Entergy

Entergy Nuclear Generating Company
Chiltonville Training Center
46 Sandwich Road
Plymouth, MA 02360-2505

November 9, 2000

Mr. Julian Williams
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Mr. Williams:

Enclosed is the following information in support of the November, 2000 NRC License Exam:

- Applicant's Exam Cover Sheet and Answer Sheet – Graded Original
- Applicant's Exam Cover Sheet and Answer Sheet – Clean Copy
- Master Exam and Answer Key
- Questions Asked By and Answers Given During Written Exam
- Comments and Recommendations
- Written Exam Seating Chart
- Form ES-403-1, Written Exam Grading Quality Checklist
- Written Exam Performance Analysis

The Examination Security Agreement, Form ES-201-3, is in the process of being completed and will be provided immediately upon completion.

If there are any questions you may have regarding the above, please contact myself at (508) 830-7617 or Scott Willoughby at (508) 830-7638.

Sincerely,

Mark Santiago

Mark Santiago
Superintendent, Operations Training

MS/mg
O0941

NRC Exam Comment #1

Question #: 16

Question: During handling of irradiated fuel in Secondary Containment, the following alarms are received:

REFUEL FLOOR RAD HI
REFUEL FLOOR VENT RAD CHAN A HI
REFUEL FLOOR VENT RAD CHAN B HI

If the crew finds that neither SBGT fan will start, the required compensatory action is:

a. evacuate the Reactor Building.

b. lock closed or verify locked closed the inner RBTL personnel pass door.

c. evacuate refuel floor personnel to the RB 91' changeout area.

d. don SCBA's in the control room.

Answer Per Exam Key: a

Comment:

This question tests the candidates knowledge of the subsequent actions of procedure 5.4.3, Refueling Floor High Radiation as it pertains to a failure of both standby gas treatment trains.

The answer was based on step [3.0] of the subsequent actions of this procedure:

*[3] **IF** both Standby Gas Treatment System filter trains fail to start **OR** are unavailable, **THEN EVACUATE** the Reactor Building in accordance with Step [7] below.*

This statement led to "a" as being the correct answer.

However, upon further review, if step [7] of the procedure is referred to, then the answer changes to just evacuating refuel floor personnel to the 91' level of the reactor building. Step [7] of this procedure reads as follows:

[7] ***EVACUATE*** *as follows:*

(a) Refuel Floor ARM, New Fuel Storage Vault ARM, or Refuel Floor Exhaust PRM in alarm HIGH:
- *(1)* ***EVACUATE*** *Refuel Floor personnel to RB 91' changeout area.*
- *(2)* ***NOTIFY*** *Radiation Protection to report to RB 91' changeout area for personnel monitoring and decontamination.*

(b) Any alarm in Step 4.0[7](a) ***AND*** *any other Reactor Building ARM in alarm HIGH:*
- *(1)* ***EVACUATE*** *the Reactor Building.* ***NOTIFY*** *personnel to report to the Red Line.*
- *(2)* ***NOTIFY*** *Radiation Protection to report to the Red Line for personnel monitoring and decontamination.*

The stem of the question gives three alarms, Refuel Floor Rad Hi (Refuel floor ARM) and both channels of the Refuel Floor Exhaust PRMs (Channel A/B Refuel Floor Vent Rad Chan A/B Hi). No other reactor building ARMs are provided. Therefore the degree of the Reactor Building Evacuation prescribed in step [3] is to evacuate personnel from the refuel floor to the 91' changeout area.

Recommendation;

Change the answer key to reflect distracter "c" as the only correct response.

Reference Attachments:

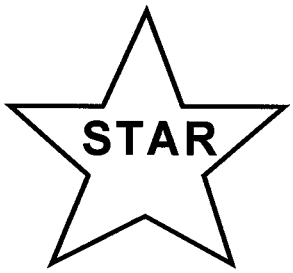
Attachment 1: Procedure 5.4.3

PILGRIM NUCLEAR POWER STATION

Procedure No. 5.4.3

REFUELING FLOOR HIGH RADIATION

Attachment 1
for Question #1b.



Stop
Think
Act
Review

SAFETY REVIEW REQUIRED

SAFETY RELATED

1.0 SYMPTOMS

- This section is NOT intended to include all possible symptoms.

[1] ALARMS

	Annunciator	Window
(a)	**"REFUEL FLOOR RAD HI"**	C904LC-C7
(b)	**"REFL FLR VENT RAD CHAN A HI"**	C904LC-A4
(c)	**"REFL FLR VENT RAD CHAN B HI"**	C904LC-B4

[2] Local installed radiation monitor alarm on Refuel Bridge.

[3] Report from Refuel Floor personnel of a fuel drop event.

2.0 AUTOMATIC ACTIONS

- This section is NOT intended to include all possible automatic actions.

[1] Reactor Building ventilation fans trip and dampers close.

[2] SGT initiates.

3.0 IMMEDIATE OPERATOR ACTIONS

[1] **IF** a fuel bundle is grappled to the refuel bridge mast, **THEN LOWER** the fuel bundle in the nearest Reactor Vessel **OR** Spent Fuel Pool location.

[2] **TERMINATE** all fuel handling/refuel floor operations.

[3] **EVACUATE** the refuel floor.

4.0 SUBSEQUENT ACTIONS

[1] **START** the Control Room High Efficiency Air Filtration System (CRHEAFS).

[2] **IF** CHREAFS fails to start, **THEN** Control Room personnel shall put on SCBA equipment and continue to man the Control Room.

- **NOTIFY** Radiation Protection to obtain Control Room air samples and surveys to determine Control Room habitability. **IF** allowed by radiation sampling and survey results, SCBA equipment may be removed.

[3] **IF** both Standby Gas Treatment System filter trains fail to start **OR** are unavailable, **THEN EVACUATE** the Reactor Building in accordance with Step [7] below.

CAUTION

Do not rely solely on any one instrument or indication. A comparison of applicable instrumentation may provide evidence to determine the cause of an event. Frequently monitor instrumentation to determine the trend of various parameters. Verify that appropriate instruments are tracking correctly. **[SOER 93-01]**

[4] **FREQUENTLY MONITOR** Reactor Building exhaust monitors. **IF** greater than or equal to 710 cps, **THEN ENTER** EOP-04.

[5] **LOCK CLOSED OR VERIFY LOCKED CLOSED** the inner RBTL personnel pass door.

[6] **IF** high radiation is caused from Reactor basin or Spent Fuel Pool drain-down, **THEN ENTER** PNPS 2.4.31, *"Reactor Basin And/Or Spent Fuel Pool Drain-Down".*

[7] **EVACUATE** as follows:

(a) Refuel Floor ARM, New Fuel Storage Vault ARM, or Refuel Floor Exhaust PRM in alarm HIGH:

(1) **EVACUATE** Refuel Floor personnel to RB 91' changeout area.

(2) **NOTIFY** Radiation Protection to report to RB 91' changeout area for personnel monitoring and decontamination.

(b) Any alarm in Step 4.0[7](a) **AND** any other Reactor Building ARM in alarm HIGH:

(1) **EVACUATE** the Reactor Building. **NOTIFY** personnel to report to the Red Line.

(2) **NOTIFY** Radiation Protection to report to the Red Line for personnel monitoring and decontamination.

(3) **IF** the Drywell is accessible, **THEN EVACUATE** the Drywell using the Drywell evacuation alarm located on RB 23' adjacent to the door leading into Drywell access area.

5.0 DISCUSSION

[1] Accidents that result in the release of radioactive materials directly to the Secondary Containment can occur when fuel handling is in progress. The greatest potential for the release of radioactive material exists when the Drywell head and the Reactor head are removed and refueling is in progress. This Procedure describes Operator action for the FUEL HANDLING ACCIDENT described in the FSAR Sections 14.5.5, 12.3, 7.12, 10.17, and 5.3.3.4, and in FSAR Appendix G.5.

[2] Spent fuel elements contain large quantities of fission gases which, if released, have the potential to cause serious exposure to occupants of the refueling floor and cause a release of fission products to the environment. To minimize the effects of such a release from the fuel, there are several systems which provide warning to the Operators and an automatic system which isolates the Reactor Building to prevent uncontrolled release to the environs.

[3] Procedure steps that are related to SGT and CRHEAF failures are directly related to Technical Specifications Sections 3.7.B.1.f and 3.7.B.2.e, which relate to system operability with less than the required power supplies available. Steps 4.0[2] and [3] are required to remain in this Procedure in order to meet committed actions to the NRC.

REVISION 15 **Date Originated 12/99**

Pages Affected	Description
1	Replace Boston Edison with Entergy and BECo with PNPS where applicable.

REVISION 14 **Date Originated 12/98**

Pages Affected	Description
2	Clarify Immediate Actions to be taken if a fuel bundle is grappled on the refuel bridge.
3	Rearrange Subsequent Actions steps so actions to operate CHREAFS are together.
3	Delete Subsequent Action to verify all Immediate Actions are completed.
3	Move step to lock RBTL personnel pass door to Subsequent Actions.
4	Clarify condition for Drywell to be evacuated.
4	Delete step to determine whether an EAL has been exceeded.

REVISION 13 **Date Originated 11/96**

Pages Affected	Description
2,3	Move start of CRHEAFS to Subsequent Actions.
2	Add step to verify the inner RBTL personnel pass door is securely closed and locked. **[SE No. 3034]**

NRC Exam Comment #2

Question #: 70

Question: What automatic protective function is generated by the Rod Position Information System (RPIS) upon sensing a loss of electrical power?

a. Select Block only

b. Withdrawal Block only

c. Insert Block only

d. Insert and Withdrawal Blocks

Answer Per Exam Key: a

Comment:

This question is designed to test the candidates understanding of the impact of a loss of the RPIS. As discussed in our training material, a select block will occur, deselecting any control rod from the select matrix, preventing control rod movement. The following is an excerpt from our training material for the Rod Position Information System.

> *"A select block is applied if a PIP malfunction occurs, the RPIS card is pulled or power is lost."*

However, the RPIS also provides input into the Rod Worth Minimizer. As discussed in our Rod Worth Minimizer training material:

> *"Rod position data is received from RPIS via RMCS. This input is used by the RWM to determine if the programmed sequence is being adhered to. If RPIS input is lost the RWM will detect an equipment failure and impose insert and withdraw blocks."*

This was confirmed on the PNPS simulator. See the attached figures for indications associated with the rod worth minimizer associated with a loss of RPIS. The response of the RWM to this failure is the same at any power level. Therefore because the originally proposed answer (distracter "a") included the word **ONLY**, distracter "a" is incorrect, since the RWM also imposes insert and withdraw blocks.

Recommendation;

Change the answer key to reflect distracter "d" as the only correct response.

Reference Attachments:

Attachment 1: Excerpt from RPIS Reference Text
Attachment 2: Excerpt from RWM Reference Text
Attachment 3: Simulator graphic showing alarms associated with loss of power to RPIS
Attachment 4: Simulator graphic showing RWM display following loss of RPIS

Attachment 1 to
Question 70

ROD POSITION INFORMATION SYSTEM

REFERENCE TEXT

In summary, the drift circuit will annunciate if a control rod is NOT selected and driving and either its even numbered reed switch opens, or an odd numbered reed switch closes.

D. INSTRUMENTATION AND CONTROLS

1. Control Room Instrumentation

Instrumentation/Location	Description
Rod position indication on four rod display and full core display	Reed switches indicate rod position (See Table 1)

2. Local Instrumentation

None

3. Alarms

Title/Location	Setpoint/Initiating Device
Rod over travel 905 Left B-3	3A-K3 indicates when a control rod has been withdrawn past position 48 (uncoupled).
Rod drift 905 Left A-3	3A-K37A, B, C, D alarms when rod not selected and being driven leaves an even reed switch or moves past an odd reed switch.
RPIS inop 905 Left D-4	3A-K5 (Panel 928), Loss of Power, PIP malfunction, card pulled.

4. Interlocks and Trips

Interlock or Trip	Functions
RPIS inop	A select block is applied if a PIP malfunction occurs, the RPIS card is pulled or power is lost.
Rod drift alarm bypass	Bypasses the drift alarm when a rod has been selected and has a drive (insert or withdrawal) signal applied.

Attachment 2
to Question # 70

ROD WORTH MINIMIZER

REFERENCE TEXT

5. **Control Room Controls**

Item/Location	Functions of Positions
Manual bypass keylock switch RWM Operator Display	OPERATE - Allows RWM operation BYPASS - Bypasses RWM rod block functions TEST - Allows shutdown margin test performance
Keylock mode switch RWM NUMAC Instrument Display	OPER - Allows RWM operation INOP - Causes insert and withdraw block if power <LPAP; Allows testing that may affect safety
Softkeys (function keys) RWM Instrument and Operator Display	Causes RWM to perform function indicated on display screen directly above the associated key
Cursor Directional Control Keys Instrument display	Moves the cursor on the screen. Allows operator to select specific items on the display screen
Data Keypad Instrument Display	Allows entry into various RWM functions

6. **Local Controls**

None

E. SYSTEM INTERRELATIONSHIPS

1. **Power Supplies**

The RWM instrument and operator displays are powered from 120 V instrument power panel 47L and 48L. Losing power initiates RWM insert and withdraw blocks, preventing rod movement.

2. **Reactor Manual Control System (RMCS)**

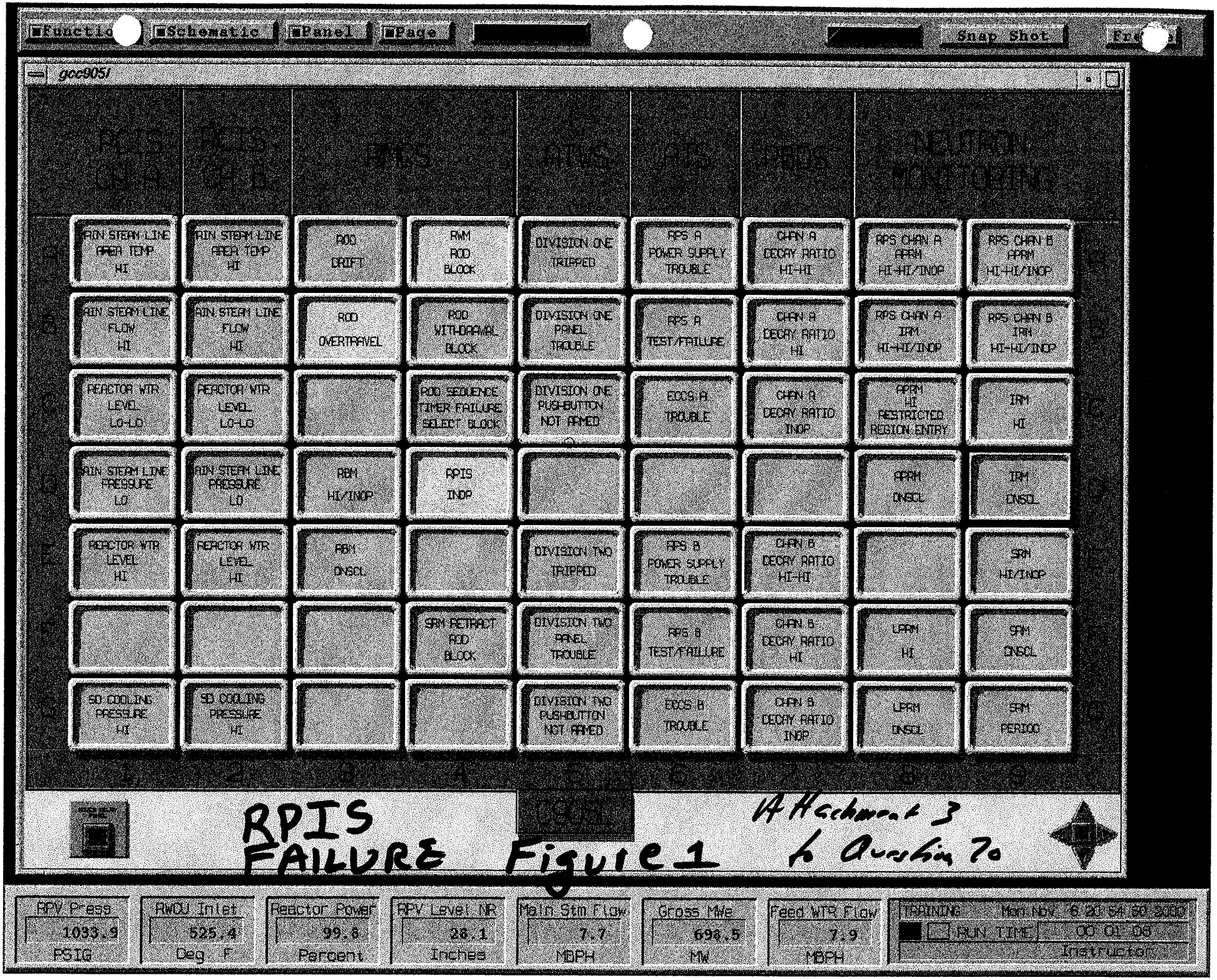
When a rod is selected, the RWM checks to see if any rod blocks need to be imposed based on control rod position. Any identified RWM rod blocks then prevent control rod movement.

3. **Feedwater Level Control System (FWLC)**

Total steam flow and total feed flow inputs are received from the FWLC circuitry. Loss of steam and feed flow inputs will prevent bypassing the RWM >20% power, and causes the RWM to initiate annunciated insert and withdraw blocks due to power level unknown (Attachment 2).

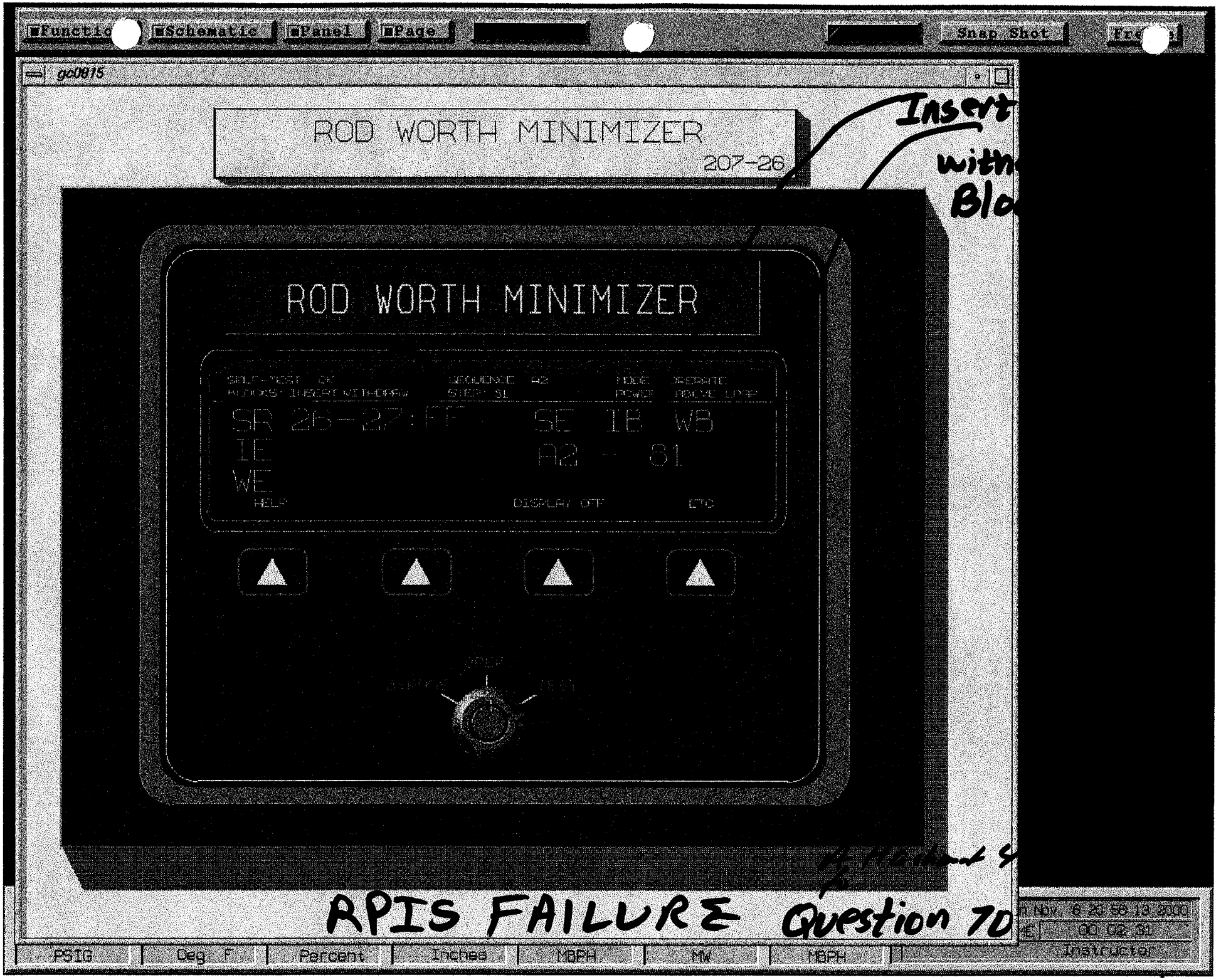
4. **Rod Position Information System (RPIS)**

Rod position data is received from RPIS via RMCS. This input is used by the RWM to determine if the programmed sequence is being adhered to. If RPIS input is lost the RWM will detect an equipment failure and impose insert and withdraw blocks.



RPIS FAILURE Figure 1

Attachment 3 to Question 70


Function
Schematic
Panel
Page
Snap Shot
gc0815
ROD WORTH MINIMIZER
207-26
Insert
with
Blo
ROD WORTH MINIMIZER
SELF-TEST OK
SEQUENCE A2
MODE OPERATE
STEP 31
SR 26-27 FF
SE 1B WB
IE
A2 - 81
WE
HELP
DISPLAY OFF
ETC
RPIS FAILURE Question 70
PSIG
Deg. F
Percent
Inches
MWPH
MW
MWPH
Instructor

NRC Exam Comment #3

Question #: 79

Question: What actions would be directed during refueling operations if a loss of high pressure service air to the refueling bridge occurred?

a. Secure refueling operations until high pressure service air is restored.

b. Place the refueling bridge air compressor in service.

c. Place the refueling bridge air compressor in service only if a fuel pool or basin drain occurs concurrently.

d. Secure refueling operations. Request maintenance to install the refueling bridge air compressor. Upon installation, place the air compressor in service to continue refueling operations.

Answer Per Exam Key: b

Comment:

This question was intended to test the candidates' understanding of the impact of a loss of service air to refueling bridge and the corrective actions that should be taken.

The following is an excerpt from our Refueling Training Material:

"Air pressure to operate the refueling tools attached to the refueling platform hoists is normally supplied by low pressure service air. If the service air supply is lost, a compressor on the refueling platform can be used."

This is also described in procedure 2.2.75, Fuel Handling and Servicing Equipment as follows

"An air compressor mounted on the north end of the bridge provides a backup air supply in the event of loss of Station air."

These statements would confirm distracter "b" as the correct response.

However station procedures do not explicitly direct operators to align the bridge air compressor should service air be lost. The only reference to the air compressor is in the pre start checks that direct steps to verify air compressor operation if the compressor is being used in lieu of service air prior to commencing refueling operations. There is no direction to place the compressor in service if service air is lost during refueling operation in any station procedure.

However the following guidance is provided should any abnormal condition occur during refueling operations.

Excerpt from Procedure 4.3, FUEL HANDLING:

"If any off-normal condition, fuel bundle damage, or evidence of interference or binding of components in the core develops, then all refueling operations shall be immediately stopped and the problem shall be investigated and corrected before further refueling operations continue."

This guidance coupled with no procedure direction to align the bridge compressor would support distracter "a" as the correct response.

Distracter "d" is incorrect because if the air compressor was placed in service, it would not be necessary for maintenance to install the compressor as the compressor is already installed.

Recommendation;

Accept either distracter "a" or "b" as a correct response.

Reference Attachments:

Attachment 1: Excerpt from Fuel Handling Training Material
Attachment 2: Excerpt from Procedure 2.2.75
Attachment 3: Excerpt from Procedure 4.3

Attachment 1
to Question 79

REFUELING

REFERENCE TEXT

If the fuel pool cooling system is unavailable, the RHR system can be crosstied for pool cooling. If necessary, the water level in the fuel pool can be returned to normal with makeup supplied from the condensate storage tanks.

3. Service Air

Air pressure to operate the refueling tools attached to the refueling platform hoists is normally supplied by low pressure service air. If the service air supply is lost, a compressor on the refueling platform can be used.

4. Power Supplies (See Attachment #1)

Breaker Number	Component
480 V MCC B-21 2176A	Service platform and jib crane
480 V MCC B-21 2176B	Refuel platform
120 V panel Y-1 3	Refueling interlock relays
480 V MCC B-21 2175	Overhead crane (Rx bldg.)

F. SYSTEM OPERATIONAL SUMMARY

NOTE: This section outlines the major steps performed during system operations and is not intended to be substituted for plant operating procedures.

1. Normal Refueling Procedure

Prior to a refueling outage, all necessary equipment is assembled and tested. Any repairs or preventive maintenance are performed and the equipment is staged in convenient locations.

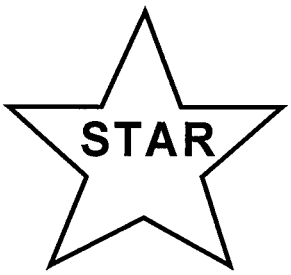
RTYPE H6.02

PILGRIM NUCLEAR POWER STATION

Procedure No. 2.2.75

FUEL HANDLING AND SERVICING EQUIPMENT

Attachment 2 to Question # 79



Stop
Think
Act
Review

SAFETY REVIEW REQUIRED

SAFETY RELATED

The refueling platform is a motor-driven bridge installed on rails on the operating floor. It traverses the Reactor well and fuel storage pool. The main hoist trolley moves on a single rail mounted on the refueling platform in a direction perpendicular to that of the platform. Three hoists are mounted on the refueling platform, one of which, the main hoist, mounted on the trolley, operates the fuel grapple. Of the two auxiliary hoists, one is mounted on the trolley and the other is installed on a monorail which extends the full length of the platform. The Rigid Pole Handling System rides on the monorail and is equipped with a 2-ton hoist. Station air is the primary source of instrument air for operating various tools. Compressed air is routed through dual air hoses to the fuel grapple and to the auxiliary hoists. An air compressor mounted on the north end of the bridge provides a backup air supply in the event of loss of Station air.

Electrical power and interlock signals are provided to the refueling platform through a reel-mounted cable which is attached to an outlet on the operating floor. A left-handed (LH) console and a right-handed (RH) console are mounted on the fuel grapple mast from which the grapple, bridge, and trolley are operated. The position indicator readouts for the XX and YY axes for positioning the trolley and bridge, and the depth indicator for the grapple as well as grapple load indication are mounted about 2 feet above and to the right of the control consoles.

4.2 FUEL GRAPPLE

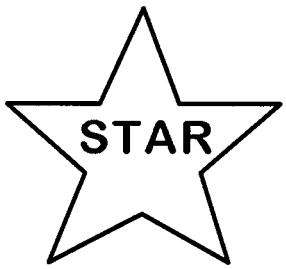
The fuel grapple consists of four triangular telescopic sections. The top section (the mast) is attached to the trolley via a gimbal and can be rotated. The operator's cab is suspended from the trolley from which the fuel grapple is operated. The control consoles are mounted on the mast within the operator's cab. There are two handles, one on each of the control consoles, by which the mast can be rotated and positioned. The hoist wires pass through the hollow mast sections and are attached to the mast head. The dual air hoses and the electric cables are routed through the center of the grapple. The head of the grapple is made to fit over the bail of the fuel bundle when the grapple hook is in the open position and, after closing, the bail and bundle can be lifted by operating the hoist. The grapple hooks are mechanically load-locking and cannot be opened electrically or mechanically with load on the hooks. If the grapple switch is set to the RELEASE position with the grapple loaded, a continuous Sonalert alarm will activate. The hoist has two limit switches to cut off "lower" power at the bottom limit or "Grapple Full Down" position. There is also a limit switch that cuts off "lower" power at a hoist load of less than 50 pounds or "slack cable" indication. The hoist has two limit switches to cut off "raise" power at a jam load of 1200 lb. A green "Grapple Closed" light illuminates whenever the grapple is fully closed. The green light will be illuminated only when the grapple is fully closed. The grapple is equipped with an internal camera with remote function capability.

PILGRIM NUCLEAR POWER STATION

Procedure No. 4.3

FUEL HANDLING

Attachment 3 to Question # 49



Stop
Think
Act
Review

MSTP RELATED

REACTIVITY CONTROL RELATED

SAFETY REVIEW REQUIRED

SAFETY RELATED

[5] An equivalent approved computer-generated Fuel Movement Schedule may be used in lieu of using the Fuel Movement Schedule in Attachment 2 of this Procedure.

[6] The appropriate Spent Fuel Pool coupon tree must be placed in a Spent Fuel Pool storage rack location adjacent to where the freshly discharged fuel is being placed. A Reactor Engineering representative will provide the Spent Fuel Pool location for the coupon tree to the fuel handling crew.

[7] If any off-normal condition, fuel bundle damage, or evidence of interference or binding of components in the core develops, then all refueling operations shall be immediately stopped and the problem shall be investigated and corrected before further refueling operations continue.

[8] Do not leave refueling platform, auxiliary hoist, or rigid pole system unattended when it is loaded and over core.

[9] Do not leave refueling platform unattended or attempt repairs or maintenance on platform when it is over core unless platform cannot otherwise be moved.

[10] All loose tools or unsecured equipment shall be removed from platform before it is positioned to conduct refueling.

[11] Fuel loading shall proceed only when all operable control rods are fully inserted, unless specifically excepted by Technical Specifications. Under no circumstances is fuel to be loaded unless the control blades in the fuel cell are fully inserted.

[12] The refueling interlocks shall be tested prior to any in-vessel fuel handling and at weekly intervals thereafter when in-vessel fuel handling operations are in progress, and following any repair work associated with interlocks prior to resuming in-vessel fuel handling.

[13] During refueling when fuel is in Reactor, any time more than one control rod is not fully inserted with fuel in their cells, all personnel shall be out of Reactor and storage cavities and at least one floor below level of fuel loading platform.

[14] During refueling when fuel is in Reactor, personnel shall be at least out of the line-of-sight of the Reactor Vessel any time a control rod is not fully inserted with fuel in its cell **UNLESS** the line-of-sight requirement has been relaxed in accordance with PNPS 2.2.87.

[15] During periods when refueling, the Reactor Manual Control System shall not be inhibited by jumpers or other methods without concurrence of the Operations Department Manager. The "REFUEL BRIDGE PLATFORM INTERLOCK BYPASS" switch on Panel C928 shall be keylocked in the "NORMAL" position. Concurrence and subsequent approval shall be obtained from the Operations Department Manager. In addition, the REACTOR MODE switch shall not be placed in "STARTUP" for any reason except as specified in approved Station Procedures.