

<b>U.S. Nuclear Regulatory Commission Site-Specific SRO Written Examination</b>	
<b>Applicant Information</b>	
Name:	
Date:	Facility/Unit V.C. Summer Unit 1
Region:    I <input type="checkbox"/> II <input checked="" type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/>	Reactor Type: W <input checked="" type="checkbox"/> CE <input type="checkbox"/> BW <input type="checkbox"/> GE <input type="checkbox"/>
Start Time:	Finish Time:
<b>Instructions</b>	
<p>Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination, you must achieve a final grade of at least 80 percent overall, with 70 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require a final grade of 80 percent to pass. You have 9 hours to complete the combined examination and 3 hours if you are only taking the SRO-only portion.</p>	
<b>Applicant Certification</b>	
<p>All work done on this examination is my own. I have neither given nor received aid.</p> <p style="text-align: right; margin-right: 100px;">_____</p> <p style="text-align: right; margin-right: 100px;">Applicant's Signature</p>	
<b>Results</b>	
RO/SRO-Only/Total Examination Values      _____ / _____ / _____ Points	
Applicant's Score      _____ / _____ / _____ Points	
Applicant's Grade      _____ / _____ / _____ Percent	

SRO Answer Key  
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48	063 A4.01	D	48
49	063 K2.01	A	49
50	064 K2.03	D	50
51	073 G2.2.44	A	51
52	076 A1 .02	D	52
53	078 A3.01	B	53
54	103 A1.01	C	54
55	103 K3.03	B	55
56	001 K1.05	C	56
57	002 K5.14	D	57
58	015 A1 .02	B	58
59	016 A3.02	C	59
60	034 A4.02	D	60
61	035 K6.01	D	61
62	041 K3.01	C	62
63	045 A2.17	A	63
64	055 K3.01	B	64
65	068 K4.01	C	65
66	G2.1.1	A	66
67	G2.1.2	B	67
68	G2.1 .43	D	68
69	G2.2.20	B	69
70	G2.2.43	D	70
71	G2.3.5	B	71
72	G2.3.7	D	72
73	G2.4.1	A	73
74	G2.4.43	B	74
75	G2.4.6	C	75
76	038 EA2.08	A	76
77	054 AA2.08	D	77
78	055 EG2.2.44	C	78
79	058 AA2.02	B	79
80	077 AG2.2.25	B	80
81	WEO5 EG2.4.2	A	81
82	076 AA2.02	A	82
83	WEO3 EG2.1.20	D	83
84	WEO9 EG2.1 .30	A	84
85	WE14 EA2.2	C	85
86	062 G2.4.8	B	86
87	005 A2.04	D	87
88	008 G2.1 .23	B	88
89	064 A2.02	D	89
90	073 A2.02	B	90
91	011 G2.2.44	B	91
92	072 G2.4.18	A	92

93	086 A2.02	B	93
94	G2.1.15	C	94
95	G2.1.40	A	95
96	G2.2.23	C	96
97	G2.2.5	C	97
98	G2.3.4	C	98
99	G2.4.26	D	99
100	G2.4.28	D	100

SRO Answer Key  
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2018 (1601) NRC test

76. Given the following plant conditions:

- 100% power initially.
- A Steam Generator Tube Rupture occurred on "A" Steam Generator.
- A Reactor trip and Safety Injection occurred.
- The C-9 interlock is not met.
- The CRS is reading the last step of EOP-4.0, E-3 STEAM GENERATOR TUBE RUPTURE.

Which ONE of the choices below completes the following statements?

In the current condition, EOP-4.1B ES-3.2 POST-SGTR COOLDOWN USING BLOWDOWN \_\_ (1) \_\_ be used to achieve conditions to place RHR in service.

In accordance with the ERG Background Document for Steam Generator Tube Ruptures, a reason for selecting EOP-4.1B, when it can be used, is because \_\_ (2) \_\_.

- A. 1) can  
2) boron dilution concerns are eliminated.
- B. 1) can  
2) it is the fastest post-SGTR cooldown method.
- C. 1) cannot  
2) boron dilution concerns are eliminated.
- D. 1) cannot  
2) is the fastest post-SGTR cooldown method.

2018 (1601) NRC test

77. Given the following plant conditions:

- 100% power initially.
- **"A"** Steam Generator faulted inside the RB.
- All EFW pumps failed to start manually or automatically.
- Upon transitioning out of EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION, the STA advised the CRS of a RED path on HEAT SINK.
- The crew entered EOP-15.0, FR-H.1 RESPONSE TO A LOSS OF SECONDARY HEAT SINK.
- Actions have been taken in step 12 to restore feed using Condensate flow.
- Operators are depressurizing **"B"** Steam Generator.
- The CRS is reading step 16, **"Check SG levels:"**.
- All other Critical Safety Functions are in a GREEN or YELLOW status.
- RB pressure is 8 psig and decreasing.

Which ONE of the choices below completes the following statement?

The CRS (1) allowed to transition out of EOP-15.0 at this time.

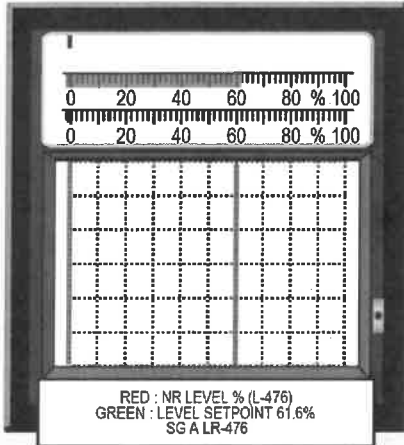
After EOP-15.0, the next required transition is to (2) .

**SG TRENDS ARE PROVIDED AS A REFERENCE**

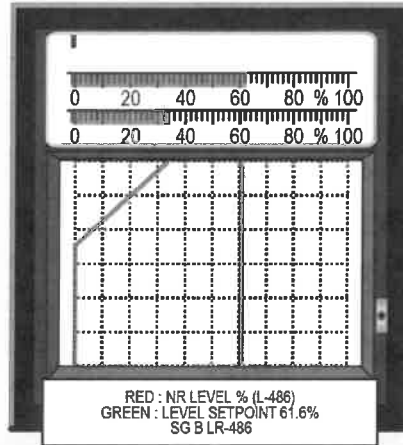
- A. 1) is  
2) EOP-2.0.
- B. 1) is  
2) EOP-3.0.
- C. 1) is **not**  
2) EOP-2.0.
- D. 1) is **not**  
2) EOP-3.0.

# Q #77

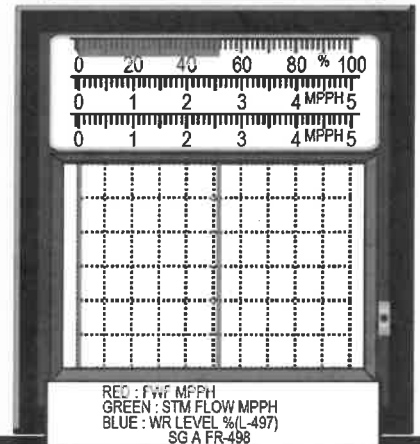
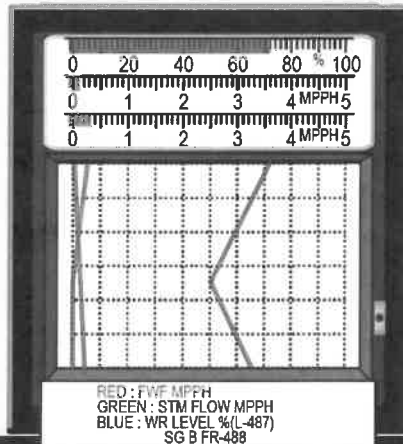
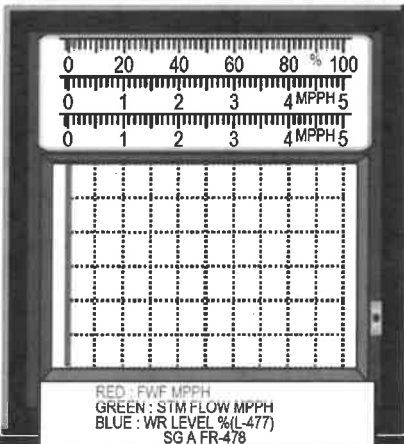
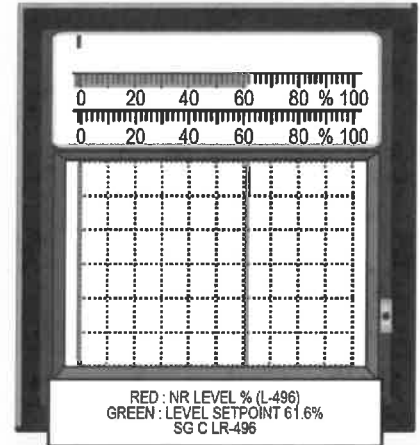
SG A



SG B



SG C



2018 (1601) NRC test

78. Given the following plant conditions:

- 100% power initially.
- Alternate Seal Injection was **inoperable** and removed from service.
- The plant has experienced a total loss of AC power.
- EOP-6.0 ECA-0.0 LOSS OF ALL ESF AC POWER is in progress.
- The 'A' D/G has been started and bus XSW-1DA is restored.
- The CRS is reading EOP-6.0, step 44, "**Verify the following to select the appropriate recovery procedure**"
- Plant conditions are as follows:
  - RCS subcooling is 45°F.
  - Pressurizer level is 18%.
  - There are **no** SI first out alarms lit on the first out annunciator panel.
  - There is **no** SI flow indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM.

Which ONE of the choices below completes the following statements?

The crew will transition to \_\_ (1) \_\_, which contains steps to \_\_ (2) \_\_.

- A. 1) EOP-6.1, ECA-0.1 LOSS OF ALL ESF AC POWER RECOVERY WITHOUT SI REQUIRED.  
2) isolate RCP seal injection before a Charging Pump is started.
- B. 1) EOP-6.1, ECA-0.1 LOSS OF ALL ESF AC POWER RECOVERY WITHOUT SI REQUIRED.  
2) start a Charging pump and then restore seal injection to RCPs.
- C. 1) EOP-6.2, ECA-0.2 LOSS OF ALL ESF AC POWER RECOVERY WITH SI REQUIRED.  
2) isolate RCP seal injection before a Charging Pump is started.
- D. 1) EOP-6.2, ECA-0.2 LOSS OF ALL ESF AC POWER RECOVERY WITH SI REQUIRED.  
2) start a Charging pump and then restore seal injection to RCPs.

2018 (1601) NRC test

79. Given the following plant conditions:

(Note the following equipment nomenclature)

XBC1A-1B, DC DISTRI BUS 1A-1B BACKUP BATTERY CHRG  
XBA1A, DC DISTRIBUTION BUS 1A BATTERY  
XBA1B, DC DISTRIBUTION BUS 1B BATTERY

6/10/17, Time 0645:

- Mode 3 with a heatup in progress.
- XBA1B, has been declared inoperable.
- Battery Charger XBC1A-1B was declared inoperable.

6/10/17, Time 0700:

- STP-501.002, QUARTERLY BATTERY SURVEILLANCE TEST has just been completed.
- <sup>The voltage on</sup> One connected cell on XBA1A <sup>is</sup> ~~read~~ 2.0 VDC. } BN 6/19/18

6/10/17, Time 0745:

- The following annunciators are received on XCP-636:
  - 4-4, TRAIN A BATT CHGR TRBL XBC 1A/1A-1B.
  - 4-6, DC SYS OVRVOLT/UNDRVOLT.
- The BOP reports 1A DC VOLTS indicates 125 VDC.

Which ONE of the choices below completes the following statements?

If the problems above remain uncorrected, the earliest time at which the plant must be placed in COLD SHUTDOWN in accordance with Technical Specifications is \_\_\_\_\_ on 6/11.

**REFERENCE PROVIDED**

- A. 1300
- B. 1400
- C. 1445
- D. 2000



## ELECTRICAL POWER SYSTEMS

### 3/4.8.2 D.C. SOURCES

#### OPERATING

#### LIMITING CONDITION FOR OPERATION

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3.8.2.1 As a minimum the following D.C. electrical sources shall be OPERABLE:

- a. 125-volt Battery bank No. 1A and its associated full capacity charger.
- b. 125-volt Battery bank No. 1B and its associated full capacity charger.

APPLICABILITY: MODES 1, 2, 3 and 4.

#### ACTION:

- a. With one of the required battery banks inoperable, restore the inoperable battery bank to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With one of the required full capacity chargers inoperable, demonstrate the OPERABILITY of its associated battery bank by performing Surveillance Requirement 4.8.2.1.a.1 within one hour, and at least once per 8 hours thereafter. If any Category A limit in Table 4.8-2 is not met, declare the battery inoperable.

#### SURVEILLANCE REQUIREMENTS

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4.8.2.1 Each 125-volt battery bank and charger shall be demonstrated OPERABLE:

- a. At least once per 7 days by verifying that:
  1. The parameters in Table 4.8-2 meet the Category A limits, and
  2. The total battery terminal voltage is greater than or equal to 129 volts on float charge.

**ELECTRICAL POWER SYSTEMS**

**SURVEILLANCE REQUIREMENTS (Continued)**

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- b. At least once per 92 days and within 7 days after a battery discharge with battery terminal voltage below 110-volts, or battery overcharge with battery terminal voltage above 150-volts, by verifying that:
  - 1. The parameters in Table 4.8-2 meet the Category B limits,
  - 2. There is no visible corrosion at either terminals or connectors, or the connection resistance of these items is less than  $150 \times 10^{-6}$  ohms, and
  - 3. The average electrolyte temperature of 10 of the connected cells is  $\geq 60^{\circ}\text{F}$ .
  
- c. At least once per 18 months by verifying that:
  - 1. The cells; cell plates and battery racks show no visual indication of physical damage or abnormal deterioration,
  - 2. The cell-to-cell and terminal connections are clean, tight, and coated with anti-corrosion material,
  - 3. The resistance of each cell-to-cell and terminal connection is less than or equal to  $150 \times 10^{-6}$  ohms, and
  - 4. The battery charger will supply at least 300 amperes at 132 volts for at least 8 hours.
  
- d. At least once per 18 months, during shutdown, by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status all of the actual or simulated emergency loads for the design duty cycle when the battery is subjected to a battery service test.
  
- e. At least once per 60 months, during shutdown, by verifying that the battery capacity is at least 80% of the manufacturer's rating when subjected to a performance discharge test. This performance discharge test may be performed in lieu of the battery service test required by Surveillance Requirement 4.8.2.1.d.
  
- f. Annual performance discharge tests of battery capacity shall be given to any battery that shows signs of degradation or has reached 85% of the service life expected for the application. Degradation is indicated when the battery capacity drops more than 10% of rated capacity from its average on previous performance tests, or is below 90% of the manufacturer's rating.

ELECTRICAL POWER SYSTEMS

TABLE 4.8-2

BATTERY SURVEILLANCE REQUIREMENTS

Parameter	CATEGORY A <sup>(1)</sup>	CATEGORY B <sup>(2)</sup>	
	Limits for each designated pilot cell	Limits for each connected cell	Allowable <sup>(3)</sup> value for each connected cell
Electrolyte Level	>Minimum level indication mark, and < 1/8" above maximum level indication mark	>Minimum level indication mark, and < 1/8" above maximum level indication mark	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 volts	≥ 2.13 volts <sup>(c)</sup>	> 2.07 volts
Specific Gravity <sup>(a)</sup>	≥ 1.200 <sup>(b)</sup>	≥ 1.195	Not more than .020 below the average of all connected cells
		Average of all connected cells > 1.205	Average of all connected cells ≥ 1.195 <sup>(b)</sup>

- (a) Corrected for electrolyte temperature and level.
- (b) Or battery charging current is less than (2) amps when on charge.
- (c) Corrected for average electrolyte temperature.
- (1) For any Category A parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that within 24 hours all the Category B measurements are taken and found to be within their allowable values, and provided all Category A and B parameter(s) are restored to within limits within the next 6 days.
- (2) For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that the Category B parameters are within their allowable values and provided the Category B parameter(s) are restored to within limits within 7 days.
- (3) Any Category B parameter not within its allowable value indicates an inoperable battery.

2018 (1601) NRC test

80. Initial conditions:

- 100% power.

Current conditions:

- 115 KV offsite power to the PARR ESF line is unavailable.

Which ONE of the choices below answers both of the following questions regarding the XTF5052, ALTERNATE AC SOURCE TRANSFORMER?

- 1) Can XTF5052 be aligned to restore 7.2 KV buses 1DA or 1DB without 115 KV power available?
  - 2) Is the XTF5052 Alternate AC Source credited in the safety analysis, in accordance with the bases for TS 3.8.1, AC Sources?
- A. 1) Yes.  
2) Yes.
- B. 1) Yes.  
2) No.
- C. 1) No.  
2) Yes.
- D. 1) No.  
2) No.

2018 (1601) NRC test

81. Given the following plant conditions:

- A loss of offsite power (115KV and 230 KV) occurred.
- The Reactor is tripped.
- All MSIVs are closed.
- Operators have entered EOP-15.1, STEAM GENERATOR OVERPRESSURE.
- Secondary radiation is normal.
- Steam Generator Narrow Range Levels:
  - "A" 79% and increasing.
  - "B" 60% and stable.
  - "C" 63% and stable.
- Steam Generator Pressures:
  - "A" 1235 psig and increasing.
  - "B" 1130 psig and stable.
  - "C" 1130 psig and stable.

Which ONE of the following describes the procedure and the action that the CRS will use to mitigate the above conditions?

- A. Remain in EOP-15.1, STEAM GENERATOR OVERPRESSURE, and dump steam from "A" Steam Generator steamline PORV.
- B. Remain in EOP-15.1, STEAM GENERATOR OVERPRESSURE, open PVM-2869A, A BYP VLV and dump steam from the "A" Steam Generator.
- C. Transition to EOP-15.2, STEAM GENERATOR HIGH LEVEL, and dump steam from "A" Steam Generator steamline PORV.
- D. Transition to EOP-15.2, STEAM GENERATOR HIGH LEVEL, and initiate blowdown from the "A" Steam Generator.

2018 (1601) NRC test

82. Given the following plant conditions:

- RCS activity greater than 1 micro-curie/gm DOSE EQUIVALENT I-131.

Which ONE of the choices completes the following statements in accordance with the bases for T.S. 3.4.8, REACTOR COOLANT SYSTEM - SPECIFIC ACTIVITY.

The 1 micro-curie/gm RCS activity limit ensures that the 2 hour doses at the site boundary will not exceed an appropriately small fraction of Part 100 limits following a \_\_ (1) \_\_ .

In accordance with the bases for T.S. 3.4.8, when specific activity is greater than 1 micro-curie/gm, operators are allowed to maintain power operations based on \_\_ (2) \_\_ .

- A. 1) steam generator tube rupture.  
2) accommodating the iodine spiking phenomenon after a power change.
- B. 1) steam generator tube rupture.  
2) time for operator actions to place letdown in service.
- C. 1) LOCA outside containment.  
2) accommodating the iodine spiking phenomenon after a power change.
- D. 1) LOCA outside containment.  
2) time for operator actions to place letdown in service.

2018 (1601) NRC test

83. Initial conditions:

- LOCA occurred.
- All offsite power (115 KV and 230 KV) was lost.
- XCP-610, 1-1, RHR PP A TRIP is in alarm.
- RCS pressure 1100 psig, decreasing.

Current conditions:

- EOP-2.0, LOSS OF REACTOR OR SECONDARY COOLANT in progress.
  - Operators are at step 16, "**Verify equipment is available for Cold Leg Recirculation**".
- RB pressure is 13 psig, decreasing.
- Pressurizer level is 0%.
- RWST level is 55%, decreasing.
- RHR Sump Level is 412 ft, increasing.
- RCS pressure 600 psig and stable.
- RCS subcooling is 48°F and stable.

Which ONE of the following describes the next procedure transition and an action that is required for the current conditions in that procedure?

- A. EOP-2.4 LOSS OF EMERGENCY COOLANT RECIRCULATION.  
Align RB Spray for recirculation.
- B. EOP-2.4 LOSS OF EMERGENCY COOLANT RECIRCULATION.  
Stop RB Spray pumps and Charging Pumps.
- C. EOP-2.1, POST- LOCA COOLDOWN AND DEPRESSURIZATION.  
Depressurize the RCS to minimize break flow.
- D. EOP-2.1, POST- LOCA COOLDOWN AND DEPRESSURIZATION.  
Commence an RCS cooldown using Steam Generator PORVs.

2018 (1601) NRC test

84. Initial conditions:

- 100% power.
- A loss of 230 KV occurred.
- Operator entered EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE

Current conditions:

- EOP-1.3, NATURAL CIRCULATION COOLDOWN is in progress.
- A cooldown is in progress at 70°F/hour.
- Power has just been restored to bus 1B.
- Conditions are satisfied to start "B" RCP.
- The CRS has determined that the cooldown rate must be maximized.

Which ONE of the following describes the required course of action?

- A. Start "B" RCP and transfer to GOP-6, PLANT SHUTDOWN FROM HOT STANDBY TO COLD SHUTDOWN (MODE 3 TO MODE 5).
- B. Start "B" RCP and transfer back to EOP-1.1, REACTOR TRIP RESPONSE at the step in effect.
- C. Start a CRDM Shroud Exhaust Fan, remain in EOP-1.3.
- D. Start a CRDM Shroud Exhaust Fan, transfer to EOP-1.4, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL.



2018 (1601) NRC test

85. Given the following plant conditions:

Time 1200:

- 100% power.

Time 1205:

- A "B" main steam line break inside the RB occurs.
- RB pressure is 21 psig.
- Both RB Spray pumps fail to start automatically or manually.

Time 1210:

- A steam generator tube rupture on "B" SG occurs.

Time 1215:

- An overload and trip of "B" Service Water Booster pump occurs.
- RB pressure is 13 psig.

Time 1225:

- "B" SG PORV begins to lift at the auto setpoint.
- RB pressure is 13 psig and stable.

Which ONE of the choices below completes the following statement?

The **highest** Emergency Action Level (EAL) classification is \_\_ (1) \_\_ and the conditions for this declaration were **first** met at \_\_ (2) \_\_ .

Do **not** consider Emergency Director Judgment as a basis for emergency classification.

**REFERENCE PROVIDED**

- A. 1) an ALERT.  
2) 1205.
- B. 1) an ALERT.  
2) 1210.
- C. 1) a SITE AREA EMERGENCY.  
2) 1215.
- D. 1) a SITE AREA EMERGENCY.  
2) 1225.



### EAL Classification Matrices- Unit 1

VCS UNIT 1	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT																																																													
<b>1</b> Loss of RBF AC Power  <b>2</b> Loss of Used DC AC Power  <b>3</b> Loss of Core of Reactor  <b>4</b> RCS Activity  <b>5</b> RCS Leakage  <b>6</b> RTR Failure  <b>7</b> Loss of Control  <b>8</b> CMT Inadequate Failure  <b>9</b> Manual Loss of Automatic Safety System  <b>F</b> Fission Product Barrier Degradation	<p>Protected loss of all off-site and all on-site AC power to RBF buses for 10 minutes or longer.</p> <p><b>S01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Loss of all off-site and all on-site AC power (Tables B-1) capability to 7.2 KV RBF buses 1DA and 1DB for a 10 min. (Note 1)</p> <p><b>AND</b></p> <p>Reduction of at least one RBF bus within 4 hours to meet steady (Note 1)</p> <p>CSFBT Core Cooling NED path conditions met</p> <p>Loss of all AC and used DC power sources for 10 minutes or longer.</p> <p><b>S01.2</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Loss of all on-site and all on-site AC power (Tables B-1) capability to 7.2 KV RBF buses 1DA and 1DB for a 10 min. (Note 1)</p> <p>AND</p> <p>100 VDC on both Train A and Train B used 120 VDC systems for a 10 min. (Note 1)</p>	<p>Loss of all on-site and all on-site AC power to RBF buses for 10 minutes or longer.</p> <p><b>S01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Loss of all off-site and all on-site AC power (Tables B-1) capability to 7.2 KV RBF buses 1DA and 1DB for a 10 min. (Note 1)</p> <p><b>AND</b></p> <p>Tables B-1 AC Power Supplies</p> <p>Checks:</p> <ul style="list-style-type: none"> <li>118 KV power to XTF-4 and XTF-6</li> <li>330 KV power to XTF-3</li> <li>120 KV power to 12.8 KV power to RBF Bus 1DA or 1DB</li> </ul> <p>Checks:</p> <ul style="list-style-type: none"> <li>Control Generator A</li> <li>Control Generator B</li> </ul> <p>Loss of all used DC power for 10 minutes or longer.</p> <p><b>S01.2</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>100 VDC on both Train A and Train B used 120 VDC systems for a 10 min. (Note 1)</p> <p><b>Table B-9 Safety System Parameters</b></p> <ul style="list-style-type: none"> <li>Reactor power</li> <li>Reactor vessel/steam generator level</li> <li>RCS pressure</li> <li>Control TGA</li> <li>Level in at least one SG</li> <li>EPMA/AV flow</li> </ul>	<p>Loss of all on-site AC power to RBF buses for 10 minutes or longer.</p> <p><b>S01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>AC power capability to 7.2 KV RBF buses 1DA and 1DB supported to a single power source (Table B-1) for a 10 min. (Note 1)</p> <p><b>AND</b></p> <p>Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS</p> <p>UNPLANNED loss of Control Room Indicators for 10 minutes or longer will trigger a reactor shutdown.</p> <p><b>S03.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>An UNPLANNED event results in the inability to monitor one or more Table B-2 parameters from within the Control Room for a 10 min. (Note 1)</p> <p>Any of the following transient events in progress:</p> <ul style="list-style-type: none"> <li>Automatic or manual trip fails to shut down the reactor</li> <li>Control Room Indicators greater than 20% normal in reactor power</li> <li>Reactor flow</li> <li>DOCS activation</li> </ul>	<p>Loss of all on-site AC power to RBF buses for 10 minutes or longer.</p> <p><b>S01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Loss of all off-site AC power (Table B-1) capability to 7.2 KV RBF buses 1DA and 1DB for a 10 min. (Note 1)</p> <p>UNPLANNED loss of Control Room Indicators for 10 minutes or longer will trigger a reactor shutdown.</p> <p><b>S03.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>An UNPLANNED event results in the inability to monitor one or more Table B-2 parameters from within the Control Room for a 10 min. (Note 1)</p> <p>Reactor vessel level greater than 100% of normal (Note 1)</p> <p><b>S04.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Wipe below the service, RSL-1 high range monitor = 40,000 cpm</p> <p><b>S04.2</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Sample analysis indicates that a primary coolant activity value is non-acceptable level specified in Technical Specifications 3.6.8</p> <p>RCS leakage for 10 minutes or longer.</p> <p><b>S05.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>RCS identified as pressure boundary leakage = 10 gpm for 10 min.</p> <p>RCS identified as pressure boundary leakage = 20 gpm for 10 min.</p> <p>Leakage from the RCS to a location outside containment = 20 gpm for a 10 min. (Note 1)</p> <p>Automatic or manual trip fails to shut down the reactor.</p> <p><b>S06.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>An automatic trip did not shut down the reactor within 110 seconds.</p> <p>AND</p> <p>A subsequent manual action taken at the reactor control console is successful in shutting down the reactor as indicated by reactor power = 5% (Note 6)</p> <p><b>S06.2</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>A manual trip did not shutdown the reactor.</p> <p>AND</p> <p>A subsequent automatic trip or manual trip action taken at the reactor control console is successful in shutting down the reactor as indicated by reactor power = 5% (Note 6)</p> <p>Loss of all on-site or on-site communication capabilities.</p> <p><b>S07.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Loss of all Table B-3 on-site communication methods.</p> <p>Loss of all Table B-3 CRO communication methods.</p> <p>Loss of all Table B-3 NRC communication methods.</p> <p>Failure to isolate containment or loss of containment pressure.</p> <p><b>S08.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Containment Isolation Incomplete</p> <p>All listed core isolation valves in each penetration to cool closed within 15 min. of the activation (Note 1)</p> <p><b>S08.2</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Containment pressure = 12 psig</p> <p>and</p> <p>all full range operational leakage (Table B-4) is operating per design for a 10 min. (Note 1)</p>																																																													
	<p><b>Notes</b></p> <p>Note 1: The Emergency Director should declare the event emergency action commencing the time that the event is announced, or will likely be announced, unless a permit is issued by any operator action, or act of nature, which causes the control room to be unable to maintain the core, and cause the release of fission products in excess of the limits of implementation of reactor shutdown strategies.</p>	<p><b>Table B-2 Communications Methods</b></p> <table border="1"> <thead> <tr> <th>System</th> <th>Onsite</th> <th>Offsite</th> <th>NRC</th> </tr> </thead> <tbody> <tr> <td>Plant Radio System</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>Radio System</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>CRO Dedicated System</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>Private Branch Exchange</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>Public Switched Telephone Network</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>Fiber optic Network</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>Satellite Phone System</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>"Federal Telephone System"</td> <td>X</td> <td>X</td> <td>X</td> </tr> </tbody> </table>	System	Onsite	Offsite	NRC	Plant Radio System	X	X	X	Radio System	X	X	X	CRO Dedicated System	X	X	X	Private Branch Exchange	X	X	X	Public Switched Telephone Network	X	X	X	Fiber optic Network	X	X	X	Satellite Phone System	X	X	X	"Federal Telephone System"	X	X	X	<p><b>Table B-3 Full Train Depressure/Leakout Equipment</b></p> <table border="1"> <thead> <tr> <th>RBCU Group</th> <th>Containment Spray</th> <th>Operating</th> <th>Operating</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>0</td> <td>2</td> <td>2</td> </tr> </tbody> </table>	RBCU Group	Containment Spray	Operating	Operating	1	0	1	1	2	0	2	2	<p><b>Table B-9 Heat/Flow Events</b></p> <ul style="list-style-type: none"> <li>Boiling event (air/quake)</li> <li>Instant or delayed flooding event</li> <li>High winds or tornado strike</li> <li>FSIS</li> <li>EPIC/CRICH</li> <li>Other events with similar reactor characteristics as determined by the RTR Manager</li> </ul>	<p><b>Table B-3 Full Train Depressure/Leakout Equipment</b></p> <table border="1"> <thead> <tr> <th>RBCU Group</th> <th>Operating</th> <th>Containment Spray</th> <th>Operating</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>0</td> <td>2</td> <td>2</td> </tr> </tbody> </table>	RBCU Group	Operating	Containment Spray	Operating	1	0	1	1	2	0	2	2
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<p><b>F01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Loss of any two barriers AND</p> <p>Loss or potential loss of third barrier (Table F-1)</p>	<p><b>F01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Loss or potential loss of any two barriers (Table F-1)</p>	<p><b>F01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Loss or potential loss of any two barriers (Table F-1)</p>	<p><b>F01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Any loss or any potential loss of other Fuel Clad or RCS (Table F-1)</p>	<p><b>F01.1</b> [1][2][3][4][5][6][7][8][9][10]</p> <p>Any loss or any potential loss of other Fuel Clad or RCS (Table F-1)</p>																																																													

	Fuel Clad Barrier		Reactor Coolant System Barrier		Containment Barrier	
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss
1. RCS or ED Tube Leakage			A. Any condition in the RANM EDGE (1) activation results in UNDESIRABLE RCS leakage	A. Operation of a standby shutdown pump is required in EITHER UNDESIRABLE RCS leakage or SG tube RUPTURE	A. Isolation or RESTRICTED flow	
2. Inadequate Heat Removal	A. CSFBT Core Cooling-RCD path conditions met	A. CSFBT Core Cooling-RANM-T path conditions met B. CSFBT Heat Sink-RCD path conditions met AND Heat Sink required		A. CSFBT Heat Sink-RCD path conditions met AND Heat Sink required		A. CSFBT Core Cooling-RCD path conditions met AND Reactor power shutdown not achieved within 15 min. (Note 1)
3. CMT Inadequate / RCS Activity	A. RSD-07 or RSD-018 CMTMT HI RANM Gamma = 2,000 R/hv B. Core equivalent to 1.21 coolant activity = 300 µCi/gm		A. RSD-07 or RSD-018 CMTMT HI RANM Gamma = 100 R/hv			A. RSD-07 or RSD-018 CMTMT HI RANM Gamma = 20,000 R/hv
4. CMT Inadequate or Broken				Table B-3 Full Train Depressure/Leakout Equipment RBCU Group Operating Containment Spray Operating 1 0 1 1 2 0 2 2	A. Containment Isolation is required AND RSD-07/018 B. Containment integrity has been lost based on (1) equipment UNDESIRABLE RCS leakage from containment to the environment C. Containment pressure = 10 psig and less than 10 min. of operation equipment (Table F-2) is operating per design for a 15 min. (Note 1)	A. CSFBT Containment-RCD path conditions met B. Containment hydrogen concentration = 4% C. Containment pressure = 10 psig and less than 10 min. of operation equipment (Table F-2) is operating per design for a 15 min. (Note 1)
5. ED Judgment	A. Any condition in the opinion of the ED that indicates loss of the fuel clad barrier	A. Any condition in the opinion of the ED that indicates potential loss of the Fuel Clad barrier	A. Any condition in the opinion of the ED that indicates loss of the RCS barrier	A. Any condition in the opinion of the ED that indicates potential loss of the RCS barrier	A. Any condition in the opinion of the ED that indicates loss of the Containment barrier	A. Any condition in the opinion of the ED that indicates potential loss of the Containment barrier

**Modes:** 1 Power Operations, 2 Startup, 3 Hot Standby, 4 Hot Shutdown, 5 Cold Shutdown, 6 Refueling, DEF Dejected

VCS-EPP-001 Rev. 6, Attachment I  
EAL Classification Matrix- Unit 1  
Page 2 of 6  
HOT CONDITIONS (RCS > 200°F)

EAL Classification Matrices- Unit 1

VCS UNIT 1	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT																																																
<b>C</b> <b>1</b> RCS Level  <b>2</b> Loss of BOP AC Power  <b>3</b> RCS Temp  <b>4</b> Loss of Head DC Power  <b>5</b> Loss of Comm.  <b>6</b> Hazardous A-BOP Safety Systems	<p>Loss of reactor vessel/RCS inventory affecting low alert containment pressure</p> <p><b>CA1.1</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>Reactor vessel level &gt; 437' elevation (top of active tank) for &gt; 20 min. (Note 1)                      AND                      Any of the following indications of containment challenge:                      • CONTAINMENT CLOSURE not established (Note 7)                      • CONTAINMENT hydrogen concentration &gt; 4%                      • UNPLANNED increase in Containment pressure</p> <p><b>CA1.2</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>Reactor vessel/RCS level cannot be monitored for &gt; 20 min. (Note 1)                      AND                      Core inventory is indicated by any of the following:                      • Reactor PSA Bigg Run/standby signal or Reactor/VAB Bigg Manipulator Crane &gt; 50,000 m³/hr (when installed)                      • Electric radionuclide monitor indication                      • UNPLANNED increase in any Table C-1 sump / tank level of sufficient magnitude to indicate core inventory                      AND                      Any of the following indications of containment challenge:                      • CONTAINMENT CLOSURE not established (Note 7)                      • CONTAINMENT hydrogen concentration &gt; 4%                      • UNPLANNED increase in Containment pressure</p>	<p>Loss of reactor vessel/RCS inventory affecting low alert containment pressure</p> <p><b>CA1.1</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>CONTAINMENT CLOSURE not established                      AND                      Reactor vessel level &gt; 425' elevation (top above the bottom of the hot leg penetration)</p> <p><b>CA1.2</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>CONTAINMENT CLOSURE not established                      AND                      Reactor vessel level &gt; 427' elevation (top of active tank)</p> <p><b>CA1.3</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>Reactor vessel/RCS level cannot be monitored for &gt; 20 min. (Note 1)                      AND                      Core inventory is indicated by any of the following:                      • Reactor PSA Bigg Run/standby signal or Reactor/VAB Bigg Manipulator Crane &gt; 50,000 m³/hr (when installed)                      • Electric radionuclide monitor indication                      • UNPLANNED increase in any Table C-1 sump / tank level of sufficient magnitude to indicate core inventory</p>	<p>Loss of reactor vessel/RCS inventory</p> <p><b>CA1.1</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>Loss of reactor vessel/RCS inventory as indicated by level &gt; 425' elevation (top or hot leg penetration)                      AND                      Reactor vessel/RCS level cannot be monitored for &gt; 15 min. (Note 1)                      AND                      UNPLANNED increase in any Table C-1 sump or tank levels due to a loss of reactor vessel/RCS inventory</p> <p><b>CA1.2</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>Loss of all safety and all service AC power to BOP tanks for &gt; 10 minutes (Note 1)</p> <p><b>CA1.3</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>Loss of all safety and all service AC power (Table C-2) capability to 7.5 KV BOP buses (10a and 10b) for &gt; 15 min (Note 1)                      AND                      Loss of all safety and all service AC power (Table C-2) capability to 7.5 KV BOP buses (10a and 10b) for &gt; 15 min (Note 1)                      AND                      Loss of all safety and all service AC power (Table C-2) capability to 7.5 KV BOP buses (10a and 10b) for &gt; 15 min (Note 1)</p> <p>Ability to maintain this plant in cold shutdown</p> <p><b>CA1.1</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>UNPLANNED increase in RCS temperature to &gt; 200°F for &gt; 10 min (Note 1)</p> <p><b>CA1.2</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>UNPLANNED RCS pressure increase &gt; 10 psig (739 kPa) due to not supply during water-chills plant conditions)</p> <p>Minimum event allowing a SAFETY SYSTEM needed for the Containment event.</p> <p><b>CA1.3</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>The occurrence of any Table C-6 hazardous event AND                      Failure of the following:                      • Level detector has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the start-up operating mode                      • The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.</p>	<p>Containment loss of reactor vessel/RCS inventory for &gt; 10 minutes (Note 1)</p> <p><b>CU1.1</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>UNPLANNED loss of reactor vessel/RCS inventory as indicated by level &gt; 425' elevation (top or hot leg penetration) for &gt; 10 min. (Note 1)                      AND                      Reactor vessel/RCS level cannot be monitored</p> <p><b>CU1.2</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>Reactor vessel/RCS level cannot be monitored AND                      UNPLANNED increase in any Table C-1 sump or tank levels due to a loss of reactor vessel/RCS inventory</p> <p>Loss of all safety and all service AC power to BOP tanks for &gt; 10 minutes (Note 1)</p> <p><b>CU1.1</b> [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16]</p> <p>AC power capacity to 7.5 KV BOP buses (10a and 10b) reduced to a single power source (Table C-2) for &gt; 15 min. (Note 1)                      AND                      Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS</p> <p>Loss of all safety and all service AC power (Table C-2) capability to 7.5 KV BOP buses (10a and 10b) for &gt; 15 min (Note 1)                      AND                      Loss of all safety and all service AC power (Table C-2) capability to 7.5 KV BOP buses (10a and 10b) for &gt; 15 min (Note 1)                      AND                      Loss of all safety and all service AC power (Table C-2) capability to 7.5 KV BOP buses (10a and 10b) for &gt; 15 min (Note 1)</p> <p>Loss of all safety and all service AC power (Table C-2) capability to 7.5 KV BOP buses (10a and 10b) for &gt; 15 min (Note 1)                      AND                      Loss of all safety and all service AC power (Table C-2) capability to 7.5 KV BOP buses (10a and 10b) for &gt; 15 min (Note 1)</p>																																																
	<p>Notes</p> <p>Note 1: The Emergency Director should declare the event promptly upon determining that time limit has been exceeded, or set ready to be exceeded.</p> <p>Note 2: If CONTAINMENT CLOSURE is established prior to exceeding the 30-minute time limit, declaration of a General Emergency is not required.</p>	<p>Table C-2 AC Power Supplies</p> <p>Onsite:</p> <ul style="list-style-type: none"> <li>115 KV power to RTF-6 and RTF-6</li> <li>230 KV power to RTF-21</li> <li>Fast Hydro Pump 12 KV power to ESP SWA 1DA or 1DB</li> </ul> <p>Offsite:</p> <ul style="list-style-type: none"> <li>Diesel Generator A</li> <li>Diesel Generator B</li> </ul>	<p>Table C-3 RCS Maximum Duration Transients</p> <p>* If an RCS level increase occurs in all operations, then the low-turbance and RES temperature as shown in the table, in the following:</p> <table border="1"> <thead> <tr> <th>RCS Status</th> <th>Containment Closure Status</th> <th>Head Trip</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>RESA AND RESB IN REDUCED INVENTORY</td> <td>NA</td> <td>50 min. *</td> <td></td> </tr> <tr> <td>Not Inced OE at REDUCED INVENTORY</td> <td>Established</td> <td>30 min. *</td> <td>0 min. *</td> </tr> </tbody> </table>	RCS Status	Containment Closure Status	Head Trip	Duration	RESA AND RESB IN REDUCED INVENTORY	NA	50 min. *		Not Inced OE at REDUCED INVENTORY	Established	30 min. *	0 min. *	<p>Table C-4 Communications Methods</p> <table border="1"> <thead> <tr> <th>System</th> <th>Available</th> <th>OK</th> <th>MNC</th> </tr> </thead> <tbody> <tr> <td>Plant Ingoing System</td> <td>X</td> <td>X</td> <td></td> </tr> <tr> <td>Radio System</td> <td>X</td> <td>X</td> <td></td> </tr> <tr> <td>CRD Dedicated System</td> <td>X</td> <td>X</td> <td></td> </tr> <tr> <td>Private Direct Exchange</td> <td></td> <td>X</td> <td>X</td> </tr> <tr> <td>Public Switched Telephone Network</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>Telephone Network</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>Emergency Phone System</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>* "Federal Telephone System"</td> <td></td> <td>X</td> <td>X</td> </tr> </tbody> </table>	System	Available	OK	MNC	Plant Ingoing System	X	X		Radio System	X	X		CRD Dedicated System	X	X		Private Direct Exchange		X	X	Public Switched Telephone Network	X	X	X	Telephone Network	X	X	X	Emergency Phone System	X	X	X	* "Federal Telephone System"		X	X
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Modes: **1** Power Operations **2** Startup **3** Hot Standby **4** Hot Shutdown **5** Cold Shutdown **6** Reloading **DEF** Default



2018 (1601) NRC test

86. Given the following plant conditions:

Time 0200:

- A complete loss of offsite power (115 KV and 230 KV) occurred.
- Both EDGs failed to start.
- EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER is in progress.

Time 0215:

- System controller reports that offsite power cannot be restored until **0800**.
- Maintenance reports that both EDGs will be out of service for 24 hours.

Time 0630:

- 1A and 1B DC VOLTS read 110 VDC.

Time 0730:

- 1A and 1B DC VOLTS read 104 VDC.

Which ONE of the choices completes the following statements in accordance with EOP-6.0?

An ELAP will be declared at time   (2)  .

Operators were **first** required to perform FSP-7.0, LOSS OF VITAL INSTRUMENTATION OR CONTROL POWER, at time   (1)   in accordance with EOP-6.0.

- A. 1) 0215.  
2) 0630.
- B. 1) 0215.  
2) 0730.
- C. 1) 0400.  
2) 0630.
- D. 1) 0400.  
2) 0730.

2018 (1601) NRC test

87. Given the following plant conditions:

6/1, Time 0800:

- 100% power.
- "A" RHR pump is declared inoperable.

6/1, Time 0930:

- The Shift Manager is informed that both MVG-8811A RHR SUMP A TO RHR PP A and MVG-8811B RHR SUMP B TO RHR PP B will not stroke automatically due to defective circuits.
  - The valves are capable of being stroked manually from the Main Control Boards.

6/1, Time 1000:

- "A" RHR pump is restored to OPERABLE status.

Which ONE of the choices below completes the following statements?

For RHR system conditions on 6/1 at time 1000, the lowest mode required to be established in accordance with Technical Specifications is \_\_(1)\_\_ and the earliest time at which this mode is required to be entered is \_\_(2)\_\_.

Assume 100% power for all conditions above.

REFERENCE PROVIDED

- A. 1) COLD SHUTDOWN  
2) 2130 on ~~6/1~~ 6/2
- B. 1) COLD SHUTDOWN  
2) 2230 on ~~6/1~~ 6/2
- C. 1) HOT SHUTDOWN  
2) 2130 on ~~6/2~~ 6/1
- D. 1) HOT SHUTDOWN  
2) 2230 on ~~6/2~~ 6/1

BK  
6/19/18

## EMERGENCY CORE COOLING SYSTEMS

### 3/4.5.2 ECCS SUBSYSTEMS - $T_{avg} \geq 350^{\circ}\text{F}$

#### LIMITING CONDITION FOR OPERATION

3.5.2 Two independent Emergency Core Cooling System (ECCS) subsystems\* shall be OPERABLE with each subsystem comprised of:

- a. One OPERABLE centrifugal charging pump,
- b. One OPERABLE residual heat removal heat exchanger,
- c. One OPERABLE residual heat removal pump, and
- d. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a safety injection signal and automatically transferring suction to the residual heat removal sump during the recirculation phase of operation.

APPLICABILITY: MODES 1, 2 and 3.

#### ACTION:

- a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours\* or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
- b. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

\* The allowable outage time for each RHR train may be extended to 7 days for the purpose of maintenance and modification. This exception may only be used one time per RHR train and is not valid after December 31, 1997.

## EMERGENCY CORE COOLING SYSTEMS

### 3/4.5.3 ECCS SUBSYSTEMS - $T_{avg} < 350^{\circ}\text{F}$

#### LIMITING CONDITION FOR OPERATION

3.5.3 As a minimum, one ECCS subsystem comprised of the following shall be OPERABLE:

- a. One OPERABLE centrifugal charging pump,#
- b. One OPERABLE residual heat removal heat exchanger,
- c. One OPERABLE residual heat removal pump, and
- d. An OPERABLE flow path capable of taking suction from the refueling water storage tank upon being manually realigned and capable of transferring suction to the RHR sump during the recirculation phase of operation.

APPLICABILITY: MODE 4.

#### ACTION:

- a. With no ECCS subsystem OPERABLE because of the inoperability of either the centrifugal charging pump or the flow path from the refueling water storage tank, restore at least one ECCS subsystem to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.
- b. With no ECCS subsystem OPERABLE because of the inoperability of either the residual heat removal heat exchanger or residual heat removal pump, restore at least one ECCS subsystem to OPERABLE status or maintain the Reactor Coolant System  $T_{avg}$  less than  $350^{\circ}\text{F}$  by use of alternate heat removal methods.
- c. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

# A maximum of one centrifugal charging pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to  $300^{\circ}\text{F}$ .



2018 (1601) NRC test

88. Given the following plant conditions:

- Mode 5.
- "A" CCW loop is supplying non-essential loads.
- "A" CCW pump is running with its switch in NORMAL AFTER START.
- "B" CCW pump is OFF with its switch in NORMAL AFTER STOP.
- "C" CCW is OFF, aligned electrically to the "B" loop, and the supply breaker is racked UP.

Which ONE of the choices below answers both of the following questions?

- 1) Which of the CCW loops is OPERABLE?
- 2) Is MODE 4 entry allowed in the current condition?

**REFERENCE PROVIDED**

- A. 1) "A" only.  
2) Yes.
- B. 1) "A" only.  
2) No.
- C. 1) "B" only.  
2) Yes.
- D. 1) "B" only.  
2) No.

PLANT SYSTEMS

3/4.7.3 COMPONENT COOLING WATER SYSTEM

LIMITING CONDITION FOR OPERATION

---

3.7.3 At least two independent component cooling water loops shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With only one component cooling water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

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4.7.3 At least two component cooling water loops shall be demonstrated OPERABLE:

- a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) servicing safety related equipment that is not locked, sealed, or otherwise secured in position, is in its correct position.

2018 (1601) NRC test

89. Given the following plant conditions:

- Mode 1.
- The "A" EDG is inoperable.
- The "B" Fuel Oil Storage Oil Tank contains 52,000 gallons.
- "B" EDG is running loaded in parallel with Bus 1DB.
- Bus 1DA is powered from 1DA NORM FEED.
- Bus 1DB is powered from 1DB ALT FEED.

Which ONE of the following answers both of the following questions?

- 1) What is an event or action that would require entry in to T.S. 3.0.3.
  - 2) Once T.S. 3.0.3 is entered, what is the highest mode in which T.S. 3.0.3 is allowed to be exited?
- A. 1) Bus 1DA is transferred to 1DA ALT FEED.  
2) 4.
- B. 1) Bus 1DA is transferred to 1DA ALT FEED.  
2) 5.
- C. 1) "B" Fuel Oil Storage Oil Tank reaches 48,000 gals;  
2) 4.
- D. 1) "B" Fuel Oil Storage Oil Tank reaches 48,000 gals;  
2) 5.

2018 (1601) NRC test

90. Given the following plant conditions:

- Mode 4
- RCS temperature is 325°F, stable.
- RM-A2, REACTOR BUILDING SAMPLE LINE MONITOR was declared inoperable due to a detector failure at 2345, 8/19.
- Manual leakrate calculations are being done to satisfy Surveillance 4.4.6.2.1.d in accordance action b. of T.S.3.4.6.1, REACTOR COOLANT SYSTEM LEAKAGE, LEAKAGE DETECTION SYSTEMS.
- The first and only calculation was performed at 0215, 8/20.

Which ONE of the following describes the latest allowable time for completion of the next leakrate calculation?

**REFERENCE PROVIDED**

- A. 2345, 8/20.
- B. 0215, 8/21.
- C. 0545, 8/21.
- D. 0815, 8/21.

## REACTOR COOLANT SYSTEM

### 3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

#### LEAKAGE DETECTION SYSTEMS

#### LIMITING CONDITION FOR OPERATION

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3.4.6.1 The following Reactor Coolant System leakage detection systems shall be OPERABLE:

- a. One reactor building sump level,
- b. One reactor building atmosphere radioactivity monitor (gaseous or particulate), and
- c. One reactor building cooling unit condensate flow rate monitor.

APPLICABILITY: MODES 1, 2, 3 and 4.

#### ACTION:

- a. With the reactor building sump level monitor inoperable, perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours<sup>(1)</sup> and restore the required reactor building sump level monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With the required reactor building atmosphere radioactivity monitor inoperable, analyze grab samples of the containment atmosphere at least once per 24 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours<sup>(1)</sup> and restore the required reactor building atmosphere radioactivity monitor to OPERABLE status or verify the reactor building cooling unit condensate flow rate monitor is OPERABLE within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- c. With the reactor building cooling unit condensate flow rate monitor inoperable, perform a CHANNEL CHECK of the required reactor building atmosphere radioactivity monitor at least once per 8 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours<sup>(1)</sup>; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- d. With the reactor building sump level monitor and the reactor building cooling unit condensate flow rate monitor inoperable and with the reactor building atmosphere gaseous radioactivity monitor being the only remaining OPERABLE leakage

---

<sup>(1)</sup> Not required to be performed/completed until 12 hours after establishment of steady state operation.

2018 (1601) NRC test

91. Given the following plant conditions:

Time 0400:

- 75% power.
- $T_{AVG}$  is on program and matched with  $T_{REF}$ .
- Pressurizer level indications are as follows:  
LI-459A 51%, stable.  
LI-460 51%, stable.  
LI-461 45%, stable.
- FCV-122, CHG FLOW controller is in AUTO, output is 36%, stable.

Time 0500:

- Pressurizer level transmitter LT-459 fails low.

**Current** time is 1300:

- No corrective maintenance has been completed.

Which ONE of the choices below completes the following statements?

At the current time of 1300, the **highest** power level allowed to be maintained in accordance with Technical Specifications is   (1)  .

The **earliest** time at which this power level was required to be established is   (2)  .

**REFERENCE PROVIDED**

- A. 1) 5%.  
2) 1100.
- B. 1) 5%.  
2) 1200.
- C. 1) 0%.  
2) 1100.
- D. 1) 0%.  
2) 1200.

SUMMER - UNIT 1

3/4 3-3

**TABLE 3.3-1 (Continued)**  
**REACTOR TRIP SYSTEM INSTRUMENTATION**

<u>FUNCTIONAL UNIT</u>	<u>TOTAL NO. OF CHANNELS</u>	<u>CHANNELS TO TRIP</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABLE MODES</u>	<u>ACTION</u>
11. Pressurizer Water Level--High	3	2	2	1	6 <sup>#</sup>
12. A. Loss of Flow - Single Loop (Above P-8)	3/loop	2/loop in any operating loop	2/loop in each operating loop	1	6 <sup>#</sup>
B. Loss of Flow - Two Loops (Above P-7 and below P-8)	3/loop	2/loop in two operating loops	2/loop each operating loop	1	6 <sup>#</sup>
13. Steam Generator Water Level--Low-Low	3/loop	2/loop in any operating loops	2/loop in each operating loop	1, 2	6 <sup>#</sup>
14. Steam/Feedwater Flow Mismatch and Low Steam Generator Water Level	2/loop-level and 2/loop-flow mismatch in each loop	1/loop-level coincident with 1/loop-flow mismatch in same loop	1/loop-level and 2/loop-flow mismatch in same loop or 2/loop-level and 1/loop-flow mismatch in same loop	1, 2	6 <sup>#</sup>

TABLE 3.3-1 (Continued)

TABLE NOTATION

- \* With the reactor trip system breakers in the closed position and the control rod drive system capable of rod withdrawal.
- # The provisions of Specification 3.0.4 are not applicable.
- ## Below the P-6 (Intermediate Range Neutron Flux Interlock) setpoint.
- ### Below the P-10 (Low Setpoint Power Range Neutron Flux Interlock) Setpoint.
- \*\*\*\* Values left blank pending NRC approval of 2 loop operation.

ACTION STATEMENTS

- ACTION 1 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours.
- ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:
- a. The inoperable channel is placed in the tripped condition within 72 hours.
  - b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.3.1.1.
  - c. Either, THERMAL POWER is restricted to less than or equal to 75% of RATED THERMAL POWER and the Power Range Neutron Flux trip setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER within 4 hours; or, the QUADRANT POWER TILT RATIO is monitored at least once per 12 hours per Specification 4.2.4.2.



TABLE 3.3-1 (Continued)

ACTION STATEMENTS (Continued)

- ACTION 3 - With the number of channels OPERABLE one less than the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:
- a. Below the P-6 (Intermediate Range Neutron Flux Interlock) setpoint, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.
  - b. Above the P-6 (Intermediate Range Neutron Flux Interlock) setpoint but below 10 percent of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 10 percent of RATED THERMAL POWER.
- ACTION 4 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement suspend all operations involving positive reactivity changes.
- ACTION 5 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or 3.1.1.2, as applicable, within 1 hour and at least once per 12 hours thereafter.
- ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:
- a. The inoperable channel is placed in the tripped condition within 72 hours; and
  - b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.3.1.1.
- ACTION 7 - With less than the Minimum Number of Channels OPERABLE, within one hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3.

2018 (1601) NRC test

92. Given the following plant conditions:

Time 0300:

- 75% power and decreasing with a plant shutdown in progress.
- A primary leak to "B" steam generator of 30 gallons per day is present.
- RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR High Rad alarm is in.

Time 0315:

- Pressurizer level and pressure began decreasing.
- The RM-G19B, STMLN HI RNG GAMMA red alarm light is lit.
- Operators manually tripped the reactor.

Time 0320:

- EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION was in progress.
- All steam generators began depressurizing uncontrollably.

Time 0325:

- EOP-3.1 ECA-2.1 UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS is in progress.
- The CRS is reading step 7, "**Check if Secondary radiation levels are normal**".
- The BOP reports that all radiation alarms are clear and show no elevated radiation levels.
- Chemistry samples of the SG secondary sides has **not** been completed.

Which ONE of the choices completes the following statements?

In accordance with the bases for EOP-3.1, step 7, "normal" means the value of a process parameter \_\_ (1) \_\_.

Exiting EOP-3.1 at step 7, and transferring to EOP-4.0, E-3 STEAM GENERATOR TUBE RUPTURE \_\_ (2) \_\_ required.

- A. 1) during routine plant operations.  
2) is
- B. 1) during routine plant operations.  
2) is **not**
- C. 1) after the reactor trip.  
2) is
- D. 1) after the reactor trip.  
2) is **not**

2018 (1601) NRC test

93. Initial conditions:

- STP-228.001 FIRE PROTECTION SYSTEM FIRE PUMPS TEST is being performed.
  - XPP0134A, ELECTRIC DRIVEN FIRE SERVICE PUMP started automatically at 96 psig on the pump discharge.
  - The pump achieved 2100 gpm with a discharge head of 125 psig.
  - XPP0134B, DIESEL DRIVEN FIRE SERVICE PUMP started automatically at 85 psig on the pump discharge.
  - The pump achieved 2600 gpm with a discharge head of 127 psig.

Current condition:

- The status of XPP0134A and XPP-134B has **not** changed.
- Operators have placed XPP0173-FS, ELECTRIC MTR DRIVEN ALT. FIRE PUMP in service on the Fire Header.

Which ONE of the choices below completes the following statements?

In the **initial** condition, the Fire Suppression Water System is inoperable due to the status of   (1)   .

In the **current** condition, the Fire Suppression Water System   (2)   OPERABLE.

- A. 1) XPP-134A.  
2) is
- B. 1) XPP-134A.  
2) is **not**
- C. 1) XPP-134B.  
2) is
- D. 1) XPP-134B.  
2) is **not**

2018 (1601) NRC test

94. Given the following condition:

- A new Special Order was implemented today.
- The following positions will be assumed by personnel who have the licenses specified:

(1) Shift Manager	SRO license
(2) CRS	SRO license
(3) NROATC	RO license
(4) BOP	RO license
(5) Shift Engineer	SRO license

Which of the on-coming watchstanders **must** initial the Special Order cover page in accordance with OAP-100.4 COMMUNICATIONS?

- A. (1) **only**.
- B. (1) and (2) **only**.
- C. (1), (2) and (5) **only**.
- D. (1), (2), (3), (4) and (5).

2018 (1601) NRC test

95. Initial Conditions:

- MODE 6 with fuel movement in progress.
- The Overload Bypass switch TS-1 must be placed in the BYPASS position.

Which ONE of the choices below completes the following statements?

In accordance with FHP-601, REFUELING ORGANIZATION, before TS-1 is allowed to be used, \_\_(1)\_\_\_.

While TS-1 is in the BYPASS position, overload protection \_\_(2)\_\_\_.

- A. 1) authorization by the Refueling Operations Coordinator (ROC) **and** concurrence by the Core Loading Supervisor (SRO) is required.  
2) still exists.
- B. 1) authorization by the Refueling Operations Coordinator (ROC) **and** concurrence by the Core Loading Supervisor (SRO) is required  
2) does **not** exist.
- C. 1) **only** the Core Loading Supervisor (SRO) authorization is required.  
2) still exists.
- D. 1) **only** the Core Loading Supervisor (SRO) authorization is required.  
2) does **not** exist.

2018 (1601) NRC test

96. Given the following plant conditions:

- Mode 3.
- Cooldown in progress for a refueling outage.
- The "A" RB Spray Pump has just been returned to an OPERABLE status after corrective maintenance.

Which ONE of the choices below completes the following statements in accordance with SAP-205, STATUS CONTROL AND REMOVAL AND RESTORATION?

- 1) Who is required to update BISI to ensure that it reflects actual equipment status?
  - 2) Which SAP-205 attachment is required to be updated after the "A" RB Spray Pump is returned to service?
- A. 1) Balance of Plant Operator.  
2) Attachment 1, REMOVAL AND RESTORATION CHECKLIST.
  - B. 1) Balance of Plant Operator.  
2) Attachment 6, OUTAGE REMOVAL AND RESTORATION CHECKLIST.
  - C. 1) Control Room Supervisor.  
2) Attachment 1, REMOVAL AND RESTORATION CHECKLIST.
  - D. 1) Control Room Supervisor.  
2) Attachment 6, OUTAGE REMOVAL AND RESTORATION CHECKLIST.

2018 (1601) NRC test

97. Which ONE of the choices below completes the following statements in accordance with SAP-148, TEMPORARY BYPASS, JUMPER, AND LIFTED LEAD CONTROL?

All Bypass Authorization Requests (BARs) should be returned to normal within \_\_\_(1)\_\_\_;

The \_\_\_(2)\_\_\_ is responsible for approving BARs that will exceed this time limit.

- A. 1) 14 days.  
2) General Manager, Nuclear Plant Operations.
- B. 1) 14 days.  
2) Manager, Operations.
- C. 1) 90 days.  
2) General Manager, Nuclear Plant Operations.
- D. 1) 90 days.  
2) Manager, Operations.

2018 (1601) NRC test

98. Given the following plant conditions:

Time 0400:

- A LOCA with a leak outside of the RB occurred.
- The Shift Manager has assumed the duties of the Interim Emergency Director.

Time 0430

- The OSC, TSC and EOF are fully manned and activated.
- The Shift Manager has been relieved of duties as the Interim Emergency Director.
- An action is required to operate plant equipment.
  - It is **not** required to protect valuable property.
  - The action is **not** for lifesaving or protecting large populations.
- An AO has volunteered who has received 500 mrem of exposure in the current year.
- In accordance with EPP-020, EMERGENCY PERSONNEL EXPOSURE CONTROL, Attachment III planned exposure limits will be used for this exposure.

Which ONE of the choices below answers both of the following questions in accordance with EPP-020?

- 1) What is the **highest** TEDE dose the AO can receive for the exposure described above?
- 2) Can the Shift Manager approve the use of the planned emergency exposure limits at time **0430**?

- A. 1) 4.5 REM.  
2) No.
- B. 1) 4.5 REM.  
2) Yes.
- C. 1) 5 REM.  
2) No.
- D. 1) 5 REM.  
2) Yes.



2018 (1601) NRC test

99. Given the following plant conditions:

- 100% power
- Various personnel have called in sick due to a flu epidemic.
- The on-coming Shift Manager is reviewing the EP/FEP Manning Sheet and the personnel available to assume the shift.
- The on-coming shift CRS, NROATC and BOP are performing shift relief with the off-going operators.
- Four fully qualified AOs reported for the on-coming shift.
  - **One** of the four is a qualified Fire Brigade Operations Advisor.
  - **One** of the four is a qualified Fire Brigade member.
- There are no additional personnel qualified Fire Brigade member or Fire Brigade Operations Advisor in the on-coming shift.

Which ONE of the following is the **minimum** required action that must be taken, if any, to ensure that AO and Fire Brigade Shift Manning requirements are met in accordance with OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES?

- A. **No** additional shift manning actions are required; minimum crew composition requirements are met.
- B. The shift manager must **only** fill a vacant AO watch position within a **maximum** of two hours.
- C. The shift manager must **only** fill a vacant Fire Brigade position within a **maximum** of two hours.
- D. The shift manager must hold a Fire Brigade member qualified AO over from the previous shift.

2018 (1601) NRC test

100. Given the following plant conditions:

Time 1100:

- 100% power initially.
- A Pressurizer PORV opens and could not be closed manually.
- Safety Injection **failed** to occur at the Pressurizer pressure setpoint.
- Operators initiated Safety Injection manually.
- A PORV block valve was closed and Safety Injection was terminated.

Time 1300.

- The pressurizer PORV was found to have been opened from the CREP.
- Safety-related relays in the Safety Injection system were found disabled.
- The Security Team Leader report concludes that the operation of the PORV and disabling of the relays was intentional and deliberate.

Which ONE of the choices completed the following statements in accordance with EPP-001, ACTIVATION AND IMPLEMENTATION OF THE EMERGENCY PLAN?

The **highest** Emergency Action Level declaration above was \_\_ (1) \_\_ and conditions were **first** met for the **highest** declaration at \_\_ (2) \_\_.

Do **not** consider Emergency Director Judgment as a basis for emergency classification

**REFERENCE PROVIDED**

- A. 1) an ALERT  
2) 1100.
- B. 1) an ALERT  
2) 1300.
- C. 1) a SITE AREA EMERGENCY  
2) 1100.
- D. 1) a SITE AREA EMERGENCY  
2) 1300.