Draft Submittal
(Pink Paper)

Senior Reactor Operator Written Exam

QUESTIONS REPORT
for OPERATIONS-M

1. OPL171.000 005/C/A/T2G1/RADCON//209001G2.3.4//2.5/3.1/0606S NEW6/26/2007

You have been assigned to assist Electrical Maintenance with setting the limit switches for the Core Spray Outboard Injection Valve. Electrical Maintenance has determined it will require 3 hours to set the limits for the valve.

During the prejob brief Radcon informs you of the following:

Your Shallow Dose exposure to the extremities for this year = 1250 mr
Beta dose to the extremities while operating the valve = 15000 mr

Which ONE of the following describes the total annual dose you will have received to the extremities at the completion of this task and the allowable limits for this type of dose.

A. 2 Rem total dose received, 50 Rem allowable dose.

B. 2.75 Rem total dose received, 15 Rem allowable dose

C. 15 Rem total dose received, 15 Rem allowable dose

D. 16.25 Rem total dose received, 50 rem allowable dose.

209001G2.3.4 Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized.

Reference 10CFR20 part 20.1004 page 329; part 20.1201 page 331

A. incorrect, this would be correct using the quality factor for Alpha radiation

B. incorrect, this would be correct using the quality factor for Neutron radiation

C. incorrect, this is allowable exposure for lens of the eye

D. correct answer

2. OPL171.000 006/MEM/T3/RADCON//2.3.1//2.6/3.0/0606S NEW6/28/2007

Which ONE of the following describes the measures required by 10 CFR 20 for control of access to areas where an individual may receive a dose of 500 rads or more in 1 hour at 1 meter from the radiation source?

A. Provide continuous direct Radcon coverage or electronic surveillance of the area.

B. A control device that energizes a conspicuous visible or audible alarm upon entry to the area.

C✓ Measures to ensure that an individual is not able to gain unauthorized or inadvertant access to the area.

D. A control device that reduces the radiation level such that a dose of < 100 mr in 1 hour at 30 cm would be received upon entry to the area.

2.3.1 Knowledge of 10 CFR: 20 and related facility radiation control requirements.

Reference: 10 CFR 20 part 20.1601 and 20.1602

A, B and D incorrect, these describes methods of control for High Rad Areas

C. correct answer

3. OPL171.007 021/C/A/T1G1/68 - RECIRC/2/295001G2.2.3//3.1/3.3/0606S NEW6/24/2007

Unit 1 was operating at full power when both seals for 1A Recirculation pump failed. 1A Recirculation pump was tripped and the UO attempted to isolate the pump per 1-AOI-68-1A. When the UO attempted to close 1-FCV-68-3 Recirc Pump A Discharge valve the handswitch could not be moved from the neutral position.

Which ONE of the following describes the required action?

A. Dispatch personnel to 480v RMOV board 1A to take local control and close 1-FCV-68-3 from the RMOV board.

B.✔ Dispatch personnel to 480v RMOV board 1B to take local control and close 1-FCV-68-3 from the RMOV board.

C. Dispatch personnel to 480v RMOV board 1D to take local control and close 1-FCV-68-3 from the RMOV board.

D. Dispatch personnel to 480v RMOV board 1E to take local control and close 1-FCV-68-3 from the RMOV board.

295001G2.2.3 Knowledge of the design / procedural / and operational differences between units.

Reference: 1-45E779-21 rev 8

A. incorrect, B Recirc valves fed from this board

B. correct answer

C. incorrect, Unit 2 and 3 B Recirc valves fed from D RMOV board, Unit 1 spared this board in place on restart

D. incorrect, Unit 2 and 3 A Recirc valves fed from E RMOV board, Unit 1 spared this board in place on restart

4. OPL171.010 019/C/A/T1G1/3 - FEEDWATER//295005AA2.07//3.5/3.6/0606S NEW6/24/2007

Unit 1 is operating at 100% power. 1-LIS-3-208B Reactor Vessel Water Level switch is inoperable. The switch has been inoperable for 4 hours and maintenance is in progress to repair.

The Maintenance Manager reports that 1-LT-3-208C has a ruptured diaphragm and will require 8 hours to replace and calibrate the level transmitter.

REFERENCE PROVIDED

Which ONE of the following is correct?

A. No action required if 1-LT-3-208C is repaired within 24 hours.

B. Reduce Reactor power to less than 25% within 6 hours.

C. Be in Mode 3 in 12 hours and reduce Reactor pressure to less than 150 psig in 36 hours.

D. Be in Mode 2 within 10 hours, Mode 3 within 13 hours and Mode 4 within 37 hours.

295005AA2.07 Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP : Reactor water level

PROVIDE REFERENCE UNIT 1 ITS SECTIONS 3.3 AND 3.5

Reference: Unit 1 Tech Specs, pages 3.3-21, 3.3-37, 3.3-40,3.3-45, 3.3-48, 3.3-49, 3.3-51, 3.5-2 and 3.5-12

A. incorrect, Main Turbine High Water level trip capability cannot be restored within 2 hours.

B. correct answer

C. incorrect, these actions are not required until HPCI/RCIC are declared inop in 24 hours

D. incorrect, these are the required actions of LCO 3.0.3

3.3 INSTRUMENTATION

3.3.2.2 Feedwater and Main Turbine High Water Level Trip Instrumentation

LCO 3.3.2.2 Two channels of feedwater and main turbine high water level trip instrumentation per trip system shall be OPERABLE.

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more feedwater and main turbine high water level trip channels inoperable, in one trip system.	A.1 Place channel(s) in trip.	7 days
B. One or more feedwater and main turbine high water level trip channels inoperable in each trip system.	B.1 Restore feedwater and main turbine high water level trip capability.	2 hours
C. Required Action and associated Completion Time not met.	C.1 Reduce THERMAL POWER to < 25% RTP.	4 hours

2 hrs + 4 hrs = 6 hrs

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	C.1 ----------NOTES---------- 1. Only applicable in MODES 1, 2, and 3. 2. Only applicable for Functions 1.c, 1.e, 2.c, 2.d, and 2.f. ---------- Declare supported ECCS feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.	1 hour from discovery of loss of initiation capability for features in both divisions
	AND	
	C.2 Restore channel to OPERABLE status.	24 hours
D. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	D.1 ----------NOTE---------- Only applicable if HPCI pump suction is not aligned to the suppression pool. ---------- Declare HPCI System inoperable.	1 hour

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
G. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	G.1	Declare ADS valves inoperable.	1 hour from discovery of loss of ADS initiation capability in both trip systems
	AND		
	G.2	Restore channel to OPERABLE status.	96 hours from discovery of inoperable channel concurrent with HPCI or RCIC inoperable AND 8 days
H. Required Action and associated Completion Time of Condition B, C, D, E, F, or G not met.	H.1	Declare associated supported ECCS feature(s) inoperable.	Immediately

Table 3.3.5.1-1 (page 4 of 6)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. High Pressure Coolant Injection (HPCI) System					
a. Reactor Vessel Water Level - Low Low, Level 2[e]	1, 2[d], 3[d]	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 470 inches above vessel zero
b. Drywell Pressure - High[e]	1, 2[d],3[d]	4	B	SR 3.3.5.1.2 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 2.5 psig
c. Reactor Vessel Water Level - High, Level 8	1, 2[d], 3[d]	2	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 583 inches above vessel zero
d. Condensate Header Level - Low	1, 2[d], 3[d]	1	D	SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.6	≥ Elev. 551 feet
e. Suppression Pool Water Level - High	1, 2[d], 3[d]	1	D	SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.6	≤ 7 inches above instrument zero
f. High Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)	1, 2[d], 3[d]	1	E	SR 3.3.5.1.2 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 671 gpm
4. Automatic Depressurization System (ADS) Trip System A					
a. Reactor Vessel Water Level - Low Low Low, Level 1[e]	1, 2[d], 3[d]	2	F	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 398 inches above vessel zero

(continued)

(d) With reactor steam dome pressure > 150 psig.

(e) During instrument calibrations, if the As Found channel setpoint is conservative with respect to the Allowable Value but outside its acceptable As Found band as defined by its associated Surveillance Requirement procedure, then there shall be an initial determination to ensure confidence that the channel can perform as required before returning the channel to service in accordance with the Surveillance. If the As Found instrument channel setpoint is not conservative with respect to the Allowable Value, the channel shall be declared inoperable.

Prior to returning a channel to service, the instrument channel setpoint shall be calibrated to a value that is within the acceptable As Left tolerance of the setpoint; otherwise, the channel shall be declared inoperable.

The nominal Trip Setpoint shall be specified on design output documentation which is incorporated by reference in the Updated Final Safety Analysis Report. The methodology used to determine the nominal Trip Setpoint, the predefined As Found Tolerance, and the As Left Tolerance band, and a listing of the setpoint design output documentation shall be specified in Chapter 7 of the Updated Final Safety Analysis Report.

3.3 INSTRUMENTATION

3.3.5.2 Reactor Core Isolation Cooling (RCIC) System Instrumentation

LCO 3.3.5.2 The RCIC System instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > 150 psig.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.5.2-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	B.1 Declare RCIC System inoperable.	1 hour from discovery of loss of RCIC initiation capability
	AND	
	B.2 Place channel in trip.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	C.1 Restore channel to OPERABLE status.	24 hours
D. Required Action and associated Completion Time of Condition B or C not met.	D.1 Declare RCIC System inoperable.	Immediately

Table 3.3.5.2-1 (page 1 of 1)
Reactor Core Isolation Cooling System Instrumentation

FUNCTION	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level - Low Low, Level 2[(a)]	4	B	SR 3.3.5.2.1 SR 3.3.5.2.2 SR 3.3.5.2.3 SR 3.3.5.2.4	≥ 470 inches above vessel zero
2. Reactor Vessel Water Level - High, Level 8	2	C	SR 3.3.5.2.1 SR 3.3.5.2.2 SR 3.3.5.2.3 SR 3.3.5.2.4	≤ 583 inches above vessel zero

(a) During instrument calibrations, if the As Found channel setpoint is conservative with respect to the Allowable Value but outside its acceptable As Found band as defined by its associated Surveillance Requirement procedure, then there shall be an initial determination to ensure confidence that the channel can perform as required before returning the channel to service in accordance with the Surveillance. If the As Found instrument channel setpoint is not conservative with respect to the Allowable Value, the channel shall be declared inoperable.

Prior to returning a channel to service, the instrument channel setpoint shall be calibrated to a value that is within the acceptable As Left tolerance of the setpoint; otherwise, the channel shall be declared inoperable.

The nominal Trip Setpoint shall be specified on design output documentation which is incorporated by reference in the Updated Final Safety Analysis Report. The methodology used to determine the nominal Trip Setpoint, the predefined As Found Tolerance, and the As Left Tolerance band, and a listing of the setpoint design output documentation shall be specified in Chapter 7 of the Updated Final Safety Analysis Report.

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. HPCI System inoperable.	C.1	Verify by administrative means RCIC System is OPERABLE.	Immediately
	AND		
	C.2	Restore HPCI System to OPERABLE status.	14 days
D. HPCI System inoperable. AND Condition A entered.	D.1	Restore HPCI System to OPERABLE status.	72 hours
	OR		
	D.2	Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	72 hours
E. One ADS valve inoperable.	E.1	Restore ADS valve to OPERABLE status.	14 days
F. One ADS valve inoperable. AND Condition A entered.	F.1	Restore ADS valve to OPERABLE status.	72 hours
	OR		
	F.2	Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	72 hours

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.3 RCIC System

LCO 3.5.3 The RCIC System shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > 150 psig.

ACTIONS

----------NOTE----------
LCO 3.0.4.b is not applicable to RCIC.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RCIC System inoperable.	A.1	Verify by administrative means High Pressure Coolant Injection System is OPERABLE.	Immediately
	AND		
	A.2	Restore RCIC System to OPERABLE status.	14 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Reduce reactor steam dome pressure to ≤ 150 psig.	36 hours

5. OPL171.016 097/MEM/T2G2/64/12/215001G2.2.13//3.6/3.8/0606S NEW6/27/2007

Unit 2 has completed a shutdown for refueling outage.

The Unit conditions are as follows:

- Reactor pressure - 925 psig
- Containment oxygen content (panel 9-53) - 20%

You have been assigned to supervise and prepare for initial Drywell entry.

Which ONE of the following describes required action(s) for initial Drywell entry?

A. ✔ TIP nitrogen supply and movement must be controlled by Clearance program.

B. Reactor Mode Switch must be in Refuel with no Control Rod movement in progress.

C. SCBAs are **not** required if oxygen content has been verified by Control Room Containment monitoring.

D. If Primary Containment is required, Mechanical Maintenance personnel must remain at the Personnel Airlock during Drywell entry.

215001G2.2.13 Knowledge of tagging and clearance procedures.

Reference: 2-OI-64 rev 106, pages 12, 13, 122 and 124

A. correct answer

B. incorrect, control rod motion is allowed by single rod out only.

C. incorrect, oxygen content must be verified by Chemlab sample.

D. incorrect, Ops personnel must remain at airlock.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

R. The CREV system makes use of two strip resistance heaters to control the temperature of the charcoal beds at 10° greater than ambient temperature. The purpose of this design is to control moisture buildup in the charcoal adsorber. However, CREV also has a technical specifications requirement to be operated for 10 hours per month, which is adequate to remove excessive moisture built up in the adsorber. Since two means of humidity control are employed, a malfunction of the heater element or circuitry will **NOT** require declaring the CREV train inoperable. Routine maintenance on the heaters should be continued as needed.

S. The Primary Containment atmosphere should be analyzed for noble gases and sampled for tritium prior to purging. The time required for this is about five hours.

T. Initial Primary Containment Entry

1. When Containment Entry is required, the heat stress requirements and confined space requirements of TVA Safety Manual, Section 8, Special Requirements Section should be referenced.

2. Initial entries will be preplanned with the best available data, including dose rates external to the inner airlock door, remote radiation monitor inside of containment and primary containment CAM readings to ensure the safety of the entry team. Any indication of unusual conditions will be further investigated prior to initial entry.

3. Initial entries are permitted only when the Reactor Mode switch is in SHUTDOWN, REFUEL, or STARTUP/HOT STANDBY position unless drywell entry at power has been authorized by the Plant Manager.

4. Entry team personnel must meet the requirements set forth in RCI-11.1 for SCBA use, when required. Determination for usage of SCBA will be made by the Shift Manager, Radiation Protection Manager and Safety Manager.

5. Shift Manager approval is required for all initial entries.

6. The Plant Manager or authorized representative approval is required for entry into primary containment with an O_2 concentration of less than 19.5% as determined by Chemistry obtaining a grab sample IAW CI-403.

7. SCBA bottles to be taken into the airlock are required to be secured in a safe manner.

8. SCBAs will be required until O_2 concentrations are known to be greater than or equal to 19.5 percent as verified by Chemistry obtaining a grab sample IAW CI-403 Emergency life support apparatus will be worn by all personnel for initial entry when SCBA is **NOT** used.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

9. Life preservers are required for work inspections off the catwalk during initial entry into the Torus.

10. At least one of the airlock doors is required to be closed whenever Primary Containment is required.

11. If Primary Containment is required, a member of Operations will remain at the Personnel Airlock during drywell entry. This person will be in continuous communication with the Control Room and with the persons in the Drywell.

12. Both the Suppression Chamber and the Drywell SHALL be purged until the O_2 concentration is greater than or equal to 19.5 % Chemistry obtaining a grab sample IAW CI-403 prior to entry into the Drywell OR Suppression Chamber.

U. Torus Entry

1. Life preservers and pikes should be located at four locations in the Torus.

2. Signs designating the locations of the life preservers and pikes should be properly located in the torus.

3. Employees working over water in the torus will wear life vest or a safety belt with the lifeline secured properly. This means work outside of the catwalk guardrails.

4. A sign requiring use of safety belts or life vests when performing work off of the catwalk should be posted at the torus access on elevation 565.

V. MSI-0-064-HLT002 is used to re-establish primary containment integrity for primary containment penetrations other than the airlock doors.

W. If CAD is isolated from the Drywell and the Reactor is **NOT** in cold shutdown condition, then an Appendix R LCO will exist.

Appendix B
(Page 2 of 19)

Initial Primary Containment Entry

1.0 PREREQUISITES (continued)

NOTE

Per SR bases 3.6.3.1.2 and FSAR 5.2.6.1, 10 hours is allowed to realign the CAD valve to the accident position, thus ensuring continued CAD System operability. To ensure adherence to this requirement, when in mode 1 or mode 2, this clearance will be issued only to the Shift Manager.

[3] **VERIFY** nitrogen to Primary Containment is isolated and a clearance placed on containment inerting valves, DWCA Nitrogen Supply, CAD valves, and TIP Nitrogen Purge valves.

_____	_____	_____
Initials	Date Unit Supervisor	Time

NOTE

When emergency or other conditions warrant, the TIP withdrawal requirement may be waived with approval of the Shift Manager and site Radiation protection Manager or his designee.

[4] **VERIFY** TIPs withdrawn and a Caution Order to obtain Radiation Protection concurrence placed on TIP operation.

Waived: Yes ☐ No ☐
(**N/A** if making torus entry only.)

_____	_____	_____
Initials	Date Shift Manager	Time

_____	_____	_____
Initials	Date Radiation Protection Manager	Time

6. OPL171.016 105/C/A/T3/64/12/2.1.33//3.4/4.0/0606S NEW6/28/2007

You are the oncoming Unit 3 Unit Supervisor, during turnover the onshift Unit Supervisor informs you that 2 Drywell Coolers had been secured his shift while performing ground isolation on 3C 480v RMOV board. Drywell Average Temperature is 152 F and stable.

Which ONE of the following is correct?

A. Exceeded 3-EOI-1 entry condition, enter 3-EOI-1 and take required actions

B. Exceeded 3-EOI-2 entry condition, enter 3-EOI-2 and take required actions

C✓ Exceeded 3-SR-2 Drywell temperature limit, enter Tech Spec section 3.6 and take required actions.

D. Exceeded normal operating Drywell temperature limit, Drywell temperature must be logged hourly until below limit.

2.1.33 Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.

Reference; Unit 3 Tech Specs section 3.6, page 3.6-17

A. incorrect, EOI-1 has no entry condition from Drywell temp.

B. incorrect, EOI-2 Drywell temp entry condition is 160 F.

C. correct answer

D. incorrect, Tech Specs requires action to lower < 150 F within 8 hours.

3.6 CONTAINMENT SYSTEMS

3.6.1.4 Drywell Air Temperature

LCO 3.6.1.4 Drywell average air temperature shall be ≤ 150°F.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Drywell average air temperature not within limit.	A.1	Restore drywell average air temperature to within limit.	8 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Be in MODE 4.	36 hours

7. OPL171.018 122/C/A/T3/65/12/2.1.12//2.9 / 4.0/0606S NEW6/28/2007

Unit 1 is operating at 100% power.
Unit 2 is operating at 100% power.
Unit 3 is refueling (MODE 5), fuel movement is in progress. Recirc pump 3A suction line work in progress has potential to drain RPV. The 3ED D/G is out of service for an inspection.

During performance of the monthly SBGT SR, B SBGT fails to start.

REFERENCE PROVIDED

Which ONE of the following describes the required actions?

A. Enter LCO 3.0.3 on Unit 1 and 2 immediately. Suspend Unit 3 fuel movement immediately.

B.✔ Enter LCO 3.0.3 on Unit 1 and 2 in 4 hours. Initiate actions to suspend OPDRVs immediately.

C. Be in Mode 3 on Unit 1 and 2 in 12 hours and Mode 4 in 36 hours. Start A and C SBGT trains in 4 hours.

D. Be in Mode 3 on Unit 1 and 2 in 12 hours and Mode 4 in 36 hours. Initiate actions to suspend OPDRVs immediately.

2.1.12 Ability to apply technical specifications for a system.

PROVIDE REFERENCE UNIT 3 TECH SPECS SECTIONS 3.6 AND 3.8

References: Unit 3 Tech Specs section 3.6.4.3 pages 3.6-51, 52 and 53
Unit 3 Tech Specs section 3.8.1 page 3.8-7

A. incorrect, supported system LCO is not applied for 4 hours.

B. correct answer

C. incorrect, these actions are required for failure to meet LCO for 1 SBGT train inop.

D. incorrect, these actions are required for failure to meet LCO for 1 SBGT train inop.

3.6 CONTAINMENT SYSTEMS

3.6.4.3 Standby Gas Treatment (SGT) System

LCO 3.6.4.3 Three SGT subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SGT subsystem inoperable.	A.1	Restore SGT subsystem to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, or 3.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Be in MODE 4.	36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A not met during OPDRVs.	C.1 Place two OPERABLE SGT subsystems in operation.	Immediately
	OR	
	C.2 Initiate action to suspend OPDRVs.	Immediately
D. Two or three SGT subsystems inoperable in MODE 1, 2, or 3.	D.1 Enter LCO 3.0.3.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two or three SGT subsystems inoperable during OPDRVs.	E.1 Initiate action to suspend OPDRVs.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
K. One or more required Unit 1 and 2 DGs inoperable.	K.1 Declare required feature(s) supported by the inoperable Unit 1 and 2 DG inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition K concurrent with inoperability of redundant required feature(s)
	AND	
	K.2 Declare affected SGT and CREVs subsystem(s) inoperable.	30 days

8. OPL171.024 088/C/A/T2G2/RWM//201006A2.06//2.9/3.3/0606S NEW6/27/2007

Unit 1 is performing a Reactor startup. Power level is at Range 8 on the IRMs when the A Feedwater Flow Transmitter 1-FT-3-78A fails upscale.

Which ONE of the following describes the response of the RWM to this failure and any required actions to continue Reactor startup?

A. RWM enters Transition Zone with no Blocks enforced; startup may continue.

B.✓ RWM Program Failure with Select Block; RWM may be bypassed to continue startup.

C. RWM Insert and Withdrawal blocks; startup may not continue until RWM is repaired.

D. RWM Withdrawal Block; RWM may be bypassed if no startup with RWM bypassed was performed in the last calender year.

201006A2.06 Ability to (a) predict the impacts of the following on the ROD WORTH MINIMIZER SYSTEM (RWH) (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of reactor water level control input

References: 171.204 rev 12, pages 10, 11, 12, 17 and 33
Unit 1 Tech Specs section 3.3.2, pages 3.3-15 and 16

A. incorrect, RWM Program error due to setpoint mismatch

B. correct answer

C. incorrect, Select block from program failure

D. incorrect, Select block from program failure

INSTRUCTOR NOTES

b. The programmed sequence is designed to limit the maximum worth of any single control rod.

3. Low power set point — Obj. V.B.7.a, Obj. V.C.2.a, Obj. V.B.11

a. The low power set point (LPSP) is the power level below which the RWM enforces adherence to the operating sequence of rod withdrawals or insertions.

b. When the core power level is above the LPSP, the RWM program does not impose any sequence constraints.

c. The low power set point is determined by a steam flow/feedwater flow measurement and is able to be set by adjustment of these sensors.

d. The LPSP is set at about 16% of rated core power. (@ 16%; 2.88 Mlbm/hr steam flow/2.275 Mlbm/hr feedflow) — The steam/feed flow values increase with EPU

e. Either steam or feedwater flow can place the system in service, but both are needed to remove the system from service. — Obj. V.B.11

4. Low power alarm point — Obj. V.B.7.b, Obj. V.C.2.b

a. The low power alarm point (LPAP) is the power level above which RWM does not enforce the rod sequence.

b. The low power alarm point setting is based ONLY on reactor steam flow.

c. A nominal value for the LPAP setting is 21% of rated core power. It is always set at some point higher than the LPSP setting.

INSTRUCTOR NOTES

d. The AUTO light on the RWM operator's panel is lit whenever the reactor is operating above the LPAP setpoints indicating that the RWM functions are automatically bypassed. All RWM Rod blocks are automatically bypassed upon reaching power levels above the LPAP setpoint.

5. Transition Zone — Obj. V.B.7.c, Obj. V.C.2.c

a. Transition Zone is the name given to the range of power levels above the low power set point but below the low power alarm point.

b. When operating in this range, the RWM does not enforce the operating sequence; i.e., will not generate a withdraw or insert block due to positioning of a control rod.

c. All RWM system displays and alarms on the RWM switch panel will continue to operate normally within the transition zone.

6. Withdraw error occurs if: — Obj. V.B.8.a, Obj. V.C.3.a, OI-85 P&L

a. A rod in the currently latched group is withdrawn past the withdraw limit for the group.

b. A rod in a group lower than the one currently latched is withdrawn past the withdraw limit for its group.

c. A rod in a group higher than the one currently latched is withdrawn past the insert limit for its group.

7. Insert error occurs if: — Obj. V.B.8.b, Obj. V.C.3.b, OI-85 P&L

a. A rod in the currently latched group is inserted past the insert limit for this group.

INSTRUCTOR NOTES

b. A rod in a group lower than the one that is presently latched is inserted past the withdraw limit for the lower group.

8. Withdraw block — Obj. V.B.8.c, Obj. V.C.3.c, OI-85 P&L

a. Imposed whenever a withdraw error is made.

b. Imposed with three insert errors existing and an insert block present, a rod other than one of the insert errors is selected.

c. In each case above, the block is applied to force the correction of the error before allowing movement of any other rods.

d. Withdraw blocks are alarmed on the RWM operator's panel by a WITHDRAW BLOCK indicator light and status indication at all RWM display screens. — Panel 9-5 RWM ROD BLOCK annunciator

9. Insert block — Obj. V.B.8.d, Obj. V.C.3.d, OI-85 P&L

a. Imposed when a rod is moved which exceeds the maximum number of allowable insert errors.

(1) The number of allowable insert errors may be varied through use of an off-line RWM system function.

(2) The number of allowable insert errors may be set to values of 0, 1 or 2.

(3) At Browns Ferry, 2 insert errors are allowed; 3 insert errors will cause an insert block.

b. Imposed when a withdraw error has been made, a withdraw block applied, and a rod other than the withdraw error rod is selected.

INSTRUCTOR NOTES

d. The RWM system performs a full relatch on a periodic basis (nominally 5 second update rate) while operating within the transition zone between the defined LPSP and LPAP setpoints. This results in a continuous relatch cycle while operating in the range of approximately 16 to 21 percent rated unit load. The timed relatch feature assures that the proper latched RWM group is identified even under conditions with rod sequencing errors exceeding the normal RWM rod block constraints.

e. The number of the currently latched group is displayed as the "Latched Group" on the RWM system display screens.

f. An evaluation of the current rod position distribution to determine the group that should be latched is performed by the RWM program at system initialization and at various pre-defined states during normal program operation to ensure that the proper group is latched at all times.

12. Select error — Obj. V.B.8.e, Obj. V.C.3.e, OI-85 P&L

a. A select error occurs whenever the operator selects a rod other than one contained in the currently latched rod group.

b. A select error also occurs if a rod block has been applied and any rod other than error rod is selected.

c. A status indicator on the RWM display screens changes both color and text when a select error is made. — Obj. V.B.8.f, Obj. V.B.9, Obj. V.B.11, OI-85 P&L

13. Select Block (Prevents rod selection) — Panel 9-5 RWM ROD BLOCK

A Select Block occurs if:

a. RWM Hardware or Software Failure occurs below LPAP. (Program Abort) can be bypassed — Obj. V.B.8.g

(4) LPAP/LPSP Mismatch

Errors in the Feed Flow and Steam Flow sensors may result in conditions in which RWM System inputs indicate that power is above the LPAP setpoint and below the LPSP. This is an impossible plant operating condition which renders the RWM system incapable of determining whether sequence monitoring functions should be activated. If this condition occurs while the RWM system is operable, the system is aborted (Program Operating Output is reset) and the following message is produced on the RWM system:

RWM Inoperable due to LPAP/LPSP Inconsistency

(5) Block/Permissive Echo Failures

The RWM system input includes signals from the RMCS which provide verification of the current rod block/permissive status (AC relay coils sense 120 VAC power at the rod insert and withdrawal busses). The RWM verifies that the proper "echo" signal is obtained as input to the system following any attempted rod blocks with the RWM in an operable state. If the proper verification signal is not received within a specified time interval (nominally one second following attempted rod block), the system aborts (Program Operating Output is reset) and one of the following messages will be produced on the RWM system:

Insert Permissive Failure - expected echo: ##

Withdraw Permissive Failure - expected echo: ##

3.3 INSTRUMENTATION

3.3.2.1 Control Rod Block Instrumentation

LCO 3.3.2.1 The control rod block instrumentation for each Function in Table 3.3.2.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.2.1-1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One rod block monitor (RBM) channel inoperable.	A.1 Restore RBM channel to OPERABLE status.	24 hours
B. Required Action and associated Completion Time of Condition A not met. OR Two RBM channels inoperable.	B.1 Place one RBM channel in trip.	1 hour
C. Rod worth minimizer (RWM) inoperable during reactor startup.	C.1 Suspend control rod movement except by scram. OR	Immediately (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.2.1.1 Verify ≥ 12 rods withdrawn.	Immediately
	OR	
	C.2.1.2 Verify by administrative methods that startup with RWM inoperable has not been performed in the last calendar year.	Immediately
	AND	
	C.2.2 Verify movement of control rods is in compliance with banked position withdrawal sequence (BPWS) by a second licensed operator or other qualified member of the technical staff.	During control rod movement
D. RWM inoperable during reactor shutdown.	D.1 Verify movement of control rods is in compliance with BPWS by a second licensed operator or other qualified member of the technical staff.	During control rod movement

(continued)

9. OPL171.031 084/C/A/T1G1/SSI/2/600000AA2.04//2.8/3.1/0606S NEW6/25/2007

Unit 1, 2 and 3 are operating at 100% power when the plant experiences a fire in Fire Zone 19. The Shift Manager enters the SSI's.

REFERENCE PROVIDED

Which ONE of the following water level control systems and level indicators would the SM provide to each Unit Supervisor as available for use with a fire in this area?

	Unit 1	Unit 2	Unit 3
A. ✓	RCIC/3-58B	HPCI/3-58B	RCIC/3-58A
B.	Feedwater/3-58B	RCIC/3-58A	HPCI/3-58A
C.	RCIC/3-58B	HPCI/3-58B	RCIC/3-58B
D.	Feedwater/3-58B	HPCI/3-58B	Feedwater/3-58A

600000AA2.04 Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: The fire's extent of potential operational damage to plant equipment

PROVIDE REFERENCE 0-SSI-001 rev 0

Reference: 0-SSI-001 rev 0, page 12

A. correct answer

B. incorrect per table 2

C. incorrect per table 2

D. incorrect per table 2

Table 2
(Page 2 of 2)

Available High Pressure Makeup for Worst Case Fire

FIRE ZONE or AREA	Unit 1 HP SYSTEMS (failed)	Unit 1 LEVEL INST. (available)	Unit 2 HP SYSTEMS (failed)	Unit 2 LEVEL INST. (available)	Unit 3 HP SYSTEMS (failed)	Unit 3 LEVEL INST. (available)
10	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58A	CRD, FW	3-LI-3-58A & B
11	CRD, FW	1-LI-3-58A	CRD, FW, HPCI	2-LI-3-58B	CRD, FW	3-LI-3-58A & B
12	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58A	CRD, FW, RCIC, HPCI	3-LI-3-58B
13	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58A	CRD, FW, RCIC, HPCI	3-LI-3-58A
14	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58B	CRD, FW	3-LI-3-58A & B
15	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58B	CRD, FW	3-LI-3-58A & B
16	CRD, FW, RCIC, HPCI	1-LI-3-46A	CRD, FW, RCIC, HPCI	2-LI-3-46A	CRD, FW, HPCI	3-LI-3-46A
17	CRD, FW, RCIC, HPCI	1-LI-3-58B	CRD, FW, RCIC	2-LI-3-58B	CRD, FW	3-LI-3-58A & B
18	CRD, FW	1-LI-3-58A	CRD, FW, RCIC, HPCI	2-LI-3-58A	CRD, FW	3-LI-3-58A & B
19	CRD, FW	1-LI-3-58B	CRD, FW, RCIC	2-LI-3-58B	CRD, FW, HPCI	3-LI-3-58A
20	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58A	CRD, FW	3-LI-3-58A & B
21	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58B	CRD, FW	3-LI-3-58A & B
22	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58B	CRD, FW	3-LI-3-58A & B
23	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58B	CRD, FW	3-LI-3-58A & B
24	CRD, FW	1-LI-3-58A	CRD, FW, RCIC	2-LI-3-58B	CRD, FW	3-LI-3-58A & B
25	CRD, FW, RCIC	1-LI-3-58B	CRD, FW, RCIC	2-LI-3-58B	CRD, FW, RCIC	3-LI-3-58A & B

10. OPL171.033 014/C/A/T3/90/5/2.3.11//2.7/3.2/0606S NEW6/28/2007

Unit 2 was operating at full power when A Main Turbine trip was received. RPS failed to deenergize on the Turbine trip and Control Rod insertion was achieved by manual ARI initiation. Plant conditions have stabilized when the UO notes the following:

- All Control Rods inserted
- RPV water level 33 inches controlled by feedwater
- RPV pressure 700 psig controlled by bypass valves
- Reactor Building and Turbine Building area High Radiation alarms
- Main Steam Line Radiation High-High alarm

Which ONE of the following describes the action(s) the Unit Supervisor should direct?

A. Emergency Depressurize as required by EOI-4.

B.✔ Close MSIVs and continue to cold shutdown per EOIs.

C. Exit EOIs and perform the actions of 2-GOI-100-12A to place Unit in cold shutdown.

D. Rapidly depressurize with Bypass valves to prevent reaching radiation level requiring Emergency Depressurization.

2.3.11 Ability to control radiation releases.

Reference: 2-ARP-9-3A rev 34, page 39

A. incorrect, EOI-4 actions are based on release rates or survey data

B. correct answer

C. incorrect, EOIs would not be exited with Reactor Building rad alarms

D. incorrect, no requirement to ED is indicated

MAIN STEAM LINE RADIATION HIGH-HIGH	
2-RA-90-0135C	
SOLID MAGENTA	27

(Page 1 of 1)

Sensor/Trip Point:

2-RM-90-136 2-RM-90-137	Setpoint is 3.0 x normal full power background including N-16 contribution and HWC System injection.

Sensor Location: Radiation monitor drawers are on Panel 2-9-10 in the control room.

Probable Cause:
A. Radiation is three times the normal full power background.
B. Sensor malfunctions.
C. SI/SR in progress.

Automatic Action:
A. Mechanical vacuum pumps trip .
B. Vacuum pump suction valves 2-FCV-66-36 and 2-FCV-66-40 close.

Operator Action:
A. **VERIFY** the alarm on 2-RM-90-136and 2-RM-90-137 on Panel 2-9-10. ☐
B. **CONFIRM** main steam line radiation level on recorder 2-RR-90-135, Panel 2-9-2. ☐
C. **IF** alarm is valid and Reactor Scram has not occurred, **THEN PERFORM** the following:
   1. **IF** core flow is above 60% **THEN LOWER** core flow to between 50-60%.. ☐
   2. **MANUALLY SCRAM** the Reactor. ☐
   3. **REFER** to 2-AOI-100-1 . ☐

D. **IF** plant conditions **DO NOT** require execution of **2-C-5, THEN VERIFY** the MSIV's closed. ☐
E. **NOTIFY** RADCON. ☐
F. **VERIFY** actions of 2-ARP-9-3A Window 7 have been completed. ☐
G. **IF** Technical Specification limits are exceeded, **THEN REFER TO** EPIP-1. ☐

References:

2-47E610-90-1	GE 2-730E915-9, 10	2-45E620-5
Technical Specifications	Technical Requirements Manual	

11. OPL171.033 019/C/A/T3/90/5/2.4.45//3.3/3.6/0606S NEW6/29/2007

Unit 3 is performing a Reactor Startup. RPV pressure is at 750 psig. Control Rod withdrawal is in progress and Reactor power is at Range 6 on the IRMs. The Woodward Governor for 3A RFP fails upscale and the Reactor scrams on APRM High-High. The Operating Crew stabilizes the Unit. After the scram is reset the UO notes the following:

- Drywell Pressure 1.8 psig and rising
- Drywell temperature 150 F and rising
- Drywell/Suppression Chamber Radiation High alarm
- Offgas Pretreatment Radiation High alarm

Which ONE of the following actions should the Unit Supervisor direct completion of within 2 hours?

A. Open 3-FCV-1-56 Main Steam Line Drain.

B. Place SJAEs on Auxiliary Boiler Steam supply.

C. ✓ Inject SLC for Alternate Source Term control.

D. Ensure Steam Seals are on Auxiliary Boiler Steam by setting the Steam Seal Regulator controller to 0 demand signal.

2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm

Reference: 3-ARP-9-7C rev 22, page 17

A. incorrect, 1-FCV-1-58 and 59 should be opened.

B. incorrect, no requirement to transfer SJAE.

C. correct answer

D. incorrect, steam seals are isolated with the FCV, not the pressure regulator.

DRYWELL/SUPPR CHAMBER RADIATION HIGH 3-RA-90-272	
SOLID MAGENTA	15

SENSOR/TRIP POINT:

3-RM-90-272A	99 R/HR
3-RM-90-273A	150 R/HR
3-RM-90-272B	9.99 E6 R/HR (Disabled Alarm Input)
3-RM-90-273B	9.99 E6 R/HR (Disabled Alarm Input)

SENSOR LOCATION: 3-RR-90-272, Panel 3-9-54, Main Control Room.
3-RR-90-273, Panel 3-9-55, Main Control Room.

PROBABLE CAUSE:
1. High radiation levels.
2. Sensor malfunction.
3. Noise spikes.

AUTOMATIC ACTION: None.

OPERATOR ACTION:

1. **VERIFY** alarm on 3-RR-90-272 (Panel 3-9-54), and 3-RR-90-273 (Panel 3-9-55).

2. **CHECK** 3-RR-90-256 for rise.

3. **ATTEMPT** to isolate equipment to stop source.

4. **IF** the alarm is determined to be valid, **THEN**

   PERFORM the following within 2 hours of the alarm:

   - **OPEN** UPSTREAM MSL DRAIN TO CONDENSER 3-FCV-001-0058.
   - **OPEN** DOWNSTREAM MSL DRAIN TO CONDENSER 3-FCV-001-0059.
   - **ENSURE** 3-PCV-001-0147 is Closed by taking STEAM SEAL REGULATOR , 3-HS-1-147 to **CLOSE.** (Panel 9-7)
   - **CLOSE** MAIN STM TO OG PREHEATER ISOL, 3-SHV-001-0741 and MAIN STM TO OG PREHEATER ISOL, 3-SHV-001-0743. (SJAE RM B)

5. **IF** ALL the following conditions exist (a, b, **AND** c):

   a. Alarm is determined to be valid, **AND**

   b The reactor will remain subcritical without boron injection under all conditions, **AND**

   c. Leakage of primary coolant into primary containment is indicated,

   THEN within 2 hours of alarm, **INJECT** SLC for alternate source term control by placing SLC PUMP 3A/3B, 3-HS-63-6A in the START A or START B position.

6. **REFER TO** EPIPs.

(CONTINUED ON NEXT PAGE)

12. OPL171.036 015/C/A/T2G1/57 - 4KV//262001A2.03//3.9/4.3/0606S NEW6/27/2007

Browns Ferry has experienced a loss of offsite power. 0-AOI-57-1A LOSP/STATION BLACKOUT performance is in progress. Drywell pressure on Unit 2 is 3 psig.

The Shift Manager determines that the following AC sources are available:

- A 4kv Shutdown board
- 3B 4kv Shutdown board
- 3C 4kv Shutdown board

Which ONE of the following describes the Unit(s) that are in Station Blackout and a required action?

A. Unit 1 is in Station Blackout, energize C 4kv Shutdown Board from 3C D/G.

B. Unit 2 is in Station Blackout, energize B 4kv Shutdown Board from A D/G.

C. Unit 1 and 2 are in Station Blackout, energize D 4kv Shutdown board from A D/G.

D. Unit 1 and 2 are in Station Blackout, energize B 4kv Shutdown board from 3B D/G.

262001A2.03 Ability to (a) predict the impacts of the following on the A.C. ELECTRICAL DISTRIBUTION ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of off-site power

Reference: 0-AOI-57-1A rev 70, pages 11, 15, 27, 63 and 64

A. incorrect, Unit 1 does not meet the condition for SBO

B. correct answer

C. incorrect, Unit 1 does not meet the condition for SBO

D. incorrect, Unit 1 does not meet the condition for SBO

4.2 Subsequent Actions (continued)

[6] **PLACE** RPS MG Sets A and B in service. REFER TO 1(2,3)-OI-99. ☐

NOTES

1) Station Blackout (SBO) is defined as a loss of 161 and 500kV systems and a failure of the two diesel generators which supply normal power to the two 480 V Shutdown Boards on a unit. Exiting the SBO can occur through Cross-connect capabilities as long as it does not place the Non-SBO unit in jeopardy. Analysis takes credit for only one unit being in an SBO Event.

2) This section is to be performed if at anytime during the loss of 161 and 500 kV Offsite power, the required Diesel Generators (for the Unit's 480 V Shutdown Bds) become inoperable thereby placing the unit in a SBO event. All times start with the recognition of an SBO Event, except for the time since shutdown.

3) The purpose of the alternate curves are to replace the normal curves (especially the PSP curve) which would force an Emergency Depressurization (thus losing RCIC level control) before the end of the 4 hour coping period of the SBO analysis. Cooldown must be commenced as soon as possible at near maximum allowable rates to ensure that reactor pressure on the SBO unit is below 235 psig before 155 minutes have elapsed.

4) To support one unit in a LOOP/LOCA and another unit in a LOOP, 3 RHR pumps, 2 Core Spray pumps, 3 RHRSW pumps and 2 EECW pumps are required long term (greater than 10 minutes). The unit in the LOOP requires one RHR pump and one RHRSW pump for long term cooling requirements. DG load management will ensure the 2 hour de-rated DG limit is not exceeded by manually removing non-required loads.

[7] **IF** the unit(s) is under a "Station Blackout" **THEN**

PERFORM the following: (Otherwise N/A and **PROCEED TO** Step 4.2[8])

[7.1] **ESTABLISH** Level control with RCIC per the EOIs. ☐

[7.2] WITHIN 16 minutes of the SBO event, **PLACE** HPCI in pressure control (as possible) per EOI. ☐

4.2 Subsequent Actions (continued)

NOTES

1) The SHIFT MANAGER/UNIT SUPERVISOR should prioritize board energization to ensure common HVAC equipment powered from 480V boards is returned to service within 1 hour as directed by Attachment 5.
2) Control Bay Vent Board B normal supply breaker trips on undervoltage. HVAC Board B breaker 2C, which supplies the Control Bay Vent Board, requires closing to energize the Vent Board.

[11] **VERIFY** the following boards are energized. **IF NOT**, **THEN**

REFER TO Attachment 1 to restore affected busses while continuing with this instruction.

	Unit 1	Unit 2	Unit 3
4KV Shutdown Boards	A, C	B, D	3EA, 3EB, 3EC, 3ED
480V Shutdown Boards	1A, 1B	2A, 2B	3A, 3B
480V DSL Aux Boards	A	B	3EA, 3EB
480V RMOV Boards	1A, 1B	2A, 2B	3A, 3B
480V Control Bay Vent Boards	A		B
480V HVAC Board			B

[12] **VERIFY** RBCCW pump(s) running. REFER TO 1(2,3)-OI-70. ☐

[13] **START** Drywell Atmospheric Cooling fans as needed. REFER TO 1(2,3)-OI-64. ☐

[14] **VERIFY** the following LPCI MG Sets in service to their respective Reactor MOV boards. ☐

- LPCI MG Sets 2D and 2E ☐
- LPCI MG Sets 3D and 3E ☐

Attachment 1
(Page 1 of 12)

Restoration of Electrical Busses

NOTES

1) 480V Shutdown Boards 1A, 1B, 2A, 2B, 3A, 3B can be transferred from the respective unit's Panel 1-9-8. 480V Diesel Aux Boards A and B (3EA and 3EB) can be transferred from Panels 0-9-23 (3-9-23). Control Bay Vent Board A can be re-energized with Norm BKR from Panel 0-9-23. Other boards will require local closing of the alternate feeder breaker.
2) TO ENERGIZE 480V Control Bay Vent Board A, 4kV Shutdown Boards A or B are required to be energized.
3) TO ENERGIZE 480V Control Bay Vent Board B, 480V HVAC Board B are required to be energized.

1.0 RESTORATION OF ELECTRICAL BUSSES

[1] **DETERMINE** restoration sequence of electrical busses and **RE-ENERGIZE** busses as necessary. REFER TO Table 1. ☐

Table 1

Conditions	Perform
480V Board De-Energized	Attachment 1, Step 2.0
Diesel Generator FAILED to START	Attachment 1, Step 3.0
Diesel Generator FAILED to TIE to a Shutdown board	Attachment 1, Step 4.0
ENERGIZING a Unit 1/2 4kV Shutdown board using a Unit 3 Diesel Generator via the BUS-TIE board	Attachment 1, Step 5.0
PARALLEL of 2 or more Diesel Generators to the same Shutdown Bus	Attachment 1, Step 6.0
Offsite Power Restoration	Attachment 1, Step 7.0
PARALLEL of a Unit 1/2 diesel generator with its associated Unit 3 diesel generator	Attachment 2
BACKFEED of 4kV Unit board "B" and establish the Main Condenser as a HEAT SINK	Attachment 3
ENERGIZING a Unit 1/2 4kV Shutdown board using a Unit 3 diesel generator	Attachment 7
ENERGIZING a Unit 1/2 4kV Shutdown board using another Unit 1/2 diesel generator	Attachment 8

Attachment 8
(Page 1 of 3)

Energizing a Unit 1/2 4KV Shutdown Board using Another Unit 1/2 DG

NOTE

Table 8 identifies the normal feeder breaker, alternate feeder breaker, diesel generator output breaker, and unit crosstie breaker associated with each 4KV-Shutdown-Board. Table 8 should be referred to as needed when performing the subsequent steps in this subsection.

Table 8

Shutdown Board	A	B	C	D
NORM FDR BKR	1614	1616	1718	1724
ALT FDR BKR	1716	1714	1624	1618
D/G BKR	1818	1822	1812	1816
EMER FDR BKR	1824	1828	1814	1826

1.0 ENERGIZING A UNIT 1/2 4KV SHUTDOWN BOARD USING ANOTHER UNIT 1/2 DG

NOTES

1) Illustration 2, Loss of Diesel Generator Cooling can be used to assist during SBO conditions.
2) When EECW cooling water flow to the Diesel Generators is lost, personnel may be required locally for restoration.
3) Man the Diesel Generators as soon as possible when they are operating.

[1] **STATION** a licensed operator at the diesel generator section of Panel 0-9-23 in the Unit 1 & 2 Control Room. ☐

Attachment 8
(Page 2 of 3)

Energizing a Unit 1/2 4KV Shutdown Board using Another Unit 1/2 DG

1.0 ENERGIZING A UNIT 1/2 4KV SHUTDOWN BOARD USING ANOTHER UNIT 1/2 DG (continued)

[2] **IF** crosstieing A and D 4kV S/D Bds will be performed, **THEN**

TRANSFER Diesel Aux Board A or B to its alternate power supply prior to crosstieing A and D 4kV S/D Bds, to prevent entering an unanalyzed condition (A and B SBGT feed from same power supply). ☐

NOTE

When an accident signal is present, the following limits apply to energizing a Unit 1/2 4KV Shutdown Board using Another Unit 1/2 DG:

- "A & B" 4kV S/D boards only supplying each other
- "C & D" 4kV S/D boards only supplying each other.

[3] FOR the 4kV S/D board to be used as the SOURCE, **PERFORM** the following:

[3.1] **VERIFY** the associated Unit 1/2 diesel generator has started and tied to its respective 4kV S/D board. ☐

[3.2] **VERIFY** the D/G MODE SELECT switch is in SINGLE UNIT and **PULL OUT** on the switch. ☐

[3.3] **VERIFY** the SINGLE UNIT light (left red) is ILLUMINATED. ☐

[3.4] **CLOSE** the 4kV S/D board's supply breaker to the associated S/D Bus. ☐

13. OPL171.046 032/C/A/T3/23 - RHRSW/8/2.2.24//2.6/3.8/0606S NEW6/28/2007

Units 1, 2 and 3 are operating at full power with no equipment out of service.

While performing calibration of the level switches for the A sump pump in C RHRSW pump room, failure of a test lead connection results in a short that disables the level switches for both sump pumps.

REFERENCE PROVIDED

Which ONE of the following describes the required action(s)?

A. Restore at least 1 sump pump to operable status within 8 hours.

B. Provide an alternate method of RHRSW pump room level control within 7 days.

C✓ Restore at least 1 sump pump to operable status within 7 days.

D. Provide an alternate method of RHRSW pump room level control within 30 days.

2.2.24 Ability to analyze the affect of maintenance activities on LCO status.

PROVIDE REFERENCE UNIT 1, 2 AND 3 TECH SPECS SECTION 3.7

References: Unit 2 Tech Specs section 3.7, pages 3.7-1 thru 3.7-4
0-OI-23 rev 76, page 10

A. incorrect, this would be required if 3 RHRSW pumps were inoperable

B. incorrect, OI does not allow use of alternate system

C. correct answer with 2 pumps inoperable (A1 and A2)

D. incorrect, OI does not allow use of alternate system

3.7 PLANT SYSTEMS

3.7.1 Residual Heat Removal Service Water (RHRSW) System and Ultimate Heat Sink (UHS)

LCO 3.7.1

----------NOTE----------
The number of required RHRSW pumps may be reduced by one for each fueled unit that has been in MODE 4 or 5 for ≥ 24 hours.

Four RHRSW subsystems and UHS shall be OPERABLE with the number of OPERABLE pumps as listed below:

1. 1 unit fueled - four OPERABLE RHRSW pumps.
2. 2 units fueled - six OPERABLE RHRSW pumps.
3. 3 units fueled - eight OPERABLE RHRSW pumps.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RHRSW pump inoperable.	A.1 ----------NOTES---------- 1. Only applicable for the 2 units fueled condition. 2. Only four RHRSW pumps powered from a separate 4 kV shutdown board are required to be OPERABLE if the other fueled unit has been in MODE 4 or 5 for ≥ 24 hours. ---------- Verify five RHRSW pumps powered from separate 4 kV shutdown boards are OPERABLE.	Immediately
	OR	
	A.2 Restore required RHRSW pump to OPERABLE status.	30 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One RHRSW subsystem inoperable.	B.1 ----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.4.7, "Residual Heat Removal (RHR) Shutdown Cooling - Hot Shutdown," for RHR shutdown cooling made inoperable by the RHRSW system. ---------- Restore RHRSW subsystem to OPERABLE status.	30 days
C. Two required RHRSW pumps inoperable.	C.1 Restore one inoperable RHRSW pump to OPERABLE status.	7 days
D. Two RHRSW subsystems inoperable..	D.1 ----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.4.7, for RHR shutdown cooling made inoperable by the RHRSW System. ---------- Restore one RHRSW subsystem to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
E. Three or more required RHRSW pumps inoperable.	E.1	Restore one RHRSW pump to OPERABLE status.	8 hours
F. Three or more RHRSW subsystems inoperable.	F.1	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.4.7 for RHR shutdown cooling made inoperable by the RHRSW System. ----------	
		Restore one RHRSW subsystem to OPERABLE status.	8 hours
G. Required Action and associated Completion Time not met.	G.1	Be in MODE 3.	12 hours
	AND		
OR	G.2	Be in MODE 4.	36 hours
UHS inoperable			

3.0 PRECAUTIONS AND LIMITATIONS (continued)

H. Extended operation of an RHRSW Pump with motor phase winding above the Maximum Operating Temperature of 275°F will degrade the motor windings (based on Class B insulation). Contact System Engineering for evaluation if ANY RHRSW pump except D1 phase winding temperature exceeds 275°F (based on Class B insulation rating). The Maximum Operating Temperature for RHRSW Pump D1 is 365°F (based on Class H insulation rating).

I. When a RHRSW pump is running, then upper and lower oil levels should not exceed the maximum level nor be less than the minimum level.

J. If the RHRSW Pump in the associated header is not operating, then the RHR Heat Exchanger Cool Water Outlet Valves are interlocked to auto close.

RHRSW Pump	Valve
A1, A2	FCV-023-0034
B1, B2	FCV-023-0046
C1, C2	FCV-023-0040
D1, D2	FCV-023-0052

K. At least one RHRSW pump room sump pump must be operable or the RHRSW/EECW pump in that room must be declared inoperable.

L. Off-line radiation monitors receive their start signal from a TDPU relay energized by the RHRSW heat exchanger's discharge flow element. During RHRSW low flows, such as shutdown cooling split flows, the initial flow rate from any in service RHRSW heat exchanger must exceed 600 gpm. This will ensure operation of the off-line Radiation Monitor. After reaching 600 gpm, the flow can be split or lowered, while maintaining minimum flow requirements, to establish the desired cooldown rate or maintain consistent shutdown cooling temperatures.

M. To avoid exceeding the qualification temperature limits (150°F) on RHRSW piping and components downstream of the common point, dilute the flow through the RHRSW piping by establishing additional flow through the selected loop's companion RHR Heat Exchanger not being used for Shutdown Cooling. [II/C] If RHRSW outlet temperature exceeds 150°F, then the following limitations apply:

1. For temperatures between 150°F and 178°F, flow through the inservice RHR Heat Exchanger shall be less than or equal to 3000 gpm.

14. OPL171.049 025/C/A/T2G2/26 - FP/9/286000A2.11//3.1/3.2/0606S NEW6/27/2007

Unit 3 was operating at full power when a pipe rupture in the Generator Seal Oil system results in a fire on elevation 617 of the Turbine Building. A and B Fire Pumps auto start in response to the fire.

Water from the Fire Suppression system causes further electrical failures and result in a loss of offsite power. All systems respond as designed to the transient.

5 minutes after the loss of offsite power, the Incident Commander reports that the fire is not extinguished.

Which ONE of the following describes the status of the High Pressure Fire pumps and any actions required to restore the pumps to service?

A. C Fire pump is running; A and B Fire pumps may be manually started after 60 seconds.

B. C Fire pump and the Diesel Fire pump are running; A and B Fire pumps may be manually started after 60 seconds.

C. Diesel Fire pump is running; A, B and C Fire pump NORMAL/EMERGENCY switches must be cycled to restore these pumps to service.

D.✓ C Fire pump and the Diesel Fire pump are running; A and B Fire pump NORMAL/EMERGENCY switches must be cycled to restore these pumps to service.

286000A2.11 Ability to (a) predict the impacts of the following on the FIRE PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Pump trips

References: 0-OI-26 rev 86, page 10;
0-AOI-57-1A rev 70, page 18
171.049 rev 13, page 35

A. incorrect, Diesel Fire Pump would also be running, accident signal trips time out after 60 seconds.

B. incorrect, accident signal trips time out after 60 seconds.

C. incorrect, C Fire pump would be running, 52Y relay would not pickup on C Fire pump.

D. correct answer

INSTRUCTOR NOTES

NOTE: Typical system pressure demand is such that one fire pump will operate in case of a fire in the buildings, and two pumps will operate in case of a transformer fire.

7. Starting any fire pump automatically closes the raw water storage tank isolation valves (FCV-25-70 and FCV-25-32).

8. Stopping all operating fire pumps automatically opens raw service water storage tank isolation valve FCV-25-32. The operator must reopen FCV-25-70 at Panel 1-9-20 or locally.

9. Fire Pump Selector switch, XS-26-43 on Control Room Panel 1-9-20, should NOT be left in the OFF position because this would prevent the automatic start of a fire pump.

10. Due to the anti-pumping feature of the electric fire pump circuit breakers, the first pump in the selected sequence will not restart if it is manually tripped with an automatic start signal present. — 2-45E765-7

11. If system header pressure is not >120 psig 15 seconds after the initiation signal, a second fire pump automatically starts.

12. If system header pressure is not >120 psig 30 seconds after the initiation signal, the third fire pump automatically starts.

13. If system header pressure is not >120 psig 45 seconds after the initiation signal, the diesel fire pump automatically starts.

14. Automatic start of the fire pumps is locked out on the following: — Obj. V.D.9, Obj. V.E.10

    a. High Drywell Pressure (2.45 psig) in conjunction with Low Reactor Pressure (450 psig) or Low Low Low Reactor Water Level (-122 in.). — 0-45E644-1, LOR-1 &2, CASA & DGVA

    AND

    b. Diesel Generators are supplying power to the 4160V Shutdown Boards.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

O. When High Pressure Fire Pumps are in service, the Fire Pump Discharge Strainers are to be flushed once per shift or anytime strainer differential pressure is greater than or equal to 2 psid.

P. The LCDXL panels do **NOT** monitor the status of the FPSL, FPX A(B)(C), OR DPS relays. These relays must be checked locally on panel 1-9-36 Unit 1 Aux Instrument Room.

Attachment 7, Fire Protection Display Panel,0-XI-026-0151, lists the Alarm Messages and Actions from local Fire Panels that input to Unit 1, Panel 1-9-22. Currently the following Edwards System Technology EST3 panels input to the Unit 1 control room 3-LCDANN panel:

1-LPNL-925-0545,

0-LPNL-925-0538

0-LPNL-925-0544,

0-LPNL-925-0555,

0-LPNL-925-0556,

3-LPNL-925-0543,

2-LPNL-925-0545,

2-LPNL-925-0546,

2-LPNL-925-0547,

3-LPNL-925-0545,

3-LPNL-925-0546,

3-LPNL-925-0547

Q. When the Channel Diesel Fire Pump House Exhaust Fan is out of service and River Temperature is greater than 80 deg F, have System Engineering evaluate the operability of the Channel Diesel Fire Pump.

R. An initiation signal from either Division I or II of Unit 1/2 common accident signal logic will result in the trip of Fire Pumps A, B & C, and are prevented from automatically restarting for an accident with normal power available or on a loss of off site power. This trip signal is sealed in for 60 seconds, after which the pump(s) may be manually restarted.

4.2 Subsequent Actions (continued)

NOTE

[NER/C] If electrical-driven fire pumps were running due to an automatic initiation, the 52Y relay will lock-out the pump breaker; thus preventing the pump(s) from being restarted. In order to restart the fire pumps, Step 4.2[21] should be performed to momentarily interrupt DC control power to the closing coils of the fire pump breakers. [NRC IE 88-075]

[21] [NER/C] **IF** electrical-driven fire pumps were running due to an automatic initiation signal prior to loss of off-site power **AND** the automatic initiation signal is still present, **THEN**

PERFORM the following to restart fire pumps necessary for fire suppression: (Otherwise N/A)

[21.1] **PLACE** the NORMAL/EMERGENCY switch for Fire Pump A (B) (C) on 4kV Shutdown Bd. A (B) (C) compt. 11(11)(10) to EMERGENCY and back to NORMAL. ☐

[21.2] **VERIFY** that the fire pump(s) start. [NER IE 88-075] ☐

[22] **MONITOR** Batt Bd amps and VOLTS on Panels 9-8. **PLACE** the battery charger back in service within 30 minutes after loss of the charger to the battery. ☐

NOTE

Step 4.2[22.1] will ensure adequate voltage is available to operate switchyard breakers.

[22.1] **TRANSFER** breaker control power from NORMAL (Battery Board 4) to ALTERNATE (Battery Board 2) as follows (at Panel 9-24):

- **OPEN** BKR 642 NOR FDR FROM BATT BD 4 BKR 219. ☐
- **CLOSE** BKR 641 ALT FDR FROM BATT BD 2 BKR 501. ☐

15. OPL171.054 054/C/A/T1G1/32 - CONTROL AIR/C/A/295019AA2.01//3.5/3.6/0606S BANK

Unit 2 is operating at 80% RTP and Unit 3 is in a refueling outage. The following alarm is received by the Unit 2 Operator:

- 0-PA-32-88, CONTROL AIR PRESS LOW

The Operator observes Unit 2 Control Air Pressure cycling between 65 and 85 psig. (Assume no operator action)

Which ONE of the following is the most likely cause for this condition?

A. A Unit 2 Control Air header leak exists and Service Air Backup to Unit 2 (0-FCV-33-1) is cycling to maintain Control Air pressure.

B.✓ A Unit 3 Control Air header leak exists and the Unit 2 to Unit 3 Crosstie Valve (2-PCV-032-3901) is cycling to maintain Control Air pressure.

C. A Unit 2 Control Air header leak exists and the Unit 2 to Unit 3 Crosstie Valve (2-PCV-032-3901) is cycling to maintain Control Air pressure.

D. A Unit 3 Control Air header leak exists and Service Air Backup to Unit 2 (0-FCV-33-1) is cycling to maintain Control Air pressure.

295019AA2.01 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Instrument air system pressure

References: 2-AOI-32-2, Rev. 32, Attachment 1 page 21

A. Incorrect since the Service Air backup valve opens at 85 psig.

B. Correct answer. The Control Air crosstie closes at 65 psig and automatically reopens at 85 psig. This assumes that the crosstie check valve fails open.

C. Incorrect since this would have no affect if the leak was on Unit 2.

D. Incorrect since this valve opens at 85 psig on Unit 2.

Attachment 1
(Page 3 of 6)

Expected System Responses

5.0 RCW

A. All RCW temperature control valves fail open except for 2-TCV-24-80B and 2-TCV-24-85B on 2A and 2B RBCCW heat exchangers and 2-TCV-024-0075B on the Main Turbine Oil Coolers (4" line) which fail CLOSED.

6.0 RAW SERVICE WATER

A. RSW Head Tank outlet valve FCV-25-32 fails CLOSED. A high pressure fire pump should be started immediately to maintain fire system pressure.

7.0 HIGH PRESSURE FIRE PROTECTION

A. Fire header pressure control valve 0-PCV-26-4 located at the Intake will fail CLOSED. Relief valve will maintain fire header pressure < 175 psig.

8.0 SERVICE AIR

A. Service air supply to control air 0-FCV-33-1 opens at 85 psig Control Air press but will fail CLOSED on loss of control air at 30 psig.

9.0 CONTROL AIR

A. Unit 2 to Unit 3 Control Air Crosstie, 2-PCV-032-3901, will close when Control Air Header pressure reaches 65 psig and lowering at the valve. The valve will reopen automatically when Control Air Header pressure rises above 85 psig at the valve.

B. U-1 TO U-2 CONT AIR CROSSTIE, 1-PCV-032-3901, will close when Control Air Header pressure reaches 65 psig and lowering at the valve. The valve will reopen automatically when Control Air Header pressure rises above 85 psig at the valve.

16. OPL171.086 004/MEM/T3/SPP 10.2/13/2.2.13//3.6/3.8/0606S BANK

Unit 2 is in a refueling outage.
RHR Pump 2A is tagged to replace the pump seal.
Electrical Maintenance has determined that the motor must be replaced on the minimum flow valve which is part of the RHR Pump 2A clearance boundary.

Which ONE of the following is correct concerning the Clearance revision?

A. The Tagging UO (RE) and WCC SRO (RE) will determine if notification of clearance holders is required.

B.✔ All current clearance holders (PAEs) shall give concurrence before this clearance can be revised.

C. All work under the clearance must be stopped while the clearance is revised and reissued.

D. The Unit Operator (RE) can revise the clearance boundary with concurrence from the responsible Maintenance Shift Supervisor.

2.2.13 Knowledge of tagging and clearance procedures.

Reference: SPP-10.2 rev 9, pages 11 and 24

A. incorrect, notification of current clearance holders is always required.

B. correct answer

C. incorrect, work can continue if clearance boundary maintains continuous personnel protection.

D. incorrect, clearance holders (PAEs) must agree to boundary change.

2.0 SCOPE (continued)

E. Clearances for work on or near Transmission Power/Supply (TPS) controlled equipment are obtained from the transmission operator in accordance with the current TPS Operating Letter on clearances.

F. This procedure does not apply to machines and equipment that are not an integral part of the power generation processes or equipment. Clearance requirements for these machines and equipment are in TVAN MMDP-12, "Lockout/Tagout."

G. The requirements of this procedure to control hazardous energy are satisfied in the following situations:

1. Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.

2. Work on motor vehicles where turning the engine off and removing the ignition key would de-energize and isolate the power source and the key is retained by the employee performing the servicing or maintenance.

3.0 PROCESS

3.1 Roles and Responsibilities

There are five primary clearance functions/activities assigned to employees. These functions/activities are only assigned to employees who have been trained within their area of responsibility to qualify them to perform their assigned clearance functions/activities described in this procedure. The five functions/activities are the following:

Responsible Employee (RE) (e.g. Unit Operator, Unit Supervisor)

Writes and issues clearances in accordance with this procedure.

Qualified Employee (QE) (e.g. Assistant Unit Operator)

Implements the clearance by operating energy-isolating devices in accordance with the clearance instructions to de-energize equipment and installing clearance tags at each isolation point.

Primary Authorized Employee (PAE):

Holds a clearance by name on the equipment that servicing, maintenance, and/or modification will be performed and holds the clearance for the Authorized Employee(s) who performs the servicing, maintenance, and/or modification.

Authorized Employee:

Performs servicing, maintenance, and/or modification on machines or equipment under a clearance.

3.4.6 Apply Normal Energy Source for Test, Alignment, Etc. (continued)

G. After the requesting PAE authorizes the RE to proceed with energy application, the RE provides the Clearance Temporary Lift Sheet to the QE and authorizes implementation of the clearance temporary lift.

H. The QE removes danger tags and manipulates the energy isolation devices in accordance with the temporary lift sheet. The lifting of danger tags is limited to the energy-isolating devices necessary to apply normal energy to the equipment under application of normal energy.

I. The PAE is responsible for performing the work activity to completion.

1. After the work activity is completed, the PAE who requested the clearance temporary lift notifies the RE that the activity is complete and the clearance may be re-established, as needed.

2. The PAE who requested the clearance temporary lift is responsible for notifying the affected PAEs who previously held the clearance(s) that the clearance temporary lift work activity is complete and that they may request the clearance be re-established.

J. If the RE does not re-establish the clearance, the clearance is released in accordance with Section 3.5.

K. If the RE re-establishes the clearance, the clearance is re-established in accordance with Sections 3.3.3, 3.3.4 and the Temporary Clearance Lift Sheet.

L. Before resuming work on cleared equipment, the PAE(s) must complete the activities required in Sections 3.3.5, 3.3.6, 3.4.1, 3.4.2, 3.4.3, and 3.4.4.

3.4.7 Revise Clearance Boundary

A. A clearance boundary can be revised by issuance of a new clearance and release of the existing clearance.

B. If a clearance revision is required, the RE performs an assessment to determine if the clearance boundary can be revised.

C. All affected PAEs on the clearance to be modified shall be notified to obtain concurrence of the Clearance revision. The PAEs who are holding the clearance will review the change and agree that work can be performed safely after revising the clearance boundary. The RE will note the reason for revising the boundary in the remarks section of the clearance.

D. If the Clearance boundary can be revised while maintaining continuous personnel protection, then work may continue.

E. The RE revising a clearance boundary will issue the clearance revision using the same process (listed below) required to establish an initial clearance:

1. Prepare Clearance (3.3.2).

17. OPL171.087 064/C/A/T1G1/90/10/295038G2.2.25//2.5/3.7/0606S NEW6/25/2007

Unit 2 is operating at full power. The system engineer for system 90 informs you that a GE SIL has been issued that will require the NUMAC Drywell Radiation monitors to be declared inoperable. GE will modify the circuit cards for these NUMAC monitors and provide the new circuit cards in 60 days.

REFERENCE PROVIDED

Which ONE of the following describes the required actions and the reason these actions are appropriate?

A. Be in Mode 3 in 12 hours; plant must be brought to a condition where the LCO does not apply.

B.✓ Initiate action in accordance with Specification 5.6 immediately; alternative means of monitoring Drywell radiation have been developed and tested.

C. Restore ONE channel to Operable status in 30 days; based on operating experience and takes into account other methods to monitor this function.

D. Initiate action in accordance with Specification 5.6 immediately; installed non-Regulatory instruments are available to monitor this function.

295038G2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.

PROVIDE REFERENCE UNIT 2 TECH SPECS SECTION 3.3, SECTION 5

References: Unit 2 Tech Spec Requirements pages 3.3-24 and 3.3-25
Unit 2 Tech Spec Bases pages B 3.3-93, B 3.3-94 and B 3.3-95

A. incorrect, this applies to other PAM instrumentation with both channels inoperable

B. correct answer

C. incorrect, one channel should be restored to operable status in 7 days

D. incorrect, this is the basis for condition A1

3.3 INSTRUMENTATION

3.3.3.1 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.3.1 The PAM instrumentation for each Function in Table 3.3.3.1-1 shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

----------NOTES----------

1. Separate Condition entry is allowed for each Function.
2. For Function 6, Separate Condition entry is allowed for each penetration flow path.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one required channel inoperable.	A.1 Restore required channel to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action in accordance with Specification 5.6.6.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more Functions with two required channels inoperable.	C.1 Restore one required channel to OPERABLE status.	7 days
D. (Deleted).		
E. Required Action and associated Completion Time of Condition C not met.	E.1 Enter the Condition referenced in Table 3.3.3.1-1 for the channel.	Immediately
F. As required by Required Action E.1 and referenced in Table 3.3.3.1-1.	F.1 Be in MODE 3.	12 hours
G. As required by Required Action E.1 and referenced in Table 3.3.3.1-1.	G.1 Initiate action in accordance with Specification 5.6.6.	Immediately

BASES

ACTIONS (continued)

A.1

When one or more Functions have one required channel that is inoperable, the required inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channels (or, in the case of a Function that has only one required channel, other non-Regulatory Guide 1.97 instrument channels to monitor the Function), the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.

B.1

If a channel has not been restored to OPERABLE status in 30 days, this Required Action specifies initiation of action in accordance with Specification 5.6.6, which requires a written report to be submitted to the NRC. This report discusses the alternate method of monitoring, the results of the root cause evaluation of the inoperability, and identifies proposed restorative actions. This action is appropriate in lieu of a shutdown requirement, since alternative actions are identified before loss of functional capability, and given the likelihood of plant conditions that would require information provided by this instrumentation.

(continued)

BASES

ACTIONS (continued)

C.1

When one or more Functions have two required channels that are inoperable (i.e., two channels inoperable in the same Function), one channel in the Function should be restored to OPERABLE status within 7 days. The Completion Time of 7 days is based on the relatively low probability of an event requiring PAM instrument operation and the availability of alternate means to obtain the required information. Continuous operation with two required channels inoperable in a Function is not acceptable because the alternate indications may not fully meet all performance qualification requirements applied to the PAM instrumentation. Therefore, requiring restoration of one inoperable channel of the Function limits the risk that the PAM Function will be in a degraded condition should an accident occur.

D.1

(Deleted).

(continued)

BASES

ACTIONS (continued)

E.1

This Required Action directs entry into the appropriate Condition referenced in Table 3.3.3.1-1. The applicable Condition referenced in the Table is Function dependent. Each time an inoperable channel has not met any Required Action of Condition C and the associated Completion Time has expired, Condition E is entered for that channel and provides for transfer to the appropriate subsequent Condition.

F.1

For the majority of Functions in Table 3.3.3.1-1, if any Required Action and associated Completion Time of Condition C are not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

G.1

Since alternate means of monitoring primary containment area radiation have been developed and tested, the Required Action is not to shut down the plant, but rather to follow the directions of Specification 5.6.6. These alternate means may be temporarily installed if the normal PAM channel cannot be restored to OPERABLE status within the allotted time. The report provided to the NRC should discuss the alternate means used, describe the degree to which the alternate means are equivalent to the installed PAM channels, justify the areas in which they are not equivalent, and provide a schedule for restoring the normal PAM channels.

(continued)

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.6.6 PAM Report

When a report is required by Condition B or G of LCO 3.3.3.1, "Post Accident Monitoring (PAM) Instrumentation," a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.

18. OPL171.098 017/C/A/T1G1/78//295031G2.3.10//2.9/3.3/0606S NEW6/25/2007

Unit 3 is in Mode 5 with refueling in progress. RHR Loop II is in Shutdown Cooling.

The UO notes the following:
- Fuel Pool Cooling pump trip
- Fuel Pool System Abnormal alarm
- FUEL POOL SKIMMER SURGE TK LEVEL LO/LO-LO alarm

The Refuel Floor SRO reports Fuel Pool level is lowering from unknown leakage and Fuel Pool level is at the top of the Cattle Chute.

Which ONE of the following describes a required action?

A. Secure and isolate ADHR, have Radcon evacuate the Refuel floor.

B. Initiate Fuel Pool makeup from EECW, have Radcon evacuate the Reactor Building.

C. Secure and isolate Shutdown Cooling, have Radcon monitor Rad levels and control access to affected areas.

D.✓ Initiate Reactor makeup with RHR/Core Spray, have Radcon monitor Rad levels and control access to affected areas.

295031G2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.

Reference: 3-AOI-78-1 rev 15, pages 4 and 6

A. incorrect, ADHR would already have isolated, evacuation is not required

B. incorrect, Reactor Building evacuation is not required

C. incorrect, SDC isolation will occur when water level reaches 2 inches

D. correct answer

1.0 PURPOSE

This instruction provides symptoms, automatic actions, and operator actions for a Fuel Pool Cleanup System Failure from loss of cooling or loss of fuel pool level.

2.0 SYMPTOMS

2.1 Loss of Level

A. Low skimmer surge tank level as indicated by any one of the following:

1. FUEL POOL SKIMMER SURGE TK LEVEL LO/LO-LO, (3-XA-55-4C Window 4) on Panel 3-9-4 in alarm.
2. SKIMMER SURGE TANK LEVEL LOW, 3-IL-078-001B/CA, white indicating lamp illuminated on 3-LPNL-925-0015.
3. SKIMMER SURGE TANK LEVEL LOW LOW ISOL, 3-IL-078-001D/FA, white indicating lamp illuminated on 3-LPNL-925-0015.
4. SKIMMER SURGE TANK LEVEL LOW LOW ISOL, 3-IL-078-001E/GA, white indicating lamp illuminated on 3-LPNL-925-0015.
5. SKIMMER SURGE TANK LEVEL LOW LOW ISOL, 3-IL-078-001D/FB, white indicating lamp illuminated on 3-LPNL-925-0016.
6. SKIMMER SURGE TANK LEVEL LOW LOW ISOL, 3-IL-078-001E/GB, white indicating lamp illuminated on 3-LPNL-925-0016.
7. SKIMMER SURGE TANK LEVEL HIGH (LOW), 3-IL-078-001AB(001B/CB), white low indicating lamp illuminated on 3-LPNL-925-0016.

B. FUEL STORAGE POOL LEVEL ABN, 3-IL-078-0002, white indicating light illuminated on 3-LPNL-925-0015.

C. FUEL POOL GATE LEAKAGE EXCESSIVE, 3-IL-078-0005, white indicating lamp illuminated on 3-LPNL-925-0015.

D. REFUEL BELLOWS LEAKAGE EXCESSIVE, 3-IL-078-0051, white indicating lamp illuminated on 3-LPNL-925-0015.

E. FUEL POOL SYSTEM ABNORMAL (3-XA-55-4C, Window 1) on Panel 3-9-4 in alarm.

F. Fuel Pool Cooling Pump tripped.

4.0 OPERATOR ACTIONS

4.1 Immediate Actions

None

4.2 Subsequent Actions

CAUTIONS

1) If power was lost to FPC pump and the FPC Demineralizer Hold Pump C(D) did not start, failure to backwash and precoat the demineralizer prior to placing it in service, may result in degraded chemistry conditions. **REFER TO** 3-OI-78.
2) [NER/C] Uncontrolled lowering in the SFSP level could raise the potential for high radiation levels which could lead to personnel over exposure. Any SFSP level below normal requires RADCON to monitor radiation conditions and control access to the affected areas as required. [IE NOTICE 87-13]

[1] **VERIFY** automatic actions have occurred. ☐

[2] **IF** Fuel Pool Cooling System failure is due to a loss of SFSP level, **THEN:** (Otherwise N/A)

PERFORM the following: ☐

[2.1] [NER/C] **NOTIFY** RADCON to continually monitor radiation levels and control area access to the affected areas UNTIL normal SFSP level has been restored. [IE NOTICE 87-13] ☐

[2.2] **IF** Condensate Makeup and Transfer System is available, **THEN:**

RAISE level using SST A CNDS SPLY SOV, 3-SHV-078-0532. **REFER TO** 3-ARP-9-4C. ☐

[2.3] **IF** fuel pool to reactor cavity gates are removed, **THEN:**

MAKEUP to reactor using any available system (i.e., Condensate System, RHR System, Core Spray System, etc.). ☐

19. OPL171.148 009/C/A/T2G1/92B//215005A2.07//3.2/3.4/0606S NEW6/26/2007

Unit 1 is at 85% power and 60% Core Flow performing a control rod shuffle for establishing a new Load Line. The Recirc Loop A Flow transmitter to APRM 1 1-FT-68-5A fails to zero.

Which ONE of the following describes the Trips/Alarms received from this failure and the required Operator actions?

A.✓ APRM HIGH-HIGH alarm
CONTROL ROD BLOCK alarm
OPRM TRIP ENABLED alarm
— Bypass APRM 1 only

B. APRM HIGH-HIGH alarm
CONTROL ROD BLOCK alarm
APRM FLOW BIAS OFF NORMAL alarm
— Bypass APRM 1 only

C. APRM UPSCALE alarm
CONTROL ROD BLOCK alarm
OPRM TRIP ENABLED alarm
— Bypass APRM 1 and RBM A

D. APRM UPSCALE alarm
CONTROL ROD BLOCK alarm
APRM FLOW BIAS OFF NORMAL alarm
— Bypass APRM 1 and RBM A

215005A2.07 Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Recirculation flow channels flow mismatch

References: 171.148 rev 8, pages 111 and 112
1-ARP-9-5A rev 8, pages 16, 31, 38 and 40

For APRM 1: W = 30%
.66W + 59% = APRM UPSCALE setpoint = .66(30) + 59 = 78.8%
.66W + 65% = APRM HI-HI setpoint = .66(30) + 65 = 84.8%

A. correct answer

B. incorrect, APRM FLOW BIAS OFF NORMAL generated by flow at 107%

C. incorrect, RBM only uses the STP or RECIRC FLOW HIGH input to generate trips

D. incorrect, RBM only uses the STP or RECIRC FLOW HIGH input to generate trips

6. **RBM**

a. Provides rod blocks based on power levels immediately around the control rod selected for movement. Up to 8 LPRMs are used for RBM flux calculation. The STP APRM flux input determines the set point of the RBM to invoke rod blocks. The RBM channels also serve as a communication hub for transferring data between the PRNM and the process computer. The RBM performs the flow compare function as well.

b. Loss of an RBM channel will cause a rod block, if not bypassed. Insufficient number of LPRM inputs can result in a rod block. Loss of a particular APRM channel may require the RBM channel to automatically select another APRM channel for an STP input.

7. **Recirculation System**

a. Provides the recirc flow signals for each APRM channel.

8 total flow instruments, 4 per loop

(1) Each loop provides a specific signal to a selected APRM channel.

(2) One signal from loop A and one from loop B are combined to yield a total recirc flow signal for each APRM channel.

b. A loss of a recirc pump and a loss of an individual loop signal was discussed. A loss of a running pump yields approximately ½ of the total flow signal for each APRM channel. All flow biased trips and rod blocks are reduced by an equivalent amount.

c. A loss of an individual loop flow signal will change that APRM channel's total flow signal by approximately ½ of the total flow signal. Just the affected APRM channel flow biased trips and rod blocks are reduced by an equivalent amount. OPRM trips are enabled. In addition the flow compare alarm generated by the RBM will be in alarm.

8. **Reactor Manual Control**

The Reactor Manual Control system receives rod block signals from APRMs, OPRMs, and RBMs.

9. **Traversing In-Core Probe**

a. The Traversing In-Core Probe system is used for the calibration of the LPRMs. Once power levels are scanned, LPRM gains are generated and downloaded to the individual LPRMs to provide accurate power indications.

b. Reactor Power Indication is generated as discussed above. Any errors as seen by LPRMs carry through and can have a direct adverse bearing on average power indications

APRM UPSCALE	
AM	11

(Page 1 of 1)

Sensor/Trip Point:

Relay K14	.66w + 59% (Rx Mode Sw. in Run)
A6K1 in 2/4 Logic Module (Voters)	10% with Rx Mode Sw. **NOT** in Run
	113% Neutron Flux Clamped
	Single loop operation with Mode Switch in RUN (0.66 (W-10%) + 59%)

Sensor Location: Control Room Panel 1`-9-14.

Probable Cause:
A. Flux level at or above setpoint.
B. Testing in progress.
C. Failed sensor.

Automatic Action: Rod withdrawal block of all control rods.

Operator Action:
A. **VALIDATE** alarm by multiple indications. ☐
B. **CHECK** for rod block. ☐
C. **STOP** any power rise or rod withdrawal in progress. ☐
D. **NOTIFY** Reactor Engineer. ☐
E. **REFER TO** Tech. Spec. TRM Table 3.3.4-1. ☐

References:

Technical Specifications	Technical Requirements Manual-TRM	
1-45E620-6-1	1-197R114-16	1-107E5784-3, 20

APRM HIGH/INOP OR OPRM TRIP	
RD	25

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Sensor/Trip Point:

APRM:

Relays K1, K2, K19 A10K5, A10K1, A6K3 in 2/4 Logic modules (voters)

C. HIGH.
   1. (0.66W + 65%) Two Loop operation with Rx MODE Switch in Run.
   2. 14.0% with Rx Mode Switch not in RUN.
   3. 119% in any mode.
   4. (0.66(W-10%)+65%) Single loop operation with Mode Switch in RUN.

D. INOP.
   1. APRM Chassis Mode switch not in OPERATE.
   2. Loss of input power.
   3. Watchdog timer timed out.
   4. Critical self test fault detected.

OPRM TRIP:

Relay K4, A4K1 in 2/4 logic modules (voters)

Any one of the three algorithms, period, growth, or amplitude for an operable OPRM Cell has exceeded its trip value conditions.

Sensor Location: Control Room Panel 1-9-14.

Probable Cause:
A. Flux level at or above setpoint.
B. Testing in progress.
C. Malfunction of sensor.
D. Control rod drop accident.
E. Thermal-Hydraulic instability Detected

Automatic Action:
A. Input signal to all four Voters, no output to RPS.
B. Full Reactor scram if two sensors actuate.

Operator Action:
A. **VALIDATE** alarm by multiple indications ☐
B. With SRO permission, **BYPASS** initiating channel to reset the alarm. **REFER TO** 1-OI-92B. ☐
C. **IF** HIGH is indicated, **THEN DETERMINE** cause of inadvertent reactivity change. ☐

Continued on Next Page

OPRM TRIP ENABLED	Sensor/Trip Point: Relay K6 A4K4 in 2/4 LOGIC MODULE (VOTERS)	Total Recirc Flow (driven) < 60% and STP ≥ 25%
30		

(Page 1 of 1)

Sensor Location: Sensors located in the Logic Modules (Voters) Panel 1-9-14, Main Control Room.

Probable Cause:

A. RECIRC PUMP tripped or removed from service.
B. Reactor has entered the Region of Potential Instability due to Total Recirculation Drive Flow < 60% and Simulated Thermal Power ≥ 25%.

Automatic Action: The APRM Bargraphs on the Operator Display Assembly(ODA) will automatically TURN ON if extinguished and default to the Oscillation Power Range Monitoring(OPRM) mode, Confirmation Density Algorithm(CDA) screen. The operator can return to the Main Display by depressing the "EXIT" soft key.

Operator Action:

A. **IF** region 1 of the Power/Flow map is entered, **THEN** **EXIT** the region immediately by either; ☐
   - While observing core thermal limits, **RAISE** core flow to greater than 40% of rated OR ☐
   - **INSERT** Control Rods to less than the 95.2% Rod line. ☐

B. **IF** the OPRM Trip Function is inoperable in MODE 1, **THEN**: **PERFORM 1**-SR-3.3.1.1.I to initiate alternate Thermal-Hydraulic Instability monitoring and required actions. ☐
C. **IF** this area was entered due to a Recirc Pump Trip, **ENTER** 1-AOI-68-1A, RECIRC PUMP TRIP/CORE FLOW DECREASE OPRMs OPERABLE or 1-AOI-68-1B, RECIRC PUMP TRIP/CORE FLOW DECREASE. ☐
D. **NOTIFY** Reactor Engineer for Core Thermal Analysis. ☐
E. **REFER TO** Tech Spec Table 3.3.1.1-1 and/or Tech Spec 3.4.1. ☐

References: 1-107E5784-3, 20 1-45E620-6 1-AOI-68-1A or 1B
Technical Specifications

APRM FLOW BIAS OFF NORMAL	
AM	32

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Sensor/Trip Point:

Relay K31, A6K4 in 2/4 logic module (voters)

(1) Either APRM Channel Recirc Flow 107% or has failed upscale.

Sensor Location: 2/4 Logic Modules (Voters) located in Panel 1-9-14, Main Control Room.

Probable Cause:
A. Malfunction of flow circuit instrumentation.
B. Testing in progress.
C. Malfunction of Sensor.

Automatic Action: Rod block.
FLOW signal on APRM bargraph indicates either > 107% or Failed upscale as seen by "↑↑↑" on the Display screen.

Operator Action:
A. **VERIFY** Rod Block. ☐
B. **REQUEST** IMs to check for high output or mismatch. ☐
C. **VERIFY** flow by either the > 107% FLOW or "↑↑↑" indicated on the APRM Display. ☐
D. **REFER TO** Tech. Spec Table 3.3.1.1-1 TRM Table 3.3.4-1, Sect. 5.3.1. ☐

References:

Technical Specifications	Technical Requirements Manual-TRM
1-45E620-6-1	1-107E5784-3, 20

20. OPL171.203 135/C/A/T1G1/EOI/8/295024EA2.06//4.1/4.1/0606S BANK

A steam line break inside containment has occurred on Unit 3. Drywell pressure is steady at +10.5 psig. All automatic actions occurred as designed. Drywell or Torus sprays have not yet been initiated.

Which ONE of the following best describes the effect on Torus water temperature?

A. The Torus water temperature will initially heat up evenly throughout the Torus.

B. The Torus water average temperature is unreliable until Torus cooling is established to provide even mixing of the water.

C. The Torus water temperature will heat up more quickly below the area of the leak in the drywell due to more energy being distributed to the Torus in that area.

D. The saturation temperature of the Torus water will be lower than at normal operating parameters due to the non-condensible gases discharged to the Torus.

295024 EA2.06 Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE: Suppression pool temperature.

References: 171.016 rev 14, pages 28 and 35

A. Correct answer.

B. Incorrect since with a steam leak the steam is distributed evenly through the downcomers.

C. Incorrect since with a steam leak the steam is distributed evenly through the downcomers.

D. Incorrect since the temperature monitors of the torus still work and the average temp is just an average of all the monitors.

		INSTRUCTOR NOTES
(7)	Vent system from drywell to suppression chamber - Eight 81-inch diameter vent pipes vent drywell to suppression chamber	TP-2 & 4
(a)	Inlet to vent pipes from drywell protected by jet deflectors to prevent damage to vent pipes from missiles and jet forces.	
(b)	Expansion joints are provided in vent pipes to allow relative motion between drywell and suppression chamber.	
(c)	All eight vent pipes exhaust into a single 57-inch diameter vent ring header in the suppression chamber.	
(d)	96 downcomer pipes extend from the vent ring header into the suppression pool below the water surface.	With dp established ~3ft. downcomer submerged has ~half its contents expelled.
(8)	Suppression chamber-drywell vacuum breakers	TP-2 Obj. V.B.4
(a)	Purpose	Obj. V.C.3 Tech. Specs. 3.6.1.6
(b)	Prevent exceeding design external pressures of the drywell (-2 psig). Vacuum breakers discharge from the torus (suppression chamber) to the drywell to equalize the pressure differential and to prevent backflow of water from the torus (suppression pool) into the vent header system via the downcomers.	Obj. V.D.2.c, Obj. V.E.2.c Obj. V.D.5
(c)	Relieve from suppression chamber to drywell if there is a pressure differential greater than 0.5 psid between them.	Obj. V.D.7

		INSTRUCTOR NOTES
(iii)	Main steam isolation valves start closing 0.5 seconds after the accident and close at fastest possible rate.	NOTE: With this assumption the reactor vessel is at a higher pressure during the blow-down and a higher drywell pressure is calculated than actually expected.
(iv)	Feedwater flow stops instantaneously at time of blowdown. This reduces subcooling, thus blowdown rates are calculated higher than expected.	
(v)	Complete carryover of all liquid in the drywell into the drywell vents which increases the peak pressure.	
(vi)	With the above assumptions the drywell peak post PUR pressure attained is predicted to be 50.6 psig, while the design pressure is 56 psig.	
(4)	Analysis of reactor blowdown on LOCA	Ref. TP-8 for pressure response and TP-9 for temperature responses.
(a)	Steam from the reactor vessel is released in the drywell pressurizing the drywell.	TP-2
(b)	As the drywell becomes pressurized, steam is blown down to the suppression pool where it is condensed.	
(c)	At this same time the non-condensables that make up the normal drywell atmosphere are also blown to the suppression pool and result in an increasing pressure in the torus. (Point A - Figure 8)	Point A - TP-8 (encircled)
(d)	The water temperature of the torus heats up as the steam is condensed in it.	

21. OPL171.203 136/C/A/T1/G2/EOI/4/295012G2.1.23//3.9/4.1/0606S BANK

The Unit 3 Reactor has scrammed. A small break LOCA has occurred with the following conditions present:

- Reactor Water level	+8 inches
- Reactor Pressure	800 psig
- HPCI System	Injecting
- Drywell Temperature	270°F steady
- Drywell Pressure	20 psig
- Suppression Pool level	14 feet

Based upon the above conditions, which ONE of the following actions should the operators perform?

A. Initiate Drywell Sprays per Appendix 17B.

B. Perform Emergency Depressurization per C-2.

C. Vent the Drywell irrespective of offsite release rates per Appendix 13.

D. Stop injecting into containment from sources external to containment except those required to shutdown the reactor.

295012G2.1.23 Ability to perform specific system and integrated plant procedures during different modes of plant operation.

References: 3-EOI-2, Rev.7
3-EOI- C-2, Rev.8

A. Correct answer. Containment temperature is maintained below 280°F and Suppression Pool level is below 18 feet. Parameters are within Curve 5, DW Spray Initiation curve, so DW spray is directed per EOI-2.

B. Incorrect since parameters are within Curve 6, Press Suppr Press, so ED is not required.

C. Incorrect since containment pressure is not high enough to vent irrespective of offsite release rates.

D. Incorrect since Suppression Pool level is maintained below 18 feet.

22. OPL171.204 053/C/A/T1G2/EOI/5/295017AA2.04//3.6/4.3/0606S NEW6/26/2007

Unit 1 was operating at full power when the following indications were received:

- Reactor Building Area High Rad alarm
- RWCU Area High Temperature alarm
- Reactor Building Ventilation Abnormal alarm

Radcon reports that radiation levels in Unit 1 Reactor building elevation 565 east are 1200 mr and rising. Radiation levels at elevation 565 west are 800 mr and stable.

REFERENCE PROVIDED

Which ONE of the following describes the required actions for the given conditions and a possible isolation source for the radiation release?

A. Enter EOI-1, FCV 74-47, 48

B. Enter EOI Contingency C2, FCV 69-1, 2, 12

C. Enter EOI-1, SDV vents and drains

D. Enter EOI-4, FCV 71-2, 3, 39

295017AA2.04 Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Source of off-site release

PROVIDE REFERENCE 1-EOI-3 FLOWCHART

Reference: 1-EOI-3 flowchart SC/R leg

A. incorrect, SDC is not a possible leakage source for this area

B. incorrect, ED is not required with given conditions

C. correct answer

D. incorrect, no entry condition for EOI-4, RCIC is not a leakage source for this area.

23. OPL171.204 054/C/A/T1G2/EOI/7/295036EA2.01//3.0/3.2/0606S NEW6/26/2007

Unit 1 has experienced a rupture of the CS&S system. Secondary Containment water levels are rising.

The RBAUO reports the following:

Reactor Building Elevation 519 water level at 21 inches

REFERENCE PROVIDED

Which ONE of the following describes the required action and the reason this action is taken?

A. Enter EOI-1, operation of RCIC Vacuum Tank Condensate Pump is jeopardized.

B.✓ Enter GOI-100-12A, operation of HPCI Aux Oil pump is jeopardized.

C. Enter EOI-1, operation of Core Spray Test Valve is jeopardized

D. Enter GOI-100-12A, operation of the PSC keep fill pumps is jeopardized.

295036EA2.01 Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL: Operability of components within the affected area.

PROVIDE REFERENCE 1-EOI-3

Reference: 1-EOI-3 flowchart; EOI program manual section 0-X-B rev 15, page 65

A. incorrect, EOI-1 entry not required with no primary system leakage

B. correct answer

C. incorrect, EOI-1 entry not required with no primary system leakage

D. incorrect, PSC pumps would be underwater, but are not required for safe shutdown

A.43 Secondary Containment Maximum Safe Operating Water Level

UNITS 1, 2, and 3

Reference/Philosophy

RIMS R61 920506 009

Maximum safe water level values were chosen to protect equipment necessary to safely shut down the plant. The HPCI oil pump and a CS junction box to the test valve is located at 20 in. In the other rooms, equipment became endangered at 21 and 22 in. Each of the four corner rooms is separated from the torus area by a curb that is approximately 12.5 inches high. An 18 inch curb separates the HPCI room from the southwest corner room. Because all areas are connected once level exceeds 18 inches on elevation 519' of the reactor building and the coarseness of the level measurement (local observation of scale on wall), a common value of 20 inches was selected for all areas.

PSTG Values

20 in.

EOI Values

20 in.

24. OPL171.205 123/C/A/T2G1/EOI//217000G2.4.7//3.1/3.8/0606S NEW6/27/2007

Unit 1 is operating at full power. RCIC suction aligned to Torus due to flange leak on the CS&S suction valve.

The Main Turbine trips due to an EHC logic failure. The Bypass Valves do **not** open to control RPV pressure after the trip. Some control rods fail to insert from the scram signal.

The UO notes the following conditions:

- Reactor Power 4%
- Torus Temperature 142 F
- Drywell Pressure 8 psig
- Reactor Water Level -140 inches slowly rising
- RCIC injecting
- HPCI LOGIC POWER FAILURE alarm
- SLC injecting with Tank level at 70%
- Appendix 8B in progress, MSIV Dp 150 psig

REFERENCE PROVIDED

Which ONE of the following describes a required action?

A. Perform Appendix 4, Emergency Depressurize.

B. Restore RPV water level to between +2 inches and +51 inches with RCIC.

C✓ Secure RCIC and maintain RPV water level between -180 inches and level to which it was lowered.

D. When SLC tank level reaches 43%, exit C5 and control RPV water level per RC/L.

217000G2.4.7 Knowledge of event based EOP mitigation strategies.

PROVIDE REFERENCE 1-EOI-C5 flowchart

References: 1-EOI-C5 flowchart, caution 6 and step C5-15, C5-17 and C5-18
1-EOI-1 flowchart, step RC/Q-18

A. incorrect, no reason to ED unless RPV level cannot be maintained above -180 inches

B. incorrect, RPV water level will not be raised till SLC tank reaches 67%

C. correct answer

D. incorrect, C5 is only exited if the Reactor will remain subcritical without boron injection

25. OPL171.205 124/C/A/T2G1/E0I//218000A2.05//3.4/3.6/0606S NEW6/26/2007

Unit 1 was operating at full power when the Unit received a loss of offsite power and loss of coolant accident.

The US notes the following conditions:

- 1B 250v RMOV board was lost due to a failure of 1-FCV-71-34.
- Suppression Chamber Pressure - 24 psig and rising
- RPV pressure - 800 psig
- Drywell Temperature - 275 F and rising

The Unit Supervisor has determined that Emergency Depressurization is required due to Drywell pressure and temperature.

REFERENCE PROVIDED

Which ONE of the following describes the number of ADS SRVs that will open when the UO manually operates the ADS valves and any required actions?

A. 3 valves open, rapidly depressurize with HPCI in test mode.

B. ✓ 4 valves open, open additional SRVs to establish 6 open SRVs.

C. 5 valves open, no additional actions required to depressurize.

D. 6 valves open, place Shutdown Cooling in service when interlocks clear.

218000A2.05 Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of A.C. or D.C. power to ADS valves

PROVIDE REFERENCE 1-EOI-C2 flowchart

References: 1-AOI-1-1 rev 0, page 31; 1-EOI-C2 flowchart, steps C2-8, 9 and 12

A. incorrect, 4 ADS SRVs still have power.

B. correct answer

C. incorrect, 4 ADS SRVs still have power.

D. incorrect, 4 ADS SRVs still have power.

Attachment 1
(Page 1 of 4)

Unit 1 SRV Solenoid Power Breaker/Fuse Table, Panels 1-25-32 and 1-LPNL-925-0658

NOTE

UNIT 1 ADS valves that have more than one power supply will AUTO TRANSFER on a loss of power, and are NORMAL SEEKING.

Unit 1 SRV Solenoid Power Breaker Table						
SRV	NORMAL PWR 250V RMOV BD	BRKR	ALTERNATE 250V RMOV BD	BRKR	ALTERNATE BATT. BD	BRKR
1-4	1A	11B2				
1-5	* 1C	7A			2	716
1-18	1B	8C1	**			
1-19	* 1B	1B2	**			
1-22	* 1A	11C2	1B	1C1		
1-23	1C	1B1				
1-30	* 1A	9B1	1C	8A	2	716
1-31	* 1B	1C2	**			
1-34	* 1C	10A			2	716
1-41	1A	11C1				
1-42	1B	8B2				
1-179	1B	8C2	**			
1-180	1C	10B1				

* ADS Valves.

** All components have been removed from 1-25-32.