Form 4.2-3 Reactor Operator Written Examination Cover Sheet

U.S. Nuclear Regulatory Commission **Reactor Operator Written Examination**	
Applicant Information	
Name:	
Date:	Facility/Unit: Browns Ferry
Region: I ☐ II ☒ III ☐ IV ☐	Reactor Vendor/Type: BWR
Start Time:	Finish Time:
Instructions Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination, you must achieve a final grade of at least 80 percent. You have 6 hours to complete this portion of the examination.	
Applicant Certification All work done on this examination is my own. I have neither given nor received aid. _____ Applicant's Signature	
Results	
Examination Points	_____ Points
Applicant's Points	_____ Points
Applicant's Grade	_____ Percent

Test: BFN ILT NRC EXAM

Class: ILT 2304

Instructor:

LXR•TEST™ Response Form
LXR-20020
Side 1

Name: Browns Ferry 2023-301

Signature: ANSWER KEY

Date: RO EXAM 1-75

READ CAREFULLY!
OK NOT OK

- Use black ink only.
- Mark responses darkly and fill completely.
- Erase unwanted marks clearly.
- Do NOT make any stray marks on the page
- No credit will be given for improper marks.
- If Side 2 is used, fill in ID on both sides.

DOCKET NUMBER

Version

C 1 C 2 C 3 C 4 | V

SECTION 1

	T	F		T	F
1	A	B	D	51	A	C	D
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4	B	C	D	54	A	B	D
5	B	C	D	55	A	C	D
6	A	B	C	56	A	B	D
7	A	B	C	57	A	B	C
8	A	C	D	58	A	B	C
9	A	B	C	59	A	B	C
10	A	C	D	60	B	C	D
11	A	B	D	61	A	B	C
12	A	C	D	62	A	B	C
13	A	B	C	63	A	C	D
14	B	C	D	64	A	B	C
15	B	C	D	65	B	C	D
16	B	C	D	66	A	C	D
17	A	C	D	67	A	B	C
18	B	C	D	68	A	B	C
19	A	B	D	69	A	C	D
20	B	C	D	70	A	C	D
21	A	C	D	71	A	B	C
22	A	C	D	72	A	B	D
23	A	B	D	73	B	C	D
24	A	B	D	74	A	B	D
25	A	B	C	75	A	B	C
26	A	C	D				
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37	B	C	D				
38	B	C	D				
39	A	B	C				
40	A	C	D				
41	A	C	D				
42	A	C	D				
43	B	C	D				
44	B	C	D				
45	A	B	D				
46	B	C	D				
47	A	B	D				
48	B	C	D				
49	B	C	D				
50	B	C	D				

[redacted]

SECTION 2

1 2 3

4 5 6

7 8 9

10 11 12

1. Unit 1 is operating at 100% Rated Thermal Power (RTP) when the following conditions occur:

   - 1A Recirc Pump trips
   - Initial Load Line is 105.3%

   In accordance with 1-AOI-68-1, Recirc Pump Trip / Core Flow Decrease, the required Operator action is to _____.

   A. insert a Manual Reactor SCRAM

   B. raise Core Flow until > 46,600 gpm

   C. insert Control Rods until Load Line is AT LEAST < 67%

   D. insert Control Rods until Load Line is AT LEAST < 74%

2. A Reactor Startup is in progress on Unit 1.

In accordance with 1-GOI-100-1A, Unit Startup, the **(1)** count rate doubling has been chosen as a starting point to limit Control Rod withdrawal to single notch movement.

The earliest time that all Source Range Monitors (SRMs) are required to be fully withdrawn is when **ALL** Intermediate Range Monitors (IRMs) are on Range **(2)**.

A. (1) third
(2) 4

B. (1) third
(2) 3

C. (1) fourth
(2) 4

D. (1) fourth
(2) 3

3. Unit 1 is operating at 95% RTP and the following conditions exist:

- MAPRAT: 1.1
- Reactor Engineer is running a TIP trace in automatic

Given the conditions above, which **ONE** of the following completes the statements below?

The TIP trace is required to change the **(1)**.

If an event occurs which results in Reactor Water Level reaching (-) 10 inches, TIPs **(2)** automatically retract to the in-shield position.

A. (1) APLHGR limit
(2) will

B. (1) APLHGR limit
(2) will NOT

C. (1) Gain Adjustment Factors
(2) will

D. (1) Gain Adjustment Factors
(2) will NOT

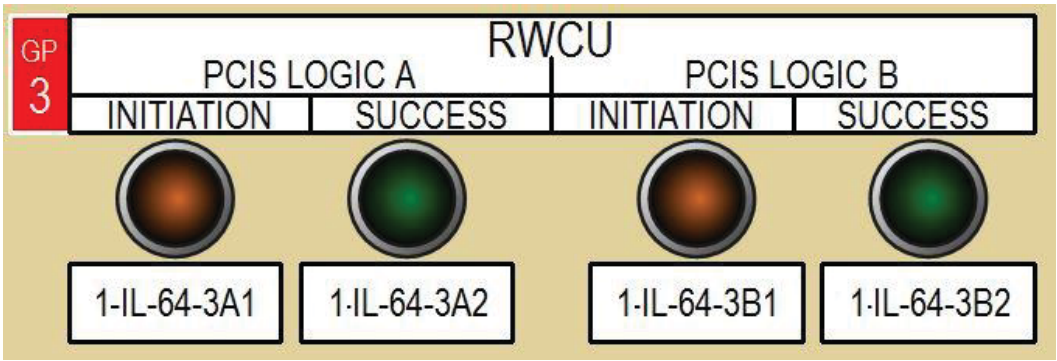
4. An event is occurring on Unit 1 with the following plant conditions:

- Drywell Pressure is 2.2 psig and rising
- Reactor Water Level is (+) 10 inches and lowering
- SLC Pump 1A is injecting to the Reactor

Given the conditions above, which **ONE** of the following completes the statements below?

Primary Containment Isolation System (PCIS) Group 3 INITIATION light (shown below) **(1)** **EXPECTED** to be illuminated.

1-FCV-069-0012, RWCU RETURN ISOLATION VALVE, **(2)** automatically close.



A. (1) is
(2) will

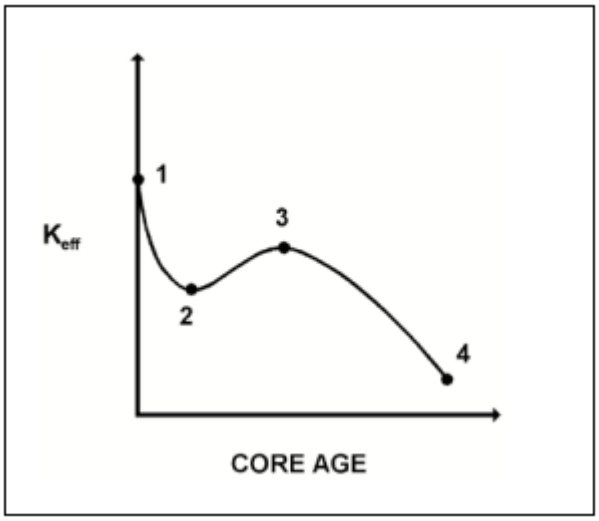
B. (1) is
(2) will NOT

C. (1) is NOT
(2) will

D. (1) is NOT
(2) will NOT

5. Referring to the drawing of effective neutron multiplication factor (k_{eff}) versus Core Age, which **ONE** of the following completes the statement below?

The major cause for the change in k_{eff} from point 3 to point 4 is the _____.



A. depletion of fuel

B. depletion of Control Rods

C. burnout of burnable poisons

D. burnout of fission product poisons

6. The Main Steam Isolation Valve (MSIV) AC solenoids are **NORMALLY** powered by _____.

A. I & C 'A'

B. Unit Preferred

C. Plant Preferred

D. Reactor Protection System

7. In accordance with BFN-ODM-4.5, Operator Aids and Operator Information Systems, which **ONE** of the following types of tags would be used to identify components that are designated as Protected Equipment during outage conditions?

A. Blue Tag

B. Green Tag

C. Orange Tag

D. Hot Pink Tag

8. Unit 1 is operating at 100% RTP.

Which **ONE** of the following completes the statements below?

Given the current condition, for the EOI Exclusion Plot Status Box on the Safety Parameter Display System (SPDS) Overview page, **(1)** is expected to be colored RED.

In accordance with 0-OI-48, Integrated Computer System, the SPDS component of ICS **(2)** qualified instrumentation that can be used as the sole guide for operating the plant.

Note: Curve 5 – Drywell Spray Initiation Limit
Curve 6 – Pressure Suppression Pressure

A. **(1)** Curve 5
(2) is

B. **(1)** Curve 5
(2) is NOT

C. **(1)** Curve 6
(2) is

D. **(1)** Curve 6
(2) is NOT

9. Unit 2 is operating at 100% RTP with the following plant conditions:

- At 1000:
  - Drywell Pressure reaches 3.0 psig due to a LOCA
  - 4KV Shutdown Board C trips due to a fault
  - 'C' EDG will **NOT** start
- At 1015:
  - Reactor Pressure is 400 psig

Given the conditions above, which **ONE** of the following completes the statement below?

At time 1015, Core Spray Pumps **___(1)___** are running and **___(2)___** injecting to the Reactor Vessel.

A. (1) 2A, 2B, and 2D
   (2) are

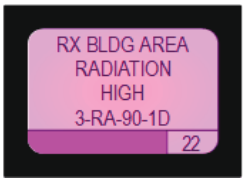
B. (1) 2A, 2B, and 2D
   (2) are **NOT**

C. (1) 2A and 2C
   (2) are

D. (1) 2A and 2C
   (2) are **NOT**

10. Unit 3 is operating at 100% RTP with the following conditions:

- TIP traces are in progress
- REACTOR BUILDING AREA RADIATION HIGH (3-9-3A, Window 22) alarms due to 3-RI-90-22A, TIP ROOM Elevation 565 REACTOR BUILDING, reaching its Maximum **NORMAL** Value



Which **ONE** of the following completes both statements below?

In accordance with 3-9-3A, Window 22, 3-EOI-3, Secondary Containment Control, **(2)** required to be entered.

An automatic Group 8 Isolation **(2)** occur.

A. (1) is
(2) will

B. (1) is
(2) will NOT

C. (1) is NOT
(2) will

D. (1) is NOT
(2) will NOT

11. Unit 2 is being placed in Shutdown Cooling for a refueling outage in accordance with 2-OI-74, Residual Heat Removal System.

For non-emergency operation, 2-MTR-074-0048, RHR SHUTDOWN COOLING SUCTION INBOARD ISOLATION VALVE MOTOR, is limited to **(1)** consecutive starts in order to prevent **(2)**.

A. (1) 5
(2) overheating the motor windings

B. (1) 5
(2) excessive cycling of the motor breaker

C. (1) 10
(2) overheating the motor windings

D. (1) 10
(2) excessive cycling of the motor breaker

12. Unit 2 is operating at 100% RTP with the following plant conditions:

- An earthquake occurs, resulting in a double-ended shear of 2A Recirculation Pump Suction piping
- Drywell Pressure is 20 psig and rising 1 psig per minute

Given these conditions, if Suppression Chamber - to - Drywell vacuum breakers fail **(1)**, the earliest time Drywell **DESIGN** Pressure Limit will be exceeded is in **(2)**.

A. **(1)** OPEN
(2) 31 minutes

B. **(1)** OPEN
(2) 37 minutes

C. **(1)** CLOSED
(2) 31 minutes

D. **(1)** CLOSED
(2) 37 minutes

13. Unit 2 is at 60% RTP when the following conditions occur:

- Outboard Main Steam Isolation Valves (MSIVs) on steam lines A and D inadvertently close
- Reactor Pressure peaks at 1065 psig

NOTE: GIVEN THE CONDITIONS ABOVE, CONSIDER EACH STATEMENT BELOW SEPARATELY.

Based **ONLY** on MSIV Position, a SCRAM **(1)** occur.

Based **ONLY** on the peak Reactor Pressure, a SCRAM **(2)** occur.

A. (1) will
(2) will

B. (1) will
(2) will NOT

C. (1) will NOT
(2) will

D. (1) will NOT
(2) will NOT

14. Intermediate Range Monitor (IRM) drawers on Panel 9-12 are **POWERED** by **(1)**.

The IRM Detectors **OPERATE** at **(2)**.

A. (1) 24VDC
(2) 100VDC

B. (1) 24VDC
(2) 350VDC

C. (1) 120VAC
(2) 100VDC

D. (1) 120VAC
(2) 350VDC

15. Unit 2 was operating at 100% RTP when 480V RMOV Board 2B is de-energized.

Which **ONE** of the following completes the statement below regarding the impact to the Reactor Protection System (RPS)?

A Reactor half SCRAM **(1)** occurred, and circuit protectors C1 and C2 **(2)** de-energized.

A. (1) has
(2) are

B. (1) has
(2) are NOT

C. (1) has NOT
(2) are

D. (1) has NOT
(2) are NOT

16. A Unit 2 Loss of Coolant Accident (LOCA) has occurred and resulted in the following conditions:

- 2-PI-3-207A, REACTOR PRESSURE, indicates 400 psig
- 2-LI-3-52 and 2-LI-3-62, REACTOR WATER LEVEL ACCIDENT RANGE, indicates (-) 190 inches

Given the current conditions, which **ONE** of the following completes the statements below?

The Top of Active Fuel (TAF) **(1)** submerged at this time.

2-LT-3-52 and 2-LT-3-62 **(2)** used for the 2/3 CORE HEIGHT covered permissive interlock.

[REFERENCE PROVIDED]

A. **(1)** is
(2) are

B. **(1)** is
(2) are NOT

C. **(1)** is NOT
(2) are

D. **(1)** is NOT
(2) are NOT

17. Unit 2 was operating at 100% RTP when events occurred resulting in the following conditions:

- The crew is implementing 2-AOI-100-2, Control Room Abandonment
- During AOI IMMEDIATE ACTIONS, an electrical ATWS occurs
- Reactor Power is 100%

Given the conditions above and in accordance with 2-AOI-100-2, the Operator is directed to **(1)** at **(2)**.

A. (1) pull fuses
(2) Battery Board 2 Panel 9

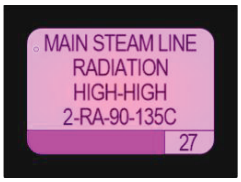
B. (1) pull fuses
(2) Panels 2-9-15 and 2-9-17

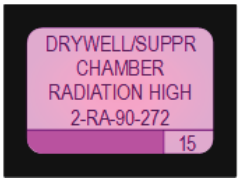
C. (1) open breakers
(2) Battery Board 2 Panel 9

D. (1) open breakers
(2) Panels 2-9-15 and 2-9-17

18. Unit 2 was operating at 100% RTP when an event occurred, resulting in the following conditions:

- A manual SCRAM was inserted due to a LOCA, **ALL** Control Rods are in
- Drywell Pressure is 4 psig and rising
- MAIN STEAM LINE RADIATION HIGH-HIGH (2-9-3A, Window 27) is alarming **AND** verified valid
- DRYWELL/SUPPRESSION CHAMBER RADIATION HIGH (2-9-7C, Window 15) is alarming **AND** verified valid





Given the conditions above, 2-FCV-1-58(59), UPSTREAM(DOWNSTREAM) MAIN STEAM LINE DRAIN TO CONDENSER, **(1)** required to be OPEN and Standby Liquid Control (SLC) **(2)** required to be injected.

A. (1) are
(2) is

B. (1) are
(2) is NOT

C. (1) are NOT
(2) is

D. (1) are NOT
(2) is NOT

19. A fire has occurred in the Unit 3 Reactor Building.

Which **ONE** of the following completes the statements below?

The crew is implementing 0-AOI-26-1, Fire Response, Step 4.2 [1]:

> [1] **IF** directed by the Unit SRO, **THEN PERFORM** the following:
>
> [1.1] **NOTIFY** AUOs to report to their assigned Control Room(s), all other AUOs will report to ….

The reason the AUOs are required to report to their assigned Control Room(s) is **(1)**.

All other AUOs are required to report to **(2)**.

A. (1) for personnel accountability
(2) Unit 2 MCR

B. (1) for personnel accountability
(2) safest location near the Fire Brigade Staging Area

C. (1) to ensure FSS Recovery Actions can be completed with maximum efficiency
(2) Unit 2 MCR

D. (1) to ensure FSS Recovery Actions can be completed with maximum efficiency
(2) safest location near the Fire Brigade Staging Area

20. Which **ONE** of the following completes the following statement in accordance with 0-AOI-57-1E, Grid Instability?

At full load, when the Generator Voltage Regulator is operated in **MANUAL**, the administrative limit for **INCOMING** reactive load is **(1)** MVAR and the purpose of this limit is to prevent **(2)**.

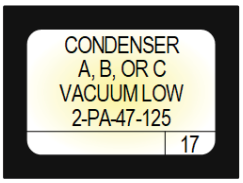
A. **(1)** 175
(2) slipping a pole

B. **(1)** 175
(2) rotor overheating

C. **(1)** 300
(2) slipping a pole

D. **(1)** 300
(2) rotor overheating

21. Unit 2 is operating with the following conditions:



- Reactor Power is 20%
- CONDENSER A, B, OR C VACUUM LOW (2-9-7B, Window 17) in alarm
- The crew is implementing 2-AOI-47-3, Loss of Condenser Vacuum

Which **ONE** of the following completes the statements below regarding the Off-Gas System mechanical vacuum pumps?

The mechanical vacuum pumps' discharge flow path is routed **(1)**.

Given the current conditions, a mechanical vacuum pump **(2)** to be placed in service.

A. (1) directly to the main stack
(2) is required

B. (1) directly to the main stack
(2) is NOT allowed

C. (1) through the charcoal absorbers
(2) is required

D. (1) through the charcoal absorbers
(2) is NOT allowed

22. Unit 2 is operating at 80% RTP when the Main Turbine tripped resulting in the following conditions:

- ATWS actions have been completed
- Reactor Power is 9%
- Reactor Pressure is 1030 psig and rising
- The crew is implementing the RPV Pressure leg of 2-EOI-1A, ATWS RPV Control

Given the conditions above, which **ONE** of the following completes the statements below?

In accordance with BFN-ODM-4.20, Strategies for Successful Transient Mitigation, a **MINIMUM** of **(1)** Main Turbine Bypass Valves are required to be OPEN for the current Reactor Power Level to control Reactor Pressure between 800 – 1000 psig.

In accordance with 2-EOI-1A, Reactor Pressure is required to be **(2)** .

A. (1) 3
(2) slowly lowered to depressurize the RPV at < 100°F/hr

B. (1) 3
(2) restored and maintained < 1073 psig

C. (1) 6
(2) slowly lowered to depressurize the RPV at < 100°F/hr

D. (1) 6
(2) restored and maintained < 1073 psig

23. A Loss of Coolant Accident (LOCA) has occurred on Unit 2.

In accordance with 2-EOI-Appendix-13, Emergency Venting Primary Containment, the preferred Containment vent path is from the **(1)**, and it **(2)** permitted to exceed radiological release rate limits when the preferred vent path is used.

A. (1) Drywell
(2) is

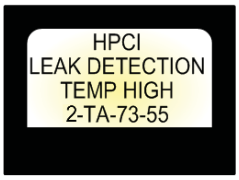
B. (1) Drywell
(2) is **NOT**

C. (1) Suppression Chamber
(2) is

D. (1) Suppression Chamber
(2) is **NOT**

24. Unit 2 was operating at 100% RTP and the following alarms/indications occurred:

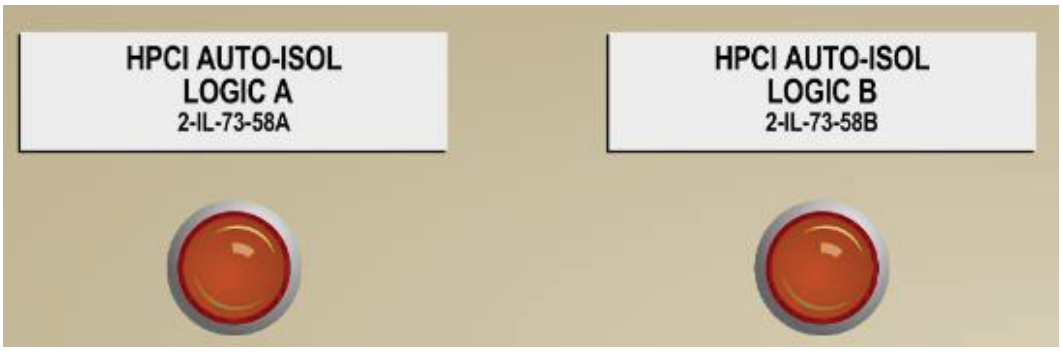
- HPCI LEAK DETECTION TEMP HIGH, (2-9-3F, Window 10) alarmed
- On Panel 2-9-22, 2-TR-69-29, 2-TE-73-55A, HPCI PUMP ROOM TEMPERATURE, is **YELLOW** and indicates 158 °F



Which **ONE** of the following completes the statements below?

Given the current conditions above, HPCI AUTO-ISOL LOGIC A and HPCI AUTO-ISOL LOGIC B (see below), **___(1)___** **EXPECTED** to be illuminated.

In accordance with the given ARP, 2-EOI-3, Secondary Containment Control, **___(2)___** required to be entered.



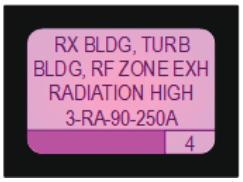
A. **(1)** are
(2) is

B. **(1)** are
(2) is **NOT**

C. **(1)** are **NOT**
(2) is

D. **(1)** are **NOT**
(2) is **NOT**

25. Unit 3 is operating at 100% RTP when the following alarm is received:



- RX BLDG, TURB BLDG, RF ZONE EXH RADIATION HIGH, (3-9-3A, Window 4)

Which **ONE** of the following completes the statements below?

When received, this alarm **(1)** require entry into the EOIs.

The given alarm **(2)** triggered by radiation detector 3-RM-90-142, REACTOR ZONE RADIATION MONITOR **.**

A. (1) does
(2) is

B. (1) does
(2) is NOT

C. (1) does NOT
(2) is

D. (1) does NOT
(2) is NOT

26. Which **ONE** of the following completes the statements below?

The 1-EOI-3, Secondary Containment Control, Floor Drain Sump Level entry condition setpoint is **(1)**.

A Reactor Building Floor Drain Sump Level indicator percentage (%) **(2)** available in the Main Control Room.

A. (1) 66 inches
(2) is

B. (1) 66 inches
(2) is NOT

C. (1) 75 inches
(2) is

D. (1) 75 inches
(2) is NOT

27. Unit 2 was operating at 100% RTP when an event occurred resulting in the following conditions:

- Reactor Pressure is 400 psig and slowly lowering
- Drywell Pressure is 5 psig and slowly rising
- Reactor Water Level is (-) 100 inches and rising
- NO Operator actions have been taken

Given the conditions above, which **ONE** of the following completes the statements below?

The RHRSW Offline Monitor Sample Pumps **(1)** automatically start.

There are **(2)** RHRSW Offline Radiation Detectors per **UNIT**.

A. (1) will
(2) two

B. (1) will
(2) four

C. (1) will NOT
(2) two

D. (1) will NOT
(2) four

28. Unit 1 is operating at 100% RTP with suspected simmering of an SRV resulting in heat addition to the Suppression Pool with the following conditions:

- Suppression Pool Temperature is 90 °F and rising
- The NUSO has directed Suppression Pool Cooling to be placed in service

Given the conditions above, in accordance with 1-OI-74, Residual Heat Removal System, to minimize the time in Suppression Pool Cooling, **(1)** is required to be operated.

In accordance with 1-EOI-2, Primary Containment Control, when Suppression Pool Temperature **CANNOT** be maintained below 95 °F, **(2)** Suppression Pool Cooling is required to be placed in service.

A. (1) 1 RHR Pump in **EACH** loop
(2) at least one loop of

B. (1) 1 RHR Pump in **EACH** loop
(2) both loops

C. (1) 2 RHR Pumps in **ONE** loop
(2) at least one loop of

D. (1) 2 RHR Pumps in **ONE** loop
(2) both loops

29. During Emergency Depressurization on Unit 3, the **EARLIEST** time that the HPCI Turbine will trip is when Reactor Pressure reaches _____.

A. 70 psig

B. 110 psig

C. 140 psig

D. 150 psig

30. Unit 1 is in MODE 4 for a Refueling Outage when the following occur:

- Shutdown Cooling is lost
- 1-AOI-74-1, Loss of Shutdown Cooling, is being implemented
- The crew is maximizing Reactor Water Cleanup System (RWCU) flow

In accordance with 1-AOI-74-1, RWCU blowdown flow to the Main Condenser is required to be **(1)**.

In accordance with 1-OI-69, RWCU System, maximum system flow with 2 pump operation is **(2)**.

A. (1) minimized
(2) 200 gpm

B. (1) minimized
(2) 340 gpm

C. (1) maximized
(2) 200 gpm

D. (1) maximized
(2) 340 gpm

31. Unit 2 has the following conditions:

- ATWS has occurred
- 2-EOI Appendix-3B, Alternate SLC Injection, is being implemented

Which **ONE** of the following completes the statements below?

Hose connections are made from **(1)** SLC tank drain to the CRD Pump **(2)** suction filter.

A. (1) Unit 1's
(2) 1B

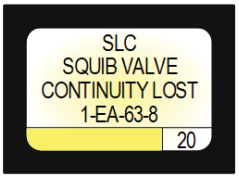
B. (1) Unit 1's
(2) 2A

C. (1) Unit 3's
(2) 1B

D. (1) Unit 3's
(2) 2A

32. Unit 1 Anticipated Transient Without SCRAM (ATWS) conditions exist with the following conditions:

- 1-EOI-1A, ATWS RPV Control, is in progress
- SLC SQUIB VALVE CONTINUITY LOST (1-9-5B, Window 20) alarms



Squib Valve ___**(1)**___ has fired.

The time to inject Hot Shutdown Boron Weight (HSBW) is ___**(2)**___ compared to the time with both Squib Valves open.

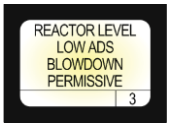
A. (1) A
(2) longer

B. (1) A
(2) the same

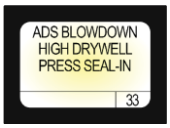
C. (1) B
(2) longer

D. (1) B
(2) the same

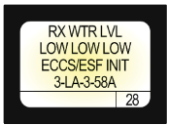
33. Unit 3 has SCRAMMED due to a LOCA with the following conditions:



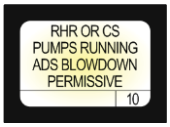
- REACTOR LEVEL LOW ADS BLOWDOWN PERMISSIVE (3-9-3C, Window 3) alarms



- ADS BLOWDOWN HIGH DRYWELL PRESSURE SEAL-IN (3-9-3C, Window 33) alarms



- REACTOR WATER LOW-LOW-LOW ECCS/ESF INITIATE (3-9-3C, Window 28) alarms



- RHR OR CS PUMPS RUNNING ADS BLOWDOWN PERMISSIVE (3-9-3C, Window 10) alarms

Given the conditions above, in accordance with the given Alarm Response Procedures, the Automatic Depressurization System (ADS) initiation logic for High Drywell Pressure is bypassed when Window **(1)** is in alarm for a **MINIMUM** of **(2)**.

A. (1) 10
   (2) 95 seconds

B. (1) 10
   (2) 265 seconds

C. (1) 28
   (2) 95 seconds

D. (1) 28
   (2) 265 seconds

34. Unit 3 is operating at 100% RTP when the following conditions occur:

- Suppression Pool Water Level begins to lower
- 3-EOI-2, Primary Containment Control, is being implemented

Given the conditions above, which **ONE** of the following completes the statement below?

The **EARLIEST** time that Emergency Depressurization is required is
(1) Suppression Pool Water Level **CANNOT** be maintained above **(2)**.

A. (1) **BEFORE**
(2) 11.5 ft

B. (1) **BEFORE**
(2) 12.75 ft

C. (1) **WHEN**
(2) 11.5 ft

D. (1) **WHEN**
(2) 12.75 ft

35. Which **ONE** of the following completes the statements below in accordance with 3-EOI-2, Primary Containment Control, and the EOI Program Manual?

When Drywell Temperature **CANNOT** be restored and maintained below **(1)**, Emergency Depressurization is required.

The basis for this temperature value is that it is the **(2)**.

A. (1) 280 ºF
(2) ADS qualification temperature

B. (1) 280 ºF
(2) containment design temperature

C. (1) 350 ºF
(2) ADS qualification temperature

D. (1) 350 ºF
(2) containment design temperature

36. Unit 2 is in MODE 3, with the following plant conditions:

- Loop II of RHR in Shutdown Cooling (SDC) Mode
- Diesel Generator (EDG) 'B' is tagged out of service
- 4KV Shutdown Board 'B' trips and locks out due to an electrical fault
- Reactor Water Level lowers to 0 inches

Given the conditions above, 2-FCV-74-47, SHUTDOWN COOLING OUTBOARD SUCTION ISOLATION, will **(1)** and 2-FCV-74-48, SHUTDOWN COOLING INBOARD SUCTION ISOLATION, will **(2)**.

A. (1) remain open
   (2) remain open

B. (1) remain open
   (2) automatically close

C. (1) automatically close
   (2) remain open

D. (1) automatically close
   (2) automatically close

37. Which ONE of the following completes the statement below in accordance with 2-OI-92B, Average Power Range Monitoring?

Local Power Range Monitors (LPRMs) can be **MANUALLY** bypassed **(1)** using **(2)**.

A. (1) **ONLY** at Panel 2-9-14
(2) soft keys

B. (1) **ONLY** at Panel 2-9-14
(2) OPER/INOP Keylock Switch

C. (1) on Panel 2-9-5 **OR** 2-9-14
(2) soft keys

D. (1) on Panel 2-9-5 **OR** 2-9-14
(2) OPER/INOP Keylock Switch

38. The crew is implementing 0-AOI-57-1A, Loss of Offsite Power (161 and 500KV) Station Blackout.

Which **ONE** of the following completes the statements below?

250VDC Unit Batteries 1, 2, and 3 **(1)** have adequate capacity to supply the required units' loads for the Station Blackout (SBO) coping duration of 4 hours.

In accordance with 0-OI-57D, DC Electrical System, a critical voltage for any battery cell is **(2)** ; prolonged operation of a cell below this value will reduce its life expectancy.

A. **(1)** do
(2) 2.13VDC

B. **(1)** do
(2) 124VDC

C. **(1)** do NOT
(2) 2.13VDC

D. **(1)** do NOT
(2) 124VDC

39. A fault causes a loss of 250VDC RMOV Board 3B.

If a Unit 3 RCIC automatic start signal is received, RCIC **(1)** start.

Given the loss of power, RCIC **(2)** isolate on low Reactor Pressure.

A. (1) will
(2) will

B. (1) will
(2) will **NOT**

C. (1) will **NOT**
(2) will

D. (1) will **NOT**
(2) will **NOT**

40. The Unit 2 Control Room has been abandoned, with the following conditions:

- 2-AOI-100-2, Control Room Abandonment, is in progress
- The Control Room Crew is stationed at Panel 2-25-32
- 2-XS-256-1, ATU BUS MANUAL TRANSFER, on Panel 2-25-32 is placed in ALTERNATE

Given the conditions above, the RCIC Flow Controller is powered by **(1)**, and RCIC **(2)** trip on High Reactor Water Level.

A. (1) Unit Preferred
(2) will

B. (1) Unit Preferred
(2) will NOT

C. (1) the Division I ECCS Inverter
(2) will

D. (1) the Division I ECCS Inverter
(2) will NOT

41. Unit 1 is at 100% RTP when an RPS MG set trips.

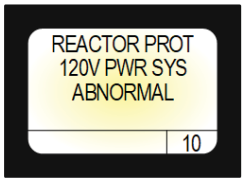
Subsequently, the following valves travel CLOSED:

- 1-FCV-69-01, RWCU INBOARD SUCTION ISOLATION VALVE
- 1-FCV-69-02, RWCU OUTBOARD SUCTION VALVE

Given the conditions above, which **ONE** of the following completes the statements below?

Reactor Protection System (RPS) Bus **(1)** has de-energized.

REACTOR PROTECTION 120V PWR SYS ABNORMAL, (1-9-5B, Window 10) **(2)** expected to be alarming.



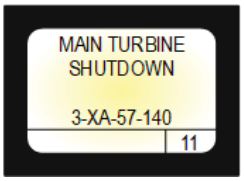
A. (1) 1A
(2) is NOT

B. (1) 1A
(2) is

C. (1) 1B
(2) is NOT

D. (1) 1B
(2) is

42. Unit 3 is operating at 20% RTP when the following conditions occur:



- MAIN TURBINE SHUTDOWN, (3-9-8A, Window 11) alarms
- The crew entered the applicable AOI

Which **ONE** of the following completes the statements below?

The operator is required to set 3-TIC-24-75, TURBINE OIL TEMPERATURE CONTROL to **(1)**.

Given the conditions above, an automatic Reactor SCRAM **(2)** occur.

A. (1) 85 ºF
(2) will

B. (1) 85 ºF
(2) will NOT

C. (1) 115 ºF
(2) will

D. (1) 115 ºF
(2) will NOT

43. In accordance with **TECHNICAL SPECIFICATIONS (TECH SPECS)**, if Reactor Steam Dome Pressure reaches 1200 psig, the REQUIRED ACTION to restore Reactor Pressure must be completed within _____.

A. 15 minutes

B. 30 minutes

C. 1 hour

D. 2 hours

44. Unit 3 is operating at 100% RTP when the following conditions occur:

At 1130:

- RFWCS is in THREE ELEMENT
- Reactor Water Level is at normal operating level and slowly rising
- Operator just reported that HPCI has initiated and is injecting
- All three RFPT speeds are lowering
- **NO** Operator Actions have been taken

At 1132:

HPCI is injecting into **(1)** Feedwater System line and RFWCS will be in **(2)** Element Control.

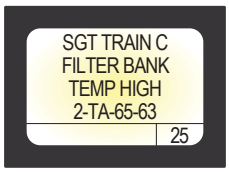
A. (1) 'A'
(2) Single

B. (1) 'A'
(2) Three

C. (1) 'B'
(2) Single

D. (1) 'B'
(2) Three

45. An event has occurred on Unit 2, requiring the use of the Standby Gas Treatment (SGT) System, with the following conditions:



- SGT TRAIN C FILTER BANK TEMP HIGH (2-9-3B, Window 25) alarms
- The Outside AUO reports that SGT 'C' charcoal filter temperature is 150 °F

Which **ONE** of the following completes the statements below given the conditions above?

The SGT decay heat removal mode **(1)** initiated.

0-DMP-065-0052, Train C Decay Heat Damper, is powered from **(2)**.

A. (1) is automatically
(2) 'A' Diesel Aux Board

B. (1) is automatically
(2) 'A' 480V Common Board

C. (1) must be manually
(2) 'A' Diesel Aux Board

D. (1) must be manually
(2) 'A' 480V Common Board

46. Unit 3 was operating at 100% Rated Thermal Power (RTP) when the following occurs:

- Loss of Offsite power
- Drywell Pressure is 20 psig
- Reactor Pressure is 350 psig and lowering
- 3A, 3B, 3D EDGs start and tie to their respective 4KV Shutdown Boards
- 3C EDG is tagged out of service

Given the conditions above, 250V Battery Charger(s) **(1)** has(have) under gone load shed and 480V Common Board **(2)** is the alternate 480V AC supply to the affected Battery Charger(s).

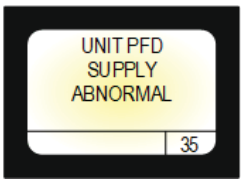
A. (1) 3
(2) 1

B. (1) 3
(2) 3

C. (1) 3 **AND** 4
(2) 1

D. (1) 3 **AND** 4
(2) 3

47. Unit 3 is operating at 100% RTP with Unit Preferred in a **NORMAL** lineup when the following conditions occur:



- UNIT PREFERRED SUPPLY ABNORMAL (3-9-8B, Window 35) alarms
- Control Bay AUO reports that Unit 3 Unit Preferred MMG set is **NOT** running

Given the conditions above, which **ONE** of the following completes the statements below?

Battery Board **(1)** has been lost.

If Control Rod movement is required, a manual Reactor SCRAM **(2)** required in accordance with 3-AOI-57-4, Loss of Unit Preferred.

A. (1) 5
(2) is

B. (1) 5
(2) is NOT

C. (1) 6
(2) is

D. (1) 6
(2) is NOT

48. Unit 1 is operating at 100% RTP when an event occurred resulting in 480V Load Shed.

Which **ONE** of the following completes the statements below?

In accordance with 1/2-AOI-57-1D, 480V Load Shed, if the load shed logic **CANNOT** be reset and operation of Battery Charger 1 is required, then place Battery Charger 1's EMERG/OFF/ON Load Shed Switch to the EMERG position **(1)**.

Battery Charger **(2)** can be aligned to BB1 (Battery Board 1) if Battery Charger 1 is not available.

A. **(1)** and leave it in the EMERG position
(2) 2B

B. **(1)** and leave it in the EMERG position
(2) 3

C. **(1)** then immediately back to the ON position
(2) 2B

D. **(1)** then immediately back to the ON position
(2) 3

49. Unit 1 was operating at 100% RTP when an event results in the following plant conditions:

- Reactor Water Level lowering to (-) 130 inches
- Drywell Pressure is 2.2 psig
- Reactor Pressure is 500 psig

Given the above conditions, **(1)** EDGs have received an automatic start signal.

If 'A' EDG fails to automatically start, 0-OI-82, Standby Diesel Generator System, Section 5.4, Manual Fast Start at 4KV Shutdown Board, **(2)** allowed to be performed.

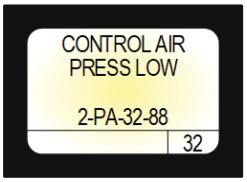
A. **(1) ALL**
(2) is

B. **(1) ALL**
(2) is NOT

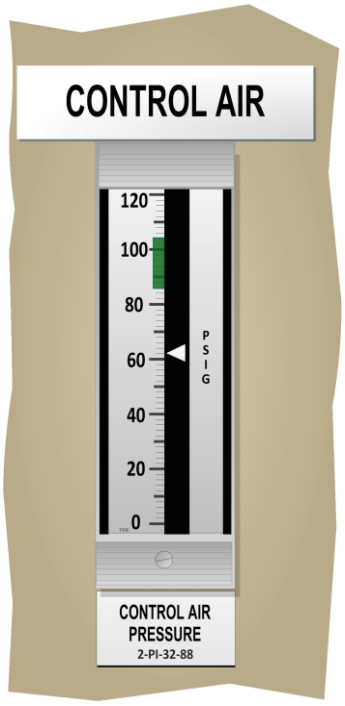
C. **(1) ONLY** A, B, C and D
(2) is

D. **(1) ONLY** A, B, C and D
(2) is NOT

50. Unit 2 is operating at 100% RTP when the following conditions occur:



- CONTROL AIR PRESSURE LOW (2-9-20B, Window 32) alarms
- Control Air Pressure is indicating 62 psig and lowering



Given the conditions above **AND** if the trend continues, which **ONE** of the following completes the statements below in accordance with 2-AOI-32-2, Attachment 1 – Expected System Responses?

2-FCV-3-20(13)(6), RFP 2A(B)(C) MINIMUM FLOW VALVES, will fail **(1)**.

2-FCV-2-130, CONDENSATE DEMINERALIZER BYPASS VALVE, will fail **(2)**.

A. (1) OPEN
(2) OPEN

B. (1) OPEN
(2) CLOSED

C. (1) CLOSED
(2) OPEN

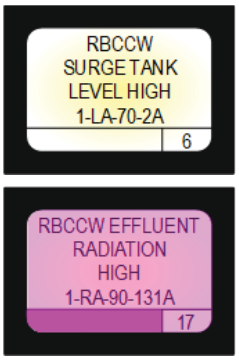
D. (1) CLOSED
(2) CLOSED

51. Unit 1 is operating at 100% RTP with the following plant conditions:

- 1-FCV-70-48, RBCCW SECTIONALIZING VALVE, is closed

Subsequently, events occur resulting in the following conditions:

- RBCCW SURGE TANK LEVEL HIGH (1-9-4C, Window 6) is in alarm
- RBCCW EFFLUENT RADIATION HIGH (1-9-3A, Window 17) is in alarm



The conditions above indicate leakage from _____.

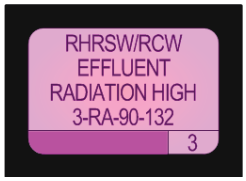
A. RWCU Pump seal coolers

B. Reactor Recirc Pump seal coolers

C. Fuel Pool Cooling Heat Exchangers

D. RWCU Non-Regenerative heat exchangers

52. Unit 3 is placing RHR Loop II in Shutdown Cooling in service to support a Refueling outage when the following occurs:



- RHRSW/RCW EFFLUENT RADIATION HIGH (3-9-3A, Window 3) alarms

Given the conditions above, which **ONE** of the following completes the statements below?

3-FCV-023-0046(52), RHR HEAT EXCHANGER 3B(3D) SERVICE WATER DISCHARGE VALVE(S), **(1)**.

Once the high radiation condition clears, 3-RM-90-133D(134D), RHR HEAT EXCHANGER A/C(B/D) SERVICE WATER DISCHARGE OFFLINE RADIATION MONITOR, must be reset on Panel **(2)** **BEFORE** the associated annunciator window can be manually reset.

A. (1) will automatically close
(2) 9-10

B. (1) will automatically close
(2) 9-3

C. (1) must be manually closed
(2) 9-10

D. (1) must be manually closed
(2) 9-3

53. Unit 2 is operating at 50% RTP with the following plant conditions:

- 2-FIC-85-11, CRD SYSTEM FLOW CONTROL, is in automatic
- The OATC places 2-FCV-85-23A, CRD DRIVE WATER PRESSURE CONTROL VALVE, to CLOSE for one (1) second

As a result of the OATC's actions, CRD Drive Water Header Differential Pressure will **(1)**.

After five minutes, once system parameters have stabilized, CRD Cooling Water Flow will be **(2)**.

A. (1) rise
(2) lower

B. (1) rise
(2) the same

C. (1) lower
(2) lower

D. (1) lower
(2) the same

54. During a Reactor Startup, Rod Worth Minimizer (RWM) Rod Blocks are **ENFORCED** during power escalation until **BOTH** Total Steam Flow AND Total Feed Flow **FIRST** reach the **(1)** at **(2)** .

NOTE: LPAP – Low Power Alarm Point
LPSP – Low Power Set Point

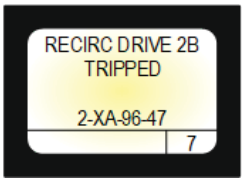
A. (1) LPAP
(2) 22%

B. (1) LPAP
(2) 27%

C. (1) LPSP
(2) 22%

D. (1) LPSP
(2) 27%

55. Unit 2 is operating at 100% RTP when the following conditions occur:



- RECIRC DRIVE 2B TRIPPED, (2-9-4B, Window 7), is in alarm
- The Power to Flow Map indicates 50% Core Flow
- **NO** Operator actions have been taken

Which **ONE** of the following completes the statements below?

Given the conditions above, the APRM Flow Biased SCRAM setpoint will be **(1)**.

In accordance with 2-AOI-68-1, Recirc Pump Trip/Core Flow Decrease, single loop operation in the MELLLA+ Operating Region **(2)** allowed.

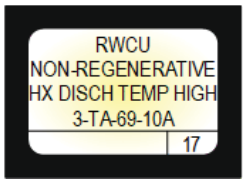
A. (1) 97.9%
(2) is

B. (1) 97.9%
(2) is **NOT**

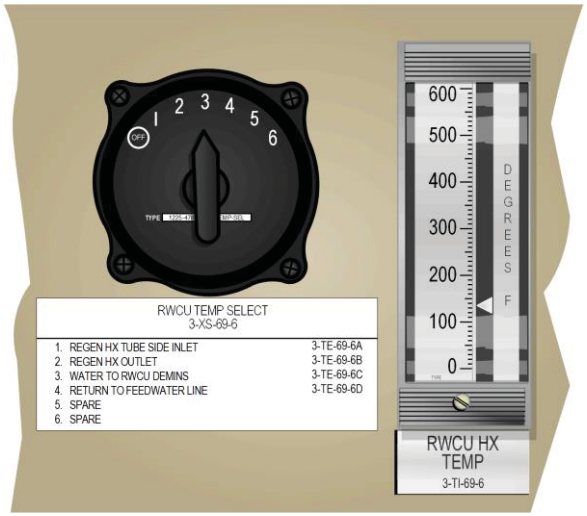
C. (1) 92.5%
(2) is

D. (1) 92.5%
(2) is **NOT**

56. Unit 3 is operating at 100% RTP, when the following conditions occur:



- RWCU NON-REGENERATIVE HEAT EXCHANGER DISCHARGE TEMPERATURE HIGH (3-9-4B, Window 17) alarms
- RWCU NON-REGENERATIVE HEAT EXCHANGER (NRHX) DISCHARGE TEMPERATURE is 135 °F and stable



NOTE: CONSIDER EACH STATEMENT BELOW SEPARATELY.

Given the conditions above, the Reactor Water Cleanup (RWCU) System **(1)** receive an isolation signal.

RWCU Pumps receive a trip signal when **(2)** is **NOT** full **OPEN**.

Note: RWCU INBOARD SUCTION ISOLATION VALVE, 3-FCV-69-1
RWCU RETURN ISOLATION VALVE, 3-FCV-69-12

A. (1) will
(2) 3-FCV-69-1

B. (1) will
(2) 3-FCV-69-12

C. (1) will **NOT**
(2) 3-FCV-69-1

D. (1) will **NOT**
(2) 3-FCV-69-12

57. Unit 1 is operating at 100% Rated Thermal Power (RTP) when the following events occur:

- Inadvertent Reactor SCRAM
- Reactor Water Level reaches a minimum of (-) 110 inches, and stabilizes at (-) 10 inches
- Reactor Pressure reaches a minimum of 840 psig

Assuming NO operator actions have been taken, which **ONE** of the following completes both statements regarding decay heat removal following the SCRAM?

Reactor Water Cleanup (RWCU) ___**(1)**___ available.

Main Turbine Bypass Valves ___**(2)**___ available.

A. (1) is
(2) are

B. (1) is
(2) are NOT

C. (1) is NOT
(2) are

D. (1) is NOT
(2) are NOT

58. A Reactor Startup is in progress on Unit 3, when the following condition occurs:

- The reference signal from APRM 2 to the respective Rod Block Monitor (RBM) fails downscale

APRM 2 is the **PRIMARY** reference channel for RBM Channel **(1)**.

Given the conditions above, the RBM **(2)** automatically transfer to **APRM 3**.

A. (1) A
(2) will

B. (1) A
(2) will NOT

C. (1) B
(2) will

D. (1) B
(2) will NOT

59. Unit 2 is operating at 100% RTP when the Nuclear Unit Senior Operator (NUSO) directs the Control Room to be abandoned.

Which **ONE** of the following completes the statement below?

In accordance with 2-AOI-100-2, Control Room Abandonment, an **IMMEDIATE** Operator Action is to _____.

A. initiate RCIC

B. place all MSIV control switches in CLOSE

C. verify MSRV control switches in CLOSE/AUTO

D. verify one pump in service to each EECW header

60. ___**(1)**___ is injected into the Condensate System at the suction of the ___**(2)**___ Pumps in order to minimize carbon steel piping corrosion.

A. (1) Oxygen
(2) Condensate

B. (1) Oxygen
(2) Condensate Booster

C. (1) Hydrogen
(2) Condensate

D. (1) Hydrogen
(2) Condensate Booster

61. Unit 2 is operating at 100% RTP when 2-RM-90-**265A**, OFFGAS POST TREAT RADIATION MONITOR, fails downscale.

Given the conditions above, which **ONE** of the following completes the statements below?

NOTE: CONSIDER EACH STATEMENT BELOW SEPARATELY.

If 2-RM-90-**266A**, OFFGAS POST TREAT RADIATION MONITOR, subsequently failed downscale, 2-FCV-66-28, OFF-GAS SYSTEM ISOLATION VALVE, would **(1)**.

If 2-RM-90-**266A**, OFFGAS POST TREAT RADIATION MONITOR, subsequently reached its High-High-High setpoint, 2-FCV-66-28, OFF-GAS SYSTEM ISOLATION VALVE, would **(2)**.

A. (1) remain open
   (2) remain open

B. (1) remain open
   (2) automatically close after 5 seconds

C. (1) automatically close after 5 seconds
   (2) remain open

D. (1) automatically close after 5 seconds
   (2) automatically close after 5 seconds

62. Which **ONE** of the following completes both statements below regarding the CO2 Fire Protection System?

The CO2 System for the EDG Auxiliary Board Rooms **(1)** automatically initiate.

EDG Rooms' ventilation dampers **(2)** release to auto-close.

A. (1) will NOT
(2) electrically

B. (1) will NOT
(2) mechanically

C. (1) will
(2) electrically

D. (1) will
(2) mechanically

63. Unit 2 is shutdown in MODE 5 and performing CCW System maintenance, with the following conditions:

- 2A CCW Pump is running, DISCHARGE VALVE is OPEN
- 2B CCW Pump is OFF, DISCHARGE VALVE is CLOSED
- 2C CCW Pump is OFF, DISCHARGE VALVE is CLOSED
- When 2-HS-27-10A, CCW Pump 2A, is taken to STOP, 2-FCV-27-13, 2A CCW PUMP DISCHARGE VALVE, automatically **FULLY** closed

The power supply to 2-FCV-27-13 is **(1)**.

Given the conditions above, 2-FCV-27-13 **(2)** as designed.

A. (1) 480V Water Supply Board
(2) operated

B. (1) 480V Water Supply Board
(2) did NOT operate

C. (1) 480V Common Board 1
(2) operated

D. (1) 480V Common Board 1
(2) did NOT operate

64. Unit 1 is operating at 100% Rated Thermal Power.

Which **ONE** of the following completes both statements in accordance with 1-SR-2, Instrument Checks and Observations?

Core Thermal Power is normally recorded every **(1)** hours.

If Nuclear Heat Balance remains unavailable for a **MINIMUM** of **(2)** hours, then Reactor Power is required to be lowered approximately 3 MWe (approximately 10 MWt) and the Shift Manager and Reactor Engineer must be notified.

A. (1) eight
(2) eight

B. (1) eight
(2) two

C. (1) two
(2) eight

D. (1) two
(2) two

65. In accordance with 2-AOI-32-2, Loss of Control Air, when Control Air Pressure drops to less than or equal to **(1)**, 2-LCV-3-53, Reactor Feedwater Start-up Bypass Valve, fails **(2)**.

A. (1) 65 psig
(2) as is

B. (1) 65 psig
(2) open

C. (1) 75 psig
(2) as is

D. (1) 75 psig
(2) open

66. Unit 2 is operating at 100% RTP when the following conditions occurs:

- 2-AOI-70-1, Loss of RBCCW, has been entered
- RECIRC PUMP B COOLING WATER FLOW LOW (2-9-4B, Window 34) alarms
- RBCCW PUMP SUCTION HEADER TEMPERATURE HIGH (2-9-4C, Window 5) alarms
- 2-TIS-70-3, RBCCW PUMP SUCTION HEADER TEMPERATURE, is 106 ºF and rising
- CRD Pump 2A has tripped
- NO Operator Actions have been taken

Given the above conditions, which **ONE** of the following completes the statements below?

Recirc Pump seals **(1)** begin to overheat in approximately 7 minutes.

In accordance with 2-AOI-70-1, when RBCCW Pump Suction Header Temperature **CANNOT** be maintained less than **(2)** Operators are required to reduce Core Flow to between 50-60% and insert a manual Reactor SCRAM.

A. (1) will
(2) 105 ºF

B. (1) will
(2) 110 ºF

C. (1) will NOT
(2) 105 ºF

D. (1) will NOT
(2) 110 ºF

67. Unit 2 is operating at 100% RTP when an event occurs resulting in the following conditions:

- A manual SCRAM was successfully inserted
- MSIVs are **CLOSED**
- Two MSRVs have been manually opened for Reactor Pressure Control
- Reactor Pressure is 825 psig and lowering
- RCIC is injecting to the RPV at 400 gpm

Subsequently, the following conditions occur:

- The BOP attempts to close MSRVs, one MSRV fails to close
- 2-AOI-1-1, Relief Valve Stuck Open, is entered

Given the conditions above and in accordance with 2-AOI-1-1, the Operator is allowed to cycle the control switch of a stuck open SRV **(1)** from CLOSE to OPEN to CLOSE positions.

If the MSRV closes due to Operator action, **INDICATED** Reactor Water Level will **(2)**.

A. (1) **ONLY** one (1) time
(2) remain the same

B. (1) **ONLY** one (1) time
(2) **INITIALLY** lower

C. (1) **UP TO** three (3) times
(2) remain the same

D. (1) **UP TO** three (3) times
(2) **INITIALLY** lower

68. Which **ONE** of the following completes statements below?

Condensate depression is the difference between **(1)** .

As condensate depression rises, cycle efficiency **(2)**.

A. (1) condenser pressure and Condensate Pump suction pressure
(2) also rises

B. (1) condenser pressure and Condensate Pump suction pressure
(2) lowers

C. (1) saturation temperature for Main Condenser vacuum and the temperature of the condensate
(2) also rises

D. (1) saturation temperature for Main Condenser vacuum and the temperature of the condensate
(2) lowers

69. An event is occurring on Unit 3 and an EOI was entered due to low Reactor Water Level.

Subsequently:

- Drywell Temperature reaches 165 °F and is steady
- Reactor Water Level is restored to (+) 55 inches using Table L-1, Preferred Injection Systems

Which **ONE** of the following identifies the required action?

NOTE: 3-EOI-1 – RPV Control Modes 1-3
3-EOI-2 – Primary Containment Control

A. Another entry condition exists for 3-EOI-1; EOI-2 entry is **NOT** required.

B. Remain in 3-EOI-1 **AND** enter 3-EOI-2

C. Exit 3-EOI-1 **AND** enter 3-EOI-2

D. Another entry condition exists for 3-EOI-1; EOI-2 entry is required.

70. Prompt criticality occurs when an amount of reactivity ($\Delta k/k$) is added _____.

A. equal to the U235 enrichment

B. equal to the delayed neutron fraction

C. that causes the doubling time to be 1.445

D. that results in the period being greater than 60

71. Unit 3 is in a Refueling Outage with the following conditions:

- 3-HS-99-5A-S1, REACTOR MODE SWITCH, is in REFUEL
- **ONE** Control Rod is withdrawn for testing
- The fuel grapple is full up and **UNLOADED**
- The Refueling bridge Operator has moved the Refueling Bridge over the Reactor Core
- Gas bubbles have just been observed coming up from the Core
- No radiation alarms have been received in the Control Room

The grapple **(1)** be lowered into the Reactor Core.

In accordance with 3-AOI-79-1, Fuel Damage During Refueling, the IMMEDIATE ACTION is to **(2)**.

A. (1) can
(2) isolate Refuel Zone Ventilation

B. (1) can
(2) evacuate all non-essential personnel from Refueling Floor

C. (1) can NOT
(2) isolate Refuel Zone Ventilation

D. (1) can NOT
(2) evacuate all non-essential personnel from Refueling Floor

72. Unit 1 was operating at 100% RTP for 10 months, when a Reactor SCRAM occurred.

IMMEDIATELY following the Reactor SCRAM, decay heat is approximately **(1)** , due to **(2)** .

A. (1) 1%
(2) fission products

B. (1) 1%
(2) delayed neutrons

C. (1) 7%
(2) fission products

D. (1) 7%
(2) delayed neutrons

73. Wide Range Gaseous Effluent Monitor System (WRGERMS) measures release rate parameters of the **(1)** Exhaust.

A WRGERMS Panel is **(2)**.

A. (1) Off-Gas Stack
(2) **ONLY** available in the Unit 2 Control Room

B. (1) Off-Gas Stack
(2) available in all three Unit Control Rooms

C. (1) Reactor Building
(2) **ONLY** available in the Unit 2 Control Room

D. (1) Reactor Building
(2) available in all three Unit Control Rooms

74. Unit 2 is operating at 100% RTP. Refer to the drawing below of a Recirculation Jet Pump.

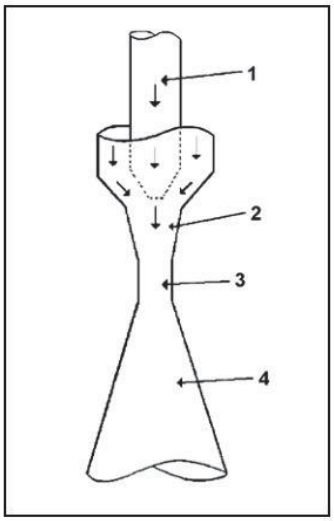
The **HIGHEST** water **VELOCITY** in the Jet Pump will exist at point _____.

A. 1

B. 2

C. 3

D. 4



75. Which **ONE** of the following is a **MAJOR** contributor to Unit 2's Reactor Vessel embrittlement?

A. High operating pressure

B. High-energy gamma radiation

C. High-energy fission fragments

D. High-energy neutron radiation

BFN ILT 2304 RO References 06062023

42. MAIN TURBINE SHUTDOWN, (3-9-8A, Window 11) – picture only

45. SGT TRAIN C FILTER BANK TEMP HIGH (2-9-3B, Window 25) – picture only

47. UNIT PREFERRED SUPPLY ABNORMAL, (3-9-8B, Window 35) – picture only

50. CONTROL AIR PRESSURE LOW (2-9-20B, Window 32) – picture only

Panel 2-9-20, 2-PI-32-88, Control Air Pressure – picture only

51. RBCCW SURGE TANK LEVEL HIGH (1-9-4C, Window 6) – picture only

RBCCW EFFLUENT RADIATION HIGH (1-9-3A, Window 17) – picture only

52. RHRSW/RCW EFFLUENT RADIATION HIGH, (3-9-3A, Window 3) – picture only

55. RECIRC DRIVE 2B TRIPPED, (2-9-4B, Window 7) – picture only

56. RWCU NON-REGENERATIVE HEAT EXCHANGER DISCHARGE TEMPERATURE HIGH (3-9-4B, Window 17) – picture only

3-XS-69-6, RWCU TEMP SELECT SWITCH – picture only

3-TI-69-6, RWCU HX TEMP INDICATOR – picture only

74. Jet Pump Diagram – picture only

EQUATIONS

$\dot{Q} = \dot{m}c_p\Delta T$

$\dot{Q} = \dot{m}\Delta h$

$\dot{Q} = UA\Delta T$

$\dot{Q} \propto \dot{m}^3_{\text{Nat Circ}}$

$\Delta T \propto \dot{m}^2_{\text{Nat Circ}}$

$K_{eff} = 1/(1-\rho)$

$\rho = (K_{eff} - 1)/K_{eff}$

$SUR = 26.06/\tau$

$$\tau = \frac{\bar{\beta}_{eff} - \rho}{\lambda_{eff}\ \rho}$$

$$\rho = \frac{\ell^*}{\tau} + \frac{\bar{\beta}_{eff}}{1 + \lambda_{eff}\ \tau}$$

$\ell^* = 1.0 \times 10^{-4}$ sec

$\lambda_{eff} = 0.1\ \text{sec}^{-1}$ (for $\rho > 0$)

$DRW \propto \varphi^2_{tip}/\varphi^2_{avg}$

$P = P_o e^{t/\tau}$

$P = P_o 10^{SUR(t)}$

$A = A_o e^{-\lambda t}$

$N = S/(1 - K_{eff})$

$CR_1(1 - K_{eff_1}) = CR_2(1 - K_{eff_2})$

$1/M = CR_1/CR_x$

$A = \pi r^2$

$F = PA$

$\dot{m} = \rho A\vec{v}$

$\dot{W}_{Pump} = \dot{m}\Delta P\upsilon$

$P = I^2R$

$P = IE$

$P_A = \sqrt{3}IE$

$P_T = \sqrt{3}IEpf$

$P_R = \sqrt{3}IE\sin\theta$

Thermal Efficiency = Net Work Out/Energy In

$$\frac{g(z_2 - z_1)}{g_c} + \frac{(\vec{v}_2^2 - \vec{v}_1^2)}{2g_c} + \upsilon(P_2 - P_1) + (u_2 - u_1) + (q - w) = 0$$

$g = 32.2\ \text{ft/sec}^2$

$g_c = 32.2$ lbm-ft/lbf-sec^2

CONVERSIONS

1 MW = 3.41 x 10^6 Btu/hr

1 hp = 2.54 x 10^3 Btu/hr

1 Btu = 778 ft-lbf

°C = (5/9)(°F − 32)

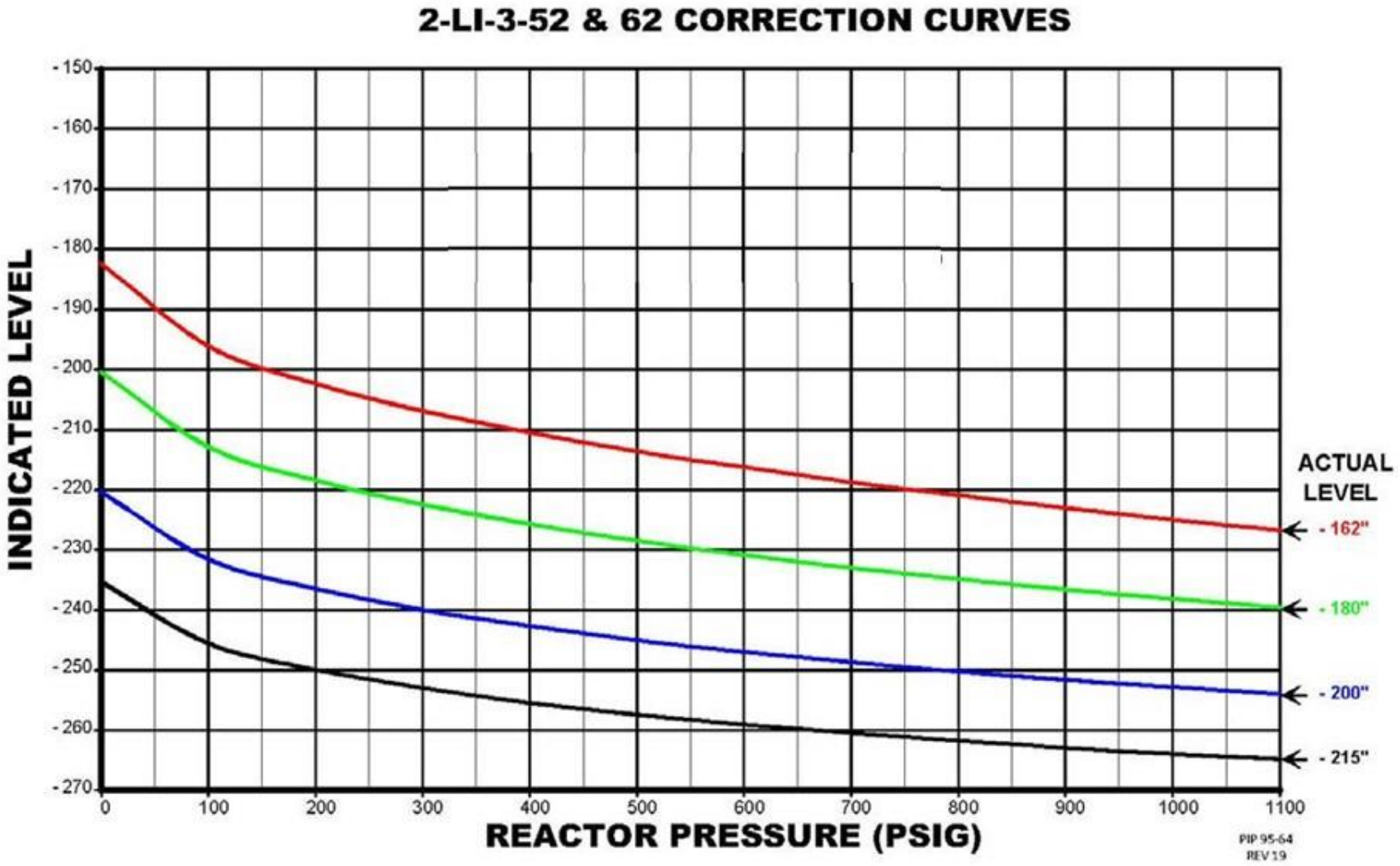
°F = (9/5)(°C) + 32

1 kg = 2.21 lbm

1 ft^3_{water} = 7.48 gal

1 gal_{water} = 8.35 lbm

1 Curie = 3.7 x 10^{10} dps


2-LI-3-52 & 62 CORRECTION CURVES
INDICATED LEVEL
-150
-160
-170
-180
-190
-200
-210
-220
-230
-240
-250
-260
-270
0
100
200
300
400
500
600
700
800
900
1000
1100
REACTOR PRESSURE (PSIG)
ACTUAL LEVEL
- 162"
- 180"
- 200"
- 215"
PIP 95-64
REV 19