 is commencing a Reactor Start Up and is pulling group ~~A~~ A+B rods.
At 25 steps, an IRPI module for ~~an~~ a "~~A~~ B" group rod on B Bank fails low.

Which one of the following describes the alarms and/or indicators which would alert the operator to this condition?

A. Rod Bottom annunciator, Rod bottom Light, and IRPI MCB indicator.

B. Rod bottom Light, IRPI MCB indicator, and "COMPUTER PRINTOUT ROD CONT SYS" 1G-B5.

C. Rod Bottom annunciator, IRPI MCB indicator, and "COMPUTER PRINTOUT ROD CONT SYS" 1G-B5.

D. Rod bottom Light, Rod Bottom annunciator, and "COMPUTER PRINTOUT ROD CONT SYS" 1G-B5.

Surry Lesson Plan ND-93.3-LP-4 objective B.
ARP 1G-B5.

A. Incorrect, a Rod bottom annunciator will not be recieved ≤ 35 steps.

B. Correct, the P-250 computer will annunciate 1G-B5, a rod bottom light will be recieved, and the MCB indicator will fail low.

C. Incorrect, a Rod bottom annunciator will not be recieved ≤ 35 steps.

D. Incorrect, a Rod bottom annunciator will not be recieved ≤ 35 steps.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B D B B C B A D C C Scramble Range: A - D

RO Tier:	T2G2	SRO Tier:	T2G1
Keyword:		Cog Level:	M 2.5/2.8
Source:	N	Exam:	SR02301
Test:	C	Misc:	GWL

- DC power supplies
- Control board position indicator

B. Explain the plant response to an IRPI failure or a loss of power to the IRPI System, including an explanation of AP-1.02, Individual Rod Position Indicators.

C. Describe the Technical Specifications associated with the IRPI System, including for SRO candidates, the basis behind these specifications.

D. Explain the overall integrated operations of the Rod Position Indication System, including its purpose, location, readouts, and component operation.

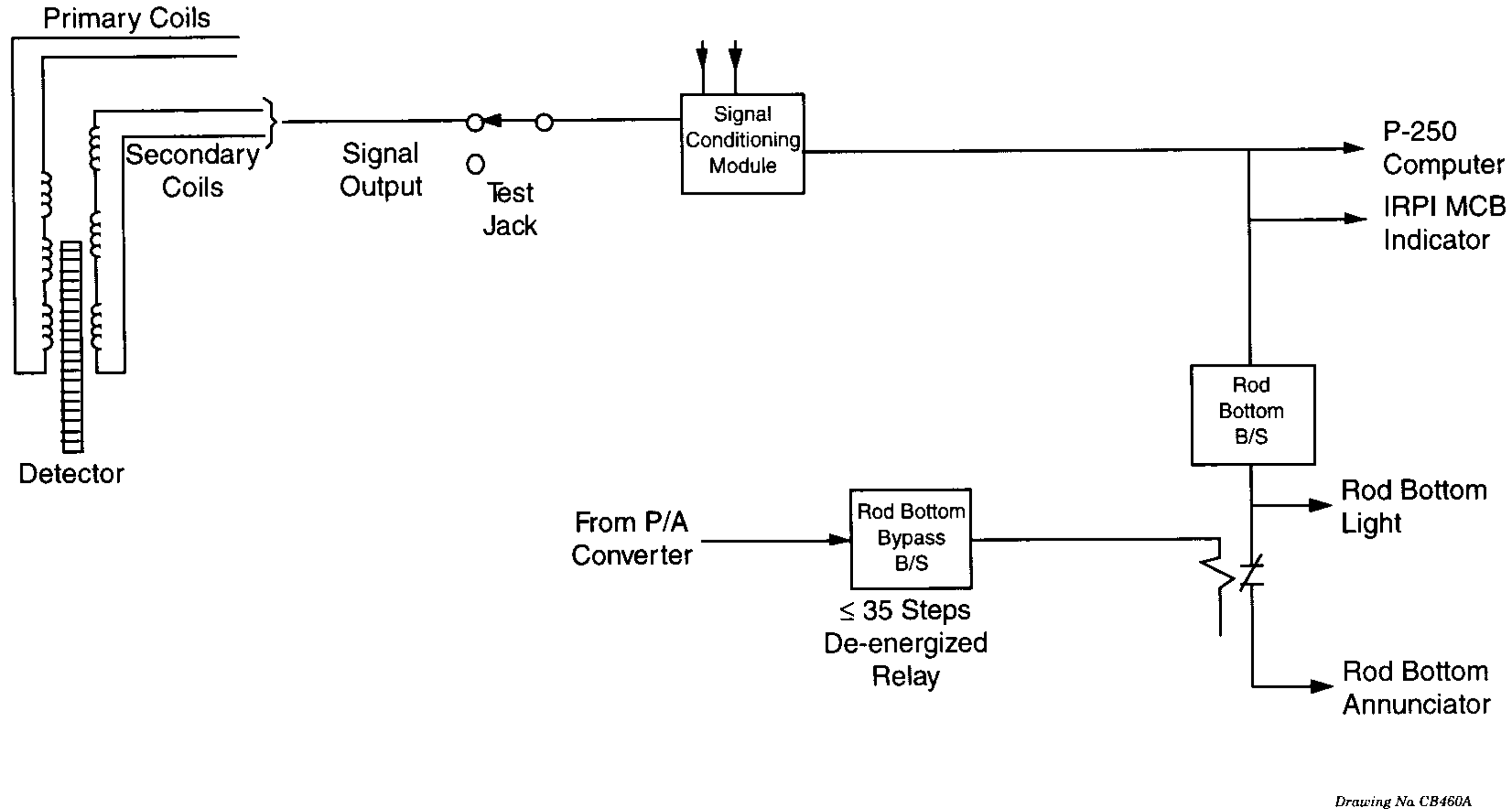
<u>Presentation</u>

Distribute all handouts. Refer to/display H/T-4.1, Objectives, and review objectives with trainees.

A. Component Operation

1. The purpose of the IRPI System is to provide continuous position indication information for each full length control rod.

Refer to/display H/T-4.2, IRPI System Diagram, and use with the following discussion.



IRPI SYSTEM DIAGRAM

10. The Rod Bottom Bypass Bistable is provided to block the rod drop alarm for control rod banks B, C, and D when it is necessary to operate the plant with some of the control rods fully inserted. The bypass bistable setpoint is 35 steps, as indicated by the rod control demand signal from the P/A converter.

Refer to/display H/T-4.4, Rod Bottom Bistable/Signal Conditioning Module, and point out pertinent items of interest and the fact that this is from the IRPI cabinet.

11. The test panel, in conjunction with the signal conditioning module "TEST/OPERATE" switch is used to do on-line testing of all full length rod position channels and output devices. The test panel supplies a variable AC test signal for use as a simulated test signal. The operator is alerted to the channel testing by an "RPI IN TEST" annunciator.

B. Effects of a Loss of Power or IRPI Failure

1. The IRPI receives its power from the Semi-Vital bus.

   a. Upon a loss of the semi-vital bus, all meter indications go to zero. The rod bottom lights will <u>not</u> come on.

   b. If power is regained (i.e., the emergency bus was de-energized and subsequently re-energized by the EDG), the rod bottom bistable will initially sense the rods at the bottom. Before the meter indications can be restored, an IRPI dropped rod signal will be generated. It is also possible that the meter indication may not return to its pre-event level.

2. If the meter indication/output module fails, the IRPI may fail low.

   a. This will result in an IRPI dropped rod annunciator.

b. This dropped rod indication will not be seen by the PRNIS. Indications to use to resolve conflict over an actual dropped rod v.s. IRPI failure would be:

(1) Deviation between the 4 PRNIS readings

(2) NIS dropped rod signal - would not be generated for just an IRPI failure.

Have trainees follow along on their copy of AP-1.02 for the following discussion.

3. AP-1.02, Individual Rod Position Indicators

a. The purpose of this procedure is to provide guidance to respond to a possible malfunctioning IRPI.

b. Review entry conditions for AP-1.02.

c. Review the steps of AP-1.02 highlighting the following areas:

(1) If the reason for IRPI deviation is not due to an IRPI failure, the position of the rod must be determined using the movable incore detectors.

(2) Maximum number of IRPIs out of service is one per group or two per bank.

(3) If an IRPI is failed and power is > 50%, the rod position must be determined once every eight hours or after rod motion of the non-indicating rod > 24 steps.

C. IRPI Technical Specifications 3.12

1. Basically this spec divides operability into three plant-mode dependent categories: above 50%, from control bank movement up to 50%, and during hot/intermediate/cold shutdown conditions.

   a. Above 50% power, the IRPIs must be within +/- 12 steps of their associated group demand counter.

   b. From movement of control banks to achieve criticality up to 50% power, IRPIs must be:

      (1) within +/- 12 steps of their group demand counter unless they are classified as in the "thermal soak" period.

      (2) within +/- 24 steps of their group demand counter during the "thermal soak" period.

         (a) This "thermal soak" period may be in effect a maximum of one (1) hour out of twenty-four (24) hours. This period may be a continuous hour or may consist of discrete shorter intervals totalled together.

         (b) During the one-hour "thermal soak" period, the step demand counters must be operable and capable of determining group demand positions to within +/- 2 steps.

   c. In Hot, Intermediate, and Cold Shutdown conditions:

      (1) Step demand counters must be operable and capable of determining group demand position to within +/- 2 steps.

(2) IRPIs must be available to verify rod movement upon demand.

2. If an IRPI channel is out of service:

a. For operation above 50% power either:

(1) Use moveable in-core detectors to check the position of the non-indicating RCC at least once every 8 hours or immediately after any motion of the affected rod exceeding 24 steps, or

(2) Reduce power to less than 50% within 8 hours.

b. For operation below 50% power, no special monitoring is required.

3. If more than one IRPI per group or two IRPIs per bank are inoperable, then the requirements of Spec 3.0.1 must be followed.

4. Automatic Tracking of Deviation Time

a. Above 50%, Annunciator GB5 will alarm if IRPI deviates more than 8 steps. The alarm will reflash when the deviation reaches 12 steps.

b. Below 50%, the alarms will occur as follows:

(1) IRPI deviates by more than 8 steps from the step counter.

(2) The alarm will reflash if the deviation reaches 12 steps.

(3) The alarm will reflash at 50 and 60 minutes until the deviation has been corrected for 24 hours.

(4) The alarm will also flash when the deviation reaches 20 and 24 steps.

Summary

The rod position indication system provides information on the status of the control rods, and of proper operation of the Rod Control System. An indication of the actual rod position is provided for comparison with the expected rod position. The IRPI system provides the indications necessary to verify proper rod alignment, overlap, and to verify the possibility of a dropped control rod. These functions are performed without the penetration of the RCS pressure boundary.

Use objectives to review material.

g. Log ΔFlux. (TS Item 3.12.B requires logging ΔFlux hourly for the first 24 hours that the data logger is out of service, 1/2 hourly thereafter).

h. Maintain Reactor Power less than or equal to 100% using an average of the Power Range indications.

i. Log all IRPI indications and Group Step counter readings every 9 steps of rod motion. (IRPI requirements are in TS Table 4.1-1#9, logged every l6 inches of rod motion when data logger out of service.

j. A check is made to determine if the computer is being removed from service for maintenance. If it is not being removed for service, attempts are made to restore the computer. If it is restored, the computer is updated and the operators stop augmented parameter surveillance and the procedure is terminated.

k. If the computer is being removed from service or restoration was not successful, then the following are performed:

   (1) Determine if containment temperature monitoring is required because of containment fire detection equipment inoperable.

   (2) Swap the RCP temperature to the Vertical Board recorder, and energize the recorder. (Use "X" and "W" cables in P-250 Cabinet in Computer Room.)

   (3) Log Charging pump temperatures hourly using the digital display on the P-250 cabinet in the computer room.

*QNUM 32037
*HNUM 32565 (Do NOT change If < 9,000,000)
*ANUM
*QCHANGED FALSE
*ACHANGED FALSE
*QDATE 1992/03/16
*FAC 280 Surry 1 & 2
*RTYP PWR-WEC3
*EXLEVEL S
*EXMNR
*QVAL
*SEC
*SUBSORT
*KA 000005A105
*QUESTION
If it becomes necessary to take rod J09 out of scan when using the plant computer for automatic tracking of Individual Rod Position Indication deviation time, which ONE of the following references provides the rod identification data to accomplish this task?

a. Unit Curve Book, DRP-003.

b. Abnormal Procedure AP-1.02, "Individual Rod Position Indicators".

c. Operational Checklist procedure OC-17, "IRPI Tracking"

d. P-250 Manual.

*ANSWER
d.
*REFERENCE
Lesson Plan ND-93.3/AIA-4.1, p. 1
Section Objective D

1831 **ID: RD00029** **Points: 1.00**

Which ONE of the following describes the signal produced by the rod position detector within the control rod Individual Position Indicator System (RPI)?

A. A linear DC signal related to its position which is converted to an analog DC signal by the rod position channel.

B. A linear AC signal related to its position which is converted to an analog AC signal by the rod position channel.

C. An AC signal related to its position which is converted to an analog DC signal by the rod position channel.

D. A non-linear DC signal related to its position which is converted to an analog AC signal by the rod position channel.

Answer: C

Question 1831 Details

Question Type:	Multiple Choice
Topic:	RD00029
System ID:	74796
User ID:	RD00029
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-93.3-LP-4D [S96-0817]

289 **ID: AOP0146** **Points: 1.00**

Which ONE of the following items does NOT have to be manually logged if the P-250 Computer fails?

A. Individual Rod Position Indication after 9 steps of rod motion.

B. ΔFlux on the Power History Log.

C. Charging Pump bearing temperatures.

D. RCP bearing temperatures.

Answer: D

Question 289 Details

Question Type:	Multiple Choice
Topic:	AOP0146
System ID:	72610
User ID:	AOP0146
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-93.4-LP-1A and C; AP-20.02 [S98-0554], [S96-0946], [S96-0172], [S94-0710]

(1)

1. 015AK2.10 001 1
-Unit one is operating at 25% reactor power during a startup.
-1C RCP Trips.

Which one of the following describes the expected steady state MCB indications that would be available to the operator?

OK

A. Loop C RCS flow will indicate 0%, loops Aand B will indicate 95%.
B. Loop C RCS flow will indicate 20%, loops Aand B will indicate 110%.
C. Loop C RCS flow will indicate 20%, loops Aand B will indicate 95%
D. Loop C RCS flow will indicate 0%, loops Aand B will indicate 110%

From Surry Exam Bank #2775.
Lesson Plan ND-95.1-LP-3 objective A.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B D B D B C B D A D Scramble Range: A - D

RO Tier: T1G1
Keyword: RCP INDICATORS
Source: B
Test: C

SRO Tier: T1G1
Cog Level: 2.8/2.8
Exam: SR02301
Misc: GWL

2775 **ID: TAA0103** **Points: 1.00**

Given the following plant conditions:

ù Unit 1 is at 22% reactor power during startup.
ù 1B RCP trips

Which ONE of the following describes the expected steady state response of the RCS?

A. Loop B RCS flow will indicate 10%, loops A and C will indicate 95%.

B. Loop B RCS flow will indicate 0%, loops A and C will indicate 110%.

C. Loop B RCS flow will indicate 20%, loops A and C will indicate 90%.

D. Loop B RCS flow will indicate 20%, loops A and C will indicate 110%.

Answer: D

Question 2775 Details

Question Type:	Multiple Choice
Topic:	TAA0103
System ID:	76035
User ID:	TAA0103
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.1-LP-3A [S98-0090]

LESSON PLAN

Introduction

In the Thermodynamics section of the license class course, one learned that heat transfer was dependent upon the mass flow rates of the fluids involved, i.e., Q = M (delta T) and Q = M (delta h). The Reactor Coolant Pumps are the motive force that provide the forced flow rates through our core. These high flow rates enable the reactor to operate at a higher heat output and still remain below the Departure from Nucleate Boiling point in the fuel region.

The loss of coolant flow incident can result from a mechanical or electrical failure in a reactor coolant pump or from an interruption in the power supply to these pumps. If the reactor is at power at the time of the incident, the immediate effect is a rapid increase in coolant temperature in the core region. This increase could result in DNB with subsequent fuel damage if the reactor is not tripped promptly.

Objectives

After receiving this instruction, the trainee will be able to:

A. Explain the plant response for a single loop loss of RCS flow from 100% power.

B. Explain the plant response for a complete loss of RCS flow from 100% power.

C. Explain the plant response for a single loop locked rotor accident.

D. Summarize the sequence of plant events occurring upon initiation of a loss of reactor coolant system flow.

QUESTIONS REPORT
for Surry2002

(15)

1. 015K4.08 001

-Unit One is at 75% power with Bank D rods at 198 steps.
-Rod Control is in Automatic.
-N44 fails high.

Which one of the following describes how control rods would respond to this failure?

A. Rods will step out until Tave-Tref mismatch causes them to step back in.

B. Rods will step out and stay out.

C. Rods will step in until Tave-Tref mismatch causes them to step back out.

D. Rods will step in and stay in.

Original idea from farley exam bank.
Surry lesson material ND-93.3-LP-3 objective K and ND-93.2-LP-4 objectives Hamd J

Answer: D.

A. Incorrect, Rods will not step out as N-44 fails high the power mismatch signal will drive rods in to lower power and match Tave and Tref.
B. Incorrect, Rods will not step out as N-44 fails high the power mismatch signal will drive rods in to lower power and match Tave and Tref.
C. Incorrect, Rods will move in to lower power as N-44 fails high but rods will not move out due to a rod stop being present.
D. Correct, Rods will move in to lower power as N-44 fails high. but will not move out due to the rod stop.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: D A D D B C C A C C Scramble Range: A - D

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:		Cog Level:	3.4/3.7 C?A
Source:	B	Exam:	SR02301
Test:	C	Misc:	GWL

QUESTIONS REPORT
for Surry2002

1. 015K4.08 001

-Unit One is at 75% power with Bank D rods at 198 steps.
-Rod Control is in Automatic.
-N44 fails high.

Which one of the following describes how control rods would respond to this failure?

A. Rods will step out until Tave-Tref mismatch causes them to step back in.

B. Rods will step out and stay out.

C. Rods will step in until Tave-Tref mismatch causes them to step back out.

D. Rods will step in and stay in.

Original idea from farley exam bank.
Surry lesson material ND-93.3-LP-3 objective ~~C~~ K and ND-93.2-LP-4 objective ~~C~~ H & J

Answer: D.

A. Incorrect, Rods will not step out as N-44 fails high the power mismatch signal will drive rods in to lower power and match Tave and Tref.
B. Incorrect, Rods will not step out as N-44 fails high the power mismatch signal will drive rods in to lower power and match Tave and Tref.
C. Incorrect, Rods will move in to lower power as N-44 fails high but rods will not move out due to a rod stop being present.
D. Correct, Rods will move in to lower power as N-44 fails high. but will not move out due to the rod stop.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: D A D D B C C A C C Scramble Range: A - D

RO Tier: T2G1
Keyword:
Source: B
Test: C

SRO Tier: T2G1
Cog Level: 3.4/3.7 C?A
Exam: SR02301
Misc: GWL

F. Explain the operation of the Miscellaneous Indication and Control Drawer, including its output indications and alarms.

G. Explain the operation of the Comparator and Rate Drawer, including its output indications and alarms.

H. Explain the operation of the Power Range detection system during abnormal operating conditions.

I. Describe the requirements for the Power Range NIS as delineated in Technical Specifications sections 3.7, 3.12, and 4.1, including for SRO candidates, the basis behind these specifications.

J. Explain the operation of the Power Range Nuclear Instrumentation System, including its purpose, construction, outputs, protection logics, abnormal operations, and legal requirements.

G. Explain the purpose of the following Main Control Board reset pushbuttons, including the alarms/components affected by use:

- Start-Up Pushbutton
- Alarm Reset Pushbutton
- Reactor Trip Breakers' Reset Pushbutton

H. Using a simplified one-line diagram for illustration, explain how the Insertion Limit annunciators are generated.

I. Explain the operator actions taken in AP-1.00, Rod Control System Malfunction, and AP-1.01, Control Rod Misalignment, to mitigate problems in the Rod Control System.

J. Summarize the Technical Specifications associated with the Rod Control System.

K. Reproducing simplified one-line diagrams for illustration purposes, explain the overall integrated operation of the Rod Control System.

Presentation

Distribute all handouts. Refer to/display H/T-3.1, Objectives.

A. Purpose and Design

1. The Rod Control System serves two (major) purposes:

   a. Provides emergency shutdown (trip) of the reactor in response to signals from the Reactor Protection System or the Reactor Operator.

O52201E27010;

CAUTION: THIS QUESTION IS **NOT** RELATED TO THE STATIC SIMULATOR CONDITIONS.

While operating at 75% power with bank D at 210 steps, how would the control rods be affected by N44 failing high if the control rod bank selector switch is in automatic? (Assume no operator actions.)

(Circle the correct response.)

A. Rods would have stepped out until Tave-Tref mismatch caused them to step back in.

B. Rods would have stepped in until Tave-Tref mismatch caused them to step back out.

C. Rods would have stepped out and stayed out.

D. Rods would have stepped in and stayed in.

ANSWER: D
PNTS: 1.0 ANSWER TIME: 3.0 Mins. PART A
QUESTION LEVEL: 100
Static Sim Scenario Nos. ___ ___ ___ ___ ___ ___ ___
S&K No. 241540020164 240108021170 __________
K/A No. 001000K1.05A __________ __________
RO/SRO Impf. 4.5 /4.4 ___/___ ___/___
Objectives: O52201E27
References: O52201E, Rod Control
Rev. Date: 2/5/93
AUTH:
TYPE: C

1835 **ID: RD00035** **Points: 1.00**

After completing a calorimetric calculation, the operator is in the process of adjusting N-44 nuclear instrumentation in accordance with current procedures.

Which ONE of the following describes the resultant plant response if Nuclear Instrumentation channel N-44 instantaneously fails LOW and no operator action is taken?

A. Control rods step out.

B. Control rods do not move.

C. Control rods step in at minimum rate.

D. Control rods step in at maximum rate.

Answer: B

Question 1835 Details

Question Type:	Multiple Choice
Topic:	RD00035
System ID:	74801
User ID:	RD00035
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-93.2-LP-4C
	[S97-0070], [S95-0889]

EXAMINATION ANSWER KEY

RO/SRO Exam Bank

1585 **ID: NIS0080** **Points: 1.00**

Which ONE of the following indicates the effect on unit operations if N-44 were to fail high with reactor power at 95%?

A. Only automatic rod withdrawal would be blocked.

B. Control rods would step out atuomatically.

C. Automatic and manual rod withdrawal would be blocked.

D. Automatic and manual rod movement would be blocked.

Answer: C

Question 1585 Details

Question Type:	Multiple Choice
Topic:	NIS0080
System ID:	74411
User ID:	NIS0080
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-93.3-LP-3C [S98-0090]

F. Explain the operation of the Miscellaneous Indication and Control Drawer, including its output indications and alarms.

G. Explain the operation of the Comparator and Rate Drawer, including its output indications and alarms.

H. Explain the operation of the Power Range detection system during abnormal operating conditions.

I. Describe the requirements for the Power Range NIS as delineated in Technical Specifications sections 3.7, 3.12, and 4.1, including for SRO candidates, the basis behind these specifications.

J. Explain the operation of the Power Range Nuclear Instrumentation System, including its purpose, construction, outputs, protection logics, abnormal operations, and legal requirements.

14/

2. 017A3.01 001
- A Total loss of off-site power has occured.
- Core Exit thermocouples read aproximately 670 degerees F.
- Steam Generator Pressure is stable at 815 psig.

Which one of the following describes the current plant conditions?

A. Natural Circulation flow is increasing.

B. The steam generators have boiled dry (due to a loss of feedwater.)

C. Natural Circulation Cooling has been interupted.

D. The reactor core has uncovered and core ~~melt~~ is imminent.

ND 86.3 LP4

Surry Bank question slightly modified.
Ref: Surry lesson plan ND-86.3-LP-4C and AP-39.00. 5, D & 6

A. Inncorrect, Natural Circ flow is not increasing, at 815 psig in the S/G temperature in the RCS should be about 525 degrees F.
B. Inncorrect, The S/Gs are not dry as evidenced by 815 psig pressure.
C. Correct, The indications show that there is no evidence of heat being transfere to the S/Gs.
D. Inncorrect, There are no indications that the core has uncovered and that core melt is imminent.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: Scramble Range: A - D

RO Tier: T2G1
Keyword:
Source: B
Test: C

SRO Tier: T2G1
Cog Level: 3.6/3.8
Exam: SR02301
Misc: GWL

We still provide steam tables don't we, yes

Question 282 Details

Question Type:	Multiple Choice
Topic:	AOP0138
System ID:	72602
User ID:	AOP0138
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-86.3-LP-4C; ND-95.1-LP-3D; AP-39.00 [S95-1098]

283 **ID: AOP0139** **Points: 1.00**

The following plant conditions exist:

ú A reactor trip with a total loss of off-site power has occurred.
ú Core exit thermocouples read aproximately 650øF and increasing.
ú Steam generator pressure is stable at 815 psig.
ú Steam generator steam flow is undetectable.

Which ONE of the following describes plant conditions?

A. The steam generators have boiled dry due to loss of feedwater.

B. Loss of natural circulation has occurred.

C. Natural circulation flow is increasing.

D. The reactor core has uncovered and core melt is imminent.

Answer: B

LESSON PLAN

Introduction

Since at any time during normal operation, the reactor coolant pumps may become unavailable for decay heat removal, the reactor operator must understand the concept of natural circulation, how its existence (or lack of it) can be detected, and what plant conditions can promote or degrade its effectiveness. Each of these items will be discussed in this section, with the emphasis on the practical aspects of establishing, maintaining, and enhancing natural circulation.

Distribute all handouts. Refer to/display H/T-4.1, Objectives, and discuss objectives with trainees.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe natural circulation in terms of the conditions that must be present in order for natural circulation to exist.

B. Describe the behavior of T_h and T_c following a reactor trip from 100% power and tripping of all reactor coolant pumps until the establishment of natural circulation.

C. State four (4) indications available to the reactor operator for verifying the existence of natural circulation including an explanation of how these indications respond to a loss of natural circulation.

D. State the plant conditions that should be maintained by the reactor operator in order to support natural circulation.

E. Describe how steam/noncondensible gas formation in the RCS could lead to a loss of natural circulation.

F. Given a set of initial conditions (reactor power, mass flow rate, core delta T), calculate one of the three unknowns during natural circulation conditions.

G. [Describe operational methods for determining the status of natural circulation including factors which either promote or retard the effectiveness of core cooling via natural circulation. SOER 81-04, Recommendation 1]

Presentation

A. Natural Circulation

1. Natural circulation is flow due to a fluid density difference caused by a temperature differential within the fluid.

2. A heated plate at the bottom of a large pool of water, where the average temperature of the water is less than that of the plate, is an example of natural circulation.

Refer to/display H/T-4.2, Natural Circulation in a Tank of Water.

3. The water temperature near the heated plate is hotter than the surrounding water causing the density of the water near the plate to be less than that of the main body of water.

4. Buoyant forces cause an upward flow of water from the plate.

QUESTIONS REPORT
for Surry2002

17

1. 017K1.01 001

trip. ERFCS Computer

One CETC on the ICCM System indicates 2700 degrees F.

Which one of the following describes how this reading will be displayed on the ERF computer?

A. The actual temperature of 2700 degrees will be displayed.

B. The display will read 2700 degrees and BAD will also be displayed.

C.✓ The display will read 2700 degrees and POOR will also be displayed.

D. The display will read 2700 degrees and SUSP will also be displayed.

Need to ask actually how this system reacts to off scale high readings XXXBAD?
Surry Lesson Plan ND-93.4-LP-3 objective C.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9

Answer: Scramble Range: A - D

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:		Cog Level:	M / 3.2/3.2
Source:	N	Exam:	SR02301
Test:	C	Misc:	

Replace Question - they will write.

OBJECTIVES

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the Inadequate Core Cooling Monitor (ICCM) System, including the following:

- RVLIS inputs and outputs
- CETC inputs and outputs
- Subcooling Margin Monitor inputs and outputs

B. Explain the technical specifications associated with the ICCM System.

C. Operate the ICCM System under all plant conditions to determine reactor vessel level, subcooling margin, thermocouple temperatures and input signal reliability.

c. At the bottom of these diagnostic display pages is an area reserved for diagnostic information messages. Only one message is displayed on a diagnostic page. If more than one diagnostic message needs to be indicated, a different message will be displayed each time the diagnostic page updates. After all of the different diagnostic messages are displayed, the cycle will repeat again with the first message. The diagnostic messages do not differentiate between the different diagnostic pages,)i.e., the same message will be displayed on each of the two pages).

d. There are four (4) sensor quality codes: GOOD, SUSPECT, POOR, and BAD. Each of these codes have various conditions which cause the ICCM to diagnose it accordingly. (See Figure 11 for reference only)

e. The plasma display will automatically re-boot itself after 15 seconds of being locked up.

Refer to/display H/T-3.14, Data Link Failure Page.

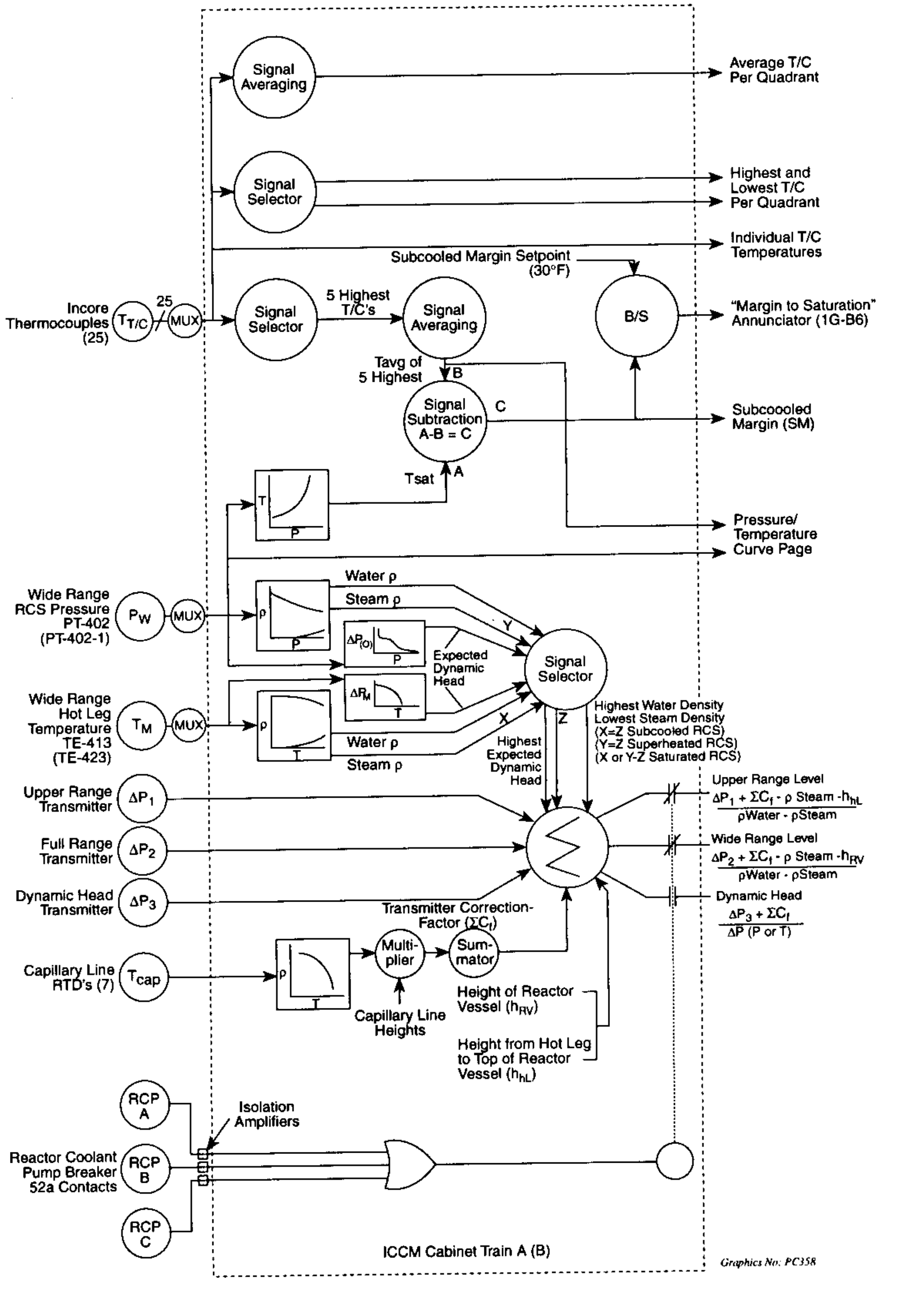
7. Data Link Failure Page

a. In the event of a data link failure between the ICCM cabinet and the display, after a 10 second time delay, a "DATA LINK FAILURE" screen is displayed.

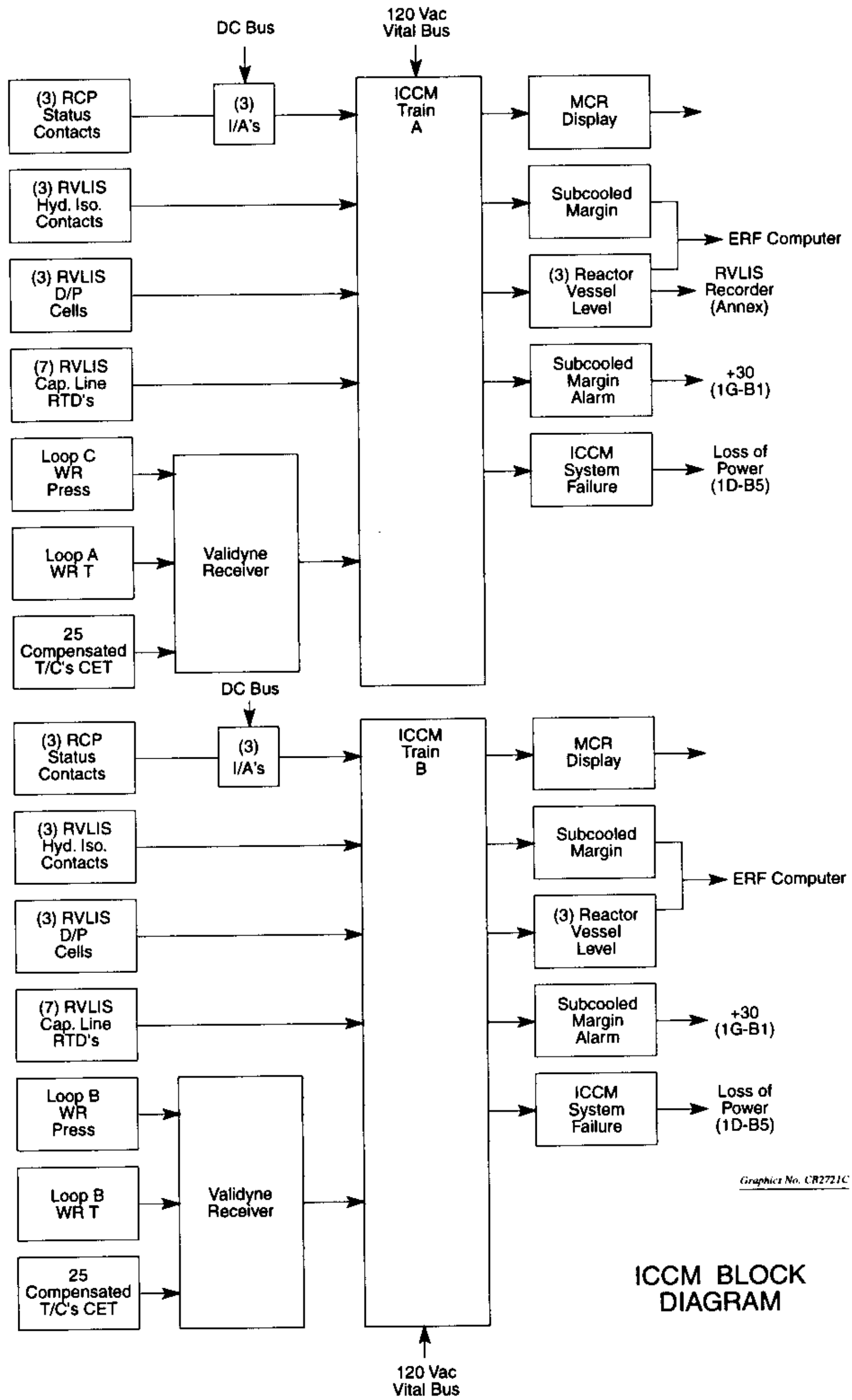
b. The previously requested page returns once the data link is re-established.

c. A data link failure can be caused by the following:

(1) ICCM cabinet is de-energized



ICCM FUNCTIONAL BLOCK DIAGRAM



Graphics No. CB2721C

ICCM BLOCK DIAGRAM

SENSOR QUALITY CODES

BAD

- Full Range Level Transmitter disabled
- Full Range Level Transmitter calibration error
- Impulse Line RTD calibration error
- Wide Range Pressure Input calibration error
- RCP Status calibration error
- Hydraulic Isolator calibration error
- Greater than half of all In-Core T/Cs in train have calibration errors
- Greater than half of all In-Core T/Cs in train offscale low or offscale high

POOR

- Full Range Level Transmitter offscale low or offscale high
- Impulse Line RTD offscale low or offscale high
- Wide Range pressure Input offscale low or offscale high
- In-Core T/C offscale low or offscale high
- In-Core T/C calibration error

SUSP

- Impulse Line RTD disabled
- Wide Range Pressure Input disabled
- RCP Status disabled
- Hydraulic Isolator disabled
- In-Core T/C disabled
- CET Average disabled

(18)

1. 022K4.05 001

Which one of the following systems provides for Containment Cooling during a design basis LOCA.

A. Service Water System.

B. Containment Ventilation System.

C. Containment Spray System.

D. Recirc Spray flowing through at least 2 RSHX's.

Source Surry Lesson Plans ND-91-LP-5. A,B,C, and D.

A. Incorrect, SW cools the RSHX's but containment is cooled by 45 degree RWST water from the Containment Spray System.
B. Incorrect, containment ventilation cools the containment during normal operations but not during a DBLOCA.
C. Correct the Containment Spray System cools and depressurizes containment during a DBALOCA.
D. Incorrect, The Recirc spray system aids in cooling the containment but it is designed to provide for core cooling after a DBLOCA.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	C B A A D B C D A B	Scramble Range:	A - D

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:		Cog Level:	2.6/2.7 M
Source:	N	Exam:	SR02301
Test:	C	Misc:	GWL

LESSON PLAN

Introduction

In the event of a primary or secondary LOCA inside containment, steam is released causing a pressure and temperature increase in containment. Without any action to depressurize containment during the LOCA, the pressure in containment could exceed the design pressure of 60 psia and cause a challenge to containment integrity.

In addition to the integrity challenge, with no actions, the containment would remain at above atmospheric pressure for a relatively long period of time over the one hour design criteria. This would extend any outleakage of radioactive materials which could result in a dose in excess of 10 CFR 100 limits.

This lesson will discuss the design bases of the CS System, describe the operation of the major components, discuss the purposes of chemical addition to the spray water, and discuss the Technical Specifications associated with the system.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the operations of the Consequence Limiting Safeguards System, including coincidence, logics, setpoints and actions occurring upon system actuation.

B. Using a simplified one-line diagram drawn from memory, describe the operation of the major components of the Containment Spray System, including the start/stop signals, the interlocks, and the Control Room instrumentation available.

C. State the Technical Specifications associated with the Containment Spray System, including for SRO candidates only, the basis for these specifications.

D. Using a simplified one-line diagram, explain the operations of the Containment Spray System, including initiation signals, interlocks, instrumentation available, and Technical Specification limitations.

Presentation

Distribute all handouts. Refer to/display H/T-5.1, Objectives, and discuss with trainees.

A. Consequence Limiting Safeguard System

1. Purpose

a. The purpose of the CLS System is to provide containment isolation and depressurization in order to limit the release of radioactive material to the atmosphere in the event of an accident.

b. This purpose is accomplished by:

(1) Partial containment isolation (Phase II) and Safety Injection initiation backup signal when containment pressure reaches 17.7 psia (3 psig) (HI CLS).

(2) Containment Spray initiation and complete containment isolation (Phase III) when containment pressure reaches 23 psia (8.3 psig) (HI-HI CLS).

B. Containment Spray Component Operation

1. CS Design Basis

a. Using "minimum safeguards equipment", the CS System is designed to provide cooled, borated water-spray for cooling and depressurizing the containment structure back to subatmospheric in less than 60 minutes following a DBA (and maintain subatmospheric conditions).

b. The CS System provides chemical addition to the spray water to reduce the concentration of radioactive iodine in the containment atmosphere quickly so that any leakage during the time containment is above 14.7 psia results in a dose that is within 10 CFR 100 limits.

c. The CS System limits maximum containment pressure to less than 45 psig (60 psia).

Write the following design criteria on the chalkboard:
1. Cool spray to depressurize within 60 minutes
2. Chemical addition to remove radioactive iodine - limit dose
3. Maximum pressure of 45 psig

Refer to/display H/T-5.5, CS System Diagram.

(2) The RWST recirculation pumps are used with the RWST coolers after initially filling the RWST following a refueling. During this mode of recirculation, the pumps take a suction through the lower, normally isolated recirculation line (CS-27) from the RWST.

d. There are two RWST coolers near the RWST. The coolers are used to cool the water to less than 45°F after initially filling the RWST. After the RWST temperature has been reduced, the coolers are isolated and the refrigeration units are used to maintain the temperature between 40° and 43°F. This temperature range ensures that sufficient cooling capacity is available for the CS System to depressurize containment within the required one-hour time period following a LOCA.

e. There are two RWST refrigeration units, rated at 7.5 tons each.

Normally, one RWST pump is in slow speed providing flow through the refrigeration unit. The unit will automatically operate to maintain RWST temperature between 40° and 43°F.

f. The RWST is vented by two means:

(1) The vent on the top of the RWST has been uncapped to prevent drawing a slight vacuum in the tank during large draw-down (i.e. Hi-Hi CLS).

(2) During normal RWST evolutions an overflow line connects near the top of tank and runs to an existing ventilation supply duct to the bottom of the safeguards valve pit. This overflow allows normal ventilation for safeguards to prevent unmonitored releases (normal ventilation or filtered ventilation during SI).

Question 1994 Details

Question Type:	Multiple Choice
Topic:	RS00011
System ID:	75001
User ID:	RS00011
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-91-LP-6F [S96-0805], [S95-0613]

1995 **ID: RS00012** **Points: 1.00**

Which ONE of the following indicates which system/components provide the heat sink for core heat removal during the first 24 hours of a Design Basis Accident?

A. Fire Protection System.

B. Containment Spray System.

C. Containment Ventilation System.

D. Recirc Spray flowing through at least 2 RSHX's.

Answer: D

19

1. 025AK1.01 001/T1G2/T1G2/VAPOR ENTRAINMENT/3.9/4.3/B/SR02301/C/RLM

WHICH of the following parameters affects vapor entrainment in the RHR suction piping?

A. RHR flow rate AND RCS pressure
B. RHR flow rate AND RCS level
C. Number of RHR pumps running AND RCS pressure
D. Number of RHR pumps running AND RCS level

Ref: SR EB # 41420
ND-95.2-LP-12, "Loss Of RHR Events", Rev 9 Objective B, page 31

Answers C and D incorrect because each pump has an individual suction line and are therefore independent of each other.

Answer A is incorrect because this phenomena is associated with reduced inventory operations where the RCS is essentially at atmospheric pressure.

LESSON PLAN

Introduction

Over the past 10 years, events involving a loss or degradation of RHR system capability have occurred frequently. Although these events have not resulted in major damage to any of the cores involved, they have all pointed to one major fact: there is a significant probability for a loss of RHR event to occur when operating the plant drained down to mid-nozzle.

The purpose of this lesson is to provide a familiarization with recent industry events involving a loss/degradation of RHR, present the possible thermal and hydraulic performance of the RCS, review the recommended actions to minimize the possibility of a loss of decay heat removal event, and discuss the Surry specific procedural actions which help mitigate a loss/degradation of RHR event.

Objectives

After receiving this instruction, the trainee will be able to:

A. [Given a case study on Loss of Decay Heat Removal event and the North Anna Loss of Inventory event, summarize the lessons learned from these events, including the procedural and design features at Surry Power Station that minimize the possibility of the occurrence of these events. SOER 85-04, Rec. 1; SOER 88-03, Rec. 3.]

B. **Explain the thermal/hydraulic performance of the RCS and RHR systems while partially filled, including the potential for boiling and loss of liquid mass from the core.**

C. Describe the steps taken in Surry's Operating Procedures to transition the plant from RCP operations to mid-nozzle RHR operation, including the basis for major steps as applied to the potential for loss of RHR.

Refer to/display H/T-12.6, Entrainment as a Function of Water Level and Flow Rate 14" RHR Intake.

(5) This graph shows that, for a given level in the RCS, as flow rate decreases the amount of vortexing greatly decreases.

Refer to/display H/T-12.7, Momentum Elevation Difference in Hot Leg Water Level.

(6) Another effect that occurs in the RHR suction pipe is the translation of momentum into an elevation difference. This is similar to the weir effect in that actual level at the RHR pump suction is < indicated standpipe level.

INSTRUCTOR'S NOTE: This effect will be shown in greater detail during the viewing of the video tape on vortexing (if available).

c. Heat removal capability of charging and letdown during the Loss of RHR Event

The engineering study showed that the heat removal capability of charging and letdown flow while the RCS is at temperature and pressure consistent with RHR operation is very limited. This method, in and by itself, would not be sufficient to remove all core decay heat.

The following are some reasons that prevent this method from being a viable alternative:

- Inadequate temperature to provide thermal driving head for heat transfer.

QUESTIONS REPORT
for Surry2002

1. 024AK1.04 001

Which one of the following describes the boric acid system requirements for an emergency boration?

A. The boric acid storage tanks are filled with a 7 - 8.5% solution of boric acid with a maximum temperature of 45 degrees F. to ensure solution solubility.

B. The boric acid storage tanks are filled with a 2300-2500 ppm solution of boric acid with a minimum temperature of 112 degrees F. to ensure proper cooling of the containment during a LOCA.

C. The boric acid storage tanks are filled with a 7 - 8.5% solution of boric acid with a minimum temperature of 112 degrees F. to ensure solution solubility

D. The boric acid storage tanks are filled with a 2300-2500 ppm solution of boric acid with a maximum temperature of 45 degrees F. to ensure proper cooling of the containment during a LOCA.

Ref: Surry Lesson Plan ND-88.3-LP-9 objective B.
TS 3.2.1 and Basis.TS 3.2.4

A. Incorrect, The solution is correct but the temperature is the temperature for the RWST operability.

B. Incorrect, The solution concentration is for the RWST. and the temperature is much to high to cool the containment after a LOCA.

C Correct, Based on Lesson material and TS.

D. Incorrect, The concentration is wrong.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: Scramble Range: A - D

RO Tier:	T1G1	SRO Tier:	T1G1
Keyword:		Cog Level:	2.8/3.6 C/A
Source:	N	Exam:	SR02301
Test:	C	Misc:	GWL

Which one of the following describes the boric acid system requirements for an emergency boration?

A. The boric acid storage tanks are filled with a 7 - 8.5% solution of boric acid with a maximum temperature of 45 degrees F. to ensure solution solubility

B. The boric acid storage tanks are filled with a 2300-2500 ppm solution of boric acid with a minimum temperature of 112 degrees F. to ensure proper cooling of the containment during a LOCA.

C. The boric acid storage tanks are filled with a 7 - 8.5% solution of boric acid with a minimum temperature of 112 degrees F. to ensure solution solubility

D. The boric acid storage tanks are filled with a 2300-2500 ppm solution of boric acid with a maximum temperature of 45 degrees F. to ensure proper cooling of the containment during a LOCA.

Correct answer C.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the Primary Grade Water System including the following:

- function/systems supplied
- capacity of PG tanks and pumps
- method of system pressure control

B. Describe the Boric Acid Transfer and Storage System including the following:

- function/systems supplied
- capacity of tanks and pumps
- methods of system temperature control
- component power supplies

C. Using a sketch of the system drawn from memory, describe the flowpaths into and out of the blender.

D. Describe the operation of the blender control system during all modes of operation.

E. Describe in detail the operation of the blender control system and associated subsystems.

Presentation

Distribute all handouts. Refer to/display H/T-9.1, Objectives, and review with class.

(2) Other major uses

(a) Spent fuel pit makeup

(b) Pressurizer relief tank: makeup and quench water

(c) Reactor coolant pump number 2 seal standpipes for makeup

(d) Containment I/A compressor makeup

B. Boric Acid Storage System

1. Purpose of the Boric Acid Transfer and Storage System.

a. Provide for storage of Boric Acid at a concentration of 7% to 8.5%.

b. Provide a means to transfer boric acid from the storage tanks to the charging makeup control system.

2. Normal System Flowpaths

Refer to/display H/T-9.3, Boric Acid Transfer and Storage Typical System Lineup.

a. 'A' BAST is lined up to supply the Unit 1 blender using the 'A' BATP. The discharge from the 'A' BATP goes through the boric acid filter and supplies the blender or recircs back to the 'A' BAST.

b. The 'B' BAST is lined up for recirc using the 'B' or 'C' BATP.

c. The 'C' BAST is lined up to supply the Unit 2 blender using the 'D' BATP. The discharge from the 'D' BATP goes through the boric acid filter and supplies the blender or recircs back to the 'C' BAST.

d. The BATP not in use is isolated and filled with PG.

3. Batch Tank Flowpath

a. The Batch Tank is used for makeup to the B.A. storage system.

b. The contents of the Batch Tank are transferred to the 'B' BAST using either 'B' or 'C' BATP. After the 'B' BAST is sampled, it can be used for makeup to 'A' or 'C' BASTs.

4. System Components and Operation

a. Boric Acid Storage Tanks

(1) Three tanks with a capacity of 7299 gallons each.

(2) Level Indication

(a) Two channels per tank. 'A' BAST indicates on Unit 1. 'B' BAST has one indicator on each unit. 'C' BAST indicates on Unit 2.

(b) High/Low level annunciator BA TK 1A Hi-Lo LVL CH 1 (DA-1) (DB-1 for Tank A channel 2) (DC-1/DD-1 for Tank B channels 1 and 2 respectively) at ≥ 100% increasing or ≤ 83% decreasing.

(c) Low Low level annunciator BA TK 1A Lo-Lo LVL CH 1 (DA-2) (DB-2 for Tank A channel 2) (DC-2/DD-2 for Tank B channels 1 and 2 respectively) at ≤ 81% decreasing.

(d) Low Low level indicates level is approaching the Tech. Spec. minimum value of 6000 gallons which is 79%.

(3) Temperature Indication

(a) Each BAST has two heater elements which are powered from the emergency bus MCCs.

(b) Each BAST has two temperature detectors which indicate locally under each tank. The setpoint for the tank can be adjusted locally in the indicator controller.

(c) Temperature annunciators BA TK 1A Hi-Lo TEMP CH 1 (DA-3) (DB-3 for Tank A channel 2) (DC-3/DD-3 for Tank B channel 1/2):

High Temperature	155 °F
Low Temperature	135 °F

Redisplay H/T-9.3, Boric Acid Transfer and Storage Typical System Lineup.

(4) Tank Recirculation

(a) Each tank has a mini-flow recirc orifice to ensure a minimum of 5 GPM recirc flow.

(3) Makeup to the Batch Tank is from PG.

e. CVCS Heat Tracing

(1) This equipment is designed to maintain the temperature of the heat traced components in the CVCS between 125°F and 180°F, thus preventing the precipitation of boric acid. The heat tracing temperature is normally maintained by the primary (A) panels. In the event of failure of one of the "A" panel circuits, the corresponding "B" panel circuit will control temperature.

(2) The individual heat tracing circuit control module controls the application of power to the heat tracing cable associated with it, based on the temperature settings and the feedback temperature signals. Additionally, this module provides over-and-under temperature (OT and UT) alarms.

(a) For the 'A' heat tracing panel, the OT and UT alarms are set for 180°F and 130°F. The operating temperature setpoint for the 'A' panel is 150°F.

(b) For the 'B' heat tracing panel, the OT and UT alarms are set for 180°F and 115°F. The operating temperature setpoint for the 'B' panel is 125°F.

(3) Actuation of an alarm on any Tech Spec-related heat tracing circuit is alarmed in the MCR by the CVCS HEAT TRACING TROUBLE alarm on the ventilation alarm panel (VSP-E-8).

3.2. CHEMICAL AND VOLUME CONTROL SYSTEM

Applicability

Applies to the operational status of the Chemical and Volume Control System.

Objective

To define those conditions of the Chemical and Volume Control System necessary to ensure safe reactor operation.

Specification

A. When fuel is in a reactor, there shall be at least one flow path to the core for boric acid injection. The minimum capability for boric acid injection shall be equivalent to that supplied from the refueling water storage tank.

B. The reactor shall not be critical unless:

1. At least two boron injection subsystems are OPERABLE consisting of:
   a. A Chemical and Volume Control subsystem consisting of:
      1. One OPERABLE flow path,
      2. One OPERABLE charging pump,
      3. One OPERABLE boric acid transfer pump,
      4. The common OPERABLE boric acid storage system with:
         a. A minimum contained borated water volume of 6000 gallons per unit,
         b. A boron concentration of at least 7.0 weight percent but not more than 8.5 weight percent boric acid solution, and
         c. A minimum solution temperature of 112°F.
         d. An OPERABLE boric acid transfer pump for recirculation.

Basis

The Chemical and Volume Control System provides control of the Reactor Coolant System boron inventory. This is normally accomplished by using boric acid transfer pumps which discharge to the suction of each unit's charging pumps. The Chemical and Volume Control System contains four boric acid transfer pumps. Two of these pumps are normally assigned to each unit but, valving and piping arrangements allow pumps to be shared such that three out of four pumps can service either unit. An alternate (not normally used) method of boration is to use the charging pumps taking suction directly from the refueling water storage tank. There are two sources of borated water available to the suction of the charging pumps through two different paths; one from the refueling water storage tank and one from the discharge of the boric acid transfer pumps.

A. The boric acid transfer pumps can deliver the boric acid tank contents (7.0% solution of boric acid) to the charging pumps.

B. The charging pumps can take suction from the volume control tank, the boric acid transfer pumps and the refueling water storage tank. Reference is made to Technical Specification 3.3.

The quantity of boric acid in storage from either the boric acid tanks or the refueling water storage tank is sufficient to borate the reactor coolant in order to reach COLD SHUTDOWN at any time during core life.

Approximately 6000 gallons of the 7.0% solution of boric acid are required to meet COLD SHUTDOWN conditions. Thus, a minimum of 6000 gallons in the boric acid tank is specified. An upper concentration limit of 8.5% boric acid in the tank is specified to maintain solution solubility at the specified low temperature limit of 112 degrees F.

The Boric Acid Tank(s) are supplied with level alarms which would annunciate if a leak in the system occurred.

1. 026A1.01 002/T2G2/T2G1/CONTAINMENT SPRAY/3.9/4.2/B/SR02301/C/RLM

Which ONE of the following variables does NOT affect the Containment Spray System's ~~capacity~~ to depressurize the containment in the event of a Design Basis Accident (DBA)?

ABILITY

A. Containment temperature
B. Component Cooling Water temperature
C. RWST temperature
D. Containment pressure

Ref: Surry EB#72970
Lesson Plan ND-91-LP-5D

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B D A B B C D D A C Scramble Range: A - D

C. State the Technical Specifications associated with the Containment Spray System, including for SRO candidates only, the basis for these specifications.

D. Using a simplified one-line diagram, explain the operations of the Containment Spray System, including initiation signals, interlocks, instrumentation available, and Technical Specification limitations.

Presentation

Distribute all handouts. Refer to/display H/T-5.1, Objectives, and discuss with trainees.

A. Consequence Limiting Safeguard System

1. Purpose

a. The purpose of the CLS System is to provide containment isolation and depressurization in order to limit the release of radioactive material to the atmosphere in the event of an accident.

b. This purpose is accomplished by:

(1) Partial containment isolation (Phase II) and Safety Injection initiation backup signal when containment pressure reaches 17.7 psia (3 psig) (HI CLS).

(2) Containment Spray initiation and complete containment isolation (Phase III) when containment pressure reaches 23 psia (8.3 psig) (HI-HI CLS).

22

1. 027AK3.01 001

-A Natural Circ cooldown is in progress in accordance with ES-0.2 Natural Circulation Cooldown.

-An RCS cooldown and depressurization is in progress.

Which one of the following describes the reason for maintaining pressure within the limits of Attacment 2 "Natural Circulation Cooldown with Two or More CRDM Fans in Operation"?

A. This curve maintains RCS temperature and pressure limits to prevent upper head voiding.
B. This curve is designed to prevent DNB limits from being exceeded.
C. This curve maintains RCS pressure at an accepatable value to allow a restart of an RCP.
D. This curve is designed to maintain the RCS at a temperature and pressure to prevent an SI.

Note: Changed K/A from AK301 to AK303.
Surry Lesson Plan ND-95.3-LP-5 objective B.

A. Correct, IAW the lesson plan This curve reprsents the RCS pressure/temperature limits to prevent upper head voiding during a NC cooldown.

B. Incorrect, the curve is designed to limit upper head voiding.

C. Incorrect, the curve is designed to limit upper head voiding.

D. Incorrect, the curve is designed to limit upper head voiding.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:			Scramble Range: A - D
RO Tier:	T1G1		SRO Tier:	T1G2		
Keyword:			Cog Level:	M 3.5/3.8		
Source:	N		Exam:	SR02301		
Test:	C		Misc:	GWL		

Objectives

After receiving this instruction, the trainee will be able to:

A. Given the major action categories associated with ES-0.2, Natural Circulation Cooldown, explain the purpose of ES-0.2, the transition criteria for entering and exiting ES-0.2 and the types of operator actions that will occur within each category.

B. Given a copy of ES-0.2, Natural Circulation Cooldown, explain the basis of each procedural step.

C. [Given actual or simulated plant conditions requiring implementation of ES-0.2, Natural Circulation Cooldown, successfully transition through the procedure, applying step background knowledge as required, to safely bring the plant to a cold shutdown condition. SOER 81-04, Recommendation 1]

Presentation

Distribute all handouts. Refer to/display H/T-5.1, Objectives, and review with trainees.

A. Major Actions of ES-0.2

1. Purpose of ES-0.2

To provide guidance for operations personnel to perform a natural circulation RCS cooldown and depressurization with no accident in progress. This restricted cooldown and depressurization is designed to progress without causing upper head void formation.

b. Previous steps checked RCS temperature less than 550°F in the hot legs. Under NC conditions, the low T_{avg} interlock is expected to be clear.

(1) In the event that T_{avg} lags the RCS temperature, the team continues with step 9 while the cooldown in progress reduces temperature until 2/3 low Tave annunciators are lit.

(2) Once 2/3 protection loops indicate below 543°F (by checking annunciators lit), SI can then be blocked in Step 8 b) and c).

10. **STEP 9: DEPRESSURIZE RCS TO 1950 PSIG.**

a. The purpose of this step is to depressurize the RCS to 50 psig less than the pressure at which SI can be blocked.

b. RCS pressure must be reduced below the pressure at which SI normally unblocks to permit blocking of SI circuitry.

c. Depressurization should be accomplished through the use of Aux Spray if letdown is in service.

(1) With letdown flow to preheat charging, thermal shock to the Aux Spray nozzle will be minimized.

(2) If letdown is not in service or cannot be established, a Pzr PORV should be used to reduce pressure, then the team goes on to Step 10.

d. The pressurizer heaters should be turned off as necessary to assist in depressurizing. It is expected that the heaters will be controlled as necessary to maintain RCS pressure as directed in subsequent steps.

a. The purpose of this step is to initiate depressurization of the RCS while maintaining the required subcooling.

b. The pressure decreases should be performed to maintain pressure/temperature under the cooldown curve (within the limits of Attachment 2).

c. This curve represents the RCS pressure/temperature limits to prevent upper head voiding during NC with CRDM fans running, including allowance for normal channel accuracy.

(1) The CRDM fans provide the necessary upper head cooling to prevent void formation during cooldown with only 50°F of subcooling. While all CRDM fans may be available, only two are required to meet the upper head cooling specifications.

(2) The total upper head C/D rate due to both the NC cooldown rate and operation of CRDM fans varies from 31°F/hr initially to about 21°F/hr when the upper head reaches 350°F.

(a) An NC cooldown rate of 25°F/hr gives an upper head cooldown rate of 10°F/hr.

(b) CRDM fans give an upper head cooldown rate from 21°F/hr at 600°F to 11°F/hr at 350°F.

c. If <2 CRDM fans are running, the cooldown rate is restricted to less than 10°F/hr and the RCS must be maintained within limits of Attachment 3.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: If at any time a natural circulation cooldown and depressurization must be done at a rate that may form a steam void in the Rx vessel, 1-ES-0.3, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN RX VESSEL, or 1-ES-0.4, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN RX VESSEL (W/O RVLIS), should be used.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	__CONTINUE RCS COOLDOWN AND DEPRESSURIZATION:	
	a) Check CRDM Fans - 2 OR MORE RUNNING DURING COOLDOWN FROM 550°F	a) Do the following: 1) Maintain cooldown rate in RCS cold legs less than 10°F/hr. 2) Depressurize RCS to maintain limits of Attachment 3. 3) GO TO Step 15.
	b) Maintain cooldown rate in RCS cold legs - LESS THAN 25°F/HR	
	c) Depressurize RCS to maintain limits of Attachment 2	

*KA 000027K303
*QUESTION
While conducting a cooldown in accordance with EOS-0.2A,"Natural Circulation Cooldown", you have reached step 13 and are initiating RCS depressurization. WHAT is the proceedural method of depressurizing the RCS for the given conditions?

a. If letdown is in service, use one PRZR PORV.

b. If letdown is in service, use auxiliary spray.

c. If auxiliary spray is not available, use CRDM fans and ambient cooling.

d. If a PRZR PORV is not available, use CRDM fans and ambient cooling.

*ANSWER
b.
*REFERENCE
EOS-0.2A p. 10
[3.7/4.1]

DOES NOT ACTUALLY MEET THE K/A!!

(NEEDED TO BE A REASON FOR)

1. 028AK2.03 001

The Pressurizer Backup heaters have automatically energized.

Which one of the following could cause this action?

A. Pressurizer Level Controller 1-RC-LC-~~1~~459 fails to 100%.

B. Pressurizer Pressure Master Controller output fails to 100%.

C. Pressurizer Level deviation falling to 5% less than program.

D. 1-RC-PT-~~1~~455 failing low.

Modified from Farley Exam bank question.
Ref: Surry Lesson Plans ND-93.3-LP-7 Objectives B and D. and ND-93.3-LP-5.

A. Correct, If the Pressurizer Level master controller output fails high, charging flow will increase and level will rise to > 5% above program and the pressurizer B/U heaters will energize.

B. Incorrect, If the pressurizer master controller fails to 0%, the system would react as if pressure was high, this would de-energize the B/U heaters.

C. Pressurizer level deviation low does not energize the B/U heaters.

D. PT-455 has no input for controlling the pressurizer B/U heaters.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: A C A B A D B A C A Scramble Range: A - D

RO Tier:	T1G3	SRO Tier:	T1G3
Keyword:		Cog Level:	C/A 2.6/2.9
Source:	M	Exam:	SR02301
Test:	C	Misc:	GWL

LESSON PLAN

Introduction

The liquid level of the pressurizer must be carefully controlled and monitored in order to provide the correct liquid-to-vapor ratio for proper pressure control during normal and transient plant operations. Improper control of pressurizer level can result in damage to pressurizer heaters, stuck open pressurizer safeties, and/or unstable RCS pressure control. The role of the operator is to verify proper system operations and to take manual level control during a system malfunction. This lesson will present an introduction to the Pressurizer Level Control System, discuss the pressurizer level program, and present a one-line diagram for system operations.

Objectives

After receiving this instruction, the trainee will be able to:

A. Explain the generation of the Pressurizer Water Level Program Setpoints, including the HZP and HFP values.

B. Reproducing a one-line diagram from memory, explain the operation, including interrelationships, of the Pressurizer Level Control circuitry components.

C. Summarize the operator actions necessary to mitigate the consequences of a failure of a pressurizer level channel, including the effects on the RCS if <u>NO</u> actions are taken.

D. Using a one-line diagram for explanatory purposes, explain the integrated operation of the Pressurizer Level Control System, including level program parameters and control circuitry components.

PRESSURE CONTROL SETPOINTS

PT-445 Pressurizer Pressure Control

PSIG	Function
2335	PCV-1456 PORV Operation
2310	High Pressure Alarm
2205 (2210 - Unit 2)	Low Pressure Alarm

PT-444 Master Controller Output Pressure Control

% Controller Output	* Ref. Pressure, psig*	Function
75	2335	PCV-1455C PORV Operation
68.75	2310	High Pressure Alarm
67.5	2305	Spray Valves Open
55	2255	Spray Valves Start Open
53.75	2250	Proportional Heaters Off
50	2235	NOP
46.25	2220	Proportional Heaters Full On
43.8	2210	Backup Heaters On/Off

* The numbers listed in this column are not actual pressures, but a relative signal of a comparator using a pressure reference setpoint signal of 2235% of controller output.

Write the following on the blackboard:

$2500 - 1700 = 800$ $\qquad$ $2235 - 1700 = 535$

$$\frac{535}{800} x \frac{X}{10}$$ $\qquad$ x = pot setting = 6.68

4. After the setpoint is set on the controller, 0 to 100% output on the controller corresponds to a 400# band (+ or - 200# from setpoint).

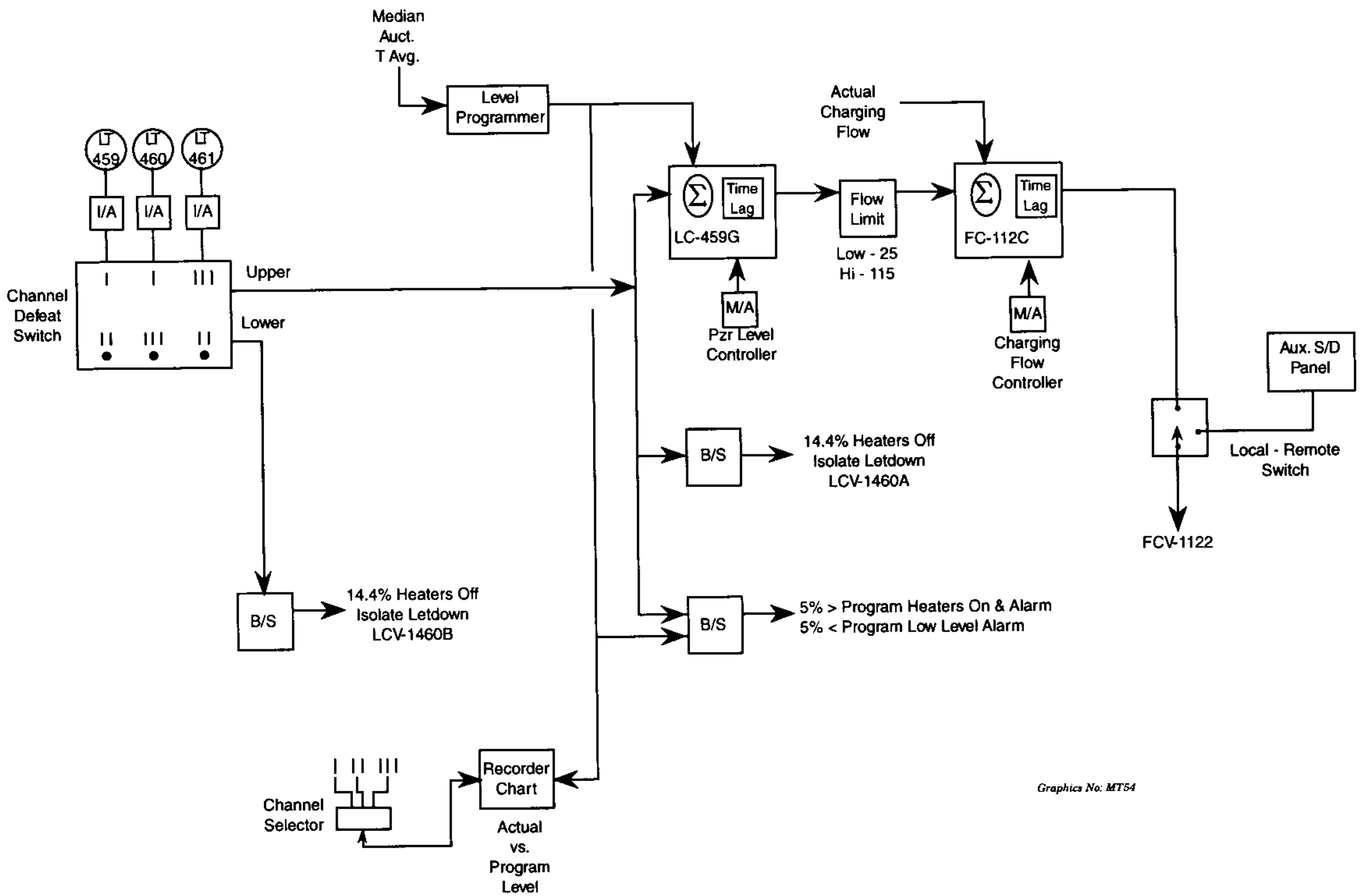
5. The Master Controller compares the input signal from PT-444 against the reference setpoint. The output of the controller, representing the pressure error, is used for the following:

   a. Input to selectable recorder PR-444

   b. Input to pressure comparator for CONTROLLER HIGH OUTPUT ALARM (C-A-8) when the pressure rises to a controller output signal of 68.75%.

   c. Input to an amplifier and converter which modifies the signal and applies it to the proportional heater controller unit (Robicon Unit) for controlling proportional heater output.

   d. Input to pressure comparator for controlling B/U heaters on/off (B/U heaters normally operated in the "on" position).



Graphics No: MT54

PZR LEVEL CONTROL

O52201H07014;

CAUTION: THIS QUESTION IS **NOT** RELATED TO THE STATIC SIMULATOR CONDITIONS.

The pressurizer backup heaters have automatically energized. Which of the following could cause this action: (Circle the correct response.)

A. Pressurizer master pressure controller m/a station failed to 100%.

B. Pressurizer level deviation falling to less than 5% above program.

C. Pressurizer master controller M/A station failed to 0%.

D. PT-445 failing low.

ANSWER: A
PNTS: 1.0 ANSWER TIME: 3.0 Mins. PART A
QUESTION LEVEL: 100
Static Sim Scenario Nos. ___ ___ ___ ___ ___ ___ ___
S&K No. 240208020050 241008020050 241008020055
K/A No. 000027A205 __________ __________
RO/SRO Impf. 3.2 /3.3 ___/___ ___/___
Objectives: O52201H25 O52520Q01 O52201H07
References: O52201H, PRZR Pressure & Level Control
Rev. Date: 10/14/97
AUTH:
TYPE: C

24

1. 029A3.01 001/T2G2/T2G2/PURGE ISOLATION/3.8/4.0/N/SR02301/C/RLM

Unit 1 is in Mode 6, with fuel movement in progress.
Refueling Shutdown.

Which ONE of the following will trip the Containment Purge Supply fans and isolate containment isolation MOV's VS-100A, B, C&D?

A. Process Vent Particulate and Gas monitor (GW-RI-101/102) alarm.
B. Containment particulate and gas monitor (RM-RI-159/160) alarm
C. Actuation High Flux at Shutdown alarm
D. Vent-vent particulate and gas - 1 detector for each (VG-RI-109/110) alarm

Ref: Surry Lesson Plans ND-88.4-LP-6 Rev. 4, Objective D
Answer B is correct based on ND-88.4-LP-6 Rev. 4, p. 8 and ND-93.5-LP-1, Handout ND-93.5-H/T-1.9.
Answers A, C and D are other rad monitors from ND-93.5-LP-1 that have no interactions with Containment purge.

MCS	Time:	1	Points:	1.00	Version:	0 1 2 3 4 5 6 7 8 9	
					Answer:	B A B A C A C A C C	Scramble Range: A - D

LESSON PLAN

Introduction

The Containment Ventilation System is designed to maintain the containment temperature within specific limits for equipment operation and personnel habitability, and to ensure the containment remains within the design pressure limits during the design basis accident. This lesson will provide the trainee with the information necessary to properly operate each of the Containment Ventilation Systems and to ensure the containment temperature is maintained within the limits assumed in the UFSAR.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the Containment Air recirculation System, including flowpaths, capacities, power supplies and trip signals.

B. Describe the operation of the control rod drive mechanism cooling system, including flowpaths, capacities, and power supplies.

C. Describe the purpose and operation of the iodine filtration system.

D. Describe the operation of the Containment Purge System, including the purpose, flowpaths, and trip signals.

E. Explain the Technical Specifications associated with the Containment Ventilation System, including for SRO candidates, the basis behind these specifications.

RADIATION MONITOR AUTOMATIC FUNCTIONS

RADIATION MONITOR	AUTOMATIC FUNCTION
1. Process Vent Particulate and Gas (Kaman & Victoreen)	1. a. Shuts FCV-GW-160 & 260 b. Shuts FCV-GW-101
2. Component Cooling Water	2. Shuts CC Surge Tank Vent Valve
3. Condenser Air Ejector	3. a. Opens TV-SV-102 b. Shuts TV-SV-103
4. Containment Particulate and Gas RM-RI-159/160	4. a. Trips affected unit's purge supply fans b. Shuts MOV-VS-100A,B,C&D c. Shuts inside suction valves for containment instr. air compressor
5. Manipulator Crane RM-RI-162	5. Same as Cont. Part & Gas

4. The exhaust air is drawn from containment and discharges through two motor operated butterfly valves connected to the safety-related charcoal filter trains through two isolation dampers installed in series. The outer containment exhaust valve has an 8-inch bypass valve to permit reduced purge flow if required. The exhaust air is drawn from the containment across the charcoal filter by the 58A or B fan and discharged to the ventilation stack.

5. System valves

   a. An 18-inch vacuum breaker valve is installed on the outside of the containment structure between the supply system penetration valves to bring the containment up to atmospheric pressure after unit shutdown.

   b. Motor operated butterfly valves are located on either side of the containment penetrations for containment integrity.

   c. The two isolation trip dampers in series are air operated and are designed to fail in the closed position on loss of air. The air is supplied from either station instrument air system or an air accumulator sized to store sufficient air to keep the dampers open for two hours on loss of normal air.

6. **A high radiation signal on the containment particulate and gas radiation monitor or the manipulator crane radiation monitor will trip the purge supply fans and close the (4) butterfly containment isolation MOVs. This is to prevent releasing activity to the atmosphere.**

7. A safety injection signal will trip the purge supply fans and shut the isolation valves and the dampers to the auxiliary ventilation system to cool the SI components and process the air from the SI components.

1. 032AK2.01 001

-Unit 2 is stable at the POAH with Physics testing in progress.
-PR channel N44 is in trip with the reactivity recorder installed .
-A fault occurs that results in a loss of Vital bus I.

Which one of the following describes the the effect on the Unit?

A. SR channel N31 will reenergize and N32 will remain deenergized ~~due to the loss of VB I.~~

B. SR channels N31 and N32 will remain deenergized ~~since the 2/2 permissive cannot be met due to the loss of power to N36.~~

C. SR channel N 32 will remain deenergergized ~~due to the P-10 interlock~~, N31 will have no power ~~due to the loss of VB I..~~

D. SR channel N31 will remain deenergized ~~due to the P-10 interlock~~, N32 will reenergize.

Surry Exam Bank question # 1592, Modified
Surry Lesson Plan. ND-90.3-LP-5: ND-93.2-LP-2

A. Incorrect, SR channel N31 will not reenergize.

B. Incorrect, SR channels N31 and N32 will remain deenergized but not for the reason listed.

C. Correct, SR channel N32 will remain deenergized due to P-10, and N31 will remain deenergized due to the loss of the vital bus.

D. Inncorrect, SR channel N31 has no power, and N32 will not reenergize.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: C A C B D D B D B A Scramble Range: A - D

RO Tier: T1G2
Keyword:
Source: M
Test: C

SRO Tier: T1G2
Cog Level: C/A 2.7/3.1
Exam: SR02301
Misc: GWL

LESSON PLAN

Introduction

The Source Range Nuclear Instrumentation System can be thought of as a low power "nuclear watchdog." It provides the operator with visual indication of neutron count rate, audible indication of neutron count rate in both the control room and containment, high count rate alarms in both the control room and containment, and lastly, it provides a reactor trip if neutron counts rise too high during a startup. By understanding the operation of this reactor "watchdog", the operator's awareness of core neutron activity will be enhanced.

Objectives

After receiving this instruction, the trainee will be able to:

A. Explain the construction and operation of a source range proportional detector.

B. Describe the outputs from the source range detector circuitry.

C. Explain the operation of the source range detection system during both normal and abnormal operating conditions.

D. Explain the operation of the source range nuclear instrumentation system including detector operation, logic and output signals, and audio count rate requirements.

B. [Describe the components and indications associated with an Uninterruptable Power Supply (UPS). <u>SOER 83-03, Recommendation 11</u>]

C. Describe the power sources and loads associated with the Appendix R distribution system.

D. Describe the power sources and loads associated with the Semi-Vital Bus distribution system.

E. [Given a loss of a Vital or Semi-Vital bus, describe the actions taken IAW AP-10.01, 10.02, 10.03, 10.04, and/or 10.05 to address this loss. <u>SOER 83-03, Recommendation 11 and SOER 81-02, Recommendation 5</u>]

F. Given a loss of a Vital or Semi-Vital bus, describe the effect on Plant indications and controls, including actions taken IAW applicable APs to address the loss.

<u>Presentation</u>

Distribute all handouts. Refer to/display H/T-5.1, Objectives, and review with trainees.

A. One-Line Diagram

1. The purpose of the Vital Bus Distribution System is to supply a stable, reliable source of power to vital instruments. It must remain uninterrupted to prevent spurious shutdowns and guarantee proper action when instruments or controls are required.

EXAMINATION ANSWER KEY

RO/SRO Exam Bank

1592 **ID: NIS0087** **Points: 1.00**

Unit 2 is stable at the POAH with physics testing in progress. The following conditions exist:

- PR Channel N-44 is in trip with the reactivity recorder installed.
- A fault occurs in the 1B1 UPS that causes the loss of Vital Bus II and IIA

Which ONE of the following describes the effect of the SR indications on the subsequent reactor trip and why?

A. SR Channel N32 will reenergize and N31 will remain deenergized due to the loss of VB II and IIA.

B. SR Channel N31 will reenergize and N32 will remain deenergized due to the loss of VB II and IIA.

C. SR Channel N31 and N32 will remain deenergized since the 2/2 permissive cannot be met due to the loss of power to N36.

D. N31 will remain deenergized due to the P-10 interlock, N32 will have no power due to the loss of VB II and IIA.

Answer: D

Question 1592 Details

Question Type:	Multiple Choice
Topic:	NIS0087
System ID:	74418
User ID:	NIS0087
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-93.2-LP-4B; AP-10.02, AP-4.00 [S99-0176]

QUESTIONS REPORT
for Surry2002

24/

1. 033K1.05 001/T2G2/T2G2/RWST/C/A 2.7/2.8/N/SR02301/C/RLM

The following are conditions for Unit 1:
-100% power
-No abnormal alarms are indicated in the control room
-Maintenance activities are in progress on the Fire Protection System in the Auxiliary Bldg.
-The Spent Fuel Pit purification system has been returned to purification alignment on the Spent Fuel Pit from the RWST
-The Aux Bldg Operator reports that the Spent Fuel Pit level has decreased 2 inches from his previous reading
-A check of the Component Cooling Water Surge Tank level indicates that the level has decreased slightly since the last log reading.

Which ONE of the following is the ~~most probable~~ cause of the decrease in the Spent FUEL Pit level?

A. Improper alignment associated ~~the~~ with the maintenance activities on the Fire Protection system.
B. Improper alignment of the Spent Fuel Pit purification system.
C. Leakage between the Component Cooling Water system and the Spent Fuel Pit Cooling system.
D. A seal failure on the ~~off service~~ non-running Spent Fuel Pit Cooling Water pump.

Ref: Surry lesson plan ND-92.5-LP-6, objective D
Answer A is incorect because the fire mains system is a makeup source
Answer C is incorrect because spent fuel pit water leaks into the CCW system
Answer D is incorrect because the stem of the question state no abnormal alarms, which includes sump alarms, are illuminated.
Answer B is correct because an improper alignment of the purification system can pump water from the SFP to the RWST.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	B B C C B A A B C A	Scramble Range: A - D

LESSON PLAN

Introduction

The Spent Fuel Pit and its support systems keep the deadly spent fuel in a safe condition while it is decaying. The operator must know what equipment is involved to keep the radioactive spent fuel from becoming a danger to himself and the general public. The SFP and Reactor Cavity Purification systems minimize radioactivity and maximize water clarity. This lesson will cover this equipment.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the purpose and construction of the Nuclear Fuel Storage Facility.

B. Describe the Spent Fuel Pit Cooling, Purification and Skimmer System.

C. Describe the function and operation of the Reactor Cavity Purification System.

D. Describe the Spent Fuel Pit and Support Systems.

g. The fuel pit ion exchanger and filter may be used for purification of either unit's refueling water storage tank. Fuel pit purification must be secured to make this lineup. The flow path is from the RWST recirc pump, through 1(2)-FC-73 and 74, through 1-FC-I-1 and 1-FC-FL-2, and back to the RWST via a lineup off the same unit's blender.

h. The system is normally lined up to clean fuel pit water. Only one pump should be running at any one time because of design flow limits on the ion exchanger and filter.

3. Fuel Pit Skimmer

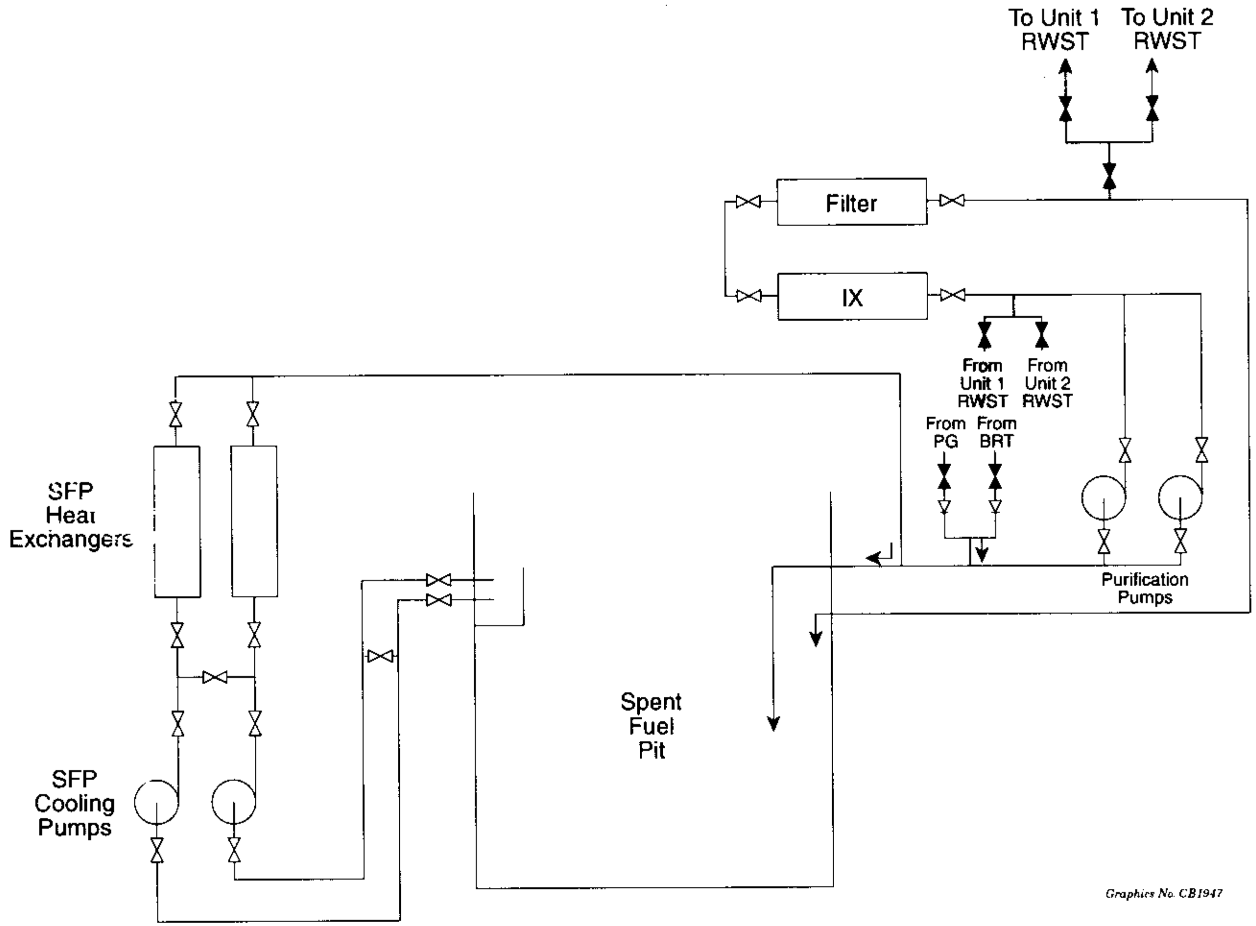
Refer to/display H/T-6.5, SFP Skimmer System, and use with the following information.

a. The Fuel Pit Skimmer is designed to remove floating debris from the SFP to improve visibility.

b. The system consists of two pumps, two suctions, two filters, and a common return line. Again, suction is from the west end of the pit, and return is into the east end. Each pump takes a suction on the surface of the pit water via an adjustable-height pot and discharges through a filter to the common return line. There is no cross-connect capability between pumps and filters.

c. The skimmer pumps (1-FC-P-3A & B) are full-size horizontal 10 gpm pumps driven by 480v AC motors. The pumps are powered from MCC-1B1 and 2B1 in the Fuel Building. They are located in the Fuel Building basement above the piping tunnel.

d. The filters (1-FC-FL-1A, B) are loaded with replaceable cartridge filter elements. They retain particles greater than ten microns in size.



SFP COOLING AND PURIFICATION

1. 034G2.1.27 001/T2G3/T2G2/UPENDER/M 2.8/2.9/N/SR02301/C/RLM

What is the purpose of the Micro-Computer Programmable Limit Switch?

A. To control the speed and stopping positions of the New Fuel Elevator.
B. To control the speed and stopping positions of the Manipulator Crane Hoist.
✓C. To control the speed and stopping positions of the Upender.
D. To control the speed and stopping positions of the ~~Fuel Transfer Conveyer Car~~ Spent Fuel Pool Crane Aux hoist.
Surry lesson plan: ND-92.5-LP-4, objective A & B
ND-92.5-LP-4, p.9

MCS	Time: 1	Points: 1.00	Version: 0 1 2 3 4 5 6 7 8 9		
			Answer: C		Scramble Range: A - D
RO Tier:	T2G3		SRO Tier:	T2G2	
Keyword:	UPENDER		Cog Level:	M 2.8/2.9	
Source:	N		Exam:	SR02301	
Test:	C		Misc:	RLM	

LESSON PLAN

Introduction

The reactor is refueled with equipment which handles spent fuel underwater from the time it leaves the reactor vessel until it is placed in a spent fuel storage rack in the spent fuel pit. Underwater transfer of spent fuel provides an economic and transparent radiation shield, as well as a reliable coolant for the removal of decay heat. The Fuel Transfer System is divided into two (2) areas: The reactor or containment side and Fuel Building side which is external to the reactor containment and is always accessible to plant personnel. The two areas are connected by a fuel transfer tube which carries the fuel through an opening in the reactor containment. Spent fuel is removed from the reactor vessel by a manipulator crane and placed in the Fuel Transfer System. In the spent fuel pool, the fuel is removed from the transfer system and placed in the spent fuel racks.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the construction and operation of the following fuel transfer equipment:

- Fuel transfer tube from the containment to the Spent Fuel Building
- Fuel transfer conveyer car and drive mechanism.
- Refueling upenders
- New fuel elevator

B. Describe the Fuel Transfer Control System including safety related interlocks.

C. Outline the steps in transfer of a fuel assembly using the Fuel Transfer System, including the precautions and limitations associated with the Fuel Transfer System.

12. The spent fuel pit panel has two unique features, one is the power on lighted pushbutton, and the other is the conveyer control on/off switch which controls the winch motors for the conveyer drive.

13. The features that are the same on both panels are as follows:

    a. Conveyer at pit light (red in containment and green on spent fuel pit panel).

    b. Frame jog/run selector switch which selects speed of the upender.

    c. Frame up pushbutton and indicating light (red).

    d. Frame down pushbutton and indicating light (green).

    e. Frame stop pushbutton.

    f. Conveyer interlock bypass switch (prevents upender movement if conveyer car is not at end of its full length of travel).

14. Micro-Computer Programmable Limit Switch

Refer to/display H/T-4.6 Upender Gear Limit Program Panel.

The upender is equipped with a Programmable Limit Switch (PLS) on both the containment side and spent fuel pit side. The P.L.S. controls the speed of the upender and the stopping of the upender by counting the number of revolutions the upender gear makes. At pre-programmed limits, the upender will speed up, slow down, stop, and emergency stop on an overtravel. A digital display provides the operator with indication of the number of revolutions.

    a. The P.L.S. has 5 gear limits

QUESTIONS REPORT
for Surry2002

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1. 035A1.01 001/T2G2/T2G2/S/G LEVEL/C/A 3.6/3.8/N/SR02301/C/RLM

With the plant operating at 65% power, a significant leak develops in the reference leg of the channel 3 level detector for "B" S/G.

Which ONE of the following describes the effects on the ~~affected~~ "B" steam generator, if NO operator action is taken?

A. Indicated steam generator level will decrease on the affected channel.
B. Feed regulating valve will close for the "B" S/G.
C. Level will equalize at some value significantly higher than original for the "B" S/G.
D. Steam flow will initially be lower than feed flow for the "B" S/G.

ND-93.3-LP-8, objective D

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B D D D D C A C C B Scramble Range: A - D

LESSON PLAN

Introduction

The Steam Generator Water Level Control System (SGWLC) is used to maintain water level in the steam generators. This water level is vital for maintaining a secondary heat sink for the Reactor Coolant System. Proper control of SG level is necessary for staying within the bounds of the safety analysis. Automatic level control will maintain these program limits. The operator's function is to verify proper operation and to take control of the system should any malfunction in automatic control occur. This lesson will provide the necessary system details to enhance operator understanding and operation. Also covered are the automatic functions and alarms provided by the SG level instrumentation.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the values of the SG level program, including the design considerations for the levels.

B. Reproducing from memory a simplified one-line diagram for illustration purposes, explain the operation of the SGWLC system.

C. Describe the protective functions provided by the SG level instruments.

D. Describe the effects and required operator actions for a failure of an input to the SGWLC System.

E. Using a simplified one-line diagram drawn from memory, explain the operation of the Steam Generator Water Level Control System, including its purpose, level program design, and protective actions.

1) This is because the circuitry now sees a high steam pressure, therefore a higher density of steam. With a higher steam density and the same volumetric flow rate from the FT, a higher mass flow rate would be indicated.

2) This will produce a FF/SF error signal with SF being > FF, causing the FRV to open.

3) The operator will have to take manual control of the FRV and adjust FF as required. The unaffected SF channel should be selected and the FRV returned to AUTO.

(b) Low failure of the pressure input to density compensation will result in the associated steam line flow for that channel going low.

1) This will produce a FF/SF error signal with SF being < FF, causing the FRV to close.

2) The operator will have to take manual control of the FRV and adjust FF as required. The unaffected SF channel should be selected and the FRV returned to AUTO.

4. S/G Level Channel Failure

a. Only channel 3 provides input to the SGWLC system. A failure of either channel 1 or 2 has no effect on SGWLC.

b. Channel 3 S/G water level fails high.

(1) This produces an error signal in the level comparator causing the FRV to close.

(2) The operator must take manual control of the FRV and control FF as required.

(3) S/G level input is not selectable, therefore the FRV must remain in manual until the level channel is repaired.

c. Channel 3 S/G water level fails low.

(1) This produces an error signal in the level comparator causing the FRV to open.

(2) The operator must take manual control of the FRV and control FF as required.

(3) S/G level input is not selectable, therefore the FRV must remain in manual until the level channel is repaired.

5. P_{imp} Channel Failure

a. Selected channel fails high

(1) If turbine power was > 20% prior to the failure, there will be no effect since S/G level was already at maximum program level.

(2) If turbine power was < 20% and the FRV was in automatic, the FRV will throttle open to increase S/G level to 44%.

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1. 038EK3.02 001/T1G2/T1G2/SECONDARY PORV/4.4/4.5/N/SR02301/C/RLM

A safety injection has occurred due to a tube rupture in the 1A Steam Generator (SG). Steam Dumps failed to actuate. Pressure for each SG has stabilized at 1020 psig. The 1B and 1C SG PORV's have modulated closed, but the 1A SG PORV appears to be cycling.

In accordance with 1-E-3, which ONE of the following is the next required action and the reason for the action?

A. Raise the pressure controller setpoint until the 1A SG PORV closes, because the PORV is a radioactive release point.
B. Locally isolate the 1A SG PORV, because pressure in the ruptured SG should be maintained greater than the pressure in the intact SG's.
C. Place the pressure controller in MANUAL and close the PORV, because pressure in the ruptured SG should be maintained greater than the pressure in the intact SG's.
D. Locally isolate the 1A SG PORV, because the PORV is a radioactive release point.

Ref: Surry procedure 1-E-3
WOG background for E-3, p.57
Surry LP ND.95.3-LP-13, objective C

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: C C C C B B D B B B Scramble Range: A - D

C. **Given actual or simulated plant conditions requiring the implementation of E-3, Steam Generator Tube Rupture, successfully transition through the procedure, applying step background knowledge as required, to safely place the plant in the required optimal recovery condition.**

Presentation

Distribute all handouts. Refer to/display H/T-13.1, Objectives, and review with trainees.

A. Major Actions of E-3, Steam Generator Tube Rupture

1. Purpose

a. E-3 provides the guidance to terminate leakage of reactor coolant into the secondary system following a SG tube rupture.

b. Included in this purpose are guidelines to safely C/D & depressurize the RCS, thereby reducing SG inleakage and minimize the possibility of an overfilled, ruptured SG safety valve relieving to the atmosphere.

c. Many plants have had to deal with a SGTR. These include:

- Point Beach Unit #1 (Feb, 1975) @ 125 gpm;
- Surry Unit #2 (Sept, 1976) @ 80 gpm;
- Prairie Island Unit #1 (Oct, 1979) @ 390 gpm;
- Ginna (Jan, 1982) @ 630 gpm; and
- North Anna #1 (Jul, 1987) @ 550 - 637 gpm

3. Major Action Categories

Refer to/display H/T-13.2, Major Action Categories.

a. <u>**IDENTIFY RUPTURED SG(s).**</u>

(1) SGs with failed tubes are identified by various symptoms, i.e., high activity, abnormal SG level increases and steam flow/feed flow mismatch. These symptoms tell the team what SG(s) to isolate. If necessary, the team should initiate sampling operations to aid in identifying the affected SG.

(2) If the affected SG cannot be immediately identified, the team is directed to continue with other steps to evaluate plant status. These steps include monitoring RCP trip criteria, checking for multiple failures such as secondary breaks, adjusting feed flow to control SG inventory, and establishing IA and power supplies as necessary.

Ask: What parameters are monitored for high activity to identify a ruptured steam generator? Answer: Air ejector discharge, blowdown, main steam lines, FW-P-2 exhaust, and generator liquid activity by sampling.

b. <u>**ISOLATE RUPTURED SG(s).**</u>

(1) Isolation of the ruptured SG is vital to successful completion of E-3. This isolation acts to limit radiological releases and is necessary to stop primary-to-secondary leakage.

STEP: Isolate Flow From Ruptured SG(s)

PURPOSE:
- o To isolate flow from the ruptured steam generators to minimize radiological releases.
- o To maintain pressure in the ruptured steam generators greater than the pressure in at least one intact steam generator following cooldown of the RCS in subsequent steps.

BASIS:

Isolation of the ruptured steam generator(s) effectively minimizes release of radioactivity from this generator. In addition, isolation is necessary to establish a pressure differential between the ruptured and non-ruptured steam generators in order to cool the RCS and stop primary-to-secondary leakage. This can be demonstrated by considering steady state energy transfer from the RCS to the steam generators simply expressed as:

$$Q_{RCS} = UA_I\ (T_{RCS} - T_{SGI}) + UA_R\ (T_{RCS} - T_{SGR})$$

where
Q_{RCS} = Heat generation rate in the primary system
UA = Total convective heat transfer coefficient
T_{RCS} = Average RCS temperature

SUB I = refers to intact steam generator
SUB R = refers to ruptured steam generator

Assuming that the steam generators are at saturation conditions:

$$Q_{RCS} = UA_I\ [T_{RCS} - T_{SAT}\ (PSG_I)] + UA_R\ [T_{RCS} - T_{SAT}\ (PSG_R)]$$

where
$T_{SAT}(P)$ = Saturation temperature at pressure, P
PSG = Steam generator pressure.

The amount of subcooling in the primary system is expressed as

$$T_{sub} = T_{SAT}\ (P_{RCS}) - T_{HOT}.$$

In order to stop primary-to-secondary leakage, the primary pressure must be reduced to a value equal to that of the ruptured steam generator. In that case:

$$P_{RCS} = PSG_R$$
$$T_{sub} = T_{SAT}\ (PSG_R) - (T_{RCS} + \Delta T/2)$$

where ΔT = core temperature rise.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: • If the TD AFW pump is the only available source of feed flow, steam supply to the TD AFW pump must be maintained from at least one SG.

• At least one SG must be maintained available for RCS cooldown.

* *

3. __ISOLATE RUPTURED SG(s):

a) Adjust ruptured SG PORV controller setpoint to 1035 psig

b) Check ruptured SG(s) PORV - CLOSED

b) WHEN ruptured SG pressure less than 1035 psig, THEN verify SG PORV closed.

IF PORV does NOT close, THEN put PORV controller in MANUAL AND close PORV.

IF PORV can NOT be closed, THEN locally isolate.

c) Verify blowdown TVs from ruptured SG(s) - CLOSED

c) Manually close valves.

d) Locally close steam supply valve(s) to TD AFW pump:

- 1-MS-87 for SG A
- 1-MS-120 for SG B
- 1-MS-158 for SG C

d) IF at least one MD AFW pump running, THEN locally isolate TD AFW pump:

- Close 1-MS-196.

OR

- Trip the Overspeed Trip valve.

(STEP 3 CONTINUED ON NEXT PAGE)

3º

1. 039A4.04 001/T2G2/T2G2/TDAFW PUMP/C/A 3.8/3.9/B/SR02301/C/RLM

The following plant conditions exist:

-Unit 1 has tripped from 100% power due to a Hi-Hi CLS event.
-Off-site power was lost following the reactor trip and the #1 Diesel Generator has failed to start.
-Steam Generator levels are 21% narrow range.

-Which ONE of the following is the status of the Auxiliary Feedwater System sixty seconds after loss of off-site power?

A. The 1-FW-3A Motor Driven pump is OFF and the 1-FW-3B Motor Driven and Turbine Driven pumps are supplying Auxiliary Feedwater.
B. The 1-FW-3A Motor Driven and the Turbine Driven pumps are OFF and the 1-FW-3B Motor Driven pump is supplying Auxiliary Feedwater.
C. BOTH Motor Driven pumps are ON supplying Auxiliary Feedwater and the Turbine Driven pump is OFF.
D. BOTH Motor Driven pumps are OFF and the Turbine Driven pump is supplying Auxiliary Feedwater.

Ref: SR EB # 167
Surry lesson plan: ND-89.3-LP-4, objective B

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: D C B B C A C D A A Scramble Range: A - D

LESSON PLAN

Introduction

As was proven at TMI-2, an unmitigated loss of secondary heat sink can result in significant core/fuel damage. The AUXILIARY FEED SYSTEM, when allowed to operate properly, will prevent the need to attempt to cooldown the core using primary feed and bleed operations. By providing the necessary detailed system information, this lesson will help the trainee to ensure the Auxiliary Feed System remains available to perform its vital functions when necessary.

Objectives

After receiving this instruction, the trainee will be able to:

A. Using the supplied drawing as an initial reference, draw a one-line diagram of the major components and flowpaths of the Auxiliary Feed System.

B. [Describe the design features and operation of the following AFW system components:

- Emergency Condensate Storage Tank (1-CN-TK-1A)
- Emergency Makeup Tank (1-CN-TK-3)
- Auxiliary Feedwater Pumps (1-FW-P-2, 3A/B)
- AFW Booster Pumps
- AFW Crosstie
- MOV-FW-151A through F
- Flow Transmitters
- Cavitating Venturis
- Radiation Monitoring

SOER 82-08, Recommendation 4]

C. Summarize, in accordance with plant abnormal procedures, the Auxiliary Feed System operations during abnormal conditions.

D. Summarize the Auxiliary Feed System Technical Specifications contained in Sections 3.6 and 4.8, including for SRO candidates, the basis behind these specifications.

E. Summarize the requirements stated in the Technical Requirements Manual for Auxiliary Feedwater.

F. Describe the overall integrated Auxiliary Feed System operations, including system interlocks, automatic signals, flowpaths, specifications and abnormal operations.

Presentation

Distribute all handouts. Refer to/display H/T-4.1, Objectives, and discuss objectives with trainees.

A. Flowpaths

1. The three aux feed pumps are used to provide a reserve source of feedwater to the steam generators, ensuring a secondary heat sink is available to the RCS during:

    a. Complete loss of outside electrical power

    b. Loss of main feed pumps

setting corresponding to the normal speed of 4200 rpm. The opening of SOV-MS-102A or B admits steam directly to the turbine rotor through the trip and governor valves causing the turbine to come up to speed.

e. The UFSAR states that "indication is provided in the MCR if some part of the system has been administratively bypassed or taken out of service." Compliance with this statement is provided whenever the motor driven AFW pumps are in pull-to-lock by:

(1) Associated lockout or overload trip annunciator will alarm.

(2) White light above red light for each control switch to monitor the breaker closing control voltage and that the breaker is racked in the "connected" position. Thus, white light illuminated would indicate that breaker is available for service.

f. Each aux feed pump is provided with a set of automatic starting signals for core protection purposes.

Write on chalkboard:

1-FW-P-2

*LO-LO LEVEL 2/3 ch<17% NR IN ANY 2/3 S/Gs

*LOSS OF VOLTAGE ON 2/3 4160V STATION SERVICE BUSES

*AMSAC INITIATION ON 2/3 CH <13% IN ANY 2/3 S/Gs <u>AND</u> BOTH 1ST STAGE PRESSURES >37%

NOTE: After the AMSAC signal is initiated, the AFW pumps will continue to run until the AMSAC signal is manually reset and the control switches for the TDAFWP PCVs are opened and returned to closed.

1-FW-3A, 3B

*LO-LO LEVEL 2/3 ch <17% NR IN ANY S/G

*LOSS OF VOLTAGE ON 2/2 RSS (X-FER BUSES) for affected unit

*ANY SI SIGNAL (AFTER 50 SEC T.D.)

*1/2 MFP BKRS OPEN ON BOTH MFPs

*AMSAC INITIATION

NOTE: If AMSAC is initiated the MDAFWPs cannot be secured even if the control switches are placed in PTL until the AMSAC signal is reset.

g. In the event an undervoltage condition occurs on a 4160v emergency bus after an SI or Hi-Hi CLS event has been initiated, the respective motor driven AFW pump will trip, and the automatic and manual start signals will be momentarily blocked (10 sec. for an SI; **140 sec. for a Hi-Hi CLS**). The pump will auto-start again after the blocking signal is removed (times-out). This load sequencing will stagger the emergency loads starting on EDG, thus preventing an overload condition.

h. The turbine driven AFW pump will remain running after an AUTO START, even if the AUTO START signals clear, until the operator places the control switches for both PCV-MS-102 A & B to OPEN/RESET then returns them to the close position. The AMSAC signal must be reset before the TDAFW Pump can be stopped.

(1) Following a Unit 2 reactor trip in 1997, the TDAFW pump tripped on overspeed. The overspeed trip occurred when the pump received a start signal while the pump was coasting down. The pump had auto started on SG low level and was shutting down as designed, when SG level recovered. While the pump was coasting down, another auto start signal was received due to SG low level.

1. 040AK2.02 001/T1G1/T1G1//2.6/2.6//SR02301/C/

Operators responding to a Steam Line Rupture are required to check the Main Steam Trip Bypass Valve (MSTBV) closed on the affected steam generator. Which ONE of the following describes how this step is accomplished?

A. MSTBV position is available on the control room benchboard in the vicinity of the turbine controls.
B. MCR Operators know that the MSTBV is closed if there are no special procedures or special orders in effect that require the MSTBV to be open.
C. Annunciator "MSTBV Out of Normal Position" is in alarm when any MSTBV is open.
D. The Turbine Building Operator is responsible for checking and reporting the position of the MSTBV whenever the reactor trips.

REF: EB# 32049
Surry Lesson Plan ND-95.3-LP-12, Rev 7, p.7.
Lesson plan objective C

Answer B is correct based on operational philosophy described in the lesson plan.
Answers A&C are incorrect because these valves have no remote indication.
Answer D is incorrect because it conflicts w/ operational philosophy.

LESSON PLAN

Introduction

Emergency Procedure, E-2, is designed to identify and isolate a loss of secondary coolant resulting from a fault in a main steam, main feed line or in any system that interconnects with the secondary pressure boundary (e.g., AFW, BD).

The objective of the recovery & restoration technique incorporated into the procedure is to first check for main steam line isolation and then identify and isolate any faulted SGs. Included in these actions is a check for the possibility of a simultaneous SG tube rupture.

Objectives

After receiving this instruction, the trainee will be able to:

A. Given the major action categories associated with E-2, Faulted SG Isolation, explain the purpose of E-2, the transition criteria for entering and exiting E-2 and the types of operator actions that will occur within each category.

B. Given a copy of E-2, Faulted SG Isolation, explain the basis for each procedural step.

C. Given actual or simulated plant conditions requiring implementation of E-2, Faulted Steam Generator Isolation, successfully transition through the procedure, applying step background knowledge as required, to safely address the initial stages of a secondary fault.

b. During isolation of a faulted SG or secondary break, normal cooldown paths are likely to be isolated. Cooldown procedures may direct the team to open one of the isolated paths resulting in a reinitiation of the event.

c. However, in cases where an isolated SG is the only SG available, this SG can be unisolated and used for RCS cooldown.

3. **STEP 1: CHECK MSTV AND BYPASS VALVE ON AFFECTED SG(s) - CLOSED.**

a. The purpose of this step is to ensure that the steam line isolation and bypass valves have closed.

b. Since this procedure is entered after a faulted SG has been identified, MSTVs & bypass valves should have previously been closed. If not, or if the valves failed to close, the team is instructed to manually close the valves. This step attempts to isolate the break & isolate the SGs from each other.

c. Although the MSTV bypass valves are locally operated and are administratively closed (locked) during unit startup, they may have been opened in previous procedures if normal steam dump to the condenser was not available.

(1) They are included in this step to ensure complete isolation of a faulted SG.

(2) While the bypass valves have no position indication available in the MCR, **it is expected that the team would assume that the valves are closed unless personnel had been previously dispatched to open them.**

1. 041K5.07 001/T2G3/T2G3/REACTIVITY EFFECTS/C/A 3.1/3.6/N/SR02301/C/

Unit 1 is starting up, near end of core life, in accordance with 1-GOP-1.5, UNIT STARTUP, 2% REACTOR POWER TO MAX ALLOWABLE POWER.

-Rx power = 11%
-Tavg = 550 degrees F
-Primary Pressure = 2235 psig
-Steam Dumps are in Pressure Control Mode and dumping steam to the condenser
-Main Turbine at Sync Speed
-Main Generator output breakers are open

Pressure transmitter P464, header pressure input to the steam dump system fails high.

Which ONE of the following describes the initial effects on the plant.

A. Steam Dumps fully open, Rx power increases and Tavg decreases
B. Steam Dumps fully close, Rx power decreases and Tavg decreases
C. Steam Dumps fully open, Rx power increases and Tavg increases
D. Steam Dumps fully close, Rx power decreases and Tavg increases

Ref: Surry Lesson Plan ND-93.3-LP-9, objective F
Answer A correct because P464 failing high compared to setpoint causes the dumps to open to lower pressure. Steam flow increase causes Tavg to decrease, late in core life means negative alpha T, means Rx power increases.
Answers B, C, and D are incorrect combinations of plant effects.

MCS	Time: 1	Points: 1.00	Version: 0 1 2 3 4 5 6 7 8 9		
			Answer: A A D A B A A A A A		Scramble Range: A - D

RO Tier:	T2G3	SRO Tier:	T2G3
Keyword:	REACTIVITY EFFECTS	Cog Level:	C/A 3.1/3.6
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

REWRITE

E. Using a simplified graphic representation of the air supply solenoid arrangement, explain the operation of the Steam Dump air supply and control arrangement in response to arming and trip open signals.

F. **Explain the overall integrated operation of the Steam Dump Control System to include, system purpose, control switch operations, arming signals, Steam Dump operational interlocks, operational modes, and air supply/control solenoids.**

Presentation

Distribute all handouts. Refer to/display H/T-9.1, Objectives, and review with class.

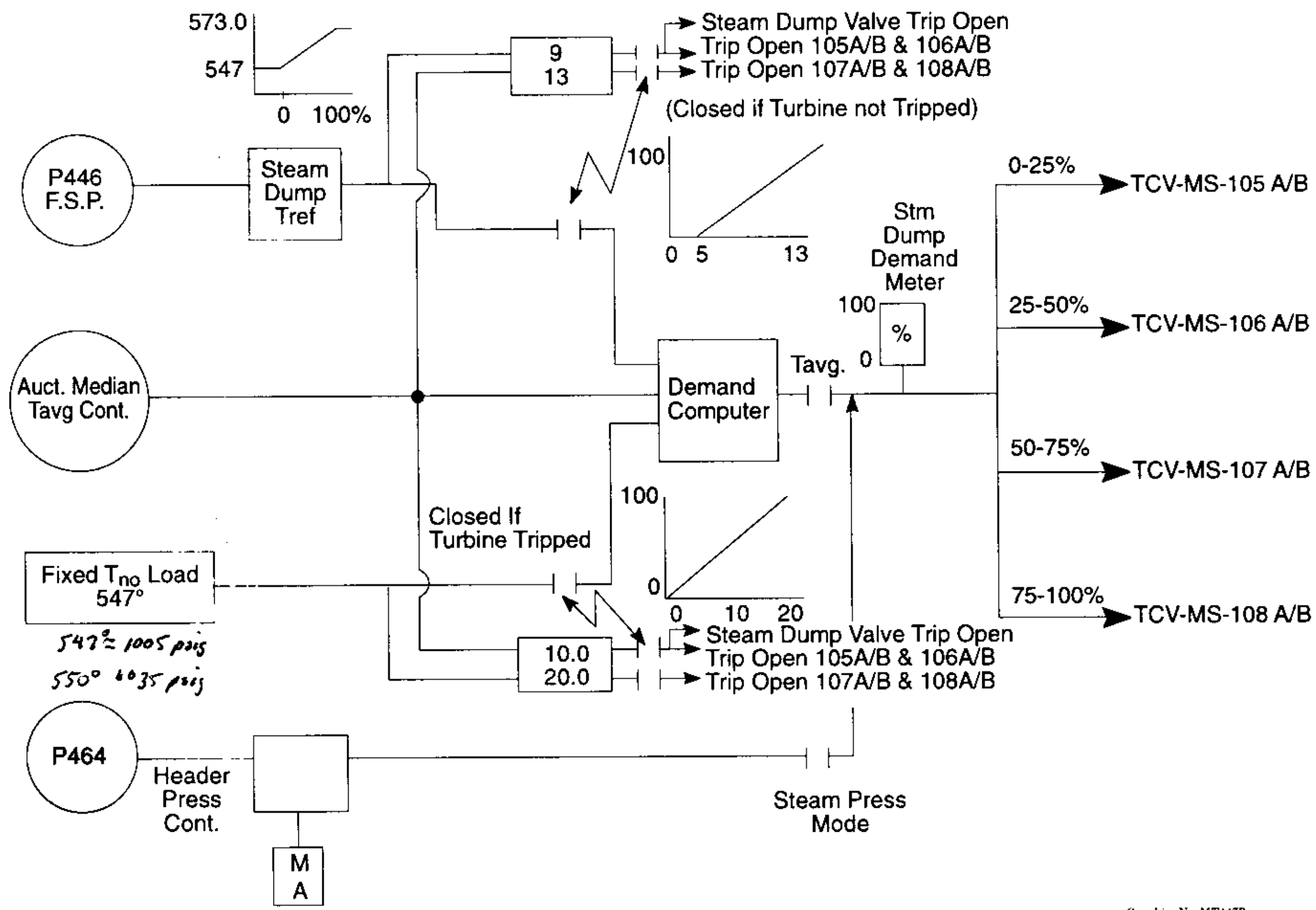
A. Turbine First Stage Impulse Pressure (P_{imp})

Refer to/display H/T-9.2, Turbine Impulse Pressure Signals.

1. The Turbine First Stage Impulse Pressure (P_{imp}) is provided by two channels, Channel III (PT-446) and Channel IV (PT-447). They indicate from 0% to 120% turbine power.

2. The first signal provided from both PT-446 and PT-447 is an input to the AMSAC circuitry. The AMSAC circuitry will be discussed in detail in a later lesson plan.

3 The next signal provided from both PT-446 and PT-447 is the **TURBINE LOAD REFERENCE SIGNAL TO STEAM FLOW COMPARATOR FOR DETERMINING VARIABLE HIGH STEAM FLOW SAFETY INJECTION TRIP AND STEAM LINE ISOLATION.**



547° = 1005 psig
550° 1035 psig

~~Rx has tripped been tripped~~

Rx has been manually tripped due to a blown diaphram on 1A FRV

STEAM DUMP MODULATING CIRCUIT

~~Atlast~~

Post trip, the plant has stabilized at 550°

The stm dumps are all shut

QUESTIONS REPORT

for Surry2002

(33)

1. 045A3.11 001/T2G3/T2G3/EXCITER/M 2.6/2.9/B/SR02301/C/RLM

After the actuation of the main generator "Over Excitation" alarm, which ONE of the following occurs?

A. Nothing will happen, this is just a warning alarm.
B. A main generator trip is immediately actuated upon receiving this alarm.
C. After a short time delay, the exciter automatically switches over to the base adjuster.
D. After a 3 second time delay, the exciter field breaker opens.

Ref: SR EB # 805

Surry lesson plan: ND-90.1-LP-6, objective E.

Surry lesson plan: ND-90.1-LP-6, p. 10

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9

Answer: D B D C B B C B D A Scramble Range: A - D

RO Tier:	T2G3	SRO Tier:	T2G3
Keyword:	EXCITER	Cog Level:	M 2.6/2.9
Source:	B	Exam:	SR02301
Test:	C	Misc:	RLM

RE-WRITE BY facility

LESSON PLAN

Introduction

The main generator produces 850 MW of electrical power for the Virginia Power Distribution System. The operator's control of this system is through the Voltage Regulator System. Massive currents can be produced in the generator by improper use of these controls. These currents occur due to a difference in applied voltage (driving force) between the main generator and the Distribution network.

A thorough understanding of regulator effects ensures the operator response to malfunctions will protect the main generator and maintain maximum unit availability.

This lesson plan discusses each component of the Excitation System and explains the effects of possible malfunctions.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the components, current flowpaths, and ratings of the Main Generator.

B. Describe the operation of the Voltage regulator.

C. Describe the controls, indications, and alarms associated with the Main Generator.

D. Given a copy of the Generator capability curve, determine if the Generator is operating within the limits established by the curve.

E. Given an actual or simulated plant condition, analyze the effect of a Voltage Regulator malfunction on Generator operation.

(1) This function is used to limit the generator excitation voltage to reduce/prevent generator winding overheating.

Refer to/display H/T-6.7, Over and Under Excitation.

(2) When an Overexcitation condition is reached, Relay K-4 energizes producing an "Excitation Field Forcing" alarm (J-A-7).

(3) If the Overexcited condition continues, Relay K-1 energizes and starts an inverse time delay. This time delay is inversely proportional to the magnitude of the overexcitation. This relay also sends a signal to the Base adjust controller to set the Base Adjust to the Full Load Preposition Limit, setting up for bumpless transfer to Base Adjust control.

(4) When the TD times out, Relay K-2 energizes which trips the Auto Voltage Regulator, shifting to base adjust control. Tripping of the Auto Regulator causes "AUTO VOLT REG AUTO TRIP" alarm (J-C-7). Also, the "OVEREXCITATION" alarm (J-A-8) actuates.

(5) If overexcitation continues, a 3 second TD will time out causing Relay K-3 to energize. K-3 will trip the exciter (41) field breaker. As generator excitation decreases, the KLF relay will energize and actuate the 86G relay to lockout the generator.

e. Volts/Hz protection

(1) Provides protection for generator winding overheat when the Generator breakers are open.

Question 804 Details

Question Type:	Multiple Choice
Topic:	EL00035
System ID:	73295
User ID:	EL00035
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-90.2-LP-2A and F [S96-0929]

805 **ID: EL00036** **Points: 1.00**

After the actuation of the main generator "Over Excitation" alarm, which ONE of the following occurs?

A. After a 3 second time delay, the exciter field breaker opens.

B. After a short time delay, the exciter automatically switches over to the base adjuster.

C. A main generator trip is immediately actuated upon receiving this alarm.

D. Nothing will happen, this is just a warning alarm.

Answer: A

54

1. 051AK3.01 001/T1G1/T1G1//2.8/3.1/B/SR02301/C/

Given the following plant conditions:
-Unit 1 is operating at 100%
-Condenser vacuum is decreasing

Which ONE of the following condenser vacuum conditions will first result in the loss of condenser steam dumps?

A. <25" Hg vacuum on 2 of 2 condenser pressure transmitters
B. <20" Hg vacuum on 2 of 2 condenser pressure transmitters
✓C. <25" Hg vacuum on 1 of 2 condenser pressure transmitters
D. <20" Hg vacuum on 1 of 2 condenser pressure transmitters

Steam Dump Interlock vacuum setpoint >25"Hg on 2 of 2 pressure transmitters Surry Lesson Plan ND-93.3-LP-9, page 13
Main Turbine Low vacuum trip setpoint <20"Hg Surry Lesson Plan ND-89.2-LP-8, detractor
Learning objective F of Lesson Plan ND-93.3-LP-9 requires knowledge of interlock setpoints.
Original question from FA EB # 47859

E. Using a simplified graphic representation of the air supply solenoid arrangement, explain the operation of the Steam Dump air supply and control arrangement in response to arming and trip open signals.

F. Explain the overall integrated operation of the Steam Dump Control System to include, system purpose, control switch operations, arming signals, Steam Dump operational interlocks, operational modes, and air supply/control solenoids.

Presentation

Distribute all handouts. Refer to/display H/T-9.1, Objectives, and review with class.

A. Turbine First Stage Impulse Pressure (P_{imp})

Refer to/display H/T-9.2, Turbine Impulse Pressure Signals.

1. The Turbine First Stage Impulse Pressure (P_{imp}) is provided by two channels, Channel III (PT-446) and Channel IV (PT-447). They indicate from 0% to 120% turbine power.

2. The first signal provided from both PT-446 and PT-447 is an input to the AMSAC circuitry. The AMSAC circuitry will be discussed in detail in a later lesson plan.

3. The next signal provided from both PT-446 and PT-447 is the **TURBINE LOAD REFERENCE SIGNAL TO STEAM FLOW COMPARATOR FOR DETERMINING VARIABLE HIGH STEAM FLOW SAFETY INJECTION TRIP AND STEAM LINE ISOLATION.**

C. Steam Dump Arming

Refer to/display H/T-9.6, Steam Dump Solenoids, and show that arming means to energize the A and B solenoids to pass inst. air to the dump valves.

1. Steam Dump "arming" means that instrument air has been made available to operate the dump valves when a demand signal is generated.

Alternately refer to/display H/T-9.7, Steam Dump Arming Circuit, and H/T-9.8, Steam Dump Permissives.

2. There are three interlocks which must be satisfied in order to arm the dumps when an arming signal is activated. These are the "condenser available" interlock, the "condenser cooling" interlock, and the "RCS temperature" interlock.

   a. **The condenser available interlock** is satisfied by 2/2 condenser pressure transmitters sensing condenser vacuum at > 25 inches Hg.

   correct answer ✓

   b. The **condenser cooling interlock** is satisfied by 1/4 condenser circulating water outlet MOVs being NOT fully closed.

   c. The **RCS temperature interlock** is satisfied by 2/3 loops T_{avg} protection being > 543°F. This interlock is designed to prevent an inadvertent excessive cooldown event. This temperature interlock can also be satisfied for the cooldown dump valves (105 A & B), if 2/3 T_{avg} are < 543°F and the Steam Dump Control Switch is momentarily placed to the BYPASS-INTERLOCK position.

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1. 054AA1.02 001/T1G2/T1G2/AFW/C/A 4.4/4.4/N/SR02301/C/RLM

-Unit 1 is starting up in accordance with 1-GOP-1.5 " _____ " .
-Rx power is 25%
-1A Main Feed Pump is in service
-Feedwater control is being transferred from the FW BYP FLOW HCV'S to the FEED REG FCV's and all SG's are overfed with 1A SG reaching 75% .
-The operating crew trips the reactor in accordance with 1-AP-21, LOSS OF MAIN FEED WATER FLOW.

Which ~~ONE~~ one of the following describes the expected status and required operator actions for the Auxiliary Feedwater system?

A. No Auxiliary Feedwater pumps auto started, manually start all Auxiliary Feedwater pumps.
B. Both Motor Driven Auxiliary Feedwater pumps delivering flow, manually start the Turbine Driven Auxiliary Feedwater pump as necessary.
C. Turbine Driven Auxiliary Feedwater pump delivering flow, manually start Motor Driven Auxiliary Feedwater pumps after time delay times out.
D. Turbine Driven Auxiliary Feedwater pump delivering flow, immediately manually start the Motor Driven Auxiliary Feedwater pumps.

Ref: Surry lesson plan ND-95.1-LP-4, objective F
Surry 1-AP-21, Loss of Main Feedwater Flow
Surry 1-E-0, Rx Trip or Safety Injection
Surry 1-GOP-1.5, Unit startup

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B A B D C C D C D B Scramble Range: A - D

RO Tier:	T1G2	SRO Tier:	T1G2
Keyword:	AFW	Cog Level:	C/A 4.4/4.4
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

LESSON PLAN

Introduction

A loss of normal feedwater accident can be caused by a number of anomalies such as pipe breaks, pump failures, valve malfunctions, or loss of outside AC electrical power. This accident results in a loss in the capability of the secondary system to remove the heat generated in the reactor core. If the reactor were not tripped during this incident, reactor core damage could possibly occur from a sudden loss of heat sink. If an alternate supply of feedwater from the auxiliary feedwater system were not available for this accident, this condition II event would rapidly degrade into a condition III event (loss of all feedwater).

Objectives

After receiving this instruction, the trainee will be able to:

A. Explain the plant sequence of events occurring upon initiation of a loss of main feedwater accident.

B. Describe the plant response to a complete loss of feedwater.

C. [Explain why manual SI actuation is not effective in achieving a system recovery during a complete loss of feedwater. SOER 86-01, Recommendation 8.]

D. Explain the difference between "feed and bleed" and "bleed and feed."

E. Explain the significance of PORV size and opening time.

F. Explain the expected plant response for a loss of feedwater accident.

Presentation

A. Sequence of Events (Loss of Main Feed)

Distribute all handouts. Refer to/display H/T 4.1, Objectives. Review objectives with trainees

Ask trainees to come up with the following protection items.

1. The following items provide the necessary protection for a loss of main feedwater accident:

   a. Reactor trip on a low-low water level in any steam generator (2/3 ch < 17%) (unless that RCS loop stop valves are closed).

   b. Reactor trip on main steam flow/feedwater flow mismatch coincidental with a low water level in any S/G (1/2 ch feed < steam by .709 x E6 pph ICW 1/2 ch level < 20%).

   c. The operation of two motor-driven auxiliary feedwater pumps (350 gpm each), which can be started either manually or automatically. Auto-starts are

      (1) Low-low water level in any one S/G (2/3 ch < 17%).

      (2) Opening of 1/2 bkrs on 2/2 main feedwater pumps.

      (3) Any SI signal (after 50 sec T.D.).

(4) Loss of power to 2/3 RSS buses

(5) AMSAC signal (2/3 ch on 1/3 SGs < 13% and 2/2 P_{imp} > 37% gives a PLC output. 2/3 PLC's output > 27 secs gives start signal).

d. The operation of one steam-turbine driven auxiliary feedwater pump (700 gpm), which can be started automatically or manually. It is started automatically on

(1) Low-low water level in 2/3 steam generators (2/3 ch < 17% on 2/3 SGs).

(2) A loss of power to 2/3 station service buses.

(3) AMSAC signal (2/3 ch on 1/3 SGs < 13% and 2/2 P_{imp} > 37% give 1 PLC output. 2/3 PLC's output > 27 secs gives start signal).

2. The above items provide functional diversity in equipment and control logic to ensure that reactor trip and automatic auxiliary feedwater flow will occur following any loss of normal feedwater, including that caused by a loss of AC power.

3. The UFSAR analysis was performed using a digital simulation of the unit to show that, following a loss of normal feedwater, the Auxiliary Feedwater System is adequate to remove stored and residual heat energy.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6.	__VERIFY CTMT ISOLATION PHASE I:
	• Phase I TVs - CLOSED
	• 1-CH-MOV-1381 - CLOSED
	• 1-SV-TV-102A - CLOSED
	• PAM isolation valves - CLOSED
	  • 1-DA-TV-103A
	  • 1-DA-TV-103B
		Manually close valves.

7.	__VERIFY AFW PUMPS RUNNING:	Only applies to SI
	a) MD AFW pumps - RUNNING (Time Delayed)	a) Manually start pumps.
	b) TD AFW pump - RUNNING IF NECESSARY	b) Manually open steam supply valves. • 1-MS-SOV-102A • 1-MS-SOV-102B
8.	__VERIFY SI PUMPS RUNNING: • CHG pumps - RUNNING • LHSI pumps - RUNNING	Manually start pumps.
9.	__CHECK CHG PUMP AUXILIARIES: • CHG pump CC pump - RUNNING • CHG pump SW pump - RUNNING	Manually start pumps.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
[1]	__CHECK MAIN FEED PUMPS - ONLY ONE RUNNING	IF no Main Feed Pumps running, THEN manually trip the Reactor AND GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION. IF two Main Feed Pumps running, THEN GO TO Step 4.
[2]	__CHECK REACTOR POWER - GREATER THAN 85%	IF Reactor power less than or equal to 65%, THEN do the following: a) Adjust turbine load to equalize steam flow and feed flow as necessary. b) GO TO Step 17. IF Reactor power greater than 65%, THEN GO TO Step 4.
[3]	__MANUALLY TRIP THE REACTOR AND GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION	
[4]	__START A THIRD CONDENSATE PUMP	
[5]	__REDUCE TURBINE LOAD TO MATCH STEAM FLOW WITH FEED FLOW • Use Valve Position Limiter	Reduce Turbine load using Turbine Manual.
6.	__CHECK CONDENSATE POLISHING BLDG - BYPASSED • MOV-CP-100 - Open	Open MOV-CP-100.

NOTE: In order to prevent a Steam Generator Level Trip, the SG FW ISOL MOVs may need to be throttled during the transfer from FW BYP FLOW HCVs to the SG FEED REG FCVs.

5.3.18 Transfer Feed Water Control from the FW BYP FLOW HCVs to the FEED REG FCVs in MANUAL control.

a. Open 1-FW-MOV-154A, SG A FW ISOL. ____

b. Open 1-FW-MOV-154B, SG B FW ISOL. ____

c. Open 1-FW-MOV-154C, SG C FW ISOL. ____

d. Throttle open 1-FW-FCV-1478, SG A FEED REG. ____

e. Close 1-FW-HCV-155A, SG A FW BYP FLOW. ____

f. Throttle open 1-FW-FCV-1488, SG B FEED REG. ____

g. Close 1-FW-HCV-155B, SG B FW BYP FLOW. ____

h. Throttle open 1-FW-FCV-1498, SG C FEED REG. ____

i. Close 1-FW-HCV-155C, SG C FW BYP FLOW. ____

5.3.19 Verify that feed flow is indicated on all six channels of SG FEED FLOW PROTECT.

- 1-FW-FI-1477, SG A FEED FLOW PROTECT ____
- 1-FW-FI-1476, SG A FEED FLOW PROTECT ____
- 1-FW-FI-1487, SG B FEED FLOW PROTECT ____
- 1-FW-FI-1486, SG B FEED FLOW PROTECT ____
- 1-FW-FI-1497, SG C FEED FLOW PROTECT ____
- 1-FW-FI-1496, SG C FEED FLOW PROTECT ____

QUESTIONS REPORT
for Surry2002

1. 069AA2.01 001/T1G1/T1G1/CONTAINMENT INTEGRIT/3.7/4.3/B/SR02301/R/RLM

Which ONE of the following conditions is a loss of containment integrity as defined in Technical Specifications?

A. The leakage rate of a containment penetration exceeds the limits of Technical Specifications while in COLD SHUTDOWN.
B. An inner airlock door is left open to perform maintenance in containment while in POWER OPERATION.

C. The fuel transfer tube blind flange is not installed with the fuel building transfer tube valve shut while in STARTUP.
D. An outer airlock door is found open while in STARTUP.
VPAP 2002: p. 67

2. 055EK3.02 001/T1G1/T1G1//4.3/4.6/B/SR02301/C/RLM
Procedure 1-ECA-0.0, "Loss Of All AC Power", directs the operator to depressurize all intact SGs to 175 psig and the preceding caution states that the step should be accomplished at the MAXIMUM rate. Which ONE of the following correctly describes the BASIS for the step and the caution?

A. To minimize secondary coolant loss.
B. To minimize RCS inventory loss.
C. Prevent loss of pressurizer level.
D. Prevent voiding in the reactor vessel head area.
REFERENCE
Lesson Plan ND-95.3-LP-17, Rev. 10, p.30
LP Objective B

b. During the rapid depressurization performed in step 21, SG level could drop out of the NR resulting in a loss of adequate heat sink. If this situation occurs, the depressurization should be stopped and AFW flow maintained until SG NR level is increased to greater than 11% [22%].

33. <u>NOTE #1 PRIOR TO STEP 21</u>: **SGs SHOULD BE DEPRESSURIZED AT THE MAXIMUM CONTROLLABLE RATE TO MINIMIZE RCS INVENTORY LOSS.** Correct answer

a. The purpose of this note is to inform the team of the desired rate for SG depressurization.

b. The intact SGs should be depressurized as quickly as possible, to minimize RCS inventory loss, but within the constraint of controllability.

Ask: Why are SGs depressurized at the max **controllable** rate vs depressurized at the max **achievable** rate? Answer: Controllability is required to ensure that SG pressures do not undershoot the specified limit.

c. SG depressurization should proceed as quickly as possible and should not be limited by the T.S. cooldown limits. **(rk)**

34. <u>NOTE #2 PRIOR TO STEP 21</u>: **PRZR LEVEL MAY BE LOST AND REACTOR VESSEL UPPER HEAD VOIDING MAY OCCUR DUE TO DEPRESSURIZATION OF SGs. DEPRESSURIZATION SHOULD NOT BE STOPPED TO PREVENT THESE OCCURRENCES.**

Basis for 2 of the distractor

B. Given a copy of ECA-0.0, Loss of All AC Power, explain the basis of each step of the procedure.

C. Given actual or simulated plant conditions requiring implementation of ECA-0.0, Loss of All AC Power, successfully transition through the procedure, applying step background knowledge as required, to safely place the plant in the required optimal recovery condition.

Presentation

Distribute all handouts. Refer to/display H/T-17.1, Objectives. Review objectives with trainees.

A. Major Actions of ECA-0.0, Loss of All AC Power

1. ECA-0.0 Purpose

The purpose of ECA-0.0 is to provide guidance to respond to a loss of all AC power.

2. Procedural Transitions.

a. Entry conditions.

There are two basic entry paths, both relying on the fact that indications exist that both emergency AC buses are de-energized.

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1. 055G2.1.28 001/T2G2/T2G2/AIR EJECTORS/C/A 3.2/3.3/N/SR02301/C/RLM

-Unit 1 has experienced a Steam Generator Tube Rupture
-The control room operators are currently executing 1-E-3, "Steam Generator Tube Rupture"

Which ONE of the following describes the operation and purpose of the Steam Jet Air Ejector exhaust system?

A. TV-SV-102A, Air Ejector Containment Isolation TV automatically closes to prevent a release to the environment.
B. TV-SV-102A, Air Ejector Containment Isolation TV automatically opens to provide a filtered vent path for continued Air Ejector operation.
C. TV-SV-102A, Air Ejector Containment Isolation TV automatically closes to provide Containment Isolation.
D. TV-SV-102A, Air Ejector Containment Isolation TV automatically opens to provide a flow path which allows RM-SV-111 to remain available for monitoring a release.

Ref: Surry lesson plan ND-89-LP-2, objective E and p. 13, 14 & 15
Valve normally open, only closes on SI.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: C D A B C B A C B B Scramble Range: A - D

RO Tier:	T2G2	SRO Tier:	T2G2
Keyword:	AIR EJECTORS	Cog Level:	C/A 3.2/3.3
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

OBJECTIVES

After receiving this instruction, the trainee will be able to:

A. Using a one-line diagram drawn from memory, describe the condensate system flowpath from the condenser to the Main Feed Pump suction.

B. Describe the major Main Condensate System components, including:
- CN pump auto start signals, and effect of lead shed and auto start inhibit
- CP-MOV-100 and CP-MOV-122 open signals
- Power limits when a feed heater train removed from service
- Purpose and operation of CN-TCV-110, BD cooler temperature divert valve

C. Describe the condenser including the following:
- Air ejectors
- Exhaust hood spray
- Air ejector rad monitor
- Hotwell level control
- Flood control panel and sensors

D. Describe the location and purpose of the chemicals injected into the Main Condensate System.

E. Describe the overall integrated Main Condensate System operations including system interlocks, chemicals added, flowpaths, and restrictions.

(2) These valves are controlled on Vertical Board-1 with red and green indicating/operating lights.

(3) TV-SV-102A is located in Safeguards by the feedwater pipe penetration area and is normally open. On an SI signal this valve will close, isolating the air ejector vent line to the containment.

(4) TV-SV-102 and TV-SV-103 are located in the air ejector vent line in the Turbine Building. TV-SV-102 is in the line to the containment and is normally closed, while TV-SV-103 leads to the atmospheric vent and is normally open.

(5) If the air ejector radiation monitor reaches the hi alarm setpoint as it would upon a SG tube leak, TV-SV-102 and TV-SV-103 swap positions, stopping the release to atmosphere and sending the radioactive non-condensibles to the containment.

(6) Should a SG tube rupture be of such magnitude that SI is required, TV-SV-102A will automatically close. In this case, the air ejector vents are completely isolated and condenser vacuum can be expected to deteriorate. If the condenser is needed for cooldown in this event, either SI is reset and TV-SV-102A reopened (as per the EOPs), or a manual valve lineup can be made in the Turbine Building. This isolates the Air Ejector vent path to the TVs and opens a vent path to the vent-vent stack, which is a monitored path.

(7) Also note that TV-SV-102 will close automatically on a Hi-CLS signal, while TV-SV-103 has only the one auto close signal from the air ejector RM instrument.

e. Radiation Monitor (RM-SV-111)

(1) The purpose of the radiation monitor is to detect radioactive non-condensible gases which would be released to the Main Steam System should a steam generator tube leak occur.

(2) The radiation monitor is a G-M tube, located in the air ejector effluent line upstream of TV-SV-102 and TV-SV-103. These valves are controlled by the RM and direct gases to the reactor containment or to the atmosphere.

f. Air Leakage Monitors (A & B)

- Number: 2
- Type: Rotameter
- Indication: 1 to 12 scfm

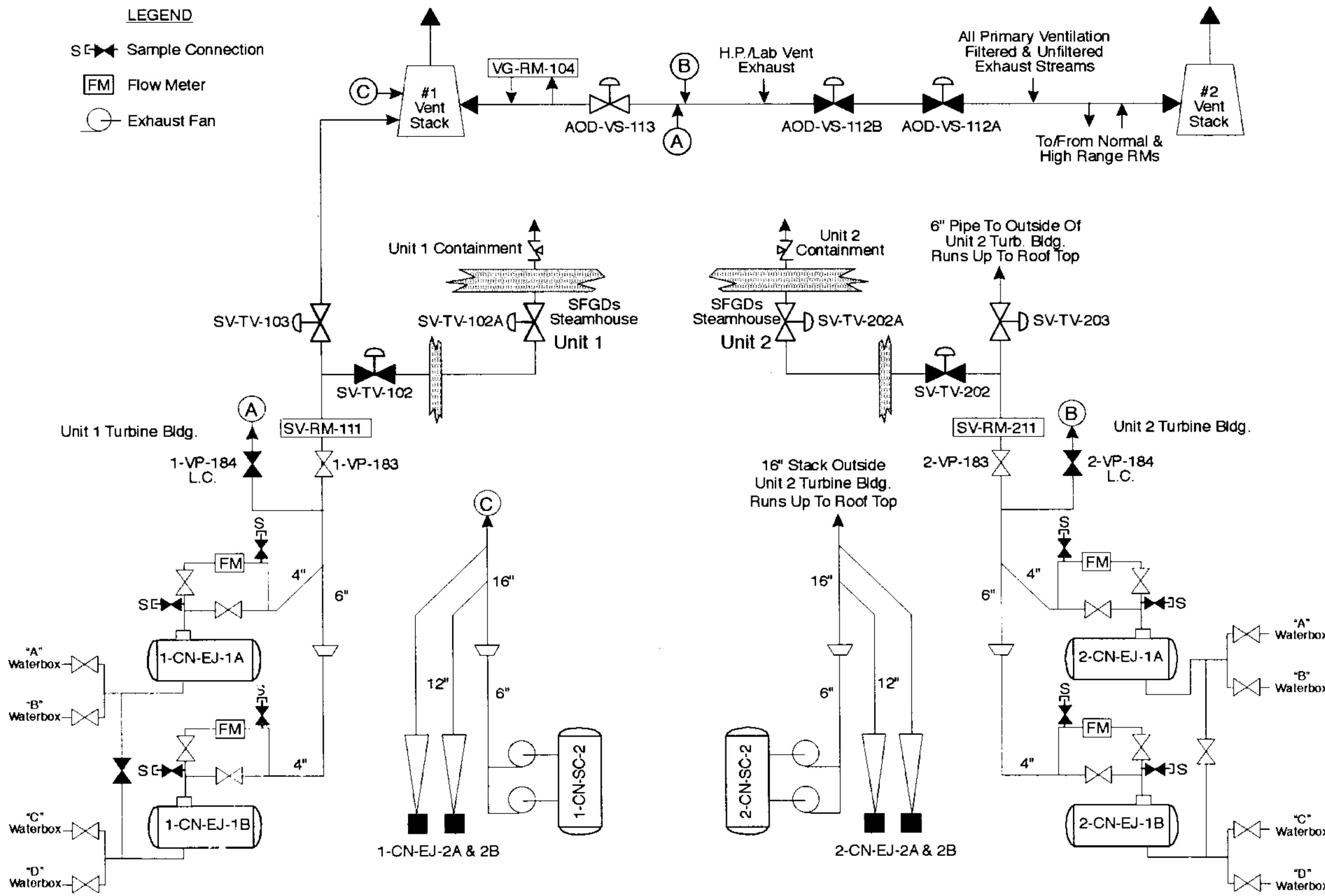
g. Condenser Vacuum Breaker (AS-MOV-100)

(1) Provided to release condenser vacuum rapidly upon unit shutdown and prevent condenser inadvertent overpressurization while maintaining shutdown conditions.

(2) The vacuum breaker has a water seal on the gate valve to prevent air in-leakage when condenser is under vacuum. The seal water supply is from the condensate header and is manually operated as necessary.

h. TV-SV-102, 102A, and 103

(1) **Trip valves TV-SV-102A, TV-SV-102, and TV-SV-103 all fail closed on a loss of instrument air.**



CONDENSER AIR EJECTOR AND AIR REMOVAL SUBSYSTEM

Graphics No: KC301B

QUESTIONS REPORT

for Surry2002

1. 056AK3.01 001/T1G3/T1G3/LOAD SEQUENCE/C/A 3.5/3.9/N/SR02301/C/RLM

Unit 1 has suffered a DBA (HI-HI CLS), followed 10 minutes later by an LOOP.

Which ONE of the following describes the correct plant response and reason?

A. The outside recirc spray pumps start first because they have larger motors.
B.✓ The outside recirc spray pumps start~~s~~ first because the Containment pressure increase will be more limited.
C. The inside recirc spray pumps start first because they have larger motors.
D. The inside recirc spray pumps starts first because the Containment pressure increase will be more limited.

RO Tier:	T1G3	SRO Tier:	T1G3
Keyword:	LOAD SEQUENCE	Cog Level:	C/A 3.5/3.9
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

- Rewritten somewhat.

C. Describe the Annunciators associated with the 4160V and 480V Station Service and Emergency Distribution systems.

D. Describe the purpose and effects of Load Sequencing on Emergency Distribution loads.

E. Describe the purpose and effects of a Degraded or Undervoltage condition on an Emergency Bus.

F. [Describe the means used at Surry to detect and isolate grounds on station electrical systems. SOER 90-01, Recommendation 4 and 5.]

G. Given copies of AP-10.07, Loss of Power, and AP-10.08 Station Power Restoration, explain the steps necessary to operate the station following a total or partial loss of power.

H. Describe the requirements of Tech Spec section 3.9 and 3.16 concerning the electrical distribution system, including for SRO candidates, the bases behind these specifications.

I. [Given an electrical system transient, describe the effects on unit operation of breaker protective devices, interlocks, and Load Sequencing; include Annunciator alarms expected, Abnormal Procedures used, and Tech Spec requirements that may apply. SOER 83-06, Recommendation 4.]

Ask: Why are the ORS pumps restarted before the IRS pumps? Answer: The reason that the OSRS pumps are restarted prior to the ISRS pumps is that the check valve in their discharge will keep the spray header full of water, so by restarting them in this Hi Hi CLS situation, containment pressure increase will be limited.

Source of correct answer

After a 30 sec TD 1-VS-F-58A restart
After 140 sec TD 1-FW-P-3A and 1-FW-P-3B start
After a 180 sec TD - Energize 480V pressurizer heaters from 1H and 1J

c. Seal-in contacts (of the accident initiated start signal) have been added to each inside and outside recirculation spray pump control circuit. The seal-in contacts will prevent the existing timing relays from dropping out as the result of a CLS reset, to allow the running pumps to restart automatically after a LOOP initiated trip.

d. A recirculation spray pump which has been manually tripped and manually restarted would require manual action once tripped by the LOOP initiated signal.

3. The load sequencing for EDG 1 and EDG 3, upon a LOOP condition subsequent to an SI condition only in Unit 1, will be as follows:

a. When power is lost to the bus:
Same as for CLS condition.

b. After the bus is reenergized:
After a 10 sec TD - Start 1-FW-P-3A and 1-FW-P-3B
After a 30 sec TD - Energize filter exhaust fan 1-VS-F-58A.
After a 180 sec TD - Energize 480V pressurizer heaters from 1H and 1J

Refer to/display H/T-6.2, RS System Diagram.

d. Also mounted inside the sump screen is containment sump temperature RTDs and level transmitters.

(1) Sump temperature is indicated on vertical board 1-1 by two meters (0 - 300°F).

(2) Sump level is displayed by two meters which provide indication from 0 to 9 feet.

4. Inside RS pumps

a. There are two IRS pumps located in the basement of containment on top of the containment sump screen assembly.

b. On receipt of a HI-HI CLS signal, the pumps automatically start after a 2-minute time delay. If the pumps are running and a loss of off-site power (LOOP) occurs, then the pumps will be tripped and their starting circuits (automatic and manual) blocked for 20 seconds. When emergency bus voltage has been restored, they will automatically start after 20 seconds. However, a pump which has been manually tripped and manually restarted would require manual action to restart the pump once tripped by the LOOP initiated signal.

c. The vertical, two-stage, centrifugal pump has a 50% spray capacity.

d. The pump's capacity is 3500 gpm. The System Design ensures a minimum of 3000 gpm to the spray rings.

Inside pump capacity

b. Normal lineup is that both suction and discharge valves are open and the pump is in automatic.

c. On receipt of a HI-HI CLS signal, the pumps automatically start after a 5-minute time delay. If the pumps are running and a loss of off-site power (LOOP) occurs, the pumps will be tripped and their starting circuits (automatic and manual) blocked for 10 seconds. When emergency bus voltage has been restored, they will automatically start after 10 seconds. However, a pump which has been manually tripped and manually restarted would require manual action to restart the pump once tripped by the LOOP initiated signal.

Outside Pump capacity

d. Each vertical, two-stage, centrifugal pump has a capacity of 3500 gpm.

e. The pumps can be stopped with control switch even with the CLS signal present (for purposes of securing leak outside containment during CLS). If a leak is not present, the EPs have the pumps running until containment is ≤ 12 psia.

f. Each pump has 50% spray capacity.

g. RS-P-2A is powered from 14H7; 2B is powered from 14J8.

h. Discharge pressure and motor current are indicated in the control room.

i. An RS PUMP LOCKOUT OR OL TRIP alarm (A-H-7 & A-H-8) provides alert that the pump is in PTL or that it tripped on overload.

j. An RS PUMP VIBRATION alarm (A-G-7 & A-G-8) is provided to alert the operator to excessive pump vibration. The reset pushbutton located near the handswitch is used to reset the vibration transmitter.

1. 056G2.1.32 001/T2G1/T2G1/CONDENSATE LIMITS/M 3.4/3.8/N/SR02301/C/RLM

-Unit 1 is starting up following a refueling outage.
1-OP-CN-001, "Condensate System Operation," requires the discharge valve of the first condensate pump to be started to be throttled to 3 turns open.

Which ONE of the following is the basis for this limitation?

A. To ensure adequate net positive suction head for the pump.

B. To minimize the peak starting current.

C. To minimize thermal shock on the system.

D. To minimize water hammer on the system.

Ref: Surry lesson plan ND89.3-LP-2, objective E
Surry operating procedure, 1-OP-CN-001, Condensate System Operation, p.14

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	D A D A D B C A D A	Scramble Range: A - D	
RO Tier:	T2G1		SRO Tier:	T2G1		
Keyword:	CONDENSATE LIMITS		Cog Level:	M 3.4/3.8		
Source:	N		Exam:	SR02301		
Test:	C		Misc:	RLM		

C. Describe the condenser including the following:

- Air ejectors
- Exhaust hood spray
- Air ejector rad monitor
- Hotwell level control
- Flood control panel and sensors

D. Describe the location and purpose of the chemicals injected into the Main Condensate System.

E. Describe the overall integrated Main Condensate System operations including system interlocks, chemicals added, flowpaths, and restrictions.

Presentation

Distribute all handouts. Refer to/display H/T-2.1, Objectives, and review with trainees.

A. Main Condensate System Flowpaths

1. The purpose of the Main Condensate System is to provide a means to:

a. transfer water to provide NPSH for the MF pumps

b. make-up to BC, CC and the boilers

c. collect drips from MS, AS, and HS drains

_____ 5.1.13 Record the mark number of the condensate pump that will be started first.

1-CN-P-_________

_____ 5.1.14 **Throttle the discharge valve for the condensate pump selected in Step 5.1.13, three turns open.** (√)

1-CN-P-1A	1-CN-P-1B	1-CN-P-1C
_____ 1-CN-39	_____ 1-CN-51	_____ 1-CN-63

_____ 5.1.15 Inform the CP Building Operator that a condensate pump will be started.

_____ 5.1.16 Throttle 1-CN-225, Seal Water Supply Hdr PCV-101 Inlet, one turn open.

_____ 5.1.17 Open the discharge valves for the idle condensate pumps that are available for service but will not be started first. (√)

1-CN-P-1A	1-CN-P-1B	1-CN-P-1C
_____ 1-CN-39	_____ 1-CN-51	_____ 1-CN-63

5.1.18 Verify the following conditions for the condensate pump to be started.

_____ ¥ Seal water is lined up.

_____ ¥ Bearing Cooling Water flow is indicated to the pump and motor.

_____ ¥ Oil level in the reservoir sight glass is mid-range.

QUESTIONS REPORT

for Surry2002

1. 057AA1.06 001/T1G1/T1G1/RHR FLOW CONTROL/3.5/3.5/N/SR02301/C/RLM

Cold S/D.

Unit 1 is in Mode 4 with RHR in service.

WHICH ~~ONE (1)~~ of the following describes the response of the RHR discharge flow control valve (1-RH-FCV-1758) to a loss of Vital Bus 1-III? Resulting in a loss of Power to the Control Rack and a loss of Power to Controller M/A STATION.

A. Automatic and ~~Remote~~ Manual control are lost.
B. Only Automatic control is lost.
C. Only Remote Manual control is lost.
D. The valve shifts to AUTO-HOLD.

Ref: Surry Lesson Plan ND-90.3-LP-5,Objective: F
Surry Lesson Plan ND-90.3-A1A-5.1 Load list
Surry 1-AP-10.03, Loss of Vital Bus III, step 2 RNO

verification of correctness + incorrectness of answers came directly from lesson plans.

TALK TO Mike

OBJECTIVES

After receiving this instruction, the trainee will be able to:

A. [Using a one-line diagram drawn from memory, describe the components and current flowpaths of the Vital, Semi-Vital, and Appendix R Distribution Systems. SOER 83-03, Recommendation 11]

B. [Describe the components and indications associated with an Uninterruptable Power Supply (UPS). SOER 83-03, Recommendation 11]

C. Describe the power sources and loads associated with the Appendix R distribution system.

D. Describe the power sources and loads associated with the Semi-Vital Bus distribution system.

E. [Given a loss of a Vital or Semi-Vital bus, describe the actions taken IAW AP-10.01, 10.02, 10.03, 10.04, and/or 10.05 to address this loss. SOER 83-03, Recommendation 11 and SOER 81-02, Recommendation 5]

F. Given a loss of a Vital or Semi-Vital bus, describe the effect on Plant indications and controls, including actions taken IAW applicable APs to address the loss.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

<u>NOTE</u>: A de-energized AC Vital Bus shall be re-energized within 2 hours <u>OR</u> the unit must be placed in Hot Shutdown within the next 6 hours.

[1] __EVALUATE FAILURE OF VITAL BUS 1-III:

- Check Vital Bus 1-III voltage on MCR voltmeter - LESS THAN 117 VOLTS

<u>AND</u>

- Check the following TVs - CLOSED
  - 1-CC-TV-105A
  - 1-CC-TV-110A

Response Not Obtained: GO TO Step 6.

<u>NOTE</u>:
- Safety Injection is imminent if Loop A or B Tave drops below 543°F. 5
- If Safety Injection occurs, RCS temperature should be controlled below 543°F to prevent recurring SI signals. 5

[2] __CHECK UNIT - AT POWER

Response Not Obtained: <u>IF</u> unit on RHR, <u>THEN</u> do the following:

a) Monitor RHR flow and pump amps.

b) Locally throttle RHR HX outlet valves as necessary:
- HX A, 1-RH-19
- HX B, 1-RH-24

GO TO Step 4.

[3] __TRIP THE REACTOR AND INITIATE 1-E-0, REACTOR TRIP OR SAFETY INJECTION

VITAL AND SEMI-VITAL BUS LOADS

Vital Bus I

Channel I Instrumentation
HCV-1142 (Shuts)
HCV-1110 (A BAST Recirc)
HIC 1947 (Hydro pp flow cont)
SG WR Level recorder
A&B RCP seal leakoff recorder
A SG Feed flow recorder
CH I ΔT recorder
PRT Level
CC-TV-140B (Shuts)
DA-TV-100A (CTMT sump pp)
MS-TV-109&110 (Shut)
RM-TV-100A&C (CTMT Part/Gas RM)
SV-TV-102 (A/E to CTMT)
SV-TV-103 (A/E to Atmos)
CV-TV-150A&B (CV pp suct)
CH-TV-1204A (LD TV)
BD-TV-100A/C/E (Inside BD TVs)
SI-TV-101A (SI Acc Vent)
CC-TV-109A ("A" RHR CC hdr)
DG-TV-108A (PDTT pp disch)
VG-TV-109A (PDTT Vent)
CH I PR, IR, SR
A&C CH pp damper (fail as is)
RMT Tr "A"
IA-TV-100 (CIA to CTMT)
IA-TV-101A (CIA compr suct)
GW-TV-100&102 (H_2 Anal)
1/2-SI-SOV-102A1 (CH suct x-tie)

Vital Bus II

Channel II Instrumentation
CH-FC-1122C (CH flow in auto-hold)
CH-LC-1112C (VCT lvl contr auto hold)
113 BA flow recorder
YIC-113 (BA integrator)
YIC-114C (PG integrator)
Master Press Contr (auto-hold)
B FRV (auto-hold)
Pzr Level Contr (auto-hold)
A&B spray valve (auto-hold)
B SG feed flow recorder
CH-HIC-1186 (seal inj contr)
B FRV bypass
HCV-1104 (B BAST recirc)
RHR temp recorder
RM-TV-100B (CTMT part/gas RM)
TV-CC-105B (B RCP CC)
TV-CH-1204B (LD TV)
TV-CC-110B (B CARF)
TV-CC-109B ("B" RHR hdr)
BD-TV-100B/D/F (BD TVs)
SI-TV-101B (SI Acc vent)
VG-TV-109B (PDTT Vent)
DG-TV-108B (PDTT pp disch)
CH II PR, IR, SR
Flood panel A
RCP vibes panel
TV-GW-104&106 (H_2 Anal)
TV-GW-111B/112B (CTMT grab sample)
1/2-SI-SOV-102B1 (CH suct x-tie)

Vital Bus III

Channel III Instrumentation
FC-113A (BA flow contr auto-hold)
FC-114A (PG flow contr auto-hold)
CH-HIC-1137 (XS LD flow)
C FRV bypass
RH-FCV-1758 (fails open)
HCV-1105 (B BAST recirc fails shut)
CH-FI-1110 (emerg Borate flow)
LD Press Contr (auto-hold)
A&C FRV (auto-hold)
Loop fill contr (auto-hold)
RH-1605 (auto-hold)
TV-CC-110A (CARF)
TV-CC-105A (A RCP CC)
TV-1519A (PG to CTMT)
CH III PR
VS-F 4A/B, VS-F-6, HV-1A/1B trip
VS-E-4A MCR chiller cont pwr lost
Tr A Ambient temp monitor
A/B/C FRV bypasses fail shut
TV-GW-101/103 (H_2 Anal)
TV-GW-111A/112A (CTMT grab sample)
LI-CN-100 (ECST level)
TV-DA-103A (fails shut)

Vital Bus IV

Channel IV Instrumentation
Bank A/B/C/D rod pos & insert lim recorder
Median T_{avg} and T_{ref} stpt recorder
Pzr Level recorder
Pzr Press recorder
TV-LM-100B/D/F/H (CTMT leak mon)
TV-CC-110C (CARF)
TV-CC-105C (C RCP CC)
TV-SI-100 (N2 to CTMT)
TV-CV-150 B/D (CV pp suct)
TV-DA-100B (CTMT sump pp disch)
CC-TV-140A (CC ret Therm bar)
CH IV PR
IA-TV-101B (CIA compr suct)
TV-DA-103B
FRV Bypasses fail shut
VS-E-4B MCR chiller lost cont pwr
TV-SI-102B
B Train RMT

1. 059AK3.03 001/T1G2/T1G1/INOPERABLE RM/M 3.0/3.7/N/SR02301/C/RLM

Annunciator 0-RM-P5, 1-SW-RI-107A HIGH, actuates and the control operator determines that 1-SW-RI-107A, CCHX Service Water Outlet, has failed.

Which ONE of the following is the reason for declaring the radiation monitor inoperable?

A. To ensure that the radiation monitor is scheduled for repair.

B.✓ To ensure ~~that~~ the requirement for compensatory sampling is evaluated.

C. To ensure that radiation monitors 1-SW-RI-107B,C&D are operable.

D. To ensure that the Component Cooling Water Surge Tank vent is shut.

Ref: Surry ARP 0-RM-P5, 1-SW-RI-107A HIGH
Surry Tech Spec 3.13, CCW
No specific learning objective found.

Assumption: Tech Spec 3.13 applies to rad monitor, RI CC 105/106 and not RI SW 107A,B,C,D

RO Tier:	T1G2	SRO Tier:	T1G1
Keyword:	INOPERABLE RM	Cog Level:	M 3.0/3.7
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: If the Service Water side of the CC HX is drained, the alarm may be actuated.

* *

1. __VERIFY ALARM - READINGS ON MONITOR OR CHART RECORDER GREATER THAN OR EQUAL TO HIGH SETPOINT

   - 1-SW-RI-107A or 1-RM-RR-150C, Pen 3

   Do the following:

   a) Increase surveillance of the following monitors:

      - 1-SW-RI-107B
      - 1-SW-RI-107C
      - 1-SW-RI-107D
      - 1-SW-RI-120

   b) Review Tech Spec 3.13, Component Cooling System.

   c) Notify HP to review VPAP-2103, OFFSITE DOSE CALCULATION MANUAL, and to initiate sampling as necessary.

   d) Evaluate entry into 0-AP-10.13, LOSS OF MAIN CONTROL ROOM ANNUNCIATORS.

   e) Initiate a Work Request.

   f) GO TO Step 9.

2. __VERIFY ALARM CAUSED BY SW DRAINAGE:

   - Check CC HX - OUT OF SERVICE WITH SW DRAINED

   AND

   - Determine if alarm caused by SW draining from CC HX

   GO TO Step 4.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. __GO TO STEP 9

4. __ISOLATE AFFECTED CC HX

5. __REVIEW TECH SPEC 3.13

6. __NOTIFY HP TO REVIEW VPAP-2103, OFFSITE DOSE CALCULATION MANUAL AND INITIATE SAMPLING AS NECESSARY

7. __PLACE ADDITIONAL CC HX(s) IN SERVICE AS REQUIRED

8. __NOTIFY HP TO DO THE FOLLOWING:

   - Verify area evacuated as necessary
   - Control access as necessary
   - Survey area as necessary
   - Investigate cause
   - Determine need for setpoint change

9. __PROVIDE NOTIFICATIONS AS NECESSARY:

   - Shift Supervisor
   - OMOC
   - STA
   - Health Physics
   - Instrumentation Department

- END -

3.13 COMPONENT COOLING SYSTEM

Applicability

Applies to the operational status of all subsystems of the Component Cooling System. The Component Cooling System consists of the Component Cooling Water Subsystem, Chilled Component Water Subsystem, Chilled Water Subsystem, and Neutron Shield Tank Cooling Water Subsystem.

Objective

To define limiting conditions for each subsystem of the Component Cooling System necessary to assure safe operation of each reactor unit of the station during startup, POWER OPERATION, or cooldown.

Specifications

A. When a unit's Reactor Coolant System temperature and pressure exceed 350°F and 450 psig, respectively, or when a unit's reactor is critical operating conditions for the Component Cooling Water Subsystem shall be as follows:

   1. For one unit operation, two component cooling water pumps and heat exchangers shall be OPERABLE.

   2. For two unit operation, three component cooling water pumps and heat exchangers shall be OPERABLE.

   3. The Component Cooling Water Subsystem shall be OPERABLE for immediate supply of cooling water to the following components, if required:

      a. Two OPERABLE residual heat removal heat exchangers.

B. During POWER OPERATION, Specification A-1, A-2, or A-3 above may be modified to allow one of the required components to be inoperable provided immediate attention is directed to making repairs. If the system is not restored within 24 hours to the requirements of Specification A-1,

See second page, this page for completeness

A-2, or A-3, an operating reactor shall be placed in HOT SHUTDOWN within the next 6 hours. If the repairs are not completed within an additional 48 hours, the affected reactor shall be placed in COLD SHUTDOWN within the following 30 hours.

C. Whenever the component cooling water radiation monitor is inoperable, the surge tank vent valve shall remain closed.

Basis

The Component Cooling System is an intermediate cooling system which serves both reactor units. It transfers heat from heat exchangers containing reactor coolant, other radioactive liquids, and other fluids to the Service Water System. The Component Cooling System is designed to (1) provide cooling water for the removal of residual and sensible heat from the Reactor Coolant System during shutdown, cooldown, and startup, (2) cool the containment recirculation air coolers and the reactor coolant pump motor coolers, (3) cool the letdown flow in the Chemical and Volume Control System during POWER OPERATION, and during residual heat removal for continued purification, (4) cool the reactor coolant pump seal water return flow, (5) provide cooling water for the neutron shield tank and (6) provide cooling to dissipate heat from other reactor unit components.

The Component Cooling Water Subsystem has four component cooling water pumps and four component cooling water heat exchangers. Each of the component cooling water heat exchangers is designed to remove during normal operation the entire heat load from one unit plus one half of the heat load common to both units. Thus, one component cooling water pump and one component cooling water heat exchanger are required for each unit which is at POWER OPERATION. Two pumps and two heat exchangers are normally operated during the removal of residual and sensible heat from one unit during cooldown. Failure of a single component may extend the time required for cooldown but does not affect the safe operation of the station.

References

UFSAR Section 5.3, Containment Systems
UFSAR Section 9.4, Component Cooling System
UFSAR Section 15.5.1.2, Containment Design Criteria

QUESTIONS REPORT
for Surry2002

4 V

1. 059G2.4.31 001/T2G1/T2G1/FEED PUMP/C/A 3.3/3.4/N/SR02301/C/RLM

-Unit 1 is operating at 100% power
-Annunciator 1H-E8, FW PP 1B LUBE OIL LO PRESSURE

Which ONE of the following actions should be taken?

A. Verify pump tripped by observing ~~steam~~ feed flow. If pump continuing to operate, trip the pump.
B. Verify pump tripped by observing pump amps. If pump continuing to operate, trip the pump.
C. Verify pump tripped by observing ~~steam~~ feed flow. If pump continuing to operate, locally check oil pressure.
D.✓ Verify pump tripped by observing pump amps. If pump continuing to operate, locally check oil pressure.

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:	FEED PUMP	Cog Level:	C/A 3.3/3.4
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

E. Describe the overall integrated operation of the Main Feedwater System, including pump and valve interlocks, support subsystems, flow paths and normal and abnormal operations.

Presentation

Distribute all handouts. Refer to/display H/T-3.1, Objectives, and review with trainees.

A. Flow Path

1. The purpose of the Feedwater System is to supply and maintain water inventory in the steam generators for the production of steam, and to provide a secondary heat sink for the Reactor Coolant System.

2. The Condensate System is the source of water for the main feed pumps. The relatively cool discharge of the drain coolers is heated in a series of six (6) feedwater heaters, compressed by the main feedwater pumps and distributed to the three (3) steam generators. The feedwater flowrate and the corresponding S/G level is determined by the position of the feed reg or feed reg bypass valves. In auto, the feed reg valve positioning control signals are provided by the S/G Water Level Control Subsystem. The bypass valve is manually controlled by the operator.

Refer to/display H/T-3.2, Main Feed System Diagram, and refer to during discussion.

LESSON PLAN

Introduction

A loss of normal feedwater accident can be caused by a number of anomalies such as pipe breaks, pump failures, valve malfunctions, or loss of outside AC electrical power. This accident results in a loss in the capability of the secondary system to remove the heat generated in the reactor core. If the reactor were not tripped during this incident, reactor core damage could possibly occur from a sudden loss of heat sink. If an alternate supply of feedwater from the auxiliary feedwater system were not available for this accident, this condition II event would rapidly degrade into a condition III event (loss of all feedwater).

Objectives

After receiving this instruction, the trainee will be able to:

A. Explain the plant sequence of events occurring upon initiation of a loss of main feedwater accident.

B. Describe the plant response to a complete loss of feedwater.

C. [Explain why manual SI actuation is not effective in achieving a system recovery during a complete loss of feedwater. SOER 86-01, Recommendation 8.]

D. Explain the difference between "feed and bleed" and "bleed and feed."

E. Explain the significance of PORV size and opening time.

F. Explain the expected plant response for a loss of feedwater accident.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

<u>NOTE</u>: • The Auxiliary Lube Oil pump should auto start at 7 psig.

• The feedwater pump should trip when lube oil pressure drops to 4 psig.

1. __VERIFY FW PUMP 1B - TRIPPED

   • 1-FW-P-1B

RESPONSE NOT OBTAINED:

Do the following:

a) Locally check oil pressure.

b) <u>IF</u> lube oil pressure less than or equal to 4 psig, <u>THEN</u> trip 1-FW-P-1B <u>AND</u> GO TO Step 2.

c) <u>IF</u> oil pressure is between 4 and 7 psig, <u>THEN</u> do the following:

   1) Locally check lube oil piping for leaks.

   2) Attempt to isolate any leaks.

   3) Verify proper level in oil reservoir <u>AND</u> fill as necessary.

   4) Verify started <u>OR</u> start ALOP.

   5) <u>IF</u> ALOP will <u>NOT</u> start, <u>THEN</u> locally check breaker:

      • 1B1-3-3C

   6) GO TO Step 4.

d) <u>IF</u> lube oil pressure is greater than 6 psig, <u>THEN</u> initiate a Work Request <u>AND</u> GO TO Step 4.

QUESTIONS REPORT +3/

for Surry2002

1. 060AK2.02 001/T1G2/T1G2/VENTILLATION/M 2.7/3.1/B/SR02301/C/RLM

Which ONE of the following identifies the action required per AP-5.21, Radiation Monitor System Ventilation Vent Monitor Malfunction, if RI-VG-104, Vent Stack 1 Gaseous RM, failed?

A. No action required as long as the backup monitor is operable.

B. Have HP setup a continuous ~~accountability sampler~~ iodine + particulate sampling.

C. Divert the Vent Stack 1 flow to the Vent Stack 2.

D. Secure potential radiological release paths.

Ref: SR EB # 313

Surry lesson plan: ND-93.5-LP-3, objective D

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	C D D B C B C C A B	Scramble Range: A - D	

RO Tier:	T1G2	SRO Tier:	T1G2
Keyword:	VENTILLATION	Cog Level:	M 2.7/3.1
Source:	B	Exam:	SR02301
Test:	C	Misc:	RLM

TALK TO MIKE

LESSON PLAN

Introduction

The NRC radiation monitors, Kamans and the Containment High Range Radiation Monitoring System (CHRRMS) were installed to respond to concerns noted after the TMI accident.

Objectivess

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the NRC Radiation Monitoring System.

B. Describe the operation of the Kaman Radiation Monitoring System.

C. Describe the operation of the CHRRMS.

D. Describe the operation of the POST TMI Radiation Monitoring Systems

Presentation

Distribute all handouts. Refer to/display H/T-3.1, Objectives, and review with trainees.

A. NRC Monitors

1. General System Information

a. The NRC Radiation Monitoring System provides high range radiation indication for each main steam line, the TDAFW exhaust steam, the process vent effluent and the vent-vent effluent.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	__VERIFY VICTOREEN MONITOR FOR VENT STACK 1 - OPERABLE • 1-VG-RI-104	Do the following: a) Align Vent Stack 1 flow to Vent Stack 2: 1) Open AOD-VS-112A and B. 2) Close AOD-VS-113. b) <u>IF</u> unable to switch alignment, <u>THEN</u> have HP immediately obtain initial sample and resample every 8 hours, <u>NOT</u> to exceed every 12 hours. c) <u>IF</u> sampler unit failed, <u>THEN</u> do the following: 1) Immediately notify HP. 2) Have HP provide continuous iodine and particulate sampling within one hour of loss of sampler unit IAW VPAP-2103S, OFFSITE DOSE CALCULATION MANUAL. d) Provide notifications: • Shift Supervisor • OMOC • STA

1. 061K2.02 001/T2G1/T2G1/LOSS OF POWER/M3.7/3.7/M/SR02301/C/RLM

Unit 1 "H" bus has just faulted.

Which ONE of the following identifies the effects on the capability of the Aux Feedwater System?

A. The 1A MDAFW pump and MOV-FW-151 B, D, F are inoperable.

B. The 1B MDAFW pump and MOV-FW-151 B, D, F are inoperable.

C.✓ The 1A MDAFW pump and MOV-FW-151 A, C, E are inoperable.

D. The 1B MDAFW pump and MOV-FW-151 A, B, C are inoperable.

Ref: SR EB # 175
Surry lesson plan ND 89.3-LP-4, objective B and ND-90.3-LP-7

LESSON PLAN

Introduction

As was proven at TMI-2, an unmitigated loss of secondary heat sink can result in significant core/fuel damage. The AUXILIARY FEED SYSTEM, when allowed to operate properly, will prevent the need to attempt to cooldown the core using primary feed and bleed operations. By providing the necessary detailed system information, this lesson will help the trainee to ensure the Auxiliary Feed System remains available to perform its vital functions when necessary.

Objectives

After receiving this instruction, the trainee will be able to:

A. Using the supplied drawing as an initial reference, draw a one-line diagram of the major components and flowpaths of the Auxiliary Feed System.

B. [Describe the design features and operation of the following AFW system components:

- Emergency Condensate Storage Tank (1-CN-TK-1A)
- Emergency Makeup Tank (1-CN-TK-3)
- Auxiliary Feedwater Pumps (1-FW-P-2, 3A/B)
- AFW Booster Pumps
- AFW Crosstie
- MOV-FW-151A through F
- Flow Transmitters
- Cavitating Venturis
- Radiation Monitoring

SOER 82-08, Recommendation 4]

c. The MOVs cannot be closed during this 45 second period. After the 45 second time delay times out, the MOVs can be manually closed using the control switch even if the AFW auto-start signal still exists.

Refer to/display H/T-4.4, AFW MOV Open Signals.

d. Once the AFW MOVs have received an open signal, no new open signal can be applied to the MOVs until all signals to the 45-second time delay agastat have cleared.

1) Example #1 - A reactor trip occurs and AFW MOVs receive an open signal on S/G low level. After S/G level is restored, the operator closes the AFW MOVs. If an SI signal is now generated, the AFW MOVs will not reopen because the AMSAC signal has not been reset.

2) Example #2 - A reactor trip occurs due to a loss of both MFPs and the AFW MOVs receive an open signal. After S/G level is restored, the operator closes the AFW MOVs and resets AMSAC. An SI signal is now generated. The SI signal opens the SI relay contact clearing all signals to the AFW MOVs. After the 50-second time delay, the SI signal will cause the AFW MOVs to reopen.

e. Power supply is from 1H1-2 and 1J1-2, each powering one valve in the supply train to each S/G.

9. Flow transmitters

These flow transmitters provide indication of flow to each S/G in gpm. They are powered from vital buses 2 and 3 which is necessary to provide diversity of power supply.

2. Emergency Makeup Tank (1-CN-TK-3)

This tank is used to supply a backup source of aux feedwater supply to the suction of the aux feed pumps. The tank is partially buried and therefore, the booster pumps are needed to prevent cavitation in the aux feed pumps when this tank is in use. This tank is sized to hold 100,000 gallons of water and is filled by gravity flow from the 110,000 gallon tank. The tank level is indicated on the vertical board.

3. Auxiliary Feedwater Pumps (1-FW-P-2, -3A, -3B)

a. Each aux feed pump is a horizontally mounted, centrifugal pump. A shaft mounted oil pump provides oil circulation to the pump bearings. Also installed are an oil reservoir, oil filter, and cooler. The oil cooler transfers heat from the lube oil to a small portion of the aux feedwater discharge in the recirc line. Oil reservoir level is indicated locally on the top of the reservoir.

b. The motor driven pumps are rated at 370 gpm each, of which 20 gpm is pump recirc flow (350 gpm NET rating). The turbine driven aux feed pump is rated for a total flow of 735 gpm (35 gpm recirc flow - NET 700 gpm).

c. Each motor driven pump is powered by a 4160 VAC motor. The motors are powered from H and J emergency buses (A-15H4; B-15J4), and are controlled from either the ASD panel or the main control board. The turbine driven pump receives steam from each line of the MS system via electro-pneumatic valves PCV-MS-102A and B.

d. The TERRY turbine is rated at 4200 rpm. The steam exhaust from the turbine is directed to atmosphere and is monitored for radiation. The inlet piping contains the trip valve and a governor valve. Under normal conditions the trip valve is full open and the governor valve is opened to a

QUESTIONS REPORT
for Surry2002

1. 061K2.02 001/T2G1/T2G1/LOSS OF POWER/M 3.7/3.7/M/SR02301/C/RLM

Unit 1 has tripped from 100% due to a Loss of Off-site power ~~event.~~
#1 Diesel Generator ~~has~~ failed to start.
Steam Generator levels are 21% narrow range.

Which ONE of the following is the status of the Auxiliary Feedwater System?

A. BOTH Motor Driven pumps are OFF and the Turbine Driven pump is supplying Auxiliary Feedwater.
B. BOTH Motor Driven pumps are ON supplying Auxiliary Feedwater and the Turbine Driven pump is OFF.
C. The 1-FW-3A Motor Driven and the Turbine Driven pumps are OFF and the 1-FW-3B Motor Driven pump is supplying Auxiliary Feedwater.
D. The 1-FW-3A Motor Driven pump is OFF and the 1-FW-3B Motor Driven and Turbine Driven pumps are supplying Auxiliary Feedwater.

Ref: SR EB # 167
Surry lesson plan ND 89.3-LP-4 and ND-90.3-LP-7
No specific objective to know power supplies.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: D A D D C D B B D D Scramble Range: A - D

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:	LOSS OF POWER	Cog Level:	M 3.7/3.7
Source:	M	Exam:	SR02301
Test:	C	Misc:	RLM

replaced

C. Summarize, in accordance with plant abnormal procedures, the Auxiliary Feed System operations during abnormal conditions.

D. Summarize the Auxiliary Feed System Technical Specifications contained in Sections 3.6 and 4.8, including for SRO candidates, the basis behind these specifications.

E. Summarize the requirements stated in the Technical Requirements Manual for Auxiliary Feedwater.

F. Describe the overall integrated Auxiliary Feed System operations, including system interlocks, automatic signals, flowpaths, specifications and abnormal operations.

are opened and returned to closed.

1-FW-3A, 3B

*LO-LO LEVEL 2/3 ch <17% NR IN ANY S/G

*LOSS OF VOLTAGE ON 2/2 RSS (X-FER BUSES) for affected unit

*ANY SI SIGNAL (AFTER 50 SEC T.D.)

*1/2 MFP BKRS OPEN ON BOTH MFPs

*AMSAC INITIATION

NOTE: If AMSAC is initiated the MDAFWPs cannot be secured even if the control switches are placed in PTL until the AMSAC signal is reset.

g. In the event an undervoltage condition occurs on a 4160v emergency bus after an SI or Hi-Hi CLS event has been initiated, the respective motor driven AFW pump will trip, and the automatic and manual start signals will be momentarily blocked (10 sec. for an SI; 140 sec. for a Hi-Hi CLS). The pump will auto-start again after the blocking signal is removed (times-out). This load sequencing will stagger the emergency loads starting on EDG, thus preventing an overload condition.

h. The turbine driven AFW pump will remain running after an AUTO START, even if the AUTO START signals clear, until the operator places the control switches for both PCV-MS-102 A & B to OPEN/RESET then returns them to the close position. The AMSAC signal must be reset before the TDAFW Pump can be stopped.

(1) Following a Unit 2 reactor trip in 1997, the TDAFW pump tripped on overspeed. The overspeed trip occurred when the pump received a start signal while the pump was coasting down. The pump had auto started on SG low level and was shutting down as designed, when SG level recovered. While the pump was coasting down,

conditions the trip valve is full open and the governor valve is opened to a setting corresponding to the normal speed of 4200 rpm. The opening of SOV-MS-102A or B admits steam directly to the turbine rotor through the trip and governor valves causing the turbine to come up to speed.

e. The UFSAR states that "indication is provided in the MCR if some part of the system has been administratively bypassed or taken out of service." Compliance with this statement is provided whenever the motor driven AFW pumps are in pull-to-lock by:

(1) Associated lockout or overload trip annunciator will alarm.

(2) White light above red light for each control switch to monitor the breaker closing control voltage and that the breaker is racked in the "connected" position. Thus, white light illuminated would indicate that breaker is available for service.

f. Each aux feed pump is provided with a set of automatic starting signals for core protection purposes.

Write on chalkboard:

1-FW-P-2

*LO-LO LEVEL 2/3 ch<17% NR IN ANY 2/3 S/Gs

*LOSS OF VOLTAGE ON 2/3 4160V STATION SERVICE BUSES

*AMSAC INITIATION ON 2/3 CH <13% IN ANY 2/3 S/Gs AND BOTH 1ST STAGE PRESSURES >37%

NOTE: After the AMSAC signal is initiated, the AFW pumps will continue to run until the AMSAC signal is manually reset and the control switches for the TDAFWP PCVs

Question 166 Details

Question Type:	Multiple Choice
Topic:	AFW0016
System ID:	72466
User ID:	AFW0016
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-89.3-LP-4B [S95-0336]

167 **ID: AFW0017** **Points: 1.00**

The following plant conditions exist:

- Unit 1 has tripped from 100% power due to a Hi-Hi CLS event.
- Off-site power was lost following the reactor trip and the #1 Diesel Generator has failed to start.
- Steam Generator levels are 21% narrow range.

Which ONE of the following is the status of the Auxiliary Feedwater System sixty seconds after loss of off-site power?

A. BOTH Motor Driven pumps are OFF and the Turbine Driven pump is supplying Auxiliary Feedwater.

B. BOTH Motor Driven pumps are ON supplying Auxiliary Feedwater and the Turbine Driven pump is OFF.

C. The 1-FW-3A Motor Driven and the Turbine Driven pumps are OFF and the 1-FW-3B Motor Driven pump is supplying Auxiliary Feedwater.

D. The 1-FW-3A Motor Driven pump is OFF and the 1-FW-3B Motor Driven and Turbine Driven pumps are supplying Auxiliary Feedwater.

Answer: A

1. 063A2.01 001/T12G2/T2G1/D C/C/A 2.5/3.2/N/SR02301/~~8~~/RLM c

(4) Look At SRO D

Unit 1 is at 100% power

An electrical maintenance worker calls the control room and tells the SRO that in the process of moving a wiring bundle, they received a spark and that it will take approximately 2 hours to determine which wire sparked. The RO notes that one set of indicating lights for both PORVs has been lost.

Which ONE of the following actions should be taken?

A. Close both block valves.
B.✓ Close and remove power from the block valve of the associated PORV.
C. Close and remove power from both block valves.
D. Close the block valve of the associated PORV.
Ref: Surry lesson plans: ND-90.3-LP-6, obj A & D, and ND-88.1-LP-9, obj H & I
Surry Tech Specs section 3.1.A.6, relief valves.

Answer B is correct for loss of the ability to manually operate one PORV for greater than 1 hr. Answers A, C, and D are correct for OTHER conditions listed in the same Tech Spec.

Note: Loss of either train of DC affects indicating lights on BOTH PORVs, but affects function of only the one associated with the lost DC power supply.

Need to check with Surry to determine if the grounding lights on the vertical board 2 also illuminate and if that causes an additional annunciator. Based on response, may want to revise stem a bit.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	B D B A B C C D B C	Scramble Range: A - D

RO Tier:	T12G2	SRO Tier:	T2G1
Keyword:	DC	Cog Level:	C/A 2.5/3.2
Source:	N	Exam:	SR02301
Test:	S	Misc:	RLM

Talk to Mike.
~~Re-write~~
Replace.

LESSON PLAN

Introduction

The most vital electrical components, those required to monitor essential core, reactor coolant, and control system parameters, are powered from the Station 125 VDC System. This system, through its chargers, batteries, and distribution panels, is the most reliable source of electricity in the station. Since it controls the output of such vital equipment, its loss is devastating to the operator's ability to control the plant.

This lesson plan will discuss location of the various components in the 125 VDC Distribution System. It will also discuss various loads on the 125 VDC Distribution Systems and the affect of their loss on unit operation.

Objectives

After receiving this instruction, the trainee will be able to:

A. Using a one-line diagram, drawn from memory, describe the power supplies to, and the major loads supplied by, the DC distribution system..

B. Describe the power supplies to and loads supplied by the Black Battery system.

C. Describe the indications and alarms associated with the DC and Black Battery distribution systems.

D. [Given a total loss of either Station Battery bus, describe the effects on station operation, and operator action taken IAW AP-10.06, Loss of DC Power. (SOER #81-15, rec 2a/b/c) SOER 83-05, rec 9)] A component loss is considered a subset of this objective

B Train

l. One PRZR PORV (1-RC-PCV-1456) will not operate due to loss of power to the DC solenoids. One set of indicating lights for both PORVs is lost.

m. "A" and "B" PRZR heaters control power. NOTE: "D" bank of heaters will be lost once the "C" SS busses are lost.

n. "B" and "C" RCPs trip, upon exciter field breaker opening. Again the Hdr to Line SI concern is present.

o. Loss of both BC pumps (AP-19.00 is directed by AP-10.13)

p. Train "B" pumps for SI and Hi Hi CLS have no control power (1-SI-P-1B, 1-RS-P-1B, 1-CS-P-1B, and 1-RS-P-2B).

q. Power to "B" train of Reactor and PRZR vent solenoids is lost.

r. Power to SI ACC solenoids is lost.

s. 1-VS-F-1B CARF will have no control power but will remain running.

t. Loss of all annunciators on the Turbine Supervisory panel.

u. Loss of control power to Unit 1's Deluge system.

v. Control room dampers 1-VS-103B & C have failed closed and 1-VS-F-15 has tripped. (Air bottles will dump)

w. Loss of power to the Intake Structure Supervisory Panel (GETAC).

Ask how a loss of BOTH DC busses will affect the following:

The "B" DC bus supplies power to the opposite train SOVs, so the benchboard control switch can still shut the MSTVs. These SOVs also receive actuation signals from HSF SI and Phase III isolation.

In the event that both DC busses are lost, it will be necessary to use the APP "R" switch on Vertical board 2 or APP "R" Panel (which have battery backups, SVB and HTP 2A3), each switch gets one SOV on each MSTV actuation circuit.

n. All LTDN (1200s, 1460s) and excess (1201) LTDN valves have failed closed. Loop fill and drain valves have failed closed. Charging line isolation, 1-CH-HCV-1310A, has failed open. Control power to 1-CH-P-1A & 1C. Power to SOVs for 1244, 1143, 1389, and LCV-1115A, VCT level control has been lost.

o. Auxiliary spray has failed closed. Couple this with the coastdown of (loss of power) "A" RCP and the operator has only one spray valve to control RCS pressure. This should not be a problem because "C" RCP is the preferred spray valve. However, it can be seen how significant the loss of the "B" DC bus would be on RCS pressure control.

A loss of RCP will initiate a Hdr to Line SI if idle SG AFW is not throttled.

p. One PRZR PORV (1-RC-PCV-1455C) will not operate due to loss of power to the DC solenoids. One set of indicating lights for both PORVs will be lost. PRT valves have failed closed.

A Train

q. "C", "D", and "E" PRZR heater groups control power lost. Pressurizer heater group "D" is powered from "C" 480V which gets control power from "A" DC bus.

H. Describe the RCS Tech Specs, including for the SRO candidate, the basis behind each specification.

I. Prepare a general content outline of the subject matter in Surry Technical Specifications, specifying the major area to which each section is dedicated, including a detailed description of the RCS section of Tech Specs.

Presentation

Distribute all handouts. Refer to/display H/T-9.1, Objectives, and review with trainees.

A. Tech Spec Section 1.0, Definitions

This section presents a number of frequently used terms. However, looking at 10CFR50.36, "Definitions" is not a required section of Tech Specs.

Ask trainees: Why are definitions considered important enough to be a T.S. Section? Answer: To ensure consistency and set a standard for terminology. To provide for uniform interpretation of the specifications.

Review each of the definitions in Tech Spec Section 1.0.

Refer to/display H/T-9.2, 2.0 Safety Limits and Limiting Safety System Settings.

c. With one PORV inoperable and not capable of being manually cycled, within 1 hour either restore the PORV to operable or capable of being manually cycled or close the block valve and remove power from the block valve.

d. With both PORVs inoperable and not capable of being manually cycled, within 1 hour restore at least 1 PORV to operable or capable of being manually cycled. Otherwise close the block valves and remove power from the block valves. Be in HSD within the next 6 hours and reduce RCS temperature to < 350°F within the following 6 hours.

Basis - Remotely operated block valves provide a positive shutoff capability should a PORV become inoperable or leak.

e. With one block valve inoperable, within 1 hour either restore the block valve to operable status or place the associated PORV in manual. In addition, restore the block valve to operable status within the next 72 hours or, be in at least HSD within the next six hours and reduce the RCS Tave to < 350°F within the following 6 hours.

f. With both block valves inoperable, within one hour either restore the block valves to operable status or place the associated PORVs in manual. Restore at least one block valve to operable status within the next hour or, be in at least HSD within the next six hours and reduce RCS Tave to < 350°F within the following 6 hours.

7. Tech Spec 3.1.A.7 - Reactor Head Vents

Requires at least two head vent paths consisting of two series isolation valves to be operable and closed whenever greater than 350°/450#.

6. Relief Valves

Two power operated relief valves (PORVs) and their associated block valves shall be OPERABLE* whenever the Reactor Coolant System average temperature is ≥350°F.

a. With one or both PORVs inoperable but capable of being manually cycled, within 1 hour either restore the PORV(s) to OPERABLE status or close the associated block valve(s) and maintain power to the associated block valve(s). Otherwise, be in at least HOT SHUTDOWN within the next 6 hours and reduce Reactor Coolant System average temperature to <350°F within the following 6 hours.

b. With one PORV inoperable and not capable of being manually cycled, within 1 hour either restore the PORV to OPERABLE status or capable of being manually cycled or close the associated block valve and remove power from the block valve. In addition, restore the PORV to OPERABLE status or capable of being manually cycled within the following 72 hours. Otherwise, be in at least HOT SHUTDOWN within the next 6 hours and reduce Reactor Coolant System average temperature to <350°F within the following 6 hours.

c. With both PORVs inoperable and not capable of being manually cycled, within 1 hour restore at least 1 PORV to OPERABLE status or capable of being manually cycled. Otherwise, close the associated block valves and remove power from the block valves. In addition, be in HOT SHUTDOWN within the next 6 hours and reduce Reactor Coolant System average temperature to <350°F within the following 6 hours.

*Automatic actuation capability may be blocked when Reactor Coolant System pressure is below 2000 psig.

4ʸ

1. 062AA1.05 001/T1G1/T1G1/SURGE TANK/C/A 3.1/3.1/N/SR02301/C/RLM
   -Unit 1 is at 100% power
   -The unit is scheduled for a Refueling shutdown at the end of the week
   -Maintenance activities are in progress which cause MOV-SW-102, Component Cooling Water Supply valve to close.

   Which ONE of the following effects would occur?

   A. Reactor power would slightly increase and Component Cooling Water Surge Tank level will increase.

   B. Reactor power would slightly increase and Component Cooling Water Surge Tank level will decrease.

   C. Reactor power would slightly decrease and Component Cooling Water Surge Tank level will increase.

   D. Reactor power would slightly decrease and Component Cooling Water Surge Tank level will decrease.

   Ref: Surry lesson plans; ND-88.3-LP-2, p.9
   ND-89.5-LP-2, objective H
   ND-88.5-LP-1, objective G
   ARP 0-VSP-D7 (CCW surge tank hi-lo)

   Answer C is correct because loss of Service water will cause CCW to heatup and expand, causing the surge tank level to increase. Reactor power will will decrease due to the letdown demin beds releasing boron due to temperature rise.

   Note to self: Need to check to see if LI-OH resin releases boron on heatup. If so, remove the end of life statement in stem. Surry uses H-OH resin at end of life.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	C B B A A D D B C D	Scramble Range: A - D

RO Tier:	T1G1	SRO Tier:	T1G1
Keyword:	SURGE TANK	Cog Level:	C/A 3.1/3.1
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

	PROCEDURE TITLE	REVISION
Ø-VSP-01	CC SURGE TK HI-LO LVL	1
		PAGE
		1 of 4

VSP-30

[illegible]NCES

1. UFSAR - Section 5.2
2. 11448-FM-72
3. 11448-ESK-10HE
4. 81-91-019
5. ()-OPT-RC-10.0, Reactor Coolant Leakage

[illegible]ABLE CAUSES

1. Alarm is actuated when LS-CC-100-1 senses CC Surge Tank level greater than or equal to 93.0%.

   High level may be caused by one or more of the following:

   - Heat exchanger tube leak from a system operating at a pressure greater than CC pressure.
   - Thermal expansion due to a loss of SW flow or a large increase in heat load.

2. Alarm is actuated when LS-CC-100-2 senses CC Surge Tank level less than or equal to 30.0%.

   Low level may be caused by one or more of the following:

   - Heat exchanger tube leak from a system operating at a pressure less than CC.
   - Piping or component leak or break.

3. Instrumentation failure has occurred.

ENTERED BY
MAR 1 1993
SHB

APPROVAL RECOMMENDED	APPROVED	DATE
Tom Holcomb	CHAIRMAN STATION NUCLEAR SAFETY AND OPERATING COMMITTEE	3-1-93
REVIEWED J. Fisher		

C. State in general the flowpath of service water from the high level intake to the discharge tunnel for the systems served by service water.

D. Describe the Charging Pump Service Water System.

E. Describe the MCR Chiller Service Water System.

F. Explain the controls associated with the system.

G. State the technical specifications associated with the Service Water Systems, including for SRO candidates, the basis behind these specifications.

H. Describe the system interconnections associated with the Service Water Systems, flowpaths affected and safety implications of stop logging, and abnormal procedures associated with the systems.

I. Describe in detail the Service Water Systems.

Presentation

Distribute all handouts. Refer to/display H/T-2.1, Objectives, and discuss objectives with trainees.

A. Purpose of Service Water System

1. Maintain water in the intake canal for long-term cooling of safety-related systems, including:

a. Recirculating spray (for post-accident cooling of containment)

(6) To the outlet line from Unit 2 C BC heat exchanger.

F. System Indications and Controls

1. Indications

a. BC H/X's have local temperature and pressure readings.

b. CC H/X's have local temperature, pressures, differential pressure and flow readings.

The flow sensors use a portable differential pressure gage.

c. RS H/X's have flow and temperature sensors with read outs in the MCR.

2. Controls

a. MOV-SW-101A, B (BC H/X Supply)

(1) Operated from benchboard 1-1

(2) Valves receive an automatic closure signal on either of the following:

(a) Intake canal level 23 feet, 6 inches

(b) High-high CLS with a blackout

b. MOV-SW-102A, B (CC H/X and SW-P-4 Supply)

(1) Operated from benchboard 1-1

D. Summarize the contents of the normal and abnormal procedures associated with the component cooling system, including:

- Normal system operation
- AP-15.00, Loss of Component Cooling
- AP-16.00, Excessive RCS Leakage

E. State the technical specifications associated with the component cooling system, including for SRO candidates, the basis behind these specifications.

F. Describe the major system components and operation of the Chilled CC System, including:

- System purposes and components supplied
- Heat Exchangers and Valves
- Chilled CC pumps
- Indications and controls

G. Describe the overall integrated operations of the component cooling system.

Presentation

Distribute all handouts. Refer to/display H/T-1.1, Objectives, and review with trainees.

A. System Components

1. The component cooling system purpose is to provide a cooling medium for various heat loads of each reactor unit. It also acts as a barrier against the release of radioactivity to the environment.

2. CC Surge Tank

a. The CC surge tank provides the NPSH for the CC pumps. It is located approximately 30 feet above the pumps, ensuring that an adequate head exists at the pump suction to prevent cavitation. The surge tank allows for fluid expansion and contraction and provides a source of makeup to the system.

b. The surge tank has a capacity of 2810 gallons and is normally maintained approximately 60% full, allowing sufficient volume to accommodate minor system surges and thermal swell due to cooldown operations.

c. Makeup water is provided by the condensate system via the bearing cooling makeup pump (1-BC-P-2) or the high pressure condensate header. There is no automatic makeup control provided, therefore, both sources of makeup water require a manual valve lineup in the Turbine Building basement.

d. The tank is vented to the process vent system via HCV-CC-100. This vent valve will automatically close upon receipt of a CC radiation monitor alarm.

3. Component Cooling Pumps

a. The CC pumps provide the motive force for circulating cooling water through the CC heat exchangers, individual system loads, and back to the pump suction. Normally two pumps (one per unit) supply the required cooling water flow. The two standby pumps provide 100% backup capability. The standby pump will auto start on a low discharge header pressure of 55 psig.

b. Each pump is rated at 9000 gpm at 200 ft. head.

(2) Cooled by Component Cooling (CC) system. CC flow is controlled to maintain letdown temperature at setpoint. The CC outlet TCV is controlled by a Hagan full station on BB 1-1. TE-1144, located on the L/D outlet of the HX, provides input to the hagan station for control. TI-1144 provides control board indication of letdown temperature on VB 1-1.

letdown

(3) Located in room across from IX alley (old gate 14).

h. FI-1150

(1) Provides letdown flow indication on vertical board 1-1.

(2) Normal letdown flowrate should be ~ 105 gpm at normal operating pressures.

i. PCV-1145

(1) Maintains upstream pressure at ~ 300 psig to prevent flashing of water leaving the orifices. Pressure is not reduced until temperature is reduced in the NRHX.

(2) Located in the NRHX cubicle.

(3) Controlled by a Hagan full station on BB 1-1.

(3) Design flowrate through each bed is 120 gpm. This is the reason letdown flow is maintained at 105 gpm.

(4) Normally one bed is in service and one in standby.

p. Cation IX

(1) One per unit located on IX alley.

(2) Loaded with H^+ type resin. Used to increase pH by removing excess free lithium. Too much lithium removes OH ions, pushing the pH in the acidic direction. Excess lithium is formed by the neutron-boron reaction.

(3) The cation IX is placed in service at the request of the chemists.

(4) It can also be used to remove cesium from the RCS.

(5) Design flowrate through the cation IX is 60 gpm. This flow is achieved by partially bypassing the IX when it is in service.

q. Deborating IXs

(1) Two per unit located on IX alley. Loaded with OH type resin.

(2) Used near the end of life for removing boron from the RCS. Generally used when Boron concentration is less than 50 ppm.

QUESTIONS REPORT
for Surry2002

+7

1. 063A4.02 001

Which one of the following is an indication of a "10K positive ground" on a 125 VDC Bus?

A. Bus Voltage indication is HIGH, current indication is LOW, and the control board ground indicating light is ON.

B. Bus Voltage indication is LOW, current indication is normal, and the control board ground indicating light is ON.

C. Bus Voltage indication is Normal, current indication is normal, and the control board ground indicating light is OFF.

D. Bus Voltage indication is HIGH, current indication is LOW, and the control board ground indicating light is OFF.

Ref: Surry Exam Bank question # 723.
Surry lesson Plan ND-90.3-LP-6 objective C; ND-90.3-LP-7 objective F.

A. Incorrect, The ground indication light should be off if a ground is present.

B. Incorrect, The ground indication light should be off if a ground is present.

C. Correct, The ground indication light should be off if a ground is present, and the voltage and current should be normal.

D. Incorrect, The ground indication light should be out, if a ground was present, however the voltage would not be high and the current should not be low.

MCS	Time:	1	Points:	1.00	Version:	0 1 2 3 4 5 6 7 8 9	
					Answer:	C A C C A A B A C B	Scramble Range: A - D

RO Tier:	T2G2	SRO Tier:	T2G1
Keyword:		Cog Level:	M/2.8/2.9
Source:	B	Exam:	SR02301
Test:	C	Misc:	GWL

Work - Bright, Both one.
Dim.

LESSON PLAN

Introduction

The most vital electrical components, those required to monitor essential core, reactor coolant, and control system parameters, are powered from the Station 125 VDC System. This system, through its chargers, batteries, and distribution panels, is the most reliable source of electricity in the station. Since it controls the output of such vital equipment, its loss is devastating to the operator's ability to control the plant.

This lesson plan will discuss location of the various components in the 125 VDC Distribution System. It will also discuss various loads on the 125 VDC Distribution Systems and the affect of their loss on unit operation.

Objectives

After receiving this instruction, the trainee will be able to:

A. Using a one-line diagram, drawn from memory, describe the power supplies to, and the major loads supplied by, the DC distribution system..

B. Describe the power supplies to and loads supplied by the Black Battery system.

C. Describe the indications and alarms associated with the DC and Black Battery distribution systems.

D. [Given a total loss of either Station Battery bus, describe the effects on station operation, and operator action taken IAW AP-10.06, Loss of DC Power. (SOER #81-15, rec 2a/b/c) SOER 83-05, rec 9)]

C. Describe the Annunciators associated with the 4160V and 480V Station Service and Emergency Distribution systems.

D. Describe the purpose and effects of Load Sequencing on Emergency Distribution loads.

E. Describe the purpose and effects of a Degraded or Undervoltage condition on an Emergency Bus.

F. [Describe the means used at Surry to detect and isolate grounds on station electrical systems. <u>SOER 90-01, Recommendation 4 and 5</u>.]

G. Given copies of AP-10.07, Loss of Power, and AP-10.08 Station Power Restoration, explain the steps necessary to operate the station following a total or partial loss of power.

H. Describe the requirements of Tech Spec section 3.9 and 3.16 concerning the electrical distribution system, including for SRO candidates, the bases behind these specifications.

I. [Given an electrical system transient, describe the effects on unit operation of breaker protective devices, interlocks, and Load Sequencing; include Annunciator alarms expected, Abnormal Procedures used, and Tech Spec requirements that may apply. <u>SOER 83-06, Recommendation 4</u>.]

723 **ID: DC00007** **Points: 1.00**

Which ONE of the following is an indication of a "10 K positive ground" on a 125 VDC bus?

A. Bus voltage indication is HIGH, current indication is LOW, and the control board ground indicating light is ON.

B. Bus voltage indication is normal, current indication is normal, and the control board ground indicating light is OFF.

C. Bus voltage indication is LOW, current indication is LOW, and the control board ground indicating light is OFF.

D. Bus voltage indication is LOW, current indication is normal, and the control board ground indicating light is ON.

Answer: B

Question 723 Details

Question Type:	Multiple Choice
Topic:	DC00007
System ID:	73141
User ID:	DC00007
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-90.3-LP-6C; ND-90.3-LP-7F [S96-1183], [S96-1180]

1. 064A2.06 001

- The Unit is in a refueling outage.
-A loss of site powr occured at 0200.
-The time is now 0700 and the # 1 EDG has been loaded at 550 KW since the event occured.

Which one of the following describes what needs to be done to satisfy the precautions and limitaions and why.

A. Load the # 1 EDG to full load for 15 minutes, to allow maximum air flow to cool the Turbochargers.

B. Load the # 1 EDG to 1150 KW for 30 minutes, to allow maximun air flow to cool the Turbochargers.

C. Load the # 1 EDG to full load for 15 minutes, to help prevent a stack fire.

D. Load the # 1 EDG to 1150 KW for 30 minutes, to help prevent a stack fire.

Surry Lesson Plan: ND-90.3-LP-1. Objective I.

A. Incorrect, The EDG does not have to be brought to full load but should be loaded > 30 minutes at > 1150 KW to burn the carbon out, and this will not cool the turbocharger.

B. Incorrect, This is the correct loading, but it will not cool the turbocharger.

C. Incorrect, This loading is not correct.

D. Correct, This is the correct loading to burn the carbon out and help prevent a stack fire.

MCS	Time:	1	Points:	1.00	Version:	0 1 2 3 4 5 6 7 8 9
					Answer:	D B D C C D D C A D

Scramble Range: A - D

RO Tier:	T2G2	SRO Tier:	T2G2
Keyword:		Cog Level:	C/A 2.9/3.3
Source:	N	Exam:	SR02301
Test:	C	Misc:	GWL

Talk to Mike

D. Describe the power sources required for EDG operation.

E. Describe the sequence of events that occur on an EDG start or stop signal.

F. Describe the indications and controls located on the Engine Control Cabinet (ECC).

G. Describe the function of the components located in the Remote Excitation Cabinet.

H. Describe the control and indications associated with the EDG control panels, including any differences that exist between #1/2 and #3 EDG panels.

I. Describe the precautions and limitations associated with the EDGs.

J. Given the failure of #1 or #2 EDG to start or load, utilize AP-17.04 to diagnose the problem, correct it, and restore the EDG to service.

K. Given the failure of #3 EDG to start or load, utilize AP-17.05 to diagnose the problem, correct it, and restore the EDG to service.

L. Given a copy of FCA-12.00, utilize this procedure to establish local control of EDG #1 or #2.

M. Describe the Tech Spec requirements for the EDG and support systems, including for SRO candidates, the basis for these requirements.

N. [Describe the EDGS, including operation, controls, support systems, and procedures utilized for operation. SOER 83-01, Recommendation 4].

d. The <u>auxiliary oil pump</u> (soak back pump) is an AC motor driven pump that runs continuously when the EDG is shutdown. The soak back pump provides three (3) special functions when the engine is shutdown:

(1) When the engine is operating under load for a period of time, the turbocharger gets very hot. When the engine stops, this heat is transferred to the thrust bearing which can cause the bearing to fail. The soak back pump removes this heat by circulating a small amount of oil to the bearings when the engine is stopped.

(2) The oil is circulated through the oil cooler when the engine is stopped, by the soak back pump so that the immersion heaters can keep it warm.

(3) The strainer housing must be kept full for immediate NPSH to the main bearing oil pump in the event the engine auto-starts. The soak back pump keeps the strainer housing full when the engine is stopped.

e. During a period of 15 minutes to 3 hours after shutdown, the EDG Turbocharger is susceptible to excessive bearing wear. This occurs because the Aux. oil pump cannot develop sufficient L. O. Pressure to keep proper lubrication at the turbocharger bearing during this period should a repeat start occur. This problem and its solution are discussed in "EMD Report on Engine Failures Due to Repeat Starts."

Refer to AIA-1.1, EMD Report on Engine Failures Due to Repeat Starts (3 pages), and discuss with the class.

I. #1 EDG Operations

Direct trainees to refer to AIA-1.3, EDG Precautions and Limitations, for the following discussion.

1. Precautions and limitations

   a. Review the status of all safety related systems. Initiation of a 6/30 hr clock can result IAW T.S. 3.0.2.

   b. The following operating limitations apply:

      (1) Maximum load 2750 KW

      (2) Output voltage 4000 - 4400 volts

      (3) Load rate 500 KW/min

      (4) Maximum KVAR rating 2,066 KVAR in or out. Should normally be maintained between 100 and 500 kVAR out.

      (5) The electric driven lube oil pump shall be operating when the EDG is shutdown to provide pre-start lubrication and post shutdown cooling of the turbocharger bearing.

      (6) High inlet pressure on the in-service fuel filter is indicative of a clogged or dirty filter. Shifting filters is required. Mid-positioning of the selector lever (both filters in service) is prohibited. All system leaks shall be evaluated by the Shift Supervisor and system Engineer.

(7) Extended light load operation of the EDG can result in exhaust port carbon buildup or "souping". This can result in a stack fire. To prevent this, the following limitations apply:

(a) If the EDG has operated > 8 hours at idle speed (470-490 RPM) or has been loaded < 570 kW for > 4.5 hours, the EDG shall be operated at 1150 kW for at least 30 minutes prior to shutdown.

(b) When increasing load for this condition, the load rate shall not exceed 75 kW/minute.

(8) Air box drains are normally left open to prevent the accumulation of oil. Lube oil injected with intake air can result in a run-away diesel conditions.

(9) Improper operation of the governor speed droop setting can result in EDG overload.

(10) During pre-start jacking of the EDG, if fluid is detected at the cylinder head test valves, the EDG shall not be started.

(11) The EDG base tank will be verified > 290 gallons prior to engine shutdown. The transfer pumps from the wall to the base tank receive power from the generator field.

c. Testing of both the unit diesels concurrently, adjusting shunt reactors, or operation of 4160 motors shall not be performed during operation of an EDG.

773 **ID: EE00032** **Points: 1.00**

Which ONE of the following conditions will result in the applicable EDG being declared inoperable?

A. The EDG base fuel tank level is 200 gallons and the wall tank level is approximately « full.

B. One train of the fuel supply from the underground fuel oil tanks OOS for 6 hours.

C. #1 EDG battery.

D. The diesel driven air compressor becomes inoperable.

Answer: C

Question 773 Details

Question Type:	Multiple Choice
Topic:	EE00032
System ID:	73242
User ID:	EE00032
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-90.3-LP-7H; SROUTP-SDS-1/K; TS 3.16 [S99-0229B], [S96-1037], [S94-1163D]

774 **ID: EE00033** **Points: 1.00**

The term "SOUPING" as applied to the EDG's, usually results from which ONE of the following conditions?

A. Frequency drop resulting from the starting current draw of a large electrical load.

B. An EDG not capable of being shutdown by normal means.

C. Frequency swings caused by misadjustment of the governor speed droop.

D. Excessive carbon build up in the exhaust ports caused by light load operation for extended periods of time.

Answer: D

H9 /

1. 067AK1.02 001

A fire has been reported in a small, oil-cooled transformer that is not covered by a permanant fire protection system. The transformer may be energized.

Which one of the following indicates the fire class rating of the portable fire extinguisher that must be used in this situation?

A. A and B
B. C and D
C. A and D
D. B and C

Surry Exam bank question # 288.
AP- 48.00.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	D C C D C D C D C C	Scramble Range: A - D	

RO Tier:	T1G1	SRO Tier:	T1G1
Keyword:		Cog Level:	3.1/3.2
Source:	B	Exam:	SR02301
Test:	C	Misc:	GWL

288 **ID: AOP0145** **Points: 1.00**

A fire has been reported in a small, oil-cooled transformer that is not covered by a permanent fire protection system. The transformer may be energized.

Which ONE of the following indicates the fire class rating of the portable fire extinguisher that must be used in this situation?

A. A and B.

B. C and D.

C. B and C.

D. A and D.

Answer: C

Question 288 Details

Question Type:	Multiple Choice
Topic:	AOP0145
System ID:	72609
User ID:	AOP0145
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	AP-48.00 [S95-0508]

50

1. 068AK2.03 001

-Both Units are being shutdown due to a fire in the Main Control Room.
-The main turbine has failed to trip using the MANUAL push-buttons.
-The main steam trip valves (MSTVs) will not close from the Main Control Board.

Which one of the following alternate methods should be used to trip the main turbine per 0-FCA-1.00, Limiting MCR Fire?

A. Dispatch an operator to trip the main turbine locally at the turbine.

B. Close the MSTVs using FIRE EMERG CLOSE switch on APP R Panel in ESGR.

C. Dispatch an operator to trip the auto stop oil pump locally at the pump.

D. Open the main generatior output breakers.

Ref: Surry Exam bank question #885.
Lesson Plan ND-95.6-LP-3 Objective B.

A, C, D, Incorrect, The procedure has the operator Close the MSTVs using the FIRE EMERG CLOSE switch on APP R Panel in ESGR.

B. Correct. Based on procedure.

MCS	Time: 1	Points: 1.00	Version: 0 1 2 3 4 5 6 7 8 9		
			Answer:		Scramble Range: A - D
RO Tier:	T1G1		SRO Tier:	T1G1	
Keyword:			Cog Level:	M 2.9/3.1	
Source:	B		Exam:	SR02301	
Test:	C		Misc:	GWL	

LOOK AT.

LESSON PLAN

Introduction

This lesson plan will provide a discussion of FCA 1.00 through FCA 9.00 and FCA 17.00. Each of these FCAs provide the guidance to deal with fires in each of the nine specific fire areas where disabling of safe shutdown equipment can occur. The FCAs in this group have a step arrangement and wording similar to steps in the ERG Procedures. It is not the intent of this lesson plan to discuss each step performed in each FCA. It is the intent to identify those steps or group of steps that differentiate these procedures from the similar ERG procedures. Additionally, AP 48.00, Operations Fire Response, will be discussed since it provides the initial path into the FCAs.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the operations response to a station fire, implementation of AP 48.00.

B. Describe the operations involved in achieving plant control at the auxiliary shutdown panel to stabilize the unit at HSD and CSD conditions following implementation of FCA-1.00, Limiting Main Control Room Fire.

C. Describe the operations involved in achieving stable HSD conditions following implementation of FCA 2.00, Limiting Unit 1 Containment Fire.

D. Describe the operations involved in achieving stable HSD conditions following implementation of FCA 3.00, Limiting Cable Vault and Cable Tunnel Fire.

E. Describe the operations involved in achieving stable HSD conditions following implementation of FCA 4.00, Limiting ESGR Number 1 Fire.

885 **ID: EOP0134** **Points: 1.00**

The following plant conditions exist:

ù Both Units are being shutdown due to a fire in the Main Control Room.
ù The main turbine has failed to trip using the MANUAL push-buttons.
ù The main steam trip valves (MSTVs) will NOT close from the main control board.

Which ONE of the following alternate methods should be used to trip the main turbine per 0-FCA-1.00, Limiting MCR Fire?

A. Close the MSTVs using FIRE EMERG CLOSE switch on APP R Panel in ESGR.

B. Dispatch an operator to trip the main turbine locally at the turbine.

C. Open the main generator output breakers.

D. Dispatch an operator to trip the auto stop oil pump locally at the pump.

Answer: A

Question 885 Details

Question Type:	Multiple Choice
Topic:	EOP0134
System ID:	73424
User ID:	EOP0134
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.6-LP-3B; FCA-1.00 [S96-1398]

51

1. 068K6.10 001

The Unit is operating at 100% power when the following alarms annunciate on the Radiation Monitoring (RM) Alarm Panel.

-Discharge Tunnel Alert.
-Discharge Tunnel High.

The Third Control Room RO notes the following:

Red and Yellow alarm Lilghts are lit. Lights
The Green light is out.
Meter indication is 100,000cpm.

Which one of the following actions shall be taken in response to these indciations?

A. No Actions are required since the RM is inoperable.

B. Continue any LW releases as long as HP is obtaining grab samples.

C. Verify all automatic acions have occurred, then direct HP to obtain grab samples. t

D. Secure all LW releases. If RS is in service, ensure RS SW radiation monitors are operable.

Surry Exam bank question # 1977.
Lesson plan ND-93.5-LP-1 Objective A.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: Scramble Range: A - D

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:		Cog Level:	2.5/2.9
Source:	BANK	Exam:	SR02301
Test:	C	Misc:	GWL

LESSON PLAN

Introduction

NRC regulations require that all effluent processes be monitored for radioactivity. The radiation monitoring system provides this function. The radiation monitoring system can be basically broken down into two groups, a pre-TMI and a post-TMI system. This lesson plan will cover the pre-TMI monitoring system. The radiation monitoring system is required to isolate effluent flow paths in the event of high radiation. If the automatic functions do not occur, it is the operator's responsibility to manually perform the isolation to prevent the release of radioactive material to the public. This lesson plan will provide the trainee with the knowledge necessary to perform this operation.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the Victoreen Area Radiation Monitoring System.

B. Describe the operation of the Victoreen Process Radiation Monitoring System.

C. Describe the operation of the Victoreen Radiation Monitoring System.

Presentation

Distribute all handouts. Refer to/display H/T-1.1, Objectives, and review with the trainees.

A. Area Monitors

1. Purpose

Question 1976 Details

Question Type:	Multiple Choice
Topic:	RM00013
System ID:	74969
User ID:	RM00013
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-93.5-LP-1A [S96-0091B]

1977 **ID: RM00014** **Points: 1.00**

The Unit is operating at 100% power when the following alarms annunciate on the Radiation Monitoring (RM) Alarm Panel:

ù Discharge tunnel - alert
ù Discharge tunnel - high

The Third Control Room RO notes the following:

ù Red and yellow alarm lights are lit.
ù Green light is out.
ù Meter indication is EEEEE CPM.

Which ONE of the following actions shall be taken in response to these indications?

A. Secure all LW releases. If RS in service, ensure RS SW Radiation Monitors are operable.

B. Verify all automatic actions have occurred, then direct HP to obtain grab samples.

C. No actions are required since the RM is inoperable.

D. Continue any LW releases and direct HP to obtain grab samples.

Answer: A

1. 071A4.07 001/T2G1/T2G1/FLOW CONTROLLER/C/A 3.0/3.0/N/SR02301/C/RLM
-A Waste Gas Decay Tank release is in progress on Unit1
-FI-GW-101 indicates 2.0 CFM
-FCV-GW-101 is in manual and being controlled by an operator

Which ONE of the following will cause flow rate to decrease?

A. A containment vacuum pump trips.
B. Aux Bldg Supply Fan HV-1A trips
C.✓ A process vent blower trips.
D. Waste gas pressure control valve 1-PCV-GW-103 fails open.
Ref: Surry Lesson Plan ND-92.4-LP-1, obj E

Answer A is incorrect because tripping the containment vacuum pump will decrease the exhaust into the common header shared by the Waste Gas FCV. This will cause the pressure in the header to decrease, which will in turn cause d/p across the FCV increase thus causing the flow across the fixed position WGDT discharge valve to increase.

Answer B is incorrect because tripping the supply fan in Aux Bldg will cause Aux Bldg pressure to decrease, causing less flow to enter the common header. This will cause the pressure in the header to decrease, which will in turn cause d/p across the FCV increase thus causing the flow across the fixed position WGDT discharge valve to increase.

Answer C is correct because the process vent blower tripping causes the header pressure upstream of the fan to increase. This will cause the pressure in the header to increase, which will in turn cause d/p across the FCV decrease thus causing the flow across the fixed position WGDT discharge valve to decrease.

Answer D is incorrect, because the PCV is upstream of the FCV and failing open causes the d/p across the FCV to increase and thus flow to increase.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	C C B C C D B A A B	Scramble Range: A - D	
RO Tier:	T2G1		SRO Tier:	T2G1		
Keyword:	FLOW CONTROLLER		Cog Level:	C/A 3.0/3.0		
Source:	N		Exam:	SR02301		
Test:	C		Misc:	RLM		

OBJECTIVES

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the Boron Recovery System.

B. Describe the operation of the Gaseous Waste System.

C. Describe the operation of the Vents and Drains System.

D. Describe the operation of the Liquid Waste System.

E. Describe the integrated operation of the liquid and gaseous waste processing systems.

a. PCV-GW-103 maintains a constant pressure on the inlet to the flow control valve. A pressure transmitter is installed to display this pressure on the WD panel (PI-GW-103).

b. Flow control valve FCV-GW-101 regulates the rate of gas bleed flow.

(1) It is controlled by a MAN/AUTO flow controller and a two-position (OPEN/CLOSE) handswitch. With the handswitch in the OPEN position, the flow controller controls the operation of the FCV (in CLOSE it prevents FCV operation). The flow controller in MANUAL allows valve positioning by use of the up/down pushbuttons. In AUTO, the controller positions the FCV using the setpoint determined by the controller's potentiometer.

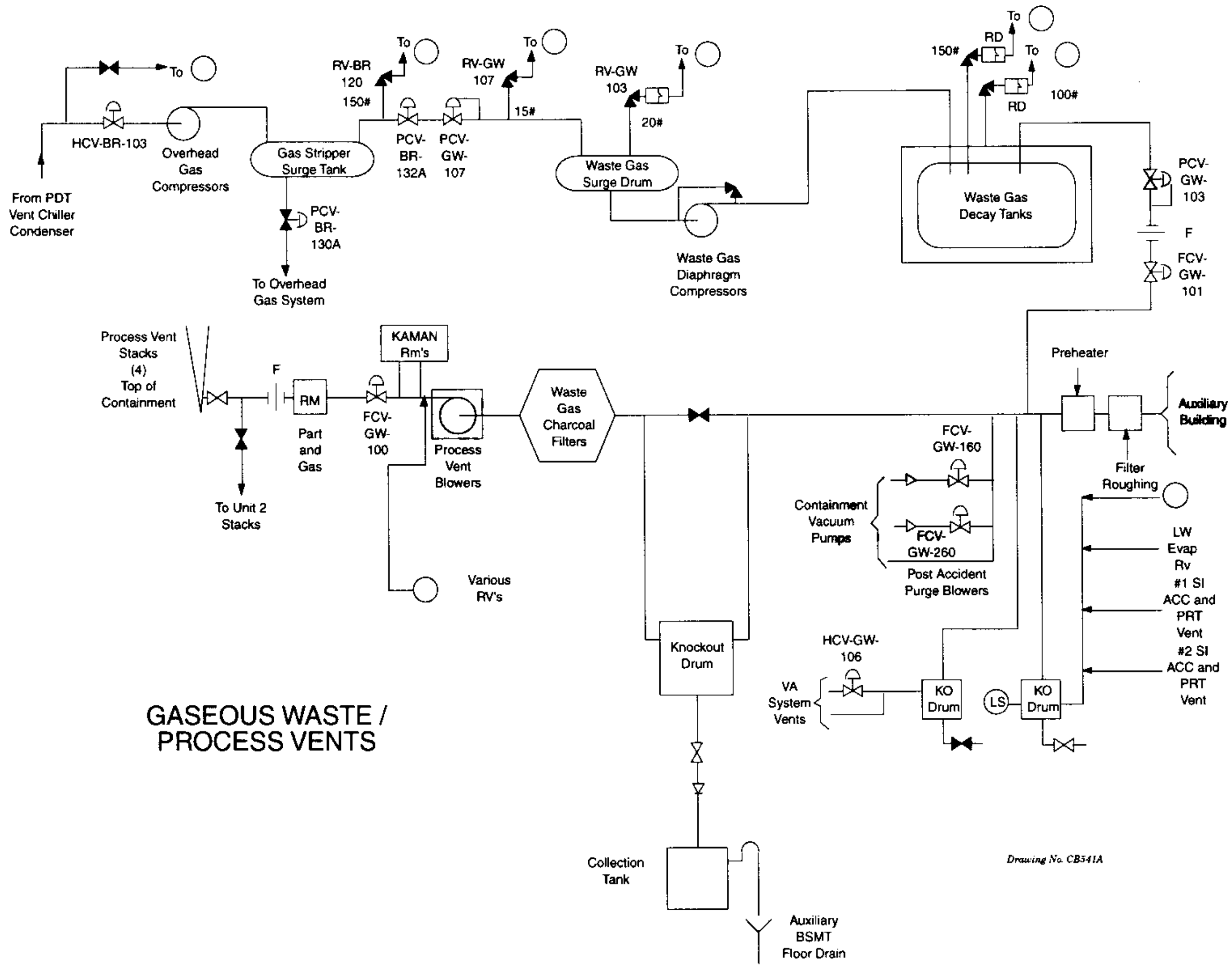
(2) When a high radiation signal is received from RM-GW-101, -102, or 130-1 (process vent particulate, gas or PV Kaman), the solenoid valve repositions and vents air from the FCV causing the valve to close.

(3) A flow indicator, FI-GW-101, on the bleed line indicates the flow entering the PV system from the WGDTs. This indicator has a 0 to 3.0 cfm range.

7. The Process Vents Subsystem normally receives gaseous wastes from the following sources:

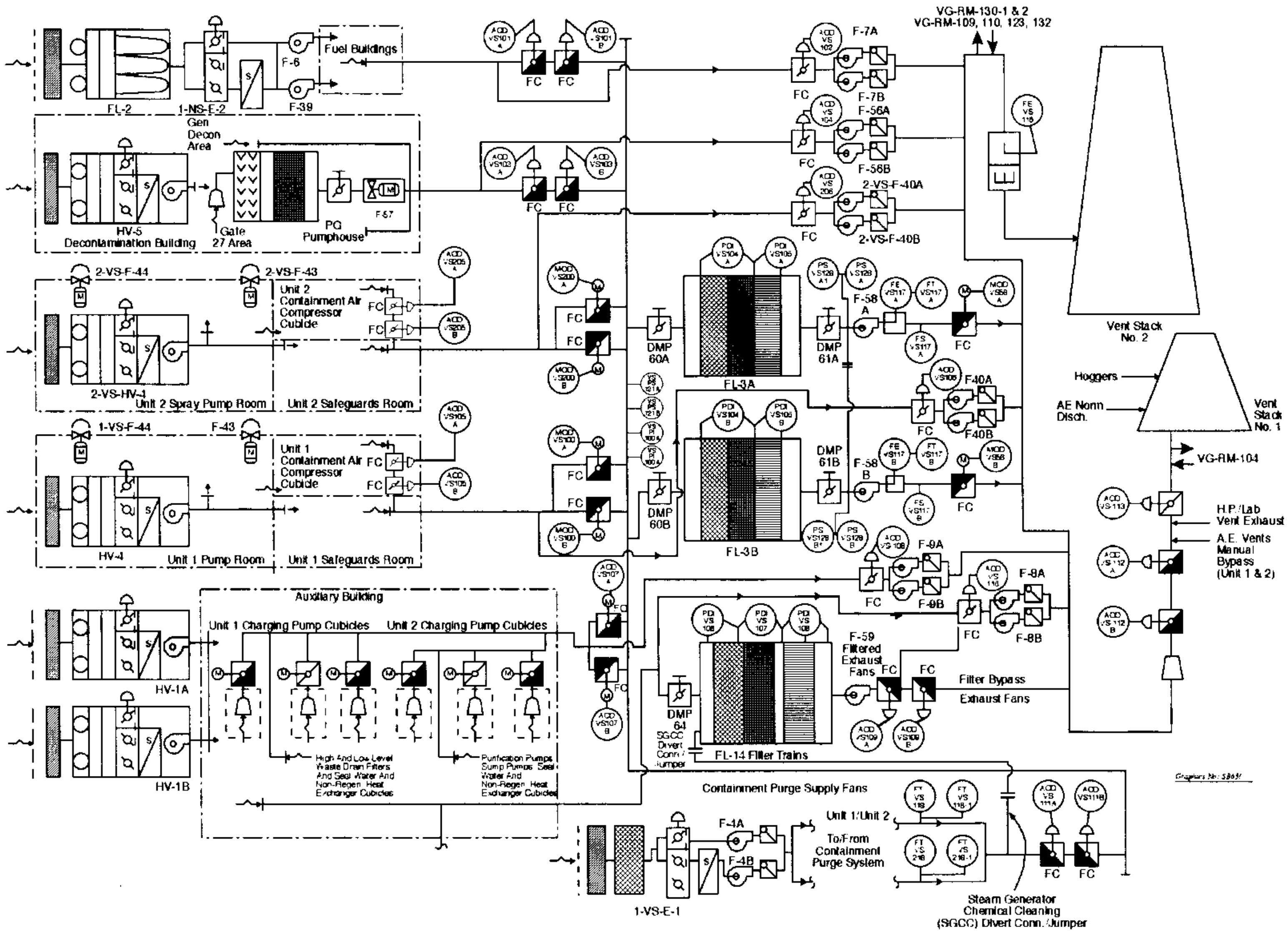
a. Containment vacuum pumps

b. VA system vents (HCV-GW-106)



GASEOUS WASTE / PROCESS VENTS

Drawing No. CB541A



VG-RM-130-1 & 2
VG-RM-109, 110, 123, 132
Fuel Buildings
F-6
F-39
FL-2
1-NS-E-2
Gen Decon Area
HV-5
Decontamination Building
Gate 27 Area
PQ Pumphouse
F-57
2-VS-F-44
2-VS-F-43
Unit 2 Containment Air Compressor Cubicle
2-VS-HV-4
Unit 2 Spray Pump Room
Unit 2 Safeguards Room
1-VS-F-44
F-43
Unit 1 Containment Air Compressor Cubicle
HV-4
Unit 1 Pump Room
Unit 1 Safeguards Room
Auxiliary Building
Unit 1 Charging Pump Cubicles
Unit 2 Charging Pump Cubicles
HV-1A
HV-1B
High And Low Level Waste Drain Filters And Seal Water And Non-Regen Heat Exchanger Cubicles
Purification Pumps Sump Pumps Seal Water And Non-Regen Heat Exchanger Cubicles
F-7A
F-7B
F-56A
F-56B
2-VS-F-40A
2-VS-F-40B
DMP 60A
DMP 60B
FL-3A
FL-3B
DMP 61A
DMP 61B
F-58 A
F-58 B
F40A
F40B
F-9A
F-9B
F-8A
F-8B
F-59 Filtered Exhaust Fans
DMP 64
SGCC Divert Conn./Jumper
FL-14 Filter Trains
Filter Bypass
Exhaust Fans
Vent Stack No. 2
Vent Stack No. 1
Hoggers
AE Norm Disch.
VG-RM-104
H.P./Lab Vent Exhaust
A.E. Vents Manual Bypass (Unit 1 & 2)
Containment Purge Supply Fans
Unit 1/Unit 2
To/From Containment Purge System
F-4A
F-4B
1-VS-E-1
Steam Generator Chemical Cleaning (SGCC) Divert Conn./Jumper
FC

53

1. 072A2.02 001/T2G1/T2G1/DETECTOR FAILURE/C/A 2.8/2.9/N/SR02301/C/RLM
Unit 1 is in a Refueling Outage with Containment Purge in operation.

The 'FAIL' alarm actuates on Area Radiation Monitor 1-RM-RI-161, Containment High ~~Radiation~~ Gamma.
Range

Which ONE of the following indicates a detector failure and what action should be taken.

A. MPU FAILURE, verify Containment Purge valves close and the supply fans trip.
B.✓ NO COUNT FAILURE, initiate a work request
C. MPU FAILURE, initiate a work request, verify Containment Instrument Air Swapped....
D. NO COUNT FAILURE, verify Containment Purge valves close and the supply fans trip.

Ref: Surry lesson plan: ND-93.5-LP-1, obj A
Answers A & D incorrect because this rad monitor does not affect purge operation (RM-159,160 or 162)
Answer C incorrect because it relates to a 'watch dog circuit' internal to the panel
Answer B correct because a detector or high voltage failure actuates this alarm and in the absence of other guidance, ARP 1-RM-K7 for this instrument indicates writting a work request if instrument has failed.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	B C C B A B B A A A	Scramble Range: A - D	

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:	DETECTOR FAILURE	Cog Level:	C/A 2.8/2.9
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

Level of detail

OBJECTIVES

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the Victoreen Area Radiation Monitoring System.

B. Describe the operation of the Victoreen Process Radiation Monitoring System.

C. Describe the operation of the Victoreen Radiation Monitoring System.

Several equipment failure conditions are monitored which produce a FAIL alarm and in some cases an error message. The fail condition is "TRUE" whenever any equipment failure is detected and "FALSE" when no equipment failures are detected. When a fail condition occurs, other than power failure, the red FAIL alarm indicator illuminates and the fail relay coil de-energizes. The Fail alarm logic is always fail-safe and the following is a brief description of the ratemeter failure modes:

- **Power Failure** - If power is lost to the ratemeter, the bargraph, alarm indicators, and the displays are blanked (turned off). The HIGH, WARN, and FAIL relay coils de-energize and open the alarm contacts.

- **No Count Failure** - If no pulses are received by the ratemeter for five minutes (30 minutes on the air ejector ratemeters), a no count failure is detected. A no count alarm usually indicates a failure in the detector or high voltage supply. The ratemeter display, however may read zero for five to thirty minutes or more without a low signal fail alarm. This is because the preamplifier is reporting a non-zero dose rate that is below the low range value.

- **MPU Failure** - If the fail timer circuit (Watchdog circuit), which checks the MPU (Main Processor Unit) function, is allowed to time out (because of a hardware failure), a failure condition will be indicated.

QUESTIONS REPORT
for Surry2002

1. 072K5.02 001/T2G1/T2G1/AREA RAD MONITOR/M 2.5/3.2/N/SR02301/C/RLM

-Area Radiation Monitor 1-RM-RI-156,"Aux Bldg Sample," is being returned to service following routine maintenance.

-The control room operator is performing a test in accordance with 0-OPT-RM-001, "Operations Periodic Test," using the check source test button.

-The Alert/Failure and High Alarms DO NOT actuate.

Which ONE of the following could be the cause of the alarm response?

A. The operator failed to hold the check source button for a sufficient length of time.
B. The radioactive source was inadequately exposed to the detector
C. The check source signal failed to insert into the detector circuit.
D. The radioactive source has decayed beyond its useful life.

Ref: Surry Lesson Plan: ND-93.5-LP-01, obj. A
0-OPT-RM-001, Rad Monitor Equipment Check
0-OP-RM-001, Rad Monitoring System
Note: There is a descrepency between the lesson plan and the ARMS procedures. The lesson plan indicates that the check source is a radioactive source. The Operating and Periodic Test procedures indicate that they are electronic signals fed into the detector circuit.

Answer C is correct in that these monitors do not have a physical radioactive source.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	C D B D D D B C C C	Scramble Range: A - D	

RO Tier:	T2G1	SRO Tier:	T2G1
Keyword:	AREA RAD MONITOR	Cog Level:	M 2.5/3.2
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

LESSON PLAN

Introduction

NRC regulations require that all effluent processes be monitored for radioactivity. The radiation monitoring system provides this function. The radiation monitoring system can be basically broken down into two groups, a pre-TMI and a post-TMI system. This lesson plan will cover the pre-TMI monitoring system. The radiation monitoring system is required to isolate effluent flow paths in the event of high radiation. If the automatic functions do not occur, it is the operator's responsibility to manually perform the isolation to prevent the release of radioactive material to the public. This lesson plan will provide the trainee with the knowledge necessary to perform this operation.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the Victoreen Area Radiation Monitoring System.

B. Describe the operation of the Victoreen Process Radiation Monitoring System.

C. Describe the operation of the Victoreen Radiation Monitoring System.

Presentation

Distribute all handouts. Refer to/display H/T-1.1, Objectives, and review with the trainees.

A. Area Monitors

1. Purpose

- **Anti-Jam Trip** - The anti-jam circuitry allows for the detection of rapid increase in pulses (due to a rapid increase in radiation at the detector) and provides a bit to the sensitivity register. A detector will reach a point, in very high radiation field, when it will no longer provide pulses, but conducts continuously. The absence of pulses would normally indicate a low radiation field, when in actuality this is not the case. The purpose of the anti-jam circuit is to detect that this situation is about to occur, and to indicate it to the MPU. The MPU will then shut down the high voltage and initiate the fail alarm.

(4) Range alarm - When the radiation field is too low to be measured, the indicator will read 0.00 E0 CPM or mR, the bargraph will go out and the range alarm light will be lit. When the radiation field is too high to be measured, the indicator will read EEEEE CPM or mR and the range alarm will be lit.

(5) Aux light has no function.

d. High voltage pushbutton - Used by Inst. Techs to display detector voltage.

e. Check source pushbutton - When this button is pushed, a radioactive source is exposed to the detector to check operation of the monitor. You should see an increased indication when the check source is exposed.

The source check is accomplished as follows:

- Depress the CHECK SOURCE Pushbutton.
- Check the digital readout indicates ≈1 5 R/hr.
- Check the LED BAR turns red and indicates 5 R/hr.

- Observe the HIGH and WARN LEDs are lit (except manip. crane).
- Acknowledge the HIGH and ALERT Annunciators.
- Check that the Annunciator alarms remain lit.
- Depress the CHECK SOURCE Pushbutton again.
- Check that the digital readout returns to normal, and the HIGH and WARN LEDs go out for ≈2 10 seconds and then relight.
- Press the Acknowledge button on the ratemeter.
- Check that the HIGH and WARN LEDs go out.
- Press the RM Annunciator RESET Pushbutton and verify that the HIGH and ALERT windows clear.

5. Recorders

Refer to/display H/T-1.5, Recorder.

a. Indications

Each recorder is a four channel recorder and provides three indications. The three indications are the chart, a bargraph for each channel and digital readout. The digital indications scrolls on one recorder and does not on the other.

b. Controls

(1) Paper ADV - advances the chart paper.

(2) UP and DOWN arrows are used to select channels for the digital read out and with the menu options. On the recorder which the digital read out scrolls, the arrows will stop the scrolling and to restart the scrolling the menu button should be pushed twice.

ATTACHMENT 3

(Page 1 of 1)

AREA RADIATION MONITORS SOURCE CHECK AND ALARM CHECK

NOTE: A readout during source checking that is prefixed with an "E" indicates a failed source check. (Reference 2.3.8)

NOTE: **When the source check is performed the Alert/Failure and High Alarms will actuate for all area monitors listed below except 1-RM-RI-162.**

1. Perform a source check for Digital Area Monitors as follows.
   a. Record the Current Reading of the respective AREA radiation monitor.
   b. For each AREA radiation monitor, depress the CHECK SOURCE pushbutton and verify an increased readout in R/hr which does not begin with an "E."
   c. Depress the ALARM ACK pushbotton on the ratemeter.
   d. Acknowledge the alarm on the Radiation Monitoring Panel.
   e. For each AREA radiation monitor, depress the CHECK SOURCE pushbutton a second time and verify the reading returns to background.
   f. Reset the alarms on the Radiation Monitoring panel.

MONITOR DESIGNATION	CURRENT READING	Increased Indication in R/hr With No "E"	Indication Returned to Background (INIT)
1-RM-RI-151 DECON BLDG			
1-RM-RI-152 NEW FUEL STOR			
1-RM-RI-153 FUEL PIT BRDG			
1-RM-RI-154 AUX BLDG CONT			
1-RM-RI-155 AUX BLDG DRUM			
1-RM-RI-156 AUX BLDG SAMPLE			
1-RM-RI-157 CONTROL ROOM			
1-RM-RI-158 CHEM LAB			
1-RM-RI-161 CTMT H/R/ GAMMA			
1-RM-RI-162 MANPLTR CRN			
1-RM-RI-163 RX CTMT			
1-RM-RI-164 INCORE INST			

2. For 1-RM-RI-162, push "HIGH" pushbutton and record setpoint. RM Setpoint: ___________
   Find alarm setpoint for 1-RM-RI-162 in Radiation Monitor Info Book: Setpoint: ___________
   Verify Radiation Monitor Info Book setpoint matches the RM Setpoint recorded above.

Init Verif

3.0 INITIAL CONDITIONS

3.1 NONE

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Internal adjustments on the log ratemeter shall not be made by Operations Department personnel.

4.2 Check Sources for the Victoreen digital radiation monitors operate as follows.

- For digital PROCESS monitors - The Check Source is exposed to the detector by depressing and holding the CHECK SOURCE push-button.
- For digital AREA monitors - A Check Source signal is inserted into the detector circuit by depressing and releasing the CHECK SOURCE push-button. The Check Source signal is removed when the CHECK SOURCE push-button is depressed and released a second time or after approximately three minutes. The digital AREA monitors do not have a radioactive Check Source.

4.3 A radiation monitor is NOT considered operable until ALL PMT's are satisfactory for the radiation monitor.

1. 073G2.1.32 001/T2G2/T2G2/PRECAUTIONS/M 3.4/3.8/N/SR02301/C/RLM de-energized.

A radiation monitor, which causes automatic actuations, is being ~~deengergized~~ for routine maintenance. Process Vent Radiation Monitor

Which ONE of the following is NOT required PRIOR to removing power?

A.✓ Review applicable section(s) of the Offsite Dose Calculation Manual
B. Review applicable Abnormal Procedures
C. Review applicable section(s) of the Tech Specs
D. Review applicable Annuciator Response Procedures

Ref: Surry Operating Procedure, 0-OP-RM-001, Radiation Monitoring System, p. 10

No specific learning objective found.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	A C C A C B A A A C	Scramble Range: A - D

RO Tier:	T2G2	SRO Tier:	T2G2
Keyword:	PRECAUTIONS	Cog Level:	M 3.4/3.8
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

5.4 Removing Process and Area Radiation Monitors from Service

* *

CAUTION: **Removing power from some Rad Monitors will cause auto actuations to occur. Review applicable APs, ARPs and Tech Specs PRIOR to removing Rad Monitor's from service.**

* *

_____ 5.4.1 Depress the ON/OFF button.

_____ 5.4.2 Place the Sample Pump START/STOP switch to the STOP position and verify the PUMP ON light is off. IF the radiation monitor does NOT have a Sample Pump, OR if removing 1-VG-RI-109/110 or 1-GW-RI-101/102 from service, THEN enter N/A.

_____ 5.4.3 IF removing 1-VG-RI-109/110 from service, THEN open breaker 1-EP-BKR-1C2-1-2B (1-VG-P-1 sample pump feeder) and verify the LOW FLOW light is lit and the sample pump is secured. Otherwise enter N/A.

_____ 5.4.4 IF removing 1-GW-RI-101/102 from service, THEN open breaker 2-EP-BKR-2A2-1-3A (1-GW-C-5 sample pump feeder) and verify the LOW FLOW light is lit and the sample pump is secured. Otherwise enter N/A.

_____ 5.4.5 Place the Filter Feed switch to the OFF position locally at skid. IF the radiation monitor does NOT have a Filter Feed switch, THEN enter N/A.

QUESTIONS REPORT
for Surry2002

52/

1. 075K1.08 001/T2G2/T2G2/SWS TO CW/M 3.2/3.2/N/SR02301/C/RLM

At what location do the Emergency Service Water lines connect to Circulating Water?

A. Immediately downstream of the Circ ulating Water pumps.
B. To each high level intake structure.
C. To the vacuum priming house.
D. Downstream of the vacuum priming house.
Ref: Surry Lesson Plan ND-89.5-LP-2, obj H

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	D A C A A B B C B C	Scramble Range: A - D	

RO Tier:	T2G2	SRO Tier:	T2G2
Keyword:	SWS TO CW	Cog Level:	M 3.2/3.2
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

C. State in general the flowpath of service water from the high level intake to the discharge tunnel for the systems served by service water.

D. Describe the Charging Pump Service Water System.

E. Describe the MCR Chiller Service Water System.

F. Explain the controls associated with the system.

G. State the technical specifications associated with the Service Water Systems, including for SRO candidates, the basis behind these specifications.

H. Describe the system interconnections associated with the Service Water Systems, flowpaths affected and safety implications of stop logging, and abnormal procedures associated with the systems.

I. Describe in detail the Service Water Systems.

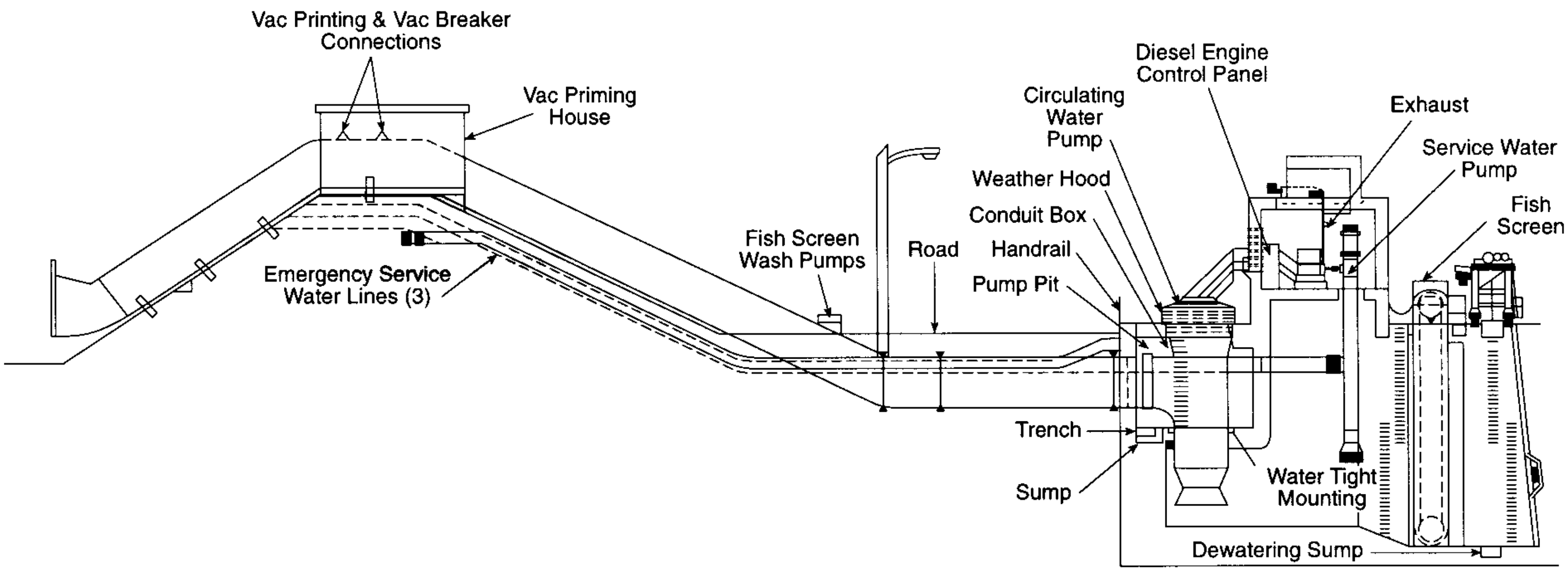
Presentation

Distribute all handouts. Refer to/display H/T-2.1, Objectives, and discuss objectives with trainees.

A. Purpose of Service Water System

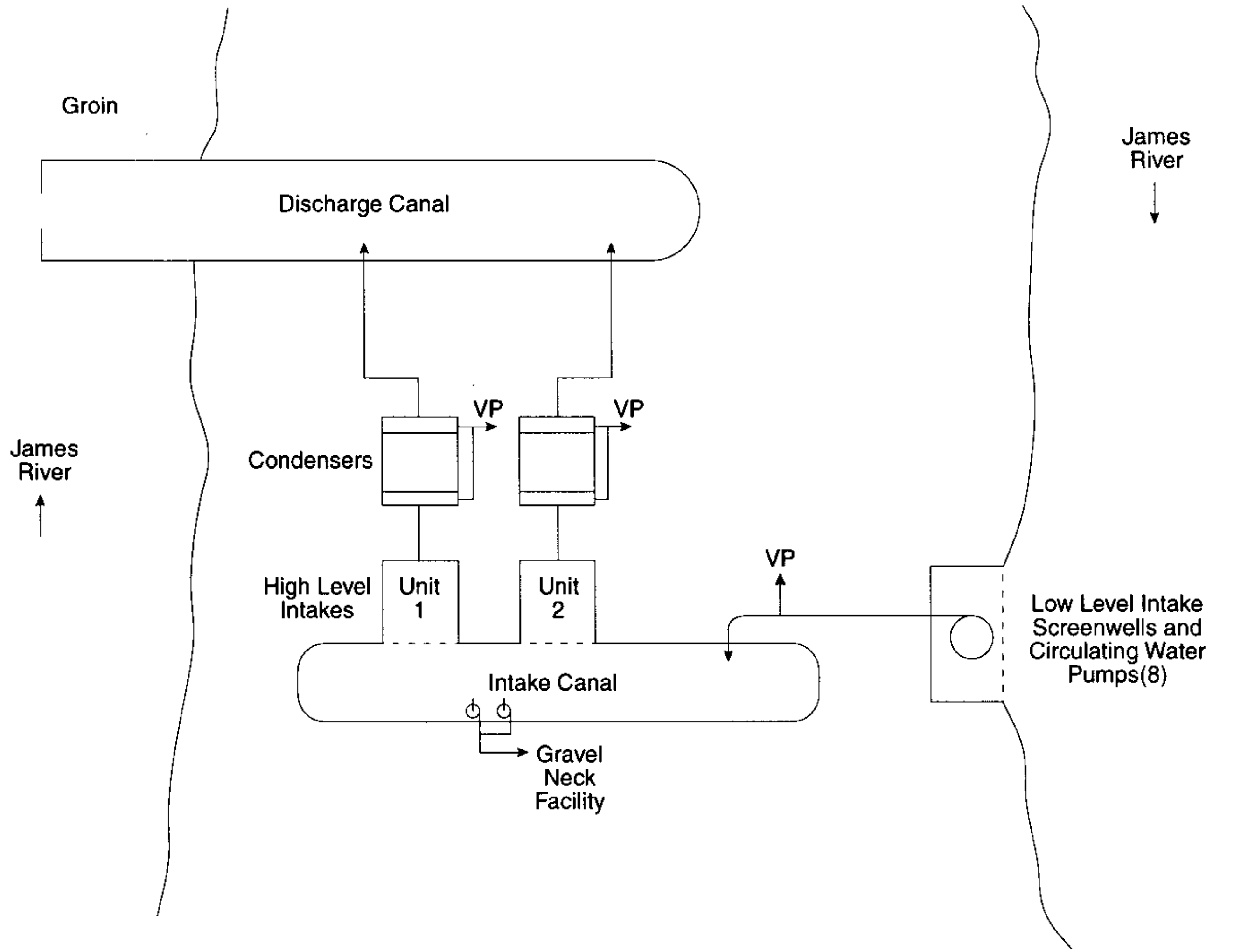
1. Maintain water in the intake canal for long-term cooling of safety-related systems, including:

a. Recirculating spray (for post-accident cooling of containment)



Graphics No: CS160D

LOW LEVEL INTAKE STRUCTURE



Graphics No. CB1552B

BASIC CIRCULATION WATER FLOWPATH

QUESTIONS REPORT
for Surry2002

1. 076AA1.04 001

Which one of the following describes the function of 1-CH-RI-118, Reactor Coolant Letdown Alert monitor?

A. Provides indication of failed fuel at power, Isolates letdown on a High Radiation Alarm.

B. Provides indication of failed fuel at power, ~~Has~~ no automatic ~~interlocks~~.

C. Provides indication of failed fuel only while shutdown, ~~Will~~ divert letdown on a High Radiation Alarm.

D. Provides indication of ion exchanger efficency, Diverts letdown on High Radiation Alarm.

Modified from question on Summer (2000) Exam.
Surry Lesson Plan ND-93.5-LP-1 Objective B.

A. Incorrect, while this radiation monitor does monitor for failed fuel, it does not isolate anything.

B. Correct, provides indication of fuel failure at power, has not automatic interlocks.

C. Incorrect, provides indication of fuel failure at power and has no automatic actions.

D. Incorrect, does not give an indication of ion exchanger efficiency, and has no automatic actions.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	B D D D C D B B A B	Scramble Range: A - D	
RO Tier:	T1G1		SRO Tier:	T1G1		
Keyword:			Cog Level:	M 3.2/3.4		
Source:	M		Exam:	SR02301		
Test:	C		Misc:	GWL		

LESSON PLAN

Introduction

NRC regulations require that all effluent processes be monitored for radioactivity. The radiation monitoring system provides this function. The radiation monitoring system can be basically broken down into two groups, a pre-TMI and a post-TMI system. This lesson plan will cover the pre-TMI monitoring system. The radiation monitoring system is required to isolate effluent flow paths in the event of high radiation. If the automatic functions do not occur, it is the operator's responsibility to manually perform the isolation to prevent the release of radioactive material to the public. This lesson plan will provide the trainee with the knowledge necessary to perform this operation.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the operation of the Victoreen Area Radiation Monitoring System.

B. Describe the operation of the Victoreen Process Radiation Monitoring System.

C. Describe the operation of the Victoreen Radiation Monitoring System.

Presentation

Distribute all handouts. Refer to/display H/T-1.1, Objectives, and review with the trainees.

A. Area Monitors

1. Purpose

3) The recorders will automatically stop when all of the sample pumps have been secured.

4) Due to the setup for these recorders, it should be unnecessary to turn the recorder "OFF".

Ask: Why are the RS SW RM pumps started following a Hi-Hi CLS Signal? Answer: Service water flow is not flowing through the RSHXs until a Hi-Hi CLS is in progress. A heat exchanger leak would get high activity containment water in the service water which is dumped into the James River.

(b) The monitor for unit 1 RS SW is located in unit 2 safeguards basement.

Ask: Why is unit 1 monitor located in unit 2? Answer: To prevent high background radiation of the unit having the accident from affecting the radiation monitor reading.

(c) If a high activity alarm is received, the associated heat exchanger SW flowpath should be isolated if there is another operating RSHX. There is one radiation monitor for each HX.

(5) Reactor Coolant Letdown (CH-RI-118/119) - 2 detectors per unit

(6) Discharge Tunnel (SW-RI-120) - 1 detector per unit

1. 076AK2.01 001/ ROT1G1/ SROT1G1/ 2.6/3.0/ MEMORY/ MOD/ SM00301/ BOTH/ ME49

Which ONE of the following describes the function of RM-L1, Primary Coolant Letdown Monitor?

A. Has no automatic interlocks; provides indication of failed fuel only after shutdown due to N-16 masking.
B. Isolates letdown on hi radiation; provides indication of failed fuel only after shutdown due to N-16 masking.
✓C. Has no automatic interlocks; provides indication of failed fuel at power.
D. Isolates letdown on hi radiation; provides indication of failed fuel at power.

REF: GS-9, revision 6, pages 20,21
SOURCE: Modified VCS GS-9 Exam Bank # 1079

sample is time delayed to allow decay of N-16 activity

KEY WORDS:

RO Tier	SRO Tier	K/A Value	Cog. Level	Source	Exam	Test	Misc
ROT1G1	SROT1G1	2.6/3.0	MEMORY	MOD	SM00301	BOTH	ME49

ANSWERS: Single Points 1

Version Answers:

0	1	2	3	4	5	6	7	8	9
C	D	A	B	C	D	A	B	C	D

☐ Scramble Choices

Scramble Range: A - D

STATISTICS:

	A	B	C	D	E	F	G	H	I	J	Omits	Total
Responses:	0	0	7	0	0	0	0	0	0	0	0	7
As a %:	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Time 1 p(diff) 1 rpb 0 Values:1 0 2 0 3 0 4 0

QUESTIONS REPORT
for Surry2002

1. 079G2.4.49 001/T2G2/T2G2/SERVICE AIR/C/A 4.0/4.0/B/SR02301/C/RLM

Unit 1 is operating at 100% power with the team responding to a loss of instrument air pressure IAW ARP B-E6 "IA Low Pressure/IA Compresser #1 Trouble." The RO notes that letdown has isolated, a MSTV closed annunciator, and an intermediate indication of the "A" MSTV.

Which ONE of the following describes the teams response to these conditions?

A. Trip the reactor, perform E-0, and continue actions of ARP B-E6.
B. Initiate AP-40.00 actions, trip the reactor, and perform actions of EOPs only as long as they do not impact AP-40.00 actions.
C. Trip the reactor, perform E-0, and initiate AP-40.00.
D. Initiate AP-40.00, and continue actions specified in ARP B-E6.

Ref: SR EB # 356

Lesson Plan: ND-95.1-9, obj A & B

MCS	Time:	1	Points:	1.00	Version:	0 1 2 3 4 5 6 7 8 9	
					Answer:	C B D B D D B D D B	Scramble Range: A - D

RO Tier:	T2G2	SRO Tier:	T2G2
Keyword:	SERVICE AIR	Cog Level:	C/A 4.0/4.0
Source:	B	Exam:	SR02301
Test:	C	Misc:	RLM

LESSON PLAN

Introduction

The Station Instrument Air System is provided to supply a source of pressurized air for the operation of pneumatically-operated valves and components throughout the plant. Realizing the importance of this system, the reliability of the IA System is improved, among other things, by the use of cross-connecting the two units' Service and Instrument Air Systems. Even with all the reliability enhancements associated with the IA Systems, there remains a high probability for system failure due to the vast amount of piping and large number of components served.

This lesson plan on the Loss of Instrument Air transient is designed to provide the trainee with an introduction to the loss of IA event with a focus on the operational aspects necessary to control the plant during this type of event.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the operator actions associated with the annunciator responses procedure for Service Air, Instrument Air, and Containment IA Alarms.

B. Identify the operator actions associated with AP-40, Non-Recoverable Loss of Instrument Air.

C. [Given a simulated Loss of Instrument Air transient, perform the necessary operational actions associated with controlling the plant. SOER 88-1, Recommendation #2 and #3/TIR S89-057]

VIRGINIA POWER
SURRY POWER STATION

ABNORMAL PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
0-AP-40.00	NON-RECOVERABLE LOSS OF INSTRUMENT AIR	14
		PAGE
	(WITH 12 ATTACHMENTS)	1 of 22

PURPOSE

To provide guidance to Operations personnel for cooldown to Cold Shutdown with a complete loss of station instrument air.

ENTRY CONDITIONS

1. Transition from Annunciator Response Procedure ()B-E6.
2. A complete loss of station instrument air resulting in failure of automatic control functions.

APPROVAL RECOMMENDED	APPROVED	DATE
REVIEWED	WB Gross	7/24/01

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION:
- Each unit affected by loss of IA should initiate this procedure.
- If instrument air pressure is restored while performing this procedure, Attachments 3, and 6 through 9 should be reviewed to terminate alternate methods of operation and ()-ES-0.2, NATURAL CIRCULATION COOLDOWN, should be initiated.

* *

1. __CHECK UNIT - AT POWER

RESPONSE NOT OBTAINED:

IF unit on RHR, THEN do the following:

a) Open TV-CC-()09A or B IAW Attachment 7.

b) Locally throttle outlet valve for in service HX.

c) Perform Steps 16 through 18 and maintain stable conditions until IA restored.

d) WHEN IA restored, THEN do the following:

   1) Perform ATT 7, Page 2.

   2) Return RH control valves to required positions.

   3) Open outlet valve for in service HX.

   4) GO TO Step 49.

IF Unit NOT on RHR, THEN do the following:

a) Consult with the following:

   - OM on call
   - STA
   - Shift Supervisor

b) Review Steps 2 through 48 to determine steps to be performed.

c) Perform steps required and GO TO appropriate procedures as required.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	___VERIFY REACTOR TRIPPED AND INITIATE ()-E-0, REACTOR TRIP OR SAFETY INJECTION	Manually trip Reactor and initiate ()-E-0, REACTOR TRIP OR SAFETY INJECTION.

* *

CAUTION: Component Cooling will be lost to Reactor Coolant pumps.

* *

3. ___TRIP REACTOR COOLANT PUMPS AND INITIATE ()-AP-39.00, NATURAL CIRCULATION OF RCS

4. ___START STM DRIVEN AUX FW PP:

   - Open ()-MS-SOV-()02A

     OR

   - Open ()-MS-SOV-()02B

5. ___MAINTAIN SG WATER LEVEL BETWEEN 20% AND 60%

6. ___SECURE THE FOLLOWING PUMPS:

   - Main Feed Pumps
   - HP Heater Drain Pumps
   - LP Heater Drain Pumps
   - Chilled CC Pumps
   - Primary Drains Transfer Pumps
   - Containment Vacuum Pumps

QUESTIONS REPORT
for Surry2002

57

1. G2.1.1 001

Which one of the following describes the required actions during a shift relief for a lunch break during a normal shift when acting as the Unit 1 Control Room Operator?

A. A log review, A shift relief checklist, and a Control Board Walkdown.

B. A Control Board Walkdown, A shift relief checklist, informing the Unit SRO of the change.

C. A log Review, A shift relief checklist, and informing the Unit SRO of the change.

D. A Control Board Walkdown, A log review, and informing the Unit SRO of the change.

Surry Exam Bank Question # 24.
Virginia Power OPAP-0005 Shift Relief and Turnover.

A. Incorrect, a shift relief trunover is not required for short term turnover.

B. Incorrect, a shift relief trunover is not required for short term turnover.

C. Incorrect, a shift relief trunover is not required for short term turnover.

D. Correct, these items are required IAW OPAP-0005.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	D C C A A A D D A B	Scramble Range: A - D
RO Tier:	T3		SRO Tier:	T3	
Keyword:	SHIFT TURNOVER		Cog Level:	M 3.7/3.8	
Source:	B		Exam:	SR02301	
Test:	C		Misc:	GWL	

Question 23 Details

Question Type:	Multiple Choice
Topic:	ADM0053
System ID:	72284
User ID:	ADM0053
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	SROUTP-SDS-2/C; OPAP-0003 [S01-0009], [S97-0830], [S95-0039]

24 **ID: ADM0055** **Points: 1.00**

Which ONE of the following is <u>not</u> <u>required</u> during a shift relief for a lunch break occurring during your normal shift, when acting as the Unit 1 Control Room Operator?

A. Control Board walkdown.

B. Shift relief checklist.

C. Log review.

D. Informing the Unit SRO of the change.

Answer: B

Question 24 Details

Question Type:	Multiple Choice
Topic:	ADM0055
System ID:	72286
User ID:	ADM0055
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	SROUTP-SDS-2/E; OPAP-0005 [S97-0830], [S95-0039]

6.2 Short Term Reliefs Occurring During the Shift

6.2.1 When performing short term reliefs (e.g., meal and restroom breaks) during the shift, the following actions shall be performed:

a. Verify that no uncontrolled transient is in progress.

b. The Relieving Operator shall be made aware of any ongoing procedures, tests, maintenance, or other evolutions that could potentially affect Unit status.

c. Inform the responsible SRO that he/she has assumed the controls.

This process shall be completed upon return of the controls to the original Operator.

6.2.2 Reliefs during the shift (e.g., exchange of Control Room supervisor function between Senior Reactor Operators, or short term relief of a Unit duty Control Room Operator) should have a turnover that ensures the oncoming individual is knowledgeable of the Unit conditions.

6.2.3 If a Control Room Operator with Unit duty expects to be away from the assigned station for situations other then meal and restroom breaks, then the shift turnover shall be in accordance with Section 6.1.

6.3 Orderly Turnover for Post Trip Review Meetings [Commitment 3.2.2]

6.3.1 The OMOC should consult the Shift Supervisor, Shift Technical Advisor, and Director Nuclear Station Safety and Licensing to determine the time for the Post Trip Review Meeting.

6.3.2 When performing reliefs for the Post Trip Review Meeting the Shift Supervisor shall verify that:

a. The affected unit is in a stable condition.

b. The "E series" procedures are at an appropriate point to allow for turnover.

c. All major manipulations and evolutions that could affect plant stability are completed.

QUESTIONS REPORT
for Surry2002

6/

1. G2.1.12 001

-A Unit 2 startup is in progress.
-The reactor is critical @ 5 x 10E-9 amps.
-Intermediate Range channel N-36 fails low.
-N-35 appears to be operable.

Which one of the following describes the correct actions required by Technical Specifications?

A. Operation above P-6 may continue unrestricted up to 100% rated thermal power.

B. The inoperable channel must be placed in a Tripped condition within 6 hours, operation may continue unrestricted.

C. Operation above P-6 is not allowed until the inoperable channel is repaired and declared operable.

D.✓ The inoperable channel must be restored to operable status prior to increasing thermal power above 10% of rated power.

Modified from Farley Exam Bank question. Surry Lesson Plan ND-93.2-LP-3 objective E. Surry Technical Specifications 3.7.14.

A. Incorrect, Operation may continue, but it is limited to 10% rated thermal power until the NI is repaired and returned to service.

B. Incorrect, again power is limited to 10% rated thermal power until the NI is repaired and returned to service.

C. Incorrect, Operation above P-6 is allowed.

D. Correct, These are the correct actions IAW Surry tech specs.

MCS	Time:	1	Points:	1.00	Version:	0 1 2 3 4 5 6 7 8 9	
					Answer:	D C B C B B C D C A	Scramble Range: A - D

RO Tier:	T3	SRO Tier:	T3
Keyword:		Cog Level:	C/A 4.3/4.2
Source:	M	Exam:	SR02301
Test:	C	Misc:	GWL

Recent Change To TECH SPECS.

TALK TO MIKE

Mike

Decrease power Below P-6 or 1
Increase Power to >10% within 24HRS

NO JOBLINK FOR AN RO?

MAY MOVE TO SRO ONLY

E. **Explain the operations of the Intermediate Range Nuclear Instrumentation System including its purpose, construction, outputs, protection logics, abnormal operations, and legal requirements.**

Presentation

Distribute all handouts. Refer to/display H/T-3.1, Objectives, and review with class.

A. IR Detector Construction

1. The purpose of the Intermediate Range NIS is to monitor the power level in the reactor between the source range and the power range and initiate protective actions, alarms, and interlocks via the reactor protection system when unsafe nuclear conditions are approached.

2. Each of the two channels of IR instrumentation receives input signals from compensated ion chambers (CIC). The detector supplies a current input to the processing instrumentation for logarithmic indication of power over a range of 10^{-11} to 10^{-3} amperes. The intermediate range detectors are located above the source range detectors in a common housing. Each CIC produces an output as a result of neutron and gamma interactions inside the detector. Until power is increased to the power range, gamma current is not proportional to reactor power; therefore gamma current must be removed electronically.

Refer to/display H/T-3.2, Compensated Ion Chamber.

3. Each IR compensated ion chamber detector is setup as a basic "can-within-a-can" arrangement. Each detector tube consists of the following:

O52302G01007;

During a plant startup with the reactor critical @ 5x10E-9, one intermediate range channel (N-36) fails. Which of the following statements is correct? (Circle the correct response.)

A. Operation above the P-6 neutron flux interlock setpoint is not allowed until the inoperable channel is repaired and declared operable.

B. If N-36 is placed in a tripped condition and the other channel is operable, you must reduce the power range neutron flux trip setpoint to less than or equal to 85%, and thermal power is restricted to less than or equal to 75%.

C. With N-36 out of service due to a failure and the remaining channel is operable, power operation is limited to less than 5% of rated thermal power.

D. Operation above P-6 neutron flux interlock may continue unrestricted up to 100% power provided the failed IR channel is placed in trip condition.

ANSWER: C
PNTS: 1.0 ANSWER TIME: 4.0 Mins. PART B
QUESTION LEVEL: 200
Static Sim Scenario Nos. ___ ___ ___ ___ ___ ___ ___
S&K No. 241538020080 ___________ ___________
K/A No. 015000K3.01 ___________ ___________
RO/SRO Impf. 3.9 /4.3 ___/___ ___/___
Objectives: O52302G01
References: Unit 1 Tech Specs O52201D, Excore NIS
Rev. Date: 8/4/94
AUTH:
TYPE: C

TABLE 3.7-1

REACTOR TRIP

INSTRUMENT OPERATING CONDITIONS

Functional Unit	Total Number Of Channels	Minimum OPERABLE Channels	Channels To Trip	Permissible Bypass Conditions	Operator Action
1. Manual	2	2	1		1
2. Nuclear Flux Power Range	4	3	2	Low trip setting at P-10	2
3. Nuclear Flux Intermediate Range	2	2	1	P-10	3
4. Nuclear Flux Source Range				P-6	
a. Below P-6 - Note A	2	2	1		4
b. Shutdown - Note B	2	1	0		5
5. Overtemperature ΔT	3	2	2		6
6. Overpower ΔT	3	2	2		6
7. Low Pressurizer Pressure	3	2	2	P-7	7
8. Hi Pressurizer Pressure	3	2	2		7

Note A - With the reactor trip breakers closed and the control rod drive system capable of rod withdrawal.

Note B - With the reactor trip breakers open.

TABLE 3.7-1 (Continued)

4. The QUADRANT POWER TILT shall be determined to be within the limit when above 75 percent of RATED POWER with one Power Range Channel inoperable by using the moveable incore detectors to confirm that the normalized symmetric power distribution, obtained from 2 sets of 4 symmetric thimble locations or a full-core flux map, is consistent with the indicated QUADRANT POWER TILT at least once per 12 hours.

2.B. With the number of OPERABLE channels one less than required by the Minimum OPERABLE Channels requirement, be in HOT SHUTDOWN within 6 hours

ACTION 3. With the number of OPERABLE channels one less than required by the Minimum OPERABLE Channels requirement and with the THERMAL POWER level:

a. Below the P-6 (Block of Source Range Reactor Trip) setpoint, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above the P-6 (Block of Source Range Reactor Trip) setpoint, but below 10% of RATED POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 10% of RATED POWER.

c. Above 10% of RATED POWER, POWER OPERATION may continue.

QUESTIONS REPORT
for Surry2002

60'/

1. G2.2.12 001/T3/T3/SURVEILLANCE USAGE/M 3.0/3.4/N/SR02301/C/RLM

Unit 1 is at 100% power

The Auxiliary Feedwater system engineer has called the control room and has requested that 1-OPT-FW-003, "Turbine Driven Auxiliary Feedwater Pump 1-FW-P-2," be performed due to an emergent industry issue. The TDAFW pump test is <u>NOT</u> on the POD. specify

Which ONE of the following is the correct action for the control room crew?

A. Ensure that the Motor Driven Auxiliary Feedwater pumps are operable and perform the TDAFW test.

B. Perform the TDAFW test AND ~~a~~ request a Probabilistic Safety Analysis, PSA, evaluation be performed prior to the end of shift.

C. Request a PSA evaluation, then perform the TDAFW test based on the satisfactory outcome of the evaluation.

D. only ~~Obtain~~ approval from the OMOC prior to performing the TDAFW test. is Required.

Ref: Surry procedure: 1-OPT-FW-003, Turbine Driven Auxiliary Feedwater Pump 1-FW-P-2, p.9. No specific object found

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	C B C D C D C C C D	Scramble Range: A - D	
RO Tier:	T3			SRO Tier:	T3	
Keyword:	SURVEILLANCE USAGE			Cog Level:	M 3.0/3.4	
Source:	N			Exam:	SR02301	
Test:	C			Misc:	RLM	

Verif

3.0 INITIAL CONDITIONS

______ 3.1 This procedure has PSA significance. IF this procedure is being performed on a day other than its POD scheduled date, THEN notify the Shift Supervisor that a PSA evaluation is required for the performance of this procedure. **(Reference 2.4.15)**

______ 3.2 The Shift Supervisor has authorized the performance of this test.

______ 3.3 Reactor power is stable at greater than 2 percent or stable at Hot Shutdown. (Reference 2.3.25)

______ 3.4 Direct communication has been established between the control room operator and operators performing the test.

______ 3.5 Personnel who will perform this test have reviewed the test, and understand their responsibilities.

______ 3.6 When performing the ERFCS verification for 1-MS-PCV-102A and/or 1-MS-PCV-102B, Turbine Driven Auxiliary Feed Pump Steam Supply Valves, a person involved in performing this procedure must be available in the control room or TSC to check the valve positions on an ERFCS display once the valves have been opened and closed.

______ 3.7 In order to prevent a possible input error into the ERFCS console, a computer Input/Output list should be available to obtain the desired ERFCS ID point for 1-MS-PCV-102A and/or 1-MS-PCV-102B, Turbine Driven Auxiliary Feed Pump Steam Supply Valves.

______ 3.8 To demonstrate cold start conditions the lube oil sump temperature is no greater than 5°F above ambient temperature. **(Reference 2.4.12) (Reference 2.4.13)**

______ 3.9 If performing this procedure with the reactor subcritical at Hot Shutdown, verify at least three RCPs are running. (Reference 2.3.25)

1. G2.2.13 001/T3/T3/TAGGING/M 3.6/3.8/B/SR02301/C/RLM

Which ONE of the following is correct when Operator Standby is used, in accordance with OPAP-0010, Tagouts?

A. A tagging record shall be generated and approved but no tags are hung.
B. A tagging record is only required when Operator Standby is used on rotating equipment.
C. A tagging record is not necessary for Operator Standby when used for less than 1 shift.
D. A tagging record shall be generated, approved, and tags hung on the equipment.
Ref: SR EB # ADM0086

No lesson plan is available

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	A D A B B A A C D D	Scramble Range: A - D

RO Tier:	T3	SRO Tier:	T3
Keyword:	TAGGING	Cog Level:	M 3.6/3.8
Source:	B	Exam:	SR02301
Test:	C	Misc:	RLM

4. Verifying that operation of the affected equipment could not occur without the posted Tag being seen.
5. Notifying the Shift Supervisor of any active Tagging Records which may be released.
6. Correcting any discrepancy found.
7. Generating a memorandum listing any Maintenance Tagging Records, excluding abandoned equipment and administratively controlled tags, that have been active/open in excess of three months. Include the maintenance tagging record number and the equipment mark number for each associated component and forward the list to the Superintendent of Operations.

c. The review shall be documented on the Periodic Test (PT) schedule.

6.11.2 **Other Reviews**

Additional reviews may be conducted as determined by the Superintendent Operations (e.g., prior to Unit start-up after an outage).

6.12 Operator Standby

6.12.1 Operator Standby may be used with the Superintendent Operations, Supervisor Shift Operations, or Operations Manager on Call permission.

6.12.2 The Shift Supervisor and the Maintenance Department Craft Supervisor shall concur when Operator Standby is used to provide work clearance.

6.12.3 Operator Standby shall be handled as if it were a Tag-Out with the exception that no tags are required to be placed on components (i.e., the Tagging Record shall be generated, approved, and completed). Operator Standby shall not be used on rotating equipment except for equipment that rotates slowly or must be cycled to perform maintenance (e.g., Intake Screen drives, Service Water strainers.)

6 ~~2~~

1. G2.2.30 001/T3/T3/COMMUNICATIONS/M 3.5/3.3/N/SR02301/C/RLM

The operating crew is performing 1-OP-FH-001, CONTROLLING PROCEDURE FOR REFUELING.

Which ONE of the following describes activities that ~~DO NOT~~ requires communications to be established with the Control Room.

A. Control Rod latching/unlatching Loading a spent fuel Cask.

B. Insert shuffle NOT

C. Head lift/set ~~Detentioning Reactor Vessel Head~~ NOT

✓D. Upper internals lift~~/set~~

Ref: Surry lesson plan: ND-92.5-LP-1, objective E.
1-OP-FH-001, CONTROLLING PROCEDURE FOR REFUELING.

NOTE: Precautions and limitations require direct communications with manipulator crane any time evolutions are in progress which may affect reactivity. The procedure then cautions that rod latching/unlatching is a reactivity manipulation. Therefore, the procedure implicitly requires that communications to be established while latching/unlatching control rods.

MCS	Time: 1	Points:	1.00	Version:	0 1 2 3 4 5 6 7 8 9		
				Answer:	B A C C C D D B C D	Scramble Range: A - D	
RO Tier:	T3			D	SRO Tier:	T3	
Keyword:	COMMUNICATIONS				Cog Level:	M 3.5/3.3	
Source:	N				Exam:	SR02301	
Test:	C				Misc:	RLM	

LESSON PLAN

Introduction

The purpose of this section is to provide the trainee with a general understanding of the process and equipment involved when refueling a reactor at Surry Power Station. It also provides the trainee with the administrative requirements and Technical Specifications associated with refueling. The material will be presented basically in outline form as an introduction to more detailed lessons on refueling.

Objectives

After receiving this instruction, the trainee will be able to:

A. Describe the major equipment and structures used in the refueling operation.

B. Describe the different phases of refueling including the preparation phase, the reactor disassembly phase, the fuel handling phase, and the reactor assembly phase.

C. Describe selected refueling precautions, limitations, and procedural notes.

D. Describe the Technical Specifications associated with refueling, including for SRO candidates, the basis behind these specifications.

E. Describe the overall refueling operation.

l. Raise Rx vessel level to 20 ft. $\pm$ 6 inches to check seal table for leakage.

m. Return Rx vessel level to <18'.

n. Verify tools and equipment removed from cavity.

o. QC hold point to check cavity and transfer canal cleanliness. After the cleanliness check is complete, initiate the Refueling Control Area Accountability Log IAW VPAP-1302, Foreign Materials Exclusion Program.

2. Reactor Disassembly Phase

a. Verify communication established between the MCR and the refueling control area. Communications are required anytime core or vessel component manipulations are being performed and may be relaxed when refueling is in a static condition.

b. Set containment refueling integrity. (Integrity must be set anytime core components will be moved. After a component is moved, the procedure allows Integrity to be relaxed. The Refueling Containment Integrity section covers which phases of refueling require integrity.)

c. Put the RMT refueling key switches in the refuel position.

d. Initiate the reactor cavity seal test OSP-FH-001.

e. Commence performing "Refueling Operation Minimum Equipment Checklist."

Init Verif

3.0 INITIAL CONDITIONS

3.1 The unit is in CSD.

4.0 PRECAUTIONS AND LIMITATIONS

4.1 If a valid 1G-C1, NIS SOURCE RNG SHUTDN HI FLUX, alarm comes in, personnel will evacuate the Containment. If the alarm comes in during fuel movement, the fuel must be placed in a safe location.

4.2 When inside the refueling Restricted Control Area, personnel must secure dosimetry worn on Anti-C Clothing with a piece of red, green, or black tape.

4.3 In case of damage or suspected damage of a fuel assembly, the Refueling SRO and Fuel Accountability and Inspection (FAI) must be notified immediately.

4.4 A Licensed SRO must be present in the Containment during fuel movement and core alterations that will affect or may affect reactivity.

4.5 **Direct communication between the Main Control Room and manipulator crane must be established before core geometry is changed or a core evolution is done that will affect or may affect reactivity.**

4.6 When two or more fuel assemblies are placed in intermediate baffle locations, the fuel assemblies shall <u>not</u> be stored side by side or corner to corner. This requirement does <u>NOT</u> apply during loading of rows A, B, R and P (the last two rows on each side of the core). **(Reference 2.4.2)**

4.7 Before fuel movement, the refueling team must attend a NFHTC-LP-1, Nuclear Fuel Handling Continuous Training Session, and must review <u>W</u> F Spec 5, Westinghouse Fuel Handling Guidelines. **(Reference 2.4.3)**

NOTE: Except when the core is off-loaded, Attachment 8 of 1-OSP-ZZ-004 will be done at least one time each shift.

5.3.23 Initiate Attachment 8 of 1-OSP-ZZ-004 and stop performance of Attachment 7.

5.3.24 Verify adequate Shutdown Margin IAW 1-OP-RX-002, Shutdown Margin (Calculated At Zero Power), or 1-OP-RX-003, Shutdown Margin For Refueling and Special Conditions.

WARNING

Control Rod latching and unlatching is a reactivity manipulation as well as a core alteration. Strict procedural compliance and conservative Operator actions are required at all times when Control Rods are latched or unlatched.

___/_____ 5.3.25 Unlatch the RCCA drive shafts IAW OP-4.4, RCCA Drive Shaft Tool.

___/_____ 5.3.26 WHEN OP-4.4 is complete, THEN open the Containment Personnel Hatch and/or the Equipment Hatch as desired. Enter N/A if the hatches will remain closed.

WARNING

Due to the heavy load of the upper internals lift rig, Refueling Containment Integrity must be set before the lift rig is positioned over the Reactor vessel.

___/_____ 5.3.27 Verify that 1-OPT-CT-210, Refueling Containment Integrity, has been completed within the last seven days.

___/_____ 5.3.28 Verify secured or secure CTMT purge IAW 1-OP-VS-001, Containment Ventilation.

4³⁄

1. G2.3.1 001/T3/T3/PLANNNED SPECIAL EXP/M 2.6/3.0/N/SR02301/C/RLM

It has been determined that a Planned Special Exposure (PSE) is necessary. The worker's current annual occupational dose is 4.75 Rem TEDE and 45 Rem Extremity. The dose for the job is expected to be .2 Rem TEDE and 2 Rem Extremity.

Assuming the actual dose received for the job is equal to the expected dose, what is the worker's total routine occupational dose?

A. 4.75 Rem TEDE and 45 Rem Extremity

B. 4.95 Rem TEDE and 45 Rem Extremity

C. 4.95 Rem TEDE and 47 Rem Extremity

D. 4.75 Rem TEDE and 47 Rem Extremity

Ref: Surry procedure VPAP 2101 p.46

No specific lesson plan or learning objective found.

Note: PSE's are not included in routine exposure

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: A C B B C C A D C A Scramble Range: A - D

RO Tier:	T3	SRO Tier:	T3
Keyword:	PLANNNED SPECIAL EXP	Cog Level:	M 2.6/3.0
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

ASK MIKE

6.3.14 **Dose Controls for Planned Special Exposures**

a. **Regulatory Dose Limits for Planned Special Exposures**

In addition to the dose limits provided in 6.3.2.a. and 6.4.2.a., an adult worker may be authorized to receive dose as part of a planned special exposure (PSE). For example, a worker's TEDE is 4.75 rem during a year and an essential job needs to be performed by the worker and will require 0.2 rem TEDE. Since the expected resulting TEDE is 4.95 rem (in excess of allowable administrative limit increases) and the expected dose is close to the annual limit, a PSE would be appropriate. After the PSE, the worker's routine occupational dose is still 4.75 rem, however, the worker's PSE dose record will increase by 0.2 rem.

Type	Planned Special Exposure Dose Limits
Total Effective Dose Equivalent (TEDE)	5 rem during a calendar year 25 rem during worker's lifetime
Lens of Eye (lens dose equivalent)	15 rem during a calendar year 75 rem during worker's lifetime
Skin (shallow dose equivalent)	50 rem during a calendar year 250 rem during worker's lifetime
Extremities (shallow dose equivalent)	50 rem during a calendar year 250 rem during worker's lifetime
Sum of deep-dose equivalent and committed dose equivalent to any organ (other than lens of eye)	50 rem per calendar year 250 rem during worker's lifetime

NOTE: PSEs shall be authorized only in an exceptional situation, when alternatives that might avoid the higher exposure are unavailable or impractical. Dose received in excess of annual limits, including doses received during accidents, emergencies, and PSEs must be subtracted from the limits for PSEs that the individual may receive during the current year and during the individual's lifetime.

b. **Administrative Controls to Initiate a Planned Special Exposure**

1. Each department shall initiate required dose extension requests. RP shall provide PSE request forms and provide assistance for the process upon request.

1. G2.3.2 001

Operations has a task to be performed in the Auxiliary Building near a line source that is reading 300 mr/hr at (2) feet. Two options exist to complete the assignment:

Option 1: Operator A can perform the assignment in 1 hour, working at a distance of (4) feet from the line source.

Option 2: Operators B and C can perform the same task, using special extension tooling, in 90 minutes working at a distance of (9) feet from the source.

Which one of the following is the correct option to be selected according to the facility ALARA plan, and the resultant exposure?

A. Option 1 with a total dose of 75 mrem.

B. Option 2 with a total dose of 45 mrem.

C. Option 1 with a total dose of 150 mrem.

D. Option 2 with a total dose of 200 mrem.

Modified From Surry Exam Bank Question # 1336.
Surry Lesson Plan ND-81.2-LP-3 objective F and L.
Changed to a line source question.

A. Incorrect, This is the correct option, however the dose was determined by the point source method.

B. Incorrect, This is not the correct method, and the dose was calculated using the point source method.

C. Correct, this is the correct option and dose as determined by the line source method.

D. Incorrect, this is not the correct option, but is the correct dose figured by the line source method.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	C C B D D A C A C A	Scramble Range: A - D	
RO Tier:	T3		SRO Tier:	T3		
Keyword:			Cog Level:	C/A 2.5/2.9		
Source:	M		Exam:	SR02301		
Test:	C		Misc:	GWL		

- Restricted Control Area
- High Radiation Area in Excess of 15 Rem
- Very High Radiation Area

B. In accordance with Surry Technical Specifications Section 6.4, list the requirements for controlling entry into Radiation/High Radiation Areas.

C. Explain the federal exposure limits for Total Effective Dose Equivalent, extremity, skin, and Lens of the Eye doses including necessary requirements and limitations for extensions.

D. Explain the station administrative exposure limits for Total Effective Dose Equivalent, extremity, skin, and Lens of the Eye doses including necessary requirements and limitations for extensions.

E. In accordance with the Surry Emergency Plan, state the Emergency Exposure Limits, including the personnel selection criteria associated with these extreme conditions.

F. Explain how the three primary means of protection for external radiation exposure (Time, Distance & Shielding) function to limit the dose received by personnel, to include applicable mathematical problems.

G. Using both mathematical and verbal descriptions, explain the difference between the "radiological" half-life of a material and the material's "effective half-life".

H. Explain external contamination to include types, differences and station limits.

I. Given a plan area Radiological Survey Map, interpret the various symbol designations to determine the expected radiological conditions in a specified work location.

J. Outline the types of information found on a standing and special RWP and differences.

K. [Describe, in general, the evolutions or events performed/controlled by Operations, that can cause the creation of high or very high radiation areas. <u>NRCTI-2515/123</u>]

L. Explain how an individual can maintain his/her external radiation dose within applicable limits by practicing the appropriate ALARA concepts.

<u>Presentation</u>

Distribute all handouts. Refer to/display H/T-3.1, Objectives, and review with trainees

A. Area Classification Definitions

There are various classifications of areas throughout the plant according to the amount of exposure expected. It is to your advantage as an operator to be able to interpret the posting sign and anticipate the dose rates expected in that area.

Point out to trainees that they will be required during the course to recall these definitions from memory - so learn them!

Refer to/display H/T-3.2, Area Classification Definitions

1. Unrestricted Area - An area to which access is neither limited or controlled by the Licensee.

$I_1 D_1 = I_2 D_2$

$$\frac{(300\ mR/HR)(2\,ft)}{4\,ft} = 150\ mR/HR$$

TOTAL DOSE 150 mr.

DISTANCES

$\frac{600}{16}$ 37.5 mr/HR

37.5 mr/hr

OPTION 2

$$\frac{300\ mr/hr\,(2\,ft)}{9\,ft} = 66.67\ mR/Hr \times 1.5$$

300

100 mr each

Total 200 mr

$\cancel{9.87\,mr} \times 1.5$ $\cancel{\times 2}$

30 ~~mr~~

[illegible]

DISTRACTORS

$I_1(D_1)^2 = I_2(D_2)^2$

$\frac{300mr(2)^2}{(4ft)^2} = \frac{1200}{16}$ $\underline{75mr\ Hr}$

@ 1 hour = 75mr TOTAL DOSE

$I_1(D_2)^2 = I_2(D_2)^2$

$\frac{(300mr\cancel{ft})(2\cancel{ft})^2}{(9\cancel{ft})^2} = \frac{1200}{81} = 14.8\ mr/hr$

14.8×1.5 22.2 mr/hr

45 mr TOTAL DOSE

OPTION 1 - TOTAL DOSE 75mr.

OPTION 2 - TOTAL DOSE 45mr.

OPTION 1 [illegible] DOSE 150mr.

OPTION 2 TOTAL DOSE 700mr.

b. Line Sources - Not all sources are small enough to be point sources. Considerations must be made for other types of sources such as pipes, tanks and etc. so that actions can be taken for adequate radiation protection. The other type of radiation source to be considered is a line source.

For a line source, the radiation decreases inversely as the distance from the source increases. The equation for a line source is very similar to the point source equation:

Write the following equation on the chalkboard and explain the terms as necessary:

$$I_1(D_1) = I_2(D_2)$$

Direct the trainees to work the following problem:

If a 20 foot pipe filled with radioactive material reads 4.0 Rem/hr at 3 feet, what is the dose rate at a distance of 8.0 feet away?

Answer: $I_2 = \frac{I_1 D_1}{D_2} = \frac{(4R/hr)(3ft)}{(8ft)} = 1.5R/hr$

Note that the direct linear relationship is accurate out to a distance of 0.5 times the source length. This point is called the "transition point" or the L/2 point. It is at this place that the point source equation is used to calculate dose rates for any distances further away.

Question 1335 Details

Question Type:	Multiple Choice
Topic:	HP00010
System ID:	73983
User ID:	HP00010
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-81.2-LP-3C; VPAP-2101 [S97-0809]

1336 **ID: HP00015** **Points: 1.00**

A point source in the auxiliary building is reading 500 mRem/hr at a distance of two (2) feet. TWO options exist to complete a mandatory assignment near this radiation source.

OPTION 1: Operator X can perform the assignment in thirty minutes working at a distance of four (4) feet from the point source.

OPTION 2: Operators Y and Z, using special extension tooling, can perform the same task in 75 minutes at a distance of eight (8) feet from the point source.

Which ONE of the following indicates the option to be selected according to facility ALARA plan and the resultant exposure?

A. Option 2 as the exposure per person is 39 mRem.

B. Option 2 as Y + Z exposure is 312 mRem.

C. Option 1 as X's exposure is 125 mRem.

D. Option 1 as X's exposure is 62.5 mRem.

Answer: D

QUESTIONS REPORT
for Surry2002

1. G2.3.4 001

Which one of the following is the MINIMUM Annual Total Effective Dose Equivalent (TEDE) dose above which a Radiation Worker will be excluded from the Radiologically Controlled Areas (RCA) until an extension is approved, ~~by the workers superintendent~~? Manager

A. 3.6 REM

B. 3.8 REM

C. 4.0 REM

D. 4.5 REM.

ND-100-LP-22 Objective B.
Old SurryExam Question 03/20/95, modified for yearly dose.
VPAP-2101 Page 33 of 101 Section 6.3.4.

A. Incorrect, This dose is 400mr < the yearly admin limit.

B. Correct, This dose is 200 mr < the yearly admin limit as outlined in VPAP-2101.

C. Incorrect, This is the yearly admin limit.

D. Incorrect, This is not the yerly limit - 200 mr.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: B B A C C D A D B D Scramble Range: A - D

RO Tier:	T3	SRO Tier:	T3
Keyword:		Cog Level:	M 2.5/3.1
Source:	M	Exam:	SR02301
Test:	C	Misc:	GWL

6.3.4 Administrative Dose Controls - General Requirements

NOTE: An integral part of administrative dose controls is the control of access to RCAs. RCA access control is addressed in 6.6.1.

a. The following control is in place to provide reasonable assurance that a worker will not exceed administrative dose limits.

If a worker has a quarterly or annual dose within 200 mrem of an administrative dose limit, the worker will be denied RCA access unless specifically authorized by the Supervisor Exposure Control and Instrumentation.

EXAMPLE: If a radiation worker has more than 1.8 rem deep-dose equivalent (whole body gamma plus neutron dose) in a calendar quarter or more than 3.8 rem TEDE in a calendar year, then that worker will be denied RCA access unless a dose extension request is approved. System employees will be denied access at 0.30 rem TEDE any time during a calendar year.

b. Request:

Type	Administrative Dose Limits
Total Effective Dose Equivalent (TEDE)	4.75 rem/year
Lens of Eye (lens dose equivalent)	14.0 rem/year
Skin (shallow dose equivalent)	45.0 rem/year
Extremities (shallow dose equivalent)	45.0 rem/year

c. An extension request shall be acknowledged by the affected worker and approved by:

- Department Manager (or Manager cognizant of worker duties)
- Manager Radiological Protection
- Site Vice President or Director Nuclear Station Operations & Maintenance or Director Nuclear Station Safety & Licensing

*QNUM 43364
*HNUM 44685 (Do NOT change If < 9,000,000)
*ANUM
*QCHANGED FALSE
*ACHANGED FALSE
*QDATE 1995/03/20
*FAC 280 Surry 1 & 2
*RTYP PWR-WEC3
*EXLEVEL S
*EXMNR
*QVAL
*SEC
*SUBSORT
*KA 194001K104
*QUESTION
Which one of the following is the MINIMUM quarterly Total Effective Dose
Equivalent (TEDE) dose above which a Radiation Worker will be excluded from
Radiologically Controlled Areas (RCA) until an extension is approved by the
workers Superintendent?

a. 1.3 Rem

b. 1.5 Rem

c. 1.8 Rem

d. 2.0 Rem

*ANSWER
c.

*REFERENCE
ND-100-LP-22, Rev. 2, pg.6, Obj. B

KA 194001K104 [3.3/3.5]

2.3.4

QUESTIONS REPORT
for Surry2002

1. G2.4.39 001

-An Emergency event has been declared.

-You are an extra operator on shift.

-You are directed to serve as an Emergency Communicator.

Which one of the following statements describes the proper method of communication to the State and Local Governments and the DES when making Notifications IAW EPIP-2.01, Notification of State and Local Governments? Spell ok

A. Use the Automatic Ringdown Phone (ARD-DES) for making notifications to the State and Loccal Governments and the INSTAPHONE for notifying the DES.

B. Use the Automatic Ringdown Phone (ARD-DES) for making all notifications to the State and Local Governments and the DES.

C. Use the INSTAPHONE for making notifications to the State and Local Governments and the Automatic Ringdown Phone (ARD-DES) for notifying the DES.

D. Use the INSTAPHONE for making all notifications to the State and Local Governments and all the DES. not notification

Ref: Surry Exam Bank Question # 1110.
Surry Lesson Plan ND-95.5-LP-3 Objective D.

Check to see if C is stil the correct answer the lesson plan and the Procedure seem to deviate some from each other.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	C D A B A B B B A D	Scramble Range: A - D
RO Tier:	T3		SRO Tier:	T3	
Keyword:			Cog Level:	M 3.3/3.1	
Source:	B		Exam:	SR02301	
Test:	C		Misc:	GWL	

B. State the number of personnel, including their locations, acting as Emergency Communicators during the various phases of an emergency from initial entry into the plan until activation of the LEOF.

C. List the three dedicated communication systems used by the Emergency Communicator.

D. Explain how data is gathered to complete the EPIP-2.01 attachments, including the sources of meteorological and radiological data, time requirements for message transmissions, and phones used for each type of data transmission.

E. Outline the responsibilities of the Emergency Communicator, as per EPIP-2.02, to establish and maintain communications with the NRC, including time requirements for message transmissions.

F. Perform the duties of Emergency Communicator in accordance with EPIPs 2.01 and 2.02.

Presentation

Distribute all handouts. Refer to/display H/T-3.1, Objectives, and review with the trainees

A. Emergency Communicator Responsibilities

1. The position of Emergency Communicator during an emergency is a very important one. The various governmental agencies need accurate information of plant status, meteorological conditions, and actual or potential radiological releases so they can take actions that will provide the most protection to the general public.

1. Instaphone - Used for notification of State and Local Governments. The Instaphone is a "party line" that can be used to talk to all six local counties and cities and the State Department of Emergency Services simultaneously.

   To use the Instaphone, pick up the handset, depress the button in the handset, and start talking. Assume that all seven parties are on the other end.

2. ARD DES - This is the Automatic Ringdown to the State Department of Emergency Services. It is used to transmit messages that are intended only for the State. These messages will be specified when the procedures are discussed. To use the phone, pick up the handset and, if required, push the extension selector button marked "ARD DES." The phone system will automatically dial the DES number.

3. NRC ENS - This is the NRC Emergency Notification System. It is used to talk directly to the NRC Operations Center in White Flint, Maryland. The number used to contact the NRC is on the phone.

4. Station Telephone System - The station network may need to be used if any of the emergency communication phone systems fail to work. The number for each agency is listed in the EPIP.

D. EPIP-2.01, Notification of State and Local Governments

Ensure each trainee has a copy of EPIP-2.01. Refer to the procedure during the following discussion.

Question 1109 Details

Question Type:	Multiple Choice
Topic:	EPIP048
System ID:	73663
User ID:	EPIP048
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.5-LP-2B and I [S96-1032]

1110 **ID: EPIP049** **Points: 1.00**

Which ONE of the following statements describes the proper method of communication of the State and Local Governments and the DES when making notifications IAW EPIP-2.01, Notification of State and Local Governments?

A. Use the INSTAPHONE for making all notifications to the State and Local Governments and the DES.

B. Use the INSTAPHONE for making notifications to the State and Local Governments and the Automatic Ringdown Phone (ARD-DES) for notifying the DES.

C. Use the Automatic Ringdown Phone (ARD-DES) for making notifications to the State and Local Governments and the INSTAPHONE for notifying the DES.

D. Use the Automatic Ringdown Phone (ARD-DES) for making all notifications to the State and Local Governments and the DES.

Answer: B

QUESTIONS REPORT
for Surry2002

1. G2.4.5 001

Which one of the following describes when CSFs should be implemented/monitored IAW the rules of usage in the ERG Network?

A. Function Restoration Procedures are only monitored when two trains of safeguards equipment ~~is~~ are available.

B. CSFs must be implemented initially upon entering E-0 "Reactor Trip or Saftey Injection" to ensure barrier protection.

when exiting . . . .

C. CSFs should be implemented immediately upon exit from ECA 0.0 "Loss of All AC".

when exiting

D. CSFs should be monitored for information only If ECA 0.0 "Loss of All AC is in effect".

Surry Lesson Plan ND-95.3-LP-2 objective F.
Question modified from Farley Exam Bank Question.

A. Incorrect, FRPs assume at least one train of electrical power available.

B. Incorrect, CSFs are not implemented until directed in E-0, or if E-0 is exited.

C. Incorrect, CSFs should not be entered when leaving ECA-0.0, The ECA 0.1 or 0.2 procedures will direct when to implement CSFs.

D. Correct, during a Loss of all AC the CSFs should only be monitored for information only the CSFs assume at least one train of electrical power is available.

MCS	Time: 1	Points:	1.00	Version:	0 1 2 3 4 5 6 7 8 9	
				Answer:	D B D B D C B A D D	Scramble Range: A - D

RO Tier:	T3	SRO Tier:	T3
Keyword:		Cog Level:	M 2.9/3.6
Source:	B	Exam:	SR02301
Test:	C	Misc:	GWL

B. Explain the two-column format of the Emergency Response Guideline Procedures, including the placement criteria for cautions and notes.

C. Explain the method by which "Immediate Operator Action" steps are identified in the body of the ERG Procedures.

D. Describe the intended overall usage of the Emergency Response Guidelines Network.

E. Given various plant conditions during which an emergency event occurs, evaluate the application of the "Modes of Applicability" as described in the ERG User's Guide.

F. Given actual or simulated EOP implementation, apply the management standards and other good practices applicable to EOP usage.

G. Explain the format design of the Emergency Response Guideline Procedures.

<u>Presentation</u>

Distribute all handouts. Refer to/display H/T-2.1, Objectives, and review objectives with trainees

A. Action Verb Identification

Direct trainees to turn to AIA-2.1, Action Verbs. Review various action verbs with trainees.

O52301B20010;

Which of the following is **TRUE** regarding monitoring of CSFs?

A. CSFs should be monitored for information only if ECP-0.0 loss of all AC is in effect.

B. CSFs must be monitored initially to ensure barrier protection upon entering EEP-0.0.

C. Function Restoration Procedures assume two trains of safeguards equipment available.

D. A yellow path on subcriticality requires transition due to severity of risk for core damage.

ANSWER: A
PNTS: 1.0 ANSWER TIME: Mins. PART .
QUESTION LEVEL: 100
Static Sim Scenario Nos.
S&K No.:
K/A No.: GEN 2.4.23
RO/SRO Impf.:
Objectives: O52301B20
References: SOP-0.8
Rev. Date: 01/06/98
JTH: MG ROLLINS
TYPE: C

3. The immediate action steps always have a bracket ([ ]) around the step number that is affected and are preceded by the NOTE.

4. The first four Immediate Actions Steps of E-0 and the Immediate Action Steps of FR-S.1 shall be performed in sequence. All other Immediate Action Steps do not have specific step sequence requirements.

D. Usage of the ERG Network

1. Entry into the Emergency Response Guideline set is limited to two specific conditions.

   a. If at any time a reactor trip or safety injection occurs or is required, the operator will enter guideline E-0, REACTOR TRIP OR SAFETY INJECTION.

   b. If at any time a complete loss of power on the AC emergency busses takes place, the operator will enter guideline ECA-0.0, LOSS OF ALL AC POWER. This includes any time during the performance of <u>any</u> other ERG.

2. The entry into E-0 is expected to be the one most frequently used, so it is described first.

   a. The operator enters at Step 1 and proceeds through E-0, following the rules of usage as described above.

      (1) He remains in E-0 and will be directed by an action step to begin monitoring the Status Trees, or

      (2) He transfers to some other guideline, at which point he begins to monitor the Status Trees.

b. Monitoring of the Status Trees takes place in accordance with its own rules of usage, in parallel with the recovery actions being performed by the operator. The monitoring may be done directly by one of the operators in the control room, by some other member of the shift assigned to the control room (STA), or by a dedicated computer routine. The Critical Safety Function Status Trees will be covered later in their own lesson.

3. Direct entry into ECA-0.0, due to loss of AC power on all AC emergency busses, is expected to be a rare occurrence. However, once in ECA-0.0, there are special considerations that come into effect.

a. Because none of the electrically powered safeguards equipment used to restore Critical Safety Functions is operable, none of the FRGs can be implemented. A NOTE at the beginning of guideline ECA-0.0 states that, "CSF Status Trees should be monitored for information only. FRGs should not be implemented."

b. Once in ECA-0.0, the operator performs the required actions and is not allowed to transition to any other guideline until some form of power is restored to the AC emergency busses. Even then, permission is not granted to implement FRGs until some initial status checks and actions are performed by the operator.

4. There is one unique guideline in the ERG set which has no entry symptoms or transitions. It is used purely as an operator aid and is entered based purely on operator judgement. The guideline is ES-0.0, REDIAGNOSIS.

839 **ID: EOP0088** **Points: 1.00**

Which ONE of the following indicates when substeps of an Emergency Operating Procedure must be performed in order?

A. Substeps designated by numbers only.

B. Substeps designated by bullets.

C. Substeps designated by asterisks.

D. Substeps designated by letters or numbers.

Answer: D

Question 839 Details

Question Type:	Multiple Choice
Topic:	EOP0088
System ID:	73378
User ID:	EOP0088
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.3-LP-2B; OPAP-0002 [S95-1096]

OTHER Questions That May fit.

838 **ID: EOP0087** **Points: 1.00**

The following plant conditions exist:

- CSD 3 weeks after plant shutdown.
- Train "A" RHR operating.
- Train "B" RHR in standby.
- Pressurizer level 100% (solid plant).
- RCS pressure 300 psig.
- RCS temperature 180°F.

Which ONE of the following procedures provides the guidance in event of a LOCA while operating in this condition?

A. Reactor Trip or Safety Injection, E-0.

B. Loss of Decay Heat Removal Capability, AP-27.00.

C. Shutdown LOCA, AP-16.01.

D. Excessive RCS Leakage, AP-16.00.

Answer: B

Question 838 Details

Question Type:	Multiple Choice
Topic:	EOP0087
System ID:	73377
User ID:	EOP0087
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.2-LP-12D; ND-95.3-LP-2E; AP-27.00 [S96-0965], [S94-1087]

EXAMINATION ANSWER KEY

RO/SRO Exam Bank

838 **ID: EOP0087** **Points: 1.00**

The following plant conditions exist:

- CSD 3 weeks after plant shutdown.
- Train "A" RHR operating.
- Train "B" RHR in standby.
- Pressurizer level 100% (solid plant).
- RCS pressure 300 psig.
- RCS temperature 180°F.

Which ONE of the following procedures provides the guidance in event of a LOCA while operating in this condition?

A. Reactor Trip or Safety Injection, E-0.

B. Loss of Decay Heat Removal Capability, AP-27.00.

C. Shutdown LOCA, AP-16.01.

D. Excessive RCS Leakage, AP-16.00.

Answer: B

Question 838 Details

Question Type:	Multiple Choice
Topic:	EOP0087
System ID:	73377
User ID:	EOP0087
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.2-LP-12D; ND-95.3-LP-2E; AP-27.00 [S96-0965], [S94-1087]

836 **ID: EOP0081** **Points: 1.00**

The following three Emergency Response Guidelines contain immediate action steps:

ù 1-E-0, Reactor Trip or Safety Injection
ù 1-ECA-0.0, Loss of All AC Power
ù 1-FR-S.1, Respone to Nuclear Power Generation/ATWS

Which ONE of the following reflects the "rules of usage" related to the performance of the Immediate Action steps?

A. Only the immediate actions steps of E-0 and ECA-0.0 must be performed in specified sequence.

B. Only the immediate action steps of FR-S.1 and ECA-0.0 must be performed in specified sequence.

C. Only the immediate actions steps of E-0 and FR-S.1 must be performed in specified sequence.

D. All immediate actions steps of E-0, ECA-0.0, and FR-S.1 must be performed in specified sequence.

Answer: C

Question 836 Details

Question Type:	Multiple Choice
Topic:	EOP0081
System ID:	73371
User ID:	EOP0081
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.3-LP-2C; OPAP-0002 [S95-1096], [S94-0439]

Question 813 Details

Question Type:	Multiple Choice
Topic:	EOP0020
System ID:	73317
User ID:	EOP0020
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.3-LP-38C and D; ND-95.4-LP-3A, B, and D; FR-C.1 [S97-0047], [S96-1021], [S96-1350]

814 **ID: EOP0022** **Points: 1.00**

Which ONE of the following action steps must be performed in sequence in accordance with the rules for Emergency Operating Procedure (EOP) usage?

A. All immediate action steps of E-0, Reactor Trip or Safety Injection, and FR-S.1, Response to Nuclear Power Generation/ATWS.

B. All immediate action steps for ECA-0.0, Loss of All AC Power, and FR-S.1, Response to Nuclear Power Generation/ATWS.

C. All immediate action steps for E-0, Reactor Trip or Safety Injection and ES-0.1, Reactor Trip Response.

D. All immediate action steps of E-0, Reactor Trip or Safety Injection, and ECA-0.0, Loss of All AC Power.

Answer: A

841 **ID: EOP0090** **Points: 1.00**

The following conditions exist:

- 100% power.
- Annunciator for S/G Low Level Rx Trip is ON and valid.
- Annunciator for Rx Trip Breakers Open is OFF.
- Bank D rods at 220 steps.
- NO operator action has been taken.

Which ONE of the following is the procedure to enter INITIALLY, given the above conditions?

A. FR-H.1, Response to Loss of Heat Sink.

B. FR-S.1, Response to Nuclear Power Generation/ATWS.

C. E-0, Reactor Trip or Safety Injection.

D. FR-S.2, Response to Loss of Core Shutdown.

Answer: C

Question 841 Details

Question Type:	Multiple Choice
Topic:	EOP0090
System ID:	73380
User ID:	EOP0090
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.3-LP-2D

QUESTIONS REPORT
for Surry2002

1. G2.4.14 001/T3/T3/GO TO/M 3.3/3.9/N/SR02301/C/GWL

While in the Emergency Respose procedures the team is directed to "Go To" another procedure,

the Method

Which one of the following is correct way to implement this direction?

A. The "GO TO" implies ~~that~~ the procedure in use is no longer applicable, and any tasks ~~that were~~ in progress need not be completed.

B. Tasks still in progress must be completed prior to the transition directed by the "GO TO" step.

C. The "GO TO" implies ~~that~~ the procedure in use is no longer applicable, but any tasks ~~that were~~ in progress ~~and~~ should be completed.

D. Tasks still in progress need not be completed prior to the transition directed by the "GO TO" step, unless preceeded by a bullet.

RO Tier:	T3	SRO Tier:	T3
Keyword:	GO TO	Cog Level:	M 3.3/3.9
Source:	N	Exam:	SR02301
Test:	C	Misc:	GWL

B. Explain the two-column format of the Emergency Response Guideline Procedures, including the placement criteria for cautions and notes.

C. Explain the method by which "Immediate Operator Action" steps are identified in the body of the ERG Procedures.

D. Describe the intended overall usage of the Emergency Response Guidelines Network.

E. Given various plant conditions during which an emergency event occurs, evaluate the application of the "Modes of Applicability" as described in the ERG User's Guide.

F. Given actual or simulated EOP implementation, apply the management standards and other good practices applicable to EOP usage.

G. Explain the format design of the Emergency Response Guideline Procedures.

<u>**Presentation**</u>

Distribute all handouts. Refer to/display H/T-2.1, Objectives, and review objectives with trainees

A. Action Verb Identification

Direct trainees to turn to AIA-2.1, Action Verbs. Review various action verbs with trainees.

b. If a particular task MUST BE COMPLETED prior to proceeding, the step containing the task or an associated NOTE will explicitly state that requirement.

11. Transitions to other procedures or to different steps in the same guideline may be made from either column. Such transitions should be made realizing that preceding NOTES or CAUTIONS are applicable.

a. Any tasks still in progress need not be completed prior to making a transition; however, the requirement to complete the tasks is still present and must not be neglected.

b. A transitional "GO TO..." to some other procedure implies that the procedure in use is now no longer applicable and the procedure referred to is now in effect.

QUESTIONS REPORT
for Surry2002

1. G2.4.20 001

-The Plant is responding to a Large Break LOCA.
-ES-1.3 "Transfer to Cold Leg Recirc" has been entered.
-The SI has been Reset.
-The STA announces that Containment Pressure has ~~risen~~ increased to 25 psia.
-At the step to Verify SI Recirc Phase Heat Sink SW flow can only been verified to one RS HX.

Which one of the following describes the correct actions that should be taken?

A. Immediately Transfer to FR-Z.1 "Response to Containment High Pressure".

B. Immediately Transfer to ECA-1.1 "Loss of Emergency Coolant Recirculation".

C. Hold at this step until both SW has been established to at least two RS HXs.

D. Continue with Alignment of SI System for Recirc, and then go to FR-Z.1.

Farley Exam Bank Question modified for Surry.
ND-95.3-LP-10 Objective C.

A. Incorrect, Note prior to step 1 in ES-1.3 states that FRs should not be implemented.

B. Incorrect, If at least one flow path from the sump to the RCS cannot be established or maintained then this would be the correct transition.

C. Incorrect, SW must be established to at least 2 RS HXs and actions should be taken to do this but rules of usage and the note for the steps to be performed as quickly as possible , therefore the crew should continue through the first 4 steps and complete the alignment.

D. This is the correct actions to perform upon completion of ES-1.3 the crew should implment FR-Z.1.

MCS	Time:	1	Points:	1.00	Version:	0 1 2 3 4 5 6 7 8 9
					Answer:	D D C B B D B B B B Scramble Range: A - D

RO Tier:	T3	SRO Tier:	T3
Keyword:		Cog Level:	C/A 4.0/4.3
Source:	M	Exam:	SR02301
Test:	C	Misc:	GWL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: • SI recirculation flow to RCS must be maintained at all times.

• Transfer to recirculation may cause high radiation in the Auxiliary Building.

* *

NOTE: Steps 1 through 4 should be performed without delay. FRs should NOT be implemented before the completion of these steps.

1. __RESET SI

2. __VERIFY SI RECIRC PHASE HEAT SINK:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a) Verify SW flow established to at least two RS HXs	a) IF less than 24 hours after reactor trip, THEN establish SW flow to at least two RS HXs. IF greater than 24 hours after reactor trip, THEN establish SW flow to at least one RS HX.
b) Verify AC emergency buses - ENERGIZED BY OFFSITE POWER	b) Stop CC and RHR pump(s) energized by EDG(s).
c) Verify RS pumps associated with RS HXs supplied by SW - AT LEAST TWO RUNNING • 1-RS-P-1A RS HX A • 1-RS-P-1B RS HX B • 1-RS-P-2A RS HX C • 1-RS-P-2B RS HX D	c) Start RS pump(s) associated with RS HX(s) supplied by SW.

C. **Given actual or simulated plant conditions requiring implementation of ES-1.3, Transfer to Cold Leg Recirculation, successfully transition through the procedure, applying step background knowledge as required, to safely transition core cooling into the cold leg recirculation mode.**

Presentation

Distribute/display H/T-10.1, Objectives. Review objectives with trainees.

A. Purpose and Transition Criteria for ES-1.3, Transfer to Cold Leg Recirculation

1. ES-1.3 Purpose

a. The purpose of ES-1.3, Transfer to Cold Leg Recirculation, is to provide guidance to transfer the SI System to the cold leg recirculation mode.

b. Performance of this procedure should result in:

(1) Verification of recirculation phase heat sink.

(a) For removal of core decay heat imparted to the SI recirc water.

(b) Also for cooling spray water to aid in depressurization of containment.

(2) Verification that the SI pumps have isolated from the RWST

(a) This is to ensure that the LHSI/HHSI pumps are no longer drawing water from the RWST.

(1) The procedure is normally exited when all actions have been completed and it is verified that core recirc flow has been established.

(2) An abnormal procedural exit would be to ECA-1.1, Loss of ECR, if at least one flow path from the sump to the core could not be established or maintained.

B. Procedural Step Bases

1. **<u>CAUTION #1 PRIOR TO STEP 1</u>: SI RECIRCULATION FLOW TO RCS MUST BE MAINTAINED AT ALL TIMES.**

   a. The purpose of this caution is to alert the team that SI flow to the RCS must be maintained at all times.

   b. The team should ensure that flow is being maintained to the RCS so that core cooling is maintained. Maintaining core cooling will minimize or prevent fuel damage.

2. **<u>CAUTION #2 PRIOR TO STEP 1</u>: TRANSFER TO RECIRCULATION MAY CAUSE HIGH RADIATION IN THE AUXILIARY BUILDING.**

   This caution warns the operator that high radiation levels could exist in the Auxiliary Building after RMT is completed.

3. **<u>NOTE PRIOR TO STEP 1</u>: STEPS 1 THROUGH 4 SHOULD BE PERFORMED WITHOUT DELAY. FRs SHOULD NOT BE IMPLEMENTED PRIOR TO THE COMPLETION OF THESE STEPS.**

a. The purpose of this caution is to call attention to the fact that operator actions should realign the SI System and should be done in a rapid manner.

b. Since the amount of water in the RWST between the swapover setpoint and the empty point is limited, the realignment of the SI system to cold leg recirc must be done as quickly as possible.

c. A suction source of water for the SI pumps must be maintained to provide for core cooling. **The actions of these first four steps must be completed even if challenges to a CSF occur at this time, since these steps relate to the maintenance of core cooling. (rk)**

4. **<u>STEP 1</u>: RESET SI.**

a. The purpose of this step is to reset the SI signal so that equipment can be realigned.

b. This allows clearing of the auto open signals to various SI MOVs.

5. **<u>STEP 2</u>: VERIFY SI RECIRC PHASE HEAT SINK.**

a. The purpose of this step is to ensure a heat sink is available prior to initiation of phase 1 RMT.

b. Since the RSHXs are the primary heat sink for removing energy from containment during sump recirc, service water cooling is verified to the heat exchangers.

O52531G04003;

The plant is responding to a large break LOCA. ESP-1.3 transfer to cold leg is in progress due to low water level in the RWST. The following occur in rapid succession:

- SI reset is completed.
- SFP to PRF dampers are closed.
- The STA announces that containment pressure has risen to 30 psig.
- At the procedure step to align CCW to RHR heat exchanger, you are unable to open the CCW to RHR heat exchanger valve MOV-3185A.

Based on the conditions listed above, you should: (Circle the correct response.)

A. Immediately go to the response to high containment pressure procedure.

B. Immediately transfer to the loss of emergency coolant recirculation procedure since cold leg recirculation cannot be established with 3185A closed.

C. Hold at the step in effect until emergency support organizations can determine if cold leg recirculation should be established.

D. Complete the alignment of at least one ECCS train for recirculation and then go to the response to high containment pressure procedure.

ANSWER: D
PTS: 1.0 ANSWER TIME: 3.0 Mins. PART B
QUESTION LEVEL: 100
Static Sim Scenario Nos.
S&K No. 240605024050
K/A No. 2.4.20
RO/SRO Impf. 3.3/4.0
Objectives: O52531G04
References: O52531G, ESP-1.3
Rev. Date: 10/21/95
AUTH:
TYPE: C

QUESTIONS REPORT
for Surry2002

1. G2.4.12 001/T3/T3/EMERG STAFFING/M 3.4/3.9/N/SR02301/C/RLM

-An ATWT occurred at 0100 and the operating crew manually tripped the Rx.
-The Shift Supervisor ~~has~~ classified the event as an ALERT at 0110.
-The time is currently 0115.

Which ONE of the following personnel are performing the functions of the NRC Emergency Communicator?

A. The Shift Technical Advisor
B.✓ An operator ≥ Step 7
C. The Assistant Shift Supervisor
D. An Operations Training instructor

Ref: Surry lesson plan ND-95.5-LP-1, obj C, pp. 5, 6 & 7
Answer A & C are incorrect in any situation.
Answer D is correct only after staff augmentation, which in this case would come from offsite.

RO Tier:	T3	SRO Tier:	T3
Keyword:	EMERG STAFFING	Cog Level:	M 3.4/3.9
Source:	N	Exam:	SR02301
Test:	C	Misc:	RLM

LESSON PLAN

Introduction

During a plant emergency, operators have specific responsibilities beyond their normal job functions. Since these are integrated into the station response to an emergency, the operator should understand his/her role with respect to the overall functions of the Emergency Plan. Through lecture and class discussion, the trainee will be presented the scope of the Surry Power Station Emergency Plan and specific details on how this is accomplished. Emphasis will be on details of the Emergency Plan which involve operations personnel. Specific Emergency Plan Implementing Procedures will also be emphasized.

Objectives

After receiving this instruction, the trainee will be able to:

A. State the six functions of the Surry Power Station Emergency Plan.

B. Define the emergency classifications in order of severity, giving an example of a condition which would initiate each classification.

C. Differentiate between the emergency organization during an unusual event and an alert or greater classification.

D. List the emergency response facilities.

E. Describe how personnel accountability is performed during an emergency.

F. List the emergency exposure limits in accordance with the Surry Power Station Emergency Plan.

G. List the available off-site support group capabilities in accordance with the Surry Power two previously assigned operators will be the Emergency Communicators. Other emergency positions can be filled as requested by the Station Emergency Manager to control the specific emergency situation.

2. If the severity of the situation enters the station into an alert classification or greater, the entire emergency organization must be manned. Even with minimum station manning, enough station personnel must be available to initiate emergency responses. The chart for the station emergency organization prior to augmentation shows how on-shift plant personnel initially fill emergency positions. One of the first duties of the Station Emergency Manager is to initiate call-out of all emergency response personnel so that the entire emergency organization, both station and corporate, becomes completely manned. This callout of personnel is performed by Security. Station emergency organization following augmentation shows this entire manning.

Refer to/display additional instructional aid, Station Emergency Organization Prior to Augmentation, to explain how on-shift plant personnel initially fill emergency positions. Briefly explain their job functions.

3. Station Emergency Organization Prior to Augmentation

   a. Station Emergency Manager (SEM)

      (1) Staffed by shift supervisor or assistant shift supervisor Distractor C

      (2) Directs emergency operations

   b. Emergency Communicators (EC)

      correct answer

      (1) Staffed by an operator, ≥ Step 7 for NRC Communicator and ≥ Step 4 for State and Local Communicator.

(2) Transmits messages to counties, state, and NRC until the TSC is activated.

c. Shift Technical Advisor (STA)

(1) Staffed by on-duty STA Distractor A

(2) Advises the shift supervisor (SEM) on operational safety conditions

d. Radiological Assessment Director (RAD)

(1) Staffed by the Health Physics Shift Supervisor

(2) Directs the activities of on-site health physics personnel.

4. Augmented Station Emergency Organization

Refer to/display additional instructional aid, Station Emergency Organization Following Augmentation, to explain the complete station emergency organization. Emphasis should be placed on the positions that operations personnel would fill. Note position specifics will be covered in later lesson plans.

a. Station Emergency Manager (SEM)

(1) Staffed by either the Site Vice-president (primary), or the Manager of Operations, or Manager of SS&L, or the Superintendent - Operations, another SS or Assistant SS.

(2) Directs emergency operations for the remainder of the crisis and instructs security to commence call-outs. Reports to Recovery Manager from the Control Room or TSC.

b. Emergency Communicators (EC)

(1) Staffed by operations training instructors. Distractor D

(2) Transmits messages to the counties, state, and NRC until the LEOF is activated. After LEOF is manned, the State and Local communications are assumed by the LEOF. NRC communications remain in the TSC.

c. Emergency Procedures Coordinator (EPC)

(1) Staffed by a current or previous SRO License or certification, and is normally manned by the Manager-Station Safety and Licensing.

(2) Maintains working documentation of the emergency.

d. Emergency Operations Director (EOD)

(1) Staffed by either the Superintendent - Operations, or an Operations Supervisor.

(2) Controls emergency operation responses.

e. Emergency Maintenance Director (EMD)

(1) Can be staffed by a Maintenance Supervisor or above and is normally manned by the Superintendent - Outage & Planning or Superintendent - Maintenance.

1. WE09G2.4.4 001

-A Natural Circulation cooldown is in progress IAW ES-0.3 Natural Circulation Cooldown with steam Void in Reactor Vessel.
-Pressurizer Level begins to rise rapidly.
-RVLIS indication lowers to < 78%.

Which one of the following courses of action is apropriate?

A. Initiate SI, a pressurizer steam break is in progress.

B. Initiate FR-I.3 Response to voids in Reactor Vessel.

C. Stop the Natural Circulation Cooldown, pressurized thermal schock in imminent.

D. Repressurize the RCS to maintain RVLIS full range greater than 78%.

Ref: Surry Lesson Plan ND-95.3-LP-6 objective C.
Surry Exam bank question #3355 modified.

A. Incorrect, the rising pressurizer level can be an indication of a pressureizer steam break, but RVLIS level would not be lowering.

B. Incorrect, FR-I.3 should not be entered while in ES-0.3 void growth is expected to occur.

C. Incorrect, The cooldown does not need to be stopped, void growth has occurred and PTS is not imminent.

D. Correct, the procedure has the operator raise RCS pressure to collapse the void in the vessel and regain RVLIS indication.

MCS	Time: 1	Points: 1.00	Version: 0 1 2 3 4 5 6 7 8 9		
			Answer:		Scramble Range: A - D
RO Tier:	T1G1		SRO Tier:	T1G1	
Keyword:			Cog Level:	4.0/4.3	
Source:	M		Exam:	SR02301	
Test:	C		Misc:	GWL	

3355 **ID: STA0103** **Points: 1.00**

During a Natural Circulation Cooldown IAW ES-0.3, a steam bubble forms in the vessel head. The STA recommends transition to FR-I.3 to vent the head.

Which ONE of the following courses of action is appropriate?

A. Stay in ES-0.3. Void growth is expected to occur and ES-0.3 provides guidance to control the void growth.

B. Initiate SI and go to FR-I.3 to vent the head.

C. Initiate FR-I.3 since ES-0.3 assumes FR-I.3 is in effect to eliminate the steam void.

D. The NC Cooldown should be stopped and a transition to FR-I.3 should be made.

Answer: A

Question 3355 Details

Question Type:	Multiple Choice
Topic:	STA0103 (Open Book)
System ID:	105978
User ID:	STA0103
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.3-LP-54B [S99-0829]

Objectives

After receiving this instruction, the trainee will be able to:

A. Given the major action categories associated with ES-0.3, Natural Circulation Cooldown With Steam Void in Rx Vessel, explain the purpose of ES-0.3, the transition criteria for entering and exiting ES-0.3 and the types of operator actions that will occur within each category.

B. Given a copy of ES-0.3, Natural Circulation Cooldown With Steam Void in Rx Vessel, explain the basis of each procedural step.

C. Given actual or simulated plant conditions requiring implementation of ES-0.3, Natural Circulation Cooldown With Steam Void in Rx Vessel, successfully transition through the procedure, applying step background knowledge as required, to safely bring the plant to a cold shutdown condition.

Presentation

Distribute all handouts. Refer to/display H/T-6.1, Objectives, and discuss with trainees.

QUESTIONS REPORT
for Surry2002

1. WE11EA1.1 001

- A LOCA has occured on Unit 1.
-The 1H 480 Emergency bus has tripped due to a fault on the bus, and cannot be re-energized.
-The Crew has progressed through E-1 and is Evaluating Plant Status.
-RCS pressure is 1000 psig and slowly lowering.
-CTMT Radiation monitors are elevated.
-Annunciator "1A-H4 LHSI PP 1B LOCKOUT OR OL TRIP" has just illuminated.

Which one of the following describes the correct operator action for the listed conditions?

A. Transition to "ES-1.2 Post LOCA COOLDOWN AND DEPRESSURIZATION".

B. Transition to "ES-1.3 TRANSFER TO COLD LEG RECIRCULATION".

C. Transition to "ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRULATION".

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

Ref: Surry Lesson Plans. ND-95.3-LP-20 Objective A.

A. Incorrect, if cold leg recirc capability was available this would be the correct transition.

B. Incorrect, if this had been a large break LOCA and RWST level was <16 feet, this would be the correct transition.

C. This is the correct transition with no LHSI pumps available.

D. Incorrect, This would be the correct transition if the radiation alarms were in the aux. bldg.

NOTE: To help the question have more validity we may want to get the actual MCB annunciators for containment high radiation.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9	
			Answer:	C A C A B D B A C B	Scramble Range: A - D
RO Tier:	T1G2		SRO Tier:	T1G2	
Keyword:			Cog Level:	C/A 3.9/4.0	
Source:	N		Exam:	SR02301	
Test:	C		Misc:	GWL	

Objectives

After receiving this instruction, the trainee will be able to:

A. Given the major action categories associated with ECA-1.1, Loss of Emergency Coolant Recirculation, explain the purpose of ECA-1.1, the transition criteria for entering and exiting ECA-1.1, and the types of operator actions that will occur within each category.

B. Given a copy of ECA-1.1, Loss of Emergency Coolant Recirculation, explain the basis of each step of the procedure.

C. Given actual or simulated plant conditions requiring implementation of ECA-1.1, Loss of Emergency Coolant Recirculation, successfully transition through the procedure, applying step background knowledge as required, to safely place the plant in the required optimal recovery condition.

Presentation

Distribute all handouts. Refer to/display H/T-20.1, Objectives, and review objectives with trainees.

A. Major Actions of ECA-1.1, Loss of Emergency Coolant Recirculation

1. Purpose

To provide guidance to restore emergency coolant recirculation capability, to delay RWST depletion by adding makeup and reducing outflow, and to depressurize the RCS to minimize break flow.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	__INITIATE EVALUATION OF PLANT STATUS:	
	a) Verify cold leg recirculation capability: 1) Power to LHSI pumps - AVAILABLE 2) Power to the following SI valves - AVAILABLE • 1-SI-MOV-1863A and B • 1-SI-MOV-1885A and D • 1-SI-MOV-1885B and C • 1-SI-MOV-1860A and B • 1-SI-MOV-1862A and B • 1-CH-MOV-1115B and D	a) IF cold leg recirculation capability can NOT be verified, THEN GO TO 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

(STEP 17 CONTINUED ON NEXT PAGE)

6. Low Head SI Pumps

a. Function

(1) Two LHSI pumps are provided to deliver large quantities of borated water from the RWST to the RCS when the RCS pressure falls below the LHSI pump shutoff head.

(2) These pumps are also used to recirc water from the containment sump to the core for long term cooling during the recirc mode.

(3) They also direct water to the suction of the HHSI pumps during the recirc mode to provide NPSH to the HHSI pumps.

(4) If RCS pressure is greater than shutoff head, the pumps run on recirc to the RWST. After verifying the LHSI pumps are not needed, one pump is secured due to recirc line sizing concerns to prevent overheating and damaging the weaker pump.

The recirc line has been re-routed to tap off upstream of the pump discharge check valve. This change should ensure an adequate flow for pump cooling when the pump is running at a dead head.

LHSI PP 1B
LOCKOUT OR OL
TRIP

The change also added a ½" line to relieve RCS backleakage to the RWST.

b. Both pumps receive a start signal upon SI initiation

c. A LHSI PUMP LOCKOUT OR OVERLOAD TRIP alarm (A-G-4 & A-H-4) is provided to indicate that the pump control is in the PTL position or that the pump has tripped on overload.

1A - H4

1. WE13G2.4.4 001

Which one of the following describes a correct transition criteria for exiting FR-H.2 Response to Steam Generator Overpressure?

A. All feedwater flow (MFW and AFW) isolated to the affected SG, and SG pressure no longer increasing.

B. Affected SG level less than 92% narrow range.

C. Steam Flow established from the affected SG with SG pressure stable at 1130 psig.

D. RCS temperature less than 530 degrees F and being cooled by the unaffected SGs.

Surry Exam Bank Question # 1022, Modified.
Surry Lesson Plan ND-95.3-LP-42A; ND-95.3-LP-43A; FR-H.2.

A. Incorrect, FR-H.2 would be exited if SG level > 92%.

B. Incorrect, this would have the operator proceed to the next step.

C. Correct, this would allow the operator to go to procedure and step in effect.

D. Incorrect, this would have the operator proceed to the next step.

MCS	Time: 1	Points: 1.00	Version:	0 1 2 3 4 5 6 7 8 9		
			Answer:	C C B D D B A B B D	Scramble Range: A - D	
RO Tier:	T1G3		SRO Tier:	T1G3		
Keyword:			Cog Level:	M 4.0/4.3		
Source:	M		Exam:	SR02301		
Test:	C		Misc:	GWL		

EXAMINATION ANSWER KEY

RO/SRO Exam Bank

1022 **ID: EOP0278** **Points: 1.00**

Which ONE of the following describes a correct transition criteria for exiting FR-H.2, Response to Steam Generator Overpressure?

A. Affected SG level greater than 92% narrow range.

B. All Feedwater Flow (MFW and AFW) isolated to the affected SG and SG pressure no longer increasing.

C. RCS temperature less than 535øF and being cooled by the unaffected SGs.

D. Steam flow established from the affected SG with SG pressure stable at 1150 psig.

Answer: A

Question 1022 Details

Question Type:	Multiple Choice
Topic:	EOP0278
System ID:	73563
User ID:	EOP0278
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.3-LP-42A; ND-95.3-LP-43A; FR-H.2 [S96-1354]

The recovery/restoration technique incorporated into this FR to respond to a SG overpressure condition is based on the assumption that the main steam lines have been isolated in order for a SG overpressure condition to develop. If the main steam line isolation or bypass valves are open, all SGs are cross-connected and are aligned to the main steam system. This alignment functions to equalize SG pressures.

This lesson on FR-H.2, RESPONSE TO STEAM GENERATOR OVERPRESSURE, will provide an in-depth look at the designed response to this low priority challenge to the Critical Safety Functions.

Objectives

After receiving this instruction, the trainee will be able to:

A. Given the Major Action Categories associated with FR-H.2, Response to Steam Generator Overpressure, explain the purpose of FR-H.2, the transition criteria for entering and exiting FR-H.2, and the types of operator actions that will occur within each category.

B. Given a copy of FR-H.2, Response to Steam Generator Overpressure, explain the basis of each procedural step.

C. Given actual or simulated plant conditions requiring implementation of FR-H.2, Response to Steam Generator Overpressure, successfully transition through the procedure, applying step background knowledge as required, to address the Critical Safety Function challenge in progress.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

<u>NOTE</u>: Throughout this procedure, AFFECTED refers to any SG in which pressure is greater than 1135 psig.

1.	__IDENTIFY AFFECTED SG(s): • Any SG pressure - GREATER THAN 1135 PSIG	RETURN TO procedure and step in effect.
2.	__VERIFY MFW ISOLATION TO AFFECTED SG(s): a) Feed REG valves - CLOSED b) SG FW bypass flow valves - CLOSED c) SG FW isolation MOVs - CLOSED d) Locally close feed reg bypass valve manual isolation valve(s): • 1-FW-26 for SG A • 1-FW-57 for SG B • 1-FW-88 for SG C	Manually close valves.
3.	__CHECK AFFECTED SG(s) NARROW RANGE LEVEL - LESS THAN 92% [84%]	GO TO 1-FR-H.3, RESPONSE TO STEAM GENERATOR HIGH LEVEL.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: If affected SG narrow range level increases to greater than 92% [84%], steam should NOT be released from affected SG(s).

* *

4.	__TRY TO DUMP STEAM FROM AFFECTED SG(s): • Manually use SG PORV(s) OR • Locally use SG PORV(s) IAW Attachment 1 OR • Condenser steam dump OR • Steam supply to TD AFW pump	GO TO Step 6.
5.	__CHECK AFFECTED SG(s) PRESSURE:	
	a) Pressure - DECREASING	a) GO TO Step 6.
	b) Pressure - LESS THAN 1135 PSIG	b) RETURN TO Step 3.
	c) Control steam release to maintain SG pressure less than 1135 psig	
	d) RETURN TO procedure and step in effect	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

<u>CAUTION</u>: AFW flow should remain isolated to affected SG(s) until a steam release path is established.

* *

6. __ISOLATE AFW FLOW TO AFFECTED SG(s)

7. __CHECK RCS HOT LEG TEMPERATURES - LESS THAN 535°F

   RESPONSE NOT OBTAINED: Cooldown RCS to less than 535°F by dumping steam from unaffected SG(s).

8. __CONTINUE ATTEMPTS TO MANUALLY OR LOCALLY DUMP STEAM FROM AFFECTED SG(s):

   • Manually use SG PORVs

   <u>OR</u>

   • Locally use SG PORV(s) IAW Attachment 1

9. __RETURN TO PROCEDURE AND STEP IN EFFECT

- END -

1. WE16EK1.3 001

Which one of the following describes entry ~~erilterila~~ Criteria for FR-Z.3, Response to Containment High Radiation Level?

A. High alarm reading on the Manipulator Crane radiation monitor.

B. High alarm reading on the Reactor Containment Area radiation monitor.

C. Greater than 2R/HR on the CHRRMS radiation monitor. > 3.0E2

D. Greater than 50 uCi/cc on the Kaman Radiation High Range High Monitor.
Surry Exam bank Question # 1032 slightly modified.
Surry Lesson Plans ND-95.3-LP-50A. ND-93.5-LP-1; and ND-L93.5-LP-3.

A,B, and D incorret, FR-Z.3 is not entered based on any of these readings.

C, Correct, this is the value that will initiate entry in to FR-Z.3.

MCS Time: 1 Points: 1.00 Version: 0 1 2 3 4 5 6 7 8 9
Answer: C A D B C C D D D B Scramble Range: A - D

RO Tier: T1G2 SRO Tier: T1G2
Keyword: Cog Level: M 3.0/3.3
Source: B Exam: SR02301
Test: C Misc: GWL

1031 **ID: EOP0287** **Points: 1.00**

Which ONE of the following is NOT an action performed in FR-Z.3, Response to Containment High Radiation?

A. Verify that non-essential containment penetrations are isolated.

B. Operate CS system to add NaOH.

C. Establish containment purge and exhaust.

D. Check containment air recirc fan operation if pressure is less than 23 psia.

Answer: C

Question 1031 Details

Question Type:	Multiple Choice
Topic:	EOP0287
System ID:	73572
User ID:	EOP0287
Status:	Active
Must Appear:	No
Difficulty:	0.00
Time to Complete:	0
Point Value:	1.00
Cross Reference:	
User Text:	1.00
User Number 1:	0.00
User Number 2:	0.00
Comment:	ND-95.3-LP-50B and C [S96-1362]

1032 **ID: EOP0288** **Points: 1.00**

Which ONE of the following describes entry criteria for FR-Z.3, Response to Containment High Radiation Level?

GAMMA

A. High alarm reading on the Containment High Range radiation monitor.

B. Greater than 2R/HR CHRRMS radiation monitor.

C. Greater than 2R/HR CHRRMS radiation monitor.

D. High alarm reading on the Manipulator Crane radiation monitor.

Answer: B

High alarm Reactor Containment Area Monitor

LESSON PLAN

Introduction

FR-Z.3, Response to Containment High Radiation Level, provides procedural guidance if high radiation is present inside containment.

The main purpose of the post-accident containment radiation monitor is to follow the radiation level in the containment during and after an accident that releases a significant quantity of radioactivity into the containment. The radiation alarm setpoint would be reached due to any significant RCS leakage into containment or after a steam line break inside containment assuming Tech Spec leakage from the SGs.

This lesson on FR-Z.3, Response to Containment High Radiation Level, will provide an in-depth look at the designed response to this low priority challenge to the Containment CSF.

Objectives

After receiving this instruction, the trainee will be able to:

A. Given the Major Action Categories associated with FR-Z.3, Response to Containment High Radiation Level, explain the purpose of FR-Z.3, the transition criteria for entering and exiting FR-Z.3, and the types of operator actions that will occur within each category.

B. Given a copy of FR-Z.3, Response to Containment High Radiation Level, explain the basis of each procedural step.

C. **Given actual or simulated plant conditions requiring implementation of FR-Z.3, Response to Containment High Radiation Level, successfully transition through the procedure, applying step background knowledge as required, to address the Critical Safety Function challenge in progress.**

Presentation

Distribute all handouts. Refer to/display H/T-50.1, Objectives, and review objectives with trainees.

A. Major Actions of FR-Z.3, Response to Containment High Radiation Level

1. The purpose of FR-Z.3, Response to Containment High Radiation Level, is to provide guidance to respond to high containment radiation level.

2. There is only one explicit entry transition, based on operator judgement. It is from the Containment CSF Status Tree on a YELLOW path priority if the containment radiation level is above the post-accident alarm setpoint.

3. There is also only one explicit exit transition. This is upon completion of the procedural actions. The team is returned to the procedure and step in effect.

4. Major Action Categories

Refer to/display H/T-50.2, Major Action Categories.

a. **VERIFY CONTAINMENT ISOLATION.**