

UNITED STATES NUCLEAR REGULATORY COMMISSION **REGION II** 101 MARIETTA STREET, N.W. ATLANTA, GEORGIA 30323

#### ENCLOSURE

Examination Report No. 50-260/0L-89-01

Tennessee Valley Authority Facility Licensee: 1101 Market Street 6N 38A Lookout Place Chattanooga, TN 37402-2801

Browns Ferry Nuclear Plant Facility Name:

Facility Docket Nos: 50-259, 50-260, and 50-296

Charles

Requalification written examinations and operating tests were administered at the Browns Ferry Nuclear Plant near Decatur, Alabama.

Chief Examiner:

Payne

Ang 30, 1989 Date Signed

Arildsen sse A.

Approved By:

Ken. E Brockman, Chief **Operator Licensing Section 2** Division of Reactor Safety

Date Signed

Aug

30, 1989

109 31, 1989 Date Signed

Summary:

Examinations were administered during the weeks of July 10 and July 17, 1989.

Requalification written examinations and operating tests were administered to 12 Reactor Operators (ROs) and 12 Senior Reactor Operators (SROs). Of the 12 ROs examined, 8 passed the examination. Of the 12 SROs examined, 7 passed the examination.



Based upon the above described results, 15 of 24 licensed operators (63 percent) passed the examination. The programmatic evaluation for the Browns Ferry Requalification Program remains unsatisfactory. An additional evaluation will be conducted prior to plant start-up to re-assess the requalification program. status.

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#### REPORT DETAILS

#### 1. Facility Employees Contacted During the Examination

- \*G. G. Campbell, Plant Manager
  \*R. G. Jones, Operations Manager
  \*P. Carrier, Manager-Licensing
  \*C. T. Dexter, Manager-Training
  \*J. Marshall, Manager-Operator Training (TVA)
  \*P. Salas, Supervisor-Compliance
  \*P. S. Hsiek, Compliance Licensing
  \*R. Moll, Operations Instructor
  \*M. Meeks, Shift Operating Supervisor
  \*M. DeRoche, Operations Instructor
- \*T. Mayfield, Operations Instructor
- \*C. Leach, Simulator Operator
- \*W. D. Lawson, Operations Instructor

`\*Attended Exit Meeting

2. NRC Personnel Involved in Examination

K. E. Brockman, Chief, Operator Licensing Section 2

D. C. Payne, Chief Examiner (Week 1)

\*J. A. Arildsen, Chief Examiner (Week 2)

\*C. Gratton, License Examiner, OLB:DLPQ:NRR

S. Guenther, License Examiner, OLB:DLPQ:NRR

R. Miller, License Examiner, Sonalyst

\*Attended Exit Meeting

#### 3. Written Exam Comments

Modifications to some of the written exam questions were proposed by the facility training staff after administration of the written exam. The utility recommendations have been consolidated within Enclosure 3. Some of the changes were accepted, based on their particular technical merit; others were not allowed. The NRC evaluation of the facility comments, and a summary of the changes made to the examination, are detailed below.

#### WEEK 1 EXAMS

Part B Exam



1. SRO #13

Comment not accepted. The relays referenced within the SIL are train specific. Since the question refers only to the situation wherein the "B" RPS Bus is de-energized, the utility recommendation is not a proper response. No change to the exam or the answer key necessitated. Comment accepted. The alternative methods of answering the question proposed by the facility are appropriate for the manner in which the question is asked and do provide an appropriate measure of the operator's knowledge. They will be added to the answer key.

3. SRO #2 (RO #4)

Comment accepted. The recommended tolerance band is appropriate and will be added to the answer key.

4. SRO #21 (RO #2)

Comment accepted. The partial credit response is appropriate and will be added to the answer key.

#### Part A Exam 176.002 -

1. Question #4723

Comment accepted. The ARP provided is specific in stating that "Low Core Flow" is an appropriate answer. It will be added to the answer key as a full credit response.

2. Question #4730

Comment accepted. The point value specified to the examinees was 1.5. However, the answer key was developed for the question to have a value of 1.0 points. The question will be changed to reflect a value of 1.0 points.

#### WEEK 2 EXAMS

Part B Exam

1. SRO #2 (RO #3)

Comment accepted. The recommended assignment of partial credit is appropriate. This allows for applying "error carried forward" and precludes the question from being a double-jeopardy situation. The answer key will be modified as suggested.

2. SRO #4 (RO #4)

Comment accepted. The wording of the question allows for this interpretation; additionally, if the examinee reponds in this manner, the knowledge being sampled is adequately displayed. No change to the answer key is required.



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3. SRO #6 (RO #7)

Comment accepted. The parametric listings are equivalent to the title of the graph. No change to the answer key is required.

4. SRO #11 (R) #12)

Comment accepted. The alternative answers are acceptable and will be added to the answer key.

#### Part A Exam 176.003

1. Question #5793

Comment accepted. The recommended additional response is acceptable.

Part A Exam 176.006

1. Question #5794

Comment not accepted. While the facility's contention that there are two correct answers is accepted, the resolution is improper. The question will be deleted from the exam. Section and total point values have been adjusted accordingly.

4. Exit Meeting

At the conclusion of the site visit, the Chief Examiner (Week 2) met with plant staff and management representatives to discuss the results of the examinations.

At this time, those items concerning plant operations which were identified by the examination team were shared with plant management. Specific commitments concerning these items were not elicited; however, their impact upon the operators' ability to effectively and consistently complete assigned tasks was noted. These shortcomings included:

- a. Hydraulic Control Unit (HCU) Accessibility Numerous tasks required operators to work above the HCUs. There were no ladders, etc. available to allow safe and easy access to these elevated areas.
- b. Keys to the locks on plant EOI lockers are currently only in the possession of the SOS/ASOS. These locks are not break-away. Consideration should be given and rapid implementation made to allow emergency access to all plant personnel.
- c. Plant operators do not know how to easily determine whether the ventilation fan on the Diesel Generator Electrical Control Cabinet is ON, or not.



- d. The identification label for Diesel Generator "A" Field Flash pushbutton is missing.
- e. Valve 2-PCV-85-32B, on the (east) Portable Nitrogen Charging Unit is not labeled. Operators could not readily identify the valve for conducting HCU pressurization.
- f. The inside of Panel 25-32, where EOI activities are performed, was dirty, debrised, and cluttered. This jeopardized the operators' ability to perform the EOI actions. Also, the operators did not know about the fluorescent light in the panel, and they were trying to perform their actions in the dark.
- g. Plant operators indicated that they had never "performed" a control room abandonment. (It had only been conducted in a table-top format.)

Additionally, on August 17, 1989, the Chief Examiner (Week 1) met with the plant staff to discuss lessons learned from the development, administration, and evaluation phases of the examination. Highlights of this discussion are included in Enclosure 5.

5. Post Examination Performance Audit

Based upon the facility's performance during the July requalification evaluation, it was necessary to further monitor their administration of annual comprehensive examinations. To support this activity, three NRC and one contract examiner audited the examinations administered during the week of August 14, 1989, This included observing the dynamic simulator and selected JPM examinations. Additionally, the written examination for the week was reviewed after its administration. During the week of August 21, 1989, one NRC examiner observed the dynamic simulator examinations given to operators who the utility had identified as needing additional training prior to their comprehensive examination.

This subsequent observation substantiated the NRC Exam Team's opinion that the facility could continue to administer their own annual comprehensive examinations, until an additional program evaluation can be conducted. This subsequent evaluation will be conducted prior to restart of Unit 2. This does not constitute an allowance for the facility to be able to return to licensed duties those personnel who failed the NRC examination or facility administered annual operating tests.

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#### ENCLOSURE 3

#### FACILITY COMMENTS ON WRITTEN EXAM QUESTIONS

The comments contained herein are extracted from the input provided by the facility. Facility comments were provided in an encapsulated form, within the revised Master Exams and Answer Keys. Future comments should be provided in a format which identifies each change to the answer key in a unique manner, with a justification for the change included in the submittal.

#### WEEK 1 EXAMS

#### Part B Exam

#### 1. SRO #13

The answer key should be revised to allow for the following alternative response. Justification is provided in GE SIL 344, enclosed.

"Check the K17 Relay for both the A and B trains and then reset the relay that had opened."

2. SRO #17 (RO #17)

The answer key should be revised to allow for the following alternative responses:

"Adjust KVAR or KW to meet Illustration #1" -or- "Adjust KW to approximately 2350."

3. SRO #2 (RO #4), Part A

Revise the answer key as follows:

"12.85 Feet, + or - 0.15 feet"

4. SRO #21 (RO #2), Part A

Add the following partial credit response to the answer key:

"dP = 20 psid" @ 1/2 credit

Part A Exam, 176.002



1. Question #4723

Add the following full credit response to the answer key. (Justification is provided in the enclosed Annunciator Response Procedure)

"Low Core Flow"

Enclosure.3

#### 2. Question #4730

The point value of the question should be changed from 1.5 to 1.0. This is to bring the question into compliance with the grading criteria established within the answer key. (There is a disagreement between the question and the answer key as to the question's worth.)

#### WEEK 2 EXAMS

#### Part B Exam

1. SRO #2 (RO #3)

Partial credit for an error carried forward needs to be established for the case where the operator answers "Yes" in Part A of the question. Add to the answer key the following partial credit response:

a. Yes (0.0)

b. "A" and 3EA" Diesel Generators (0.5)

2. SRO #4 (RO #4), Part B

Full credit should be allowed if AOI actions that accomplish "normal EOI functions" are referenced. (Potential misinterpretation of the question).

3. SRO #6 (RO #7), Part B

Accept as equivalent for the "Drywell Spray Initiation Curve", the listing of the two axis parameters - "Suppression Chamber Temperature" and "Drywell Pressure."

4. SRO #11 (RO #12), Part B

Accept these additional full credit responses to the answer key:

"Temperature near instrument runs"

"Water level indications"

Part A Exam, 176.003

1. Question #5793



Accept the following additional basis for the "ATWS Trip" as a full credit response:

"To reduce power during an ATWS Event/Failure to Scram."

# Enclosure 3

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# Part A Exam, 176.006

1. Question #5794

Accept either answer "A" or "D" as a full credit response. Justification is enclosed.



April 1981 File Tab C

DEPARTMENT

SIL No. 344 Revision 1 Category 3

#### MODE SWITCH SHUTDOWN SCRAM RESET PERMISSIVE

Recently a report was received from an operating BWR that while the reactor mode switch was in the RUN mode, a reactor protection system (RPS) motor generator set failed causing a half scram. When the RPS power was restored, the operator observed that the Mode Switch Shutdown Scram Reset Permissive was annunciated which is abnormal while in the RUN mode. Subsequent investigation determined that a relay "race" resulted in this reset permissive alarm.

The purpose of this revision to Service Information Letter (SIL) 344 is to present a different fix for the problem than that proposed in the original issue of SIL 344. While the original fix would have solved the problem of relay races between K16 and K17 when power is lost, because of variations in mode switch design it might have created other problems at some plants. The fix presented in this revision is not affected by plant mode switch configurations.

# NOTE

In the following discussion and subsequent recommendations the reference designators used to identify circuit components are typical and many vary from plant-to-plant.

#### DISCUSSION

Normal Circuit Operation: When the mode switch (S1) is in the SHUTDOWN position, its contacts 1-1c are closed causing K16A to be energized. When K16A is energized, (with the mode switch in SHUTDOWN) its contacts 1 and 2 are open preventing 120 vac from being applied to the full wave rectifier and consequently keeping K17A de-energized. In this configuration (K16A energized and K17A de-energized) a bypass circuit around the 9-9c contacts of the mode switch is formed by contacts 3-4 of K16A (closed because K16A is energized) and contacts 3-4 of K17A (closed because K17A is de-energized). This bypass circuit provides a path for voltage to energize the manual scram relays K15A and K15C after the protection system is reset. When the mode switch is moved to the intermediate position between SHUTDOWN and REFUEL, mode switch contacts 1-1c open (in some plants) and mode switch contacts 9-9c remain open (in some plants). When this happens, it is necessary to have a seal-in circuit to keep K16A energized in order to maintain the bypass circuit around the 9-9c contacts until they close in the REFUEL position. This seal-in circuit to keep K16A energized is provided by the K17A contacts 1-2 (and the normally open K16A contacts added in this revision). When the mode switch is moved to the REFUEL position, its contacts 9-9c close (and remain closed for all other mode switch positions through RUN) and the bypass is no longer needed. At the same time the mode switches 9-9c contacts close, its 2-2c contacts also close and apply 120 vac to the bridge rectifier circuit, energizing K17A. When K17A energizes, its contacts 1-2 in the coil circuit of K16A open and since the mode switch contacts 1-1c are also open, voltage is no longer applied to the coil of K16A and it GENERAL CA ELECTRIC



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de-energizes. With K17A energized and K16A de-energized both sets of relay contacts that formed the bypass around mode switch contacts 9-9c are open, removing the bypass.

#### <u>NOTE</u>

There are a number of different mode switch developments in existence in the different generations of operating plants. Some of the mode switch developments are such that a seal-in circuit for K16A is not needed. However, since the circuit does no harm (its simply redundant) and since design records for operating plants may not always reflect modifications made after the plant is turned over, we have selected a fix which should be compatible with all design configurations that have a seal-in circuit (a circuit that parallels the mode switch contacts 1-1c) to the K16A coil. Plants which do not have this seal-in circuit will not have the problem of a relay race after power loss in the RUN mode.

When the reactor is being shutdown and the mode switch is placed in the SHUTDOWN position, mode switch contacts 1-lc close energizing K16A. This action causes the K16A contacts 1-2 in the coil circuit of K17A to open and since mode switch contacts 2-2c are also open in the SHUTDOWN position, the 120 vac power is removed from the bridge circuit and K17A de-energizes. When K17A de-energizes its 3-4 contacts do not close for a two-second period. During this time the 9-9c contacts are also open and the bypass circuit around them is not completed (because the K17A 3-4 contacts have not closed) so the circuit to manual scram relays K15A and K15C is opened. Thus placing the mode switch in the SHUTDOWN position automatically initiates a manual scram if a scram has not already occurred.

Circuit Operation After Power Loss: In the original circuit configuration, if power is lost and then regained while the reactor is operating with the mode switch in the RUN position, K16A might energize before K17A. If this happens the K16A 1-2 contacts will prevent K17A from energizing. With K16A energized and K17A de-energized, the bypass circuit around mode switch contacts 9-9c is established (even though contacts 9-9c are closed in RUN) and the annunciator that indicates the bypass will be activated. As the reactor is brought down and the mode switch is rotated through the STARTUP and REFUEL positions, its contacts 2-2c are closed. Closure of the 2-2c contacts applies 120 vac to the bridge rectifier circuit to cause K17A to energize. This in turn will de-energize K16A and will open the bypass circuit around the mode switch 9-9c contacts. However, if the operator were to rotate the mode switch rapidly through the STARTUP and REFUEL positions, it is possible that the switch might be placed in the SHUTDOWN position without energizing K17A. This would place the circuits in a configuration that would prevent the de-energization of the manual scram relays (K15A and K15C) and thus prevent a scram from being automatically initiate when the mode switch is moved to the SHUTDOWN position.





#### SIL No. 344 Revision 1

# NOTE

Another RPS function may trip the RPS when going from RUN to SHUTDOWN. This is the 15% power trip in the STARTUP mode.

The energization of the wrong relay (K16A instead of K17A) after a power loss when the mode switch is in the RUN position can be prevented by wiring a spare normally open contact of K16A in series with the K16A coil. This provides a seal-in circuit for K16A which will allow the circuitry to function normally and will prevent K16A from being energized by any circuit action except the closure of mode switch contacts 1-1c.

#### RECOMMENDED ACTION

General Electric recommends that BWR operators add a spare set of normally open K16A contacts in series with the K17A contacts as shown in the attached modified circuit diagram. These contacts will close to provide a seal-in path in normal operation when K16 is energized by the closure of the 1-1c mode switch contacts and they will prevent inadvertent energization of K16 by any other event.

# NOTE

Depending on the mode switch development, which varies from plant to plant, other circuit modifications could be made to prevent the "relay race" after a loss of power. General Electric recommends this modification because it is applicable to all plants and is easily implemented.

Contact your local General Electric service representative for more information.

Prepared by: T.L. Garg/R.E. Bates

Approved by:

D.K. Willett, Manager

BWR Product Service

Product Reference: C71-Reactor Protection System

Issued by D.L. Allred, Manager

Utility Support Services



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SHUTDOWN SCRAM RESET-INTERLOCK

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PANEL 9-3 Panel 9-3 Page 87 SFARP 2-XA-55-30 Unit 2 . <del>د</del> ب **REV 0006** CORE SPRAY SENSOR/TEIP POINT: STS I SPARGER BREAK PdIS-75-28 2 psid decreasing DP (15 second time delay) 2-PDA-75-28 14 SENSOR LOCATION: Panel 25-57 Rx Bldg E1 555', R10-8 PROBABLE CAUSE: Core spray piping break between reactor vessel wall 1. and reactor shroud (if alars comes in during steady-state power operation). 2. Low core flow (valid alarm in cold condition). . . . . . . . Sensor milfunction. 3. AUTOMATIC ACTION: None. DISPATCH an AUO to Panel 25-27 to check OPERATOR ACTION: . 1. PDIS-75-28. COMPARE with PDIS-75-56, on same panel. The normal reading should be approximately 3.5 paid at high power operation. 2. If necessary, REQUEST that IMs verify proper instrument operation. If there are indications of a broken core spray 3. header, CONSIDER the associated Core Spray System inoperable and REFER to Tech Spec 3.5.A. 4. If there are no indications of a core spray header break, REFER to Tech Spec Table 3.2.B. REFERENCE DRAWINGS: 2-45N620-2 GE 7302930-2 & -8 2-472600-59 2-472610-75-1

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General Revision 0371p

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TITLE: STAN	DBY DIESEL GENERATOR SYSTEM OPERATING INSTRUCTIONS UNIT 0
8.1 Paralle	el with System Operation at Panel 9-23 (Continued) $R = V 0015$
NOTE:	
Only one Uni with system.	it 1 and 2 Diesel Generator at a time shall be operated in parallel
r.	
8.1.6	PULL and then PLACE the DG A (B, C, D) OPERATION MODE SELECTOR switch in PARALLELED W/SYSTEM.
8.1.7	RELEASE the DG A (B, C, D) OPERATION MODE SELECTOR switch and OBSERVE the PARALLELED W/SYSTEM light illuminated.
8.1.8	ADJUST diesel generator frequency using DG A (B, C, D) GOVERNOR CONTROL switch to obtain a synchroscope needle rotation of one revolution every 15 to 20 seconds in the FAST direction.
8.1.9	ADJUST diesel generator voltage (INCOMING) to match 4-kV shutdown board voltage (RUNNING) using DG A (B, C, D) VOLTAGE REGULATOR CONTROL switch.
8.1.10	When the synchroscope needle is approximately 2 minutes on the left hand side of the 12 o'clock position, CLOSE the diesel generator output breaker using DG A (B, C, D) OUTPUT BKR 1818 (1822, 1812, 1816) CONTROL switch.
8.1.11	PLACE the DG A (B, C, D) OUTPUT BKR 1818 (1822, 1812, 1816) SYNC switch to OFF.
NOTE:	•
Lagging VARS decreasing) allow for ac should be re power factor adjusted to kVAR loading the maximum	S should be maintained when adjusting kW load (increasing or This may require kW load adjustment to be stopped periodically to djusting kVAR load. Once desired kW load is achieved, Illustration <u>1</u> eferred to for determination of kVAR loading required to obtain a (pf) of 0.8 lagging. Diesel generator kVAR load should then be obtain a 0.8 pf lagging. If system conditions will <u>not</u> permit the g required to obtain a 0.8 pf lagging, kVAR load should be adjusted to kVAR lagging the system will allow.
8.1.12	ADJUST kW and kVAR load using DG A (B, C, D) GOVERNOR CONTROL switch and DG A (B, C, D) VOLTAGE REGULATOR CONTROL switch until desired kW and kVAR load is obtained.
8.1.13	RECORD time/date loaded on Illustration 2.
0 1 1/	KONITOD the effected courses that is peralloled with the discel

generator. If abnormal voltage or frequency transients are experienced, SEPARATE the 4-kV shutdown board from offsite power in accordance with Section <u>8.2</u> and REFER to <u>0-01-57A</u> to transfer the 4-kV shutdown bus to a stable offsite source if one is available.

0467p

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0-01-82



BFN OPERATOR TRAINING GROUP 1989 LICENSED REQUAL. FINAL EXAM COVER SHEET

NAME	· .	PREPARED BY NRC	
SOCIAL SECURITY	·	REVIEWED BY: M& Meck	
DATE OF EXAM	·	LEAD INSTR. <u>Rf. Molc</u>	r 
GRADED BY/DATE		4	
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SECTION A	13.0		<u>*</u> *
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### EXAMINATION RULES

1. Cheating on the test is a demonstration of unsatisfactory progress, pending further disciplinary action and will not be tolerated.

2.Place your name on all pages of your answer sheet.

3.Do not talk with anyone during the test other than the test administrator.

- 4.Read and answer all questions completely. Show all work and state all assumptions.
- 5.Write legibly, use ONLY BLACK INK and do not write on the back of your paper.
- 6. The point value for each question is indicated next to the question number.

All work on this examination is my own. I have neither given nor received aid.

Examinee Signature

MASTER WK #1

PART A 176.001

OPL176.001 Page 3 of 3

### SECTION A PLANT OPERATIONS

EXAM NO: 176.001

STUDENT HANDOUT

#### A. INITIAL PLANT CONDITIONS

100% steady state power for 3 months. No equipment out of service.

INITIATING EVENT

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XA-55-1-2 "TURB TRIPPED ELECTRICAL TROUBLE"

#### C. <u>PROCEDURES IN USE</u>

a. EOI-1: RC/P-2, C5-2, and RCQ-4 & 5.

b. EOI-2: SP/T-2, DW/T-1, SP/L-1, DW/P-1.

c. App. 8, and 3 of EOI-1 is completed.

d. App. 4 of EOI-1 is in progress.

# EXAM 176.001 GENERAL INFORMATION

# -- EXAM INFORMATION --

EXAM NO.: 176.001

DATE GENERATED: 07/09/89

TOTAL POINTS: 13.00

RESPONSE TIME (min): 32.0

MC QUESTIONS:	5		POINTS:	5.00
TF QUESTIONS:	0	•	POINTS:	0.00
ES QUESTIONS:	8		POINTS:	8.00



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ER KEY .

SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.001 PAGE: 1

PV:1.0 Q#:5093 RT:2.0 LP:OPL176.001, OPL174.850/10 CT:SYS
 Describe how the following items would respond if drywell pressure increased to 2.45 psig. (OPEN/CLOSE/NO CHANGE)

a. RHR system II test valve, 74-73.

b. RHR System II Suppression Pool Valve 74-71.

<u>ANSWER</u> : a. No change (.5)

b. No change (.5)

2) PV:1.0 Q#:5092 RT:3.0 LP:0PL176.001, 0PL174.731/10 CT:I&C

Answer the following concerning APRM indications:

a. Why are the APRM Hi-Hi lights illuminated on panel 9-14 ?

b. Why are the APRM Hi-Hi lights on panel 9-5 NOT illuminated ?

ANSWER :

a.) Rx power was >15% when mode switch was taken out of run. (.5)

b.) Panel 9-14 lights seal-in, 9-5 apron lights do not seal in. (.5)
 (power is <15%)</pre>

CR KEY

SECTION A FINAL EXAM 89 REQUAL WEEK 1 📜 E

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EXAM: 176.001 PAGE: 2

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3) PV:1.0 Q#:4260 RT:2.0 LP:OPL176.001, OPL173.724.5, 3450340102, OPL173.813

The condition that caused the RWCU system to isolate is most accurately described by:

a. RWCU system high area temperature.

b. Non-regenerative heat exchanger outlet high temperature.

c. SLC injection.

d. RWCU system pipe trench high temperature.

ANSWER :C

4) PV:1.0 Q#:5095 RT:2.0 LP:OPL176.001, OPL174.802 CT:SYS

Based on current plant conditions the status of "A" RFP is most accurately described by which of the following:

a. MSC controlling speed; using HP steam.

b. MSC controlling speed; using LP steam.

c. MGU controlling speed; using HP steam.

d. MGU controlling speed; using LP steam.

ANSWER :C

5)

PV:1.0 Q#:5103 RT:2.0 LP:0PL176.001, 0PL174.733/9 CT:0I, SYS

Based on current plant conditions, if RCIC operation were required to maintain water level, what would the operator have to do to place RCIC in service?

#### ANSWER :

Run trip throttle valve closed (71-9) .(.5) and then re-open.(.5)

ER KEY

SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.001 PAGE: 3

#### 6) PV:1.0 Q#:5101 RT:2.0 LP:0PL176.001 CT:SYS

A mechanism available to initiate CR insertion is by venting the scram air header. How does this accomplish control rod insertion?

<u>ANSWER</u>: Bleeds the air off of scram valves (1.0) (to Rx. bldg scram valves fail open on a loss of air.)

7) PV:1.0 Q#:5100 RT:3.0 LP:0PL176.001, 0PL171.016 CT:SYS

State two reasons why the drywell to torus differential pressure decreased as a result of this transient?

#### ANSWER :

1. D/W delta P compressor is isolated. (.5)

2. Suppression chamber pressure has increased slightly due to torus heat-up. (.5)

PV:1.0 Q#:5098 RT:2.0 LP:OPL176.001, OPL174.850/17 CT:SYS

Why are the RHR system I and II test isolation valve yellow lights out?

#### ANSWER :

8)

Because the test valves are open beyond their LOCA closing time (as a result of both loops being placed in torus cooling) (1.0)

ER KEY

SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.001 PAGE: 4

9) PV:1.0 Q#:5097 RT:2.0 LP:OPL176.001, OPL171.035/2,6 CT:I&C, SYS
The four-rod display LPRM detector bypass lights are on because:
a. LPRM's around the selected rod are downscale.
b. Rod selected is an edge rod.
c. APRM power is below 30%.

d. Power as sensed by turbine 1st stage is below 30%.

ANSWER :C

10) PV:1.0 Q#:5096 RT:2.0 LP:0PL176.001, 0PL174.845/10 CT:SYS

The UO reported the selected control rod would not insert using the Emergency IN switch. The control rod did not insert because of:

a. RSCS block.

b. Mode switch in S/D block.

c. RWM block.

d. RPIS INOP block. ANSWER :C

11) PV:1.0 Q#:4269 RT:4.0 LP:OPL176.001, OPL173.724.5, OPL173.826 CT:SYS

List four currently displayed indications that SLC is injecting to the reactor vessel?

ANSWER : SLC injection flow alarm. Red flow light on. Pump breaker is closed (Red light on) . AMBER continuity light out. Loss of continuity alarm. SLC pump pressure > reactor pressure. (any 4 @ .25 each) R KEY

SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.001 PAGE: 5

#### 12) PV:1.0 Q#:5792 RT:3.0 LP:0PL174.815, NRC CT:SYS

What signals/permissives are required for the RCIC condensate storage tank suction valve (FCV-71-19) to automatically open (if closed)?

#### ANSWER :

A RCIC initiation signal (low-low level/-51.5") must be present (0.5) and at least one of the torus suction valves (FCV-71-17/18) can not be fully open (.5)

#### 13) PV:1.0 Q#:5790 RT:3.0 LP:0PL171.056, NRC CT:SYS

Which one of the following does NOT represent the actual difference between the three Browns Ferry units?

The unit 1 and 2 HPCI and RCIC vacuum breaker taps from the torus are not common. The unit 3 HPCI and RCIC vacuum breaker tap from the torus is common.

- b. The unit 1 and 2 Reactor Water Cleanup System (RWCU) returns to the vessel via the B feedwater line. The unit 3 RWCU returns to the vessel via the A and B feedwater lines.
- c. Units 1 and 2 have three Raw Cooling Water (RCW) pumps each with one additional pump serving as a spare for either unit. Unit 3 has three RCW pumps and two spare pumps.
- d. Units 1 and 2 Control Rod Drive (CRD) systems share the 1B CRD pump as a standby. Unit 3 CRD system is independent of units 1 and 2.

ANSWER : A

#### OPL176.001 Page 1 of 3

#### SECTION A PLANT OPERATIONS

EXAM NO:	176.001		
DATE PREI	PARED: <u>9-</u>	-10-88	
LOCATION	STORED:	ST-07	

#### A. <u>DESCRIPTION</u>

Turbine trip from 100% power with a failure of RPS to initiate a reactor scram.

#### B. <u>STORED SIMULATOR SETUP</u>

1. INITIAL CONDITION:

IC-17, 100% power, no equipment out of service.

#### 2. MALFUNCTIONS ACTIVE:

NUMBER	DESCRIPTION
093	RPS Failure
001	Generator Trip
167	ADS Failure
172	MSIV Low Level isolation bypass

#### 3. REMOTE FUNCTIONS:

NUMBER	DESCRIPTION
FK-096	RPS A fuses removed
FK-098	. Bypass Group 6 isolation



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#### 4. OPERATOR ACTIONS TAKEN:

a. Depress manual scram pushbuttons.

b. Mode switch in Shutdown.

c. Disagreements cleared on Recirc, RWCU, and Generator.

d. Both loops of RHR in suppression pool cooling.

e. ADS is disabled.

f. SLC A injection initiated.

g. App. 8 of EOI-1 completed (Rx. Bldg. Ventilation in service)

h. HPCI Aux. oil pump in PTL

i. RCIC is tripped

j. RFPT A in manual maintaining level.

k. B and C RFPT's tripped.

#### C. INSTRUCTOR\_ACTIONS:

1. Manually advance all recorders.

2. Playback Exam: <u>ST-07, 176.001</u>

3. Playback Time: ~10 mins.

4. Turn off Recorder Power.

5. Take out of freeze and acknowledge annunciators.

D. EXAM INFORMATION:

1. Total No. Questions: 10

2. Total Points: 12

3. Response Time: 30 minutes

E. <u>EXAM\_REVIEW/APPROVAL</u>:

VALIDATED BY	R. Miller/J. Lamb
APPROVED BY	PERATIONS TRAINING
APPROVED BY	MF Meel (OPERATIONS REPRESENTATIVE)

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#### SECTION A PLANT OPERATIONS

EXAM NO: 176:001

#### STUDENT HANDOUT

#### A. INITIAL PLANT CONDITIONS

100% steady state power for 3 months. No equipment out of service.

B. INITIATING EVENT

XA-55-1-2 "TURB TRIPPED ELECTRICAL TROUBLE"

#### C. PROCEDURES IN USE

a. EOI-1: RC/P-2, C5-2, and RCQ-4 & 5.

b. EOI-2: SP/T-2, DW/T-1, SP/L-1, DW/P-1.

c. App. 8, and 3 of EOI-1 is completed.

d. App. 4 of EOI-1 is in progress.

MASTER 4 PART A 176.002

BFN OPERATOR TRAINING GROUP 1989 LICENSED REQUAL. FINAL EXAM COVER SHEET

NAME	·	PREPARED BY NRC	• · · · · · · · · · · · · · · · · · · ·
SOCIAL SECURITY NUMBER		REVIEWED BY: INSTR. MPM	leek
DATE OF EXAM		LEAD INSTR. R. M	oll .
GRADED BY/DATE		•	•
-	PT. VALUE	SCORE	26
SECTION A	13-01-12.5	•	
SECTION B	×		
TOTALS	······································		,

#### EXAMINATION RULES

1. Cheating on the test is a demonstration of unsatisfactory progress, pending further disciplinary action and will not be tolerated.

Place your name on all pages of your answer sheet.

- 3.Do not talk with anyone during the test other than the test administrator.
- 4.Read and answer all questions completely. Show all work and state all assumptions.
- 5.Write legibly, use ONLY BLACK INK and do not write on the back of your paper.
- 6. The point value for each question is indicated next to the question number.

All work on this examination is my own. I have neither given nor received aid.

Examinee Signature

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#### SECTION A PLANT OPERATIONS

EXAM NO: 176.002

STUDENT HANDOUT

### A. INITIAL PLANT CONDITIONS

Rx. subcritical, start-up in progress, currently withdrawing Group 3 Rods, Step 58, Rod 46-35. APRM "E" is bypassed.

#### B. INITIATING EVENT

None

C.

PROCEDURES IN USE

GOI-100-1A.

# -- EXAM INFORMATION --

EXAM NO.: 176.002

DATE GENERATED: 07/09/89

TOTAL POINTS: 13.00

RESPONSE TIME (min): 41.0

MC	QUESTIONS:	8	POINTS:	8.00
TF	QUESTIONS:	0	POINTS:	0.00
ES	QUESTIONS:	4	POINTS:	5,00

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ANCHER KEY

## SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.002 PAGE: 1

1) PV:1.0 Q#:5120 RT:2.0 LP:OPL176.002, OPL171.035/2 CT:SYS

Which of the following statements best describes the reason why the RBM bypass lights on panel 9-5 are illuminated?

a. Both steam flow and feedwater flow are <30%.

b. Turbine first stage pressure is sensed at  $\leq 154$  psig.

c. APRM's A and B indicate downscale.

d. APRM's B and C indicate downscale.

ANSWER :D

> 2) PV:1.0 Q#:5122 RT:4.0 LP:OPL176.002, OPL174.813/8 CT:SYS



a. A white retract permissive light is illuminated over the SRM count rate indicators on panel 9-5. If an SRM was selected and withdrawn when should the light extinguish?

b. Would the SRM detector withdrawals be blocked when the retract permit light extinguished? Justify your answer.

ANSWER :

A. <100 cps.(.5)

B. No. (.25)(Retract permit is a rod block,)not a detector block.(.25)

SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.002 PAGE: 2

3) PV:1.5 Q4:4730 RT:5.0 LP:OPL176.002, OPL173.830 CT:GOI

Prior to pulling control rods for this start-up, the following SRM readings were recorded.

SRM A:35 cpsSRM B:42 cpsSRM C:40 cpsSRM D:37 cps

Can control rod withdrawal be done in continuous notch withdrawal mode? Justify your answer.

#### ANSWER :

No (.5) Notch withdrawal must begin when any SRM reaches 16X its reading before rod withdrawal began (.5) (All SRMs are at or above this value, SRM C being the most obvious)

PV:1.0 Q#;5123 RT:2.0 LP:OPL176.002, OPL171.009/E CT:SYS

For current plant conditions, if SRV 1-31 handswitch were placed in open, the following would occur:

a. Red light on; SRV opens.

b. Red light on; SRV remains closed.

c. Red light off; SRV opens.

d. Red light off; SRV remains closed.

ANSWER :B



ANGWER KEY

SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.002 PAGE: 3

5) PV:1.0 04:5124 RT:5.0 LP:OPL176.002, OPL174.732/10 CT:I&C, SYS

For current plant conditions, if annunicator SUPPRESSION CHAMBER LEVEL HIGH (9-3, 3F-12) were received, HPCI would respond as follows:

a. 73-26 and 73-27 fully open, then 73-40 closes.

b. 73-26 and 73-27 start open, 73-40 starts closed.

c. 73-40 closes, then 73-26 and 73-27 open.

d. 73-40 remains open, 73-26 and 73-27 remain closed.

ANSWER :D

. . .

a.

6) PV:1.0 Q#:4733 RT:4.0 LP:OPL176.002, OPL174.819/5, OPL174.820/2, OPL174.731/5, OPL174.814/5 CT:SYS

The following trip signals (scram, rod block, isolation) are present:

Main Steam Line Pressure Low

b. Control Valve Fast Closure



d. APRM Downscale

For each trip signal, explain what is currently bypassing its trip function.

#### ANSWER :

A. Mode switch not in run.

B. <30% power as sensed by 1st stage pressure

C. IRM's are on range 1.

D. Mode switch not in run.

(.25 each)

SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.002 PAGE: 5

#### 10) PV:1.0 04:4727 RT:3.0 LP:OPL176.002, OPL174.819/5 CT:SYS

For current plant conditions, if the SDV keylock bypass switch was placed in bypass, which of the following statements is correct:

a. No rod block; SDV Hi-Hi scram is not bypassed.

b. Rod block; SDV Hi-Hi scram is not bypassed.

c. No rod block; SDV Hi-Hi scram is bypassed.

d. Rod block; SDV Hi-Hi scram is bypassed. ANSWER :A

11) PV:1.0 Q4:5791 RT:2.0 LP:OPL171.038, NRC, LER88-26, 3451050102 CT:SYS

Which one of the following describes the adverse effect that could occur if the Diesel Generator governor is not fully positioned to the Low Speed Stop prior to performing a manual slow start?

Bearing damage due to high oil pressure lifting the system relief , and short circuiting flow to the sump.

b. Generator damage due to loss of automatic field flashing on local start.

c. Engine damage due to crankcase overpressure.

d. Engine trip due to overspeed.

ANSWER :D

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#### SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.002 PAGE: 6

12) PV:1.0 Q4:5787 RT:3.0 LP:OPL.171.014, NRC CT:SYS

Unit 2 is operating at 100% power with the following initial conditions:

Turbine load set Pressure set Max. combined flow set Load limit set Recirc flow control 100% 920 psig 100 (125% steam flow) 100% Master manual

An electrical fault causes the load reject relay to pick-up. Which one of the following correctly describes the plant's response to this transient? Assume no operator action.

- a. Reactor pressure will increase due to rapid closure of the Turbine Control Valves resulting in a high pressure reactor scram.
- b. Control oil pressure will decrease due to rapid closure of the Turbine Control Valves resulting in a low control oil pressure scram.
- c.' Reactor power will increase due to rapid closure of the Turbine Control Valves resulting in a high flux reactor scram.
  - d. The Turbine Control Valves will rapidly close resulting in the Bypass Valves opening to control pressure with the plant eventually stabilizing at 60% power.

ANSWER :B

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OPL176.002 Page 1 of 3

# SECTION A PLANT OPERATIONS

EXAM NO: 176.002

DATE	PREPARED:	12-16-88	
DAIG	FACFAACD.	12-10-00	

LOCATION STORED: ST-06

### A. DESCRIPTION

Reactor start-up from cold conditions is in progress. Reactor is not yet critical.

#### B. STORED SIMULATOR SETUP

1. INITIAL CONDITION:

IC-4, start-up in progress.

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2. MALFUNCTIONS ACTIVE:

NUMBER DESCRIPTION

3. REMOTE FUNCTIONS:

NUMBER DESCRIPTION

None

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05790

4. OPERATOR ACTIONS TAKEN:

a. Sign off Groups 1 & 2 CR's withdrawn to position 48.

b. Currently on Step 58.

# C. INSTRUCTOR ACTIONS:

- 1. Hanually advance all recorders.
- 2. Playback Exam: <u>176.002; ST-06</u>
- 3. Playback Time: ~10 secs.

4. Turn off Recorder Power.

5. Take out of freeze and acknowledge annunciators.

6. Insure Rod 46-35 selected, SRM B and C selected for recording.

# D. EXAM INFORMATION:

1. Total No. Questions: 11

2. Total Points: 12.5

3. Response Time: 50 minutes

## E. <u>EXAM REVIEW/APPROVAL</u>:

VALIDATED BY	N. Neek
APPROVED BY	Ry mole
	OPERATIONS TRAINING

APPROVED BY

(OPERATIONS REPRESENTATIVE)

### SECTION A PLANT OPERATIONS

EXAM NO: 176.002

STUDENT HANDOUT

#### INITIAL PLANT CONDITIONS

Rx. subcritical, start-up in progress, currently withdrawing Group 3 Rods, Step 58, Rod 46-35.

# B. INITIATING EVENT

None

# C. PROCEDURES IN USE

GOI-100-1A.

MASTER WK #1 PART B RO

BFN OPERATOR TRAINING GROUP 1989 LICENSED REQUAL. FINAL EXAM COVER SHEET

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NAME	·····	PREPARED BY	<u>IRC</u>
SOCIAL SECURITY NUMBER DATE OF EXAM		REVIEWED BY:	
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GRADED BY/DATE			
	PT.VALUE	SCORE	<b>%</b>
SECTION A	· ,	۰ 	
SECTION B	22.75	<u> </u>	• 
TOTALS	•	· .	

#### EXAMINATION RULES

1. Cheating on the test is a demonstration of unsatisfactory progress, pending further disciplinary action and will not be tolerated.

Place your name on all pages of your answer sheet.

- 3.Do not talk with anyone during the test other than the test administrator.
- 4.Read and answer all questions completely. Show all work and state all assumptions.
- 5.Write legibly, use ONLY BLACK INK and do not write on the back of your paper.
- 6. The point value for each question is indicated next to the question number.

All work done on this examination is my own. I have neither given nor received aid.

Examinee Signature

# EXAM ROWEEK1B-1 GENERAL INFORMATION

-- EXAM INFORMATION --

EXAM NO.: ROWEEK1B-1

DATE GENERATED: 06/23/89

TOTAL POINTS: 22.75

RESPONSE TIME (min): 78.0

MC QUESTIONS:	13	POINTS:	13.00
TF QUESTIONS:	0	POINTS:	0.00
ES QUESTIONS:	8	POINTS:	9.75

#### EXAM: ROWEEK1B-1 PAGE: 1

### ANSWER KEY

1 ) • PV:1.0 0#:4343 RT:5.0 LP:OPL174.822.6, 3440130302, 2950150301 CT:TS

The feedwater master controller fails, demanding minimum feedwater flow, with the unit operating at rated power. At -105" the MSIVs close causing the reactor to scram. HPCI and RCIC initiate. Reactor pressure is controlled with SRVs.

Which one of the following statements is correct concerning the above situation?

a. The Thermal Power Safety Limit has been exceeded.

b. The Power Transient Safety Limit has been exceeded.

c. The Reactor Vessel Water Level Safety Limit has been exceeded.

d. The Reactor Coolant Safety Limit has been exceeded.

e. No Safety Limit has been exceeded.

NSWER : B

2) • PV:1.0 Q#:4355 RT:7.0 LP:OPL174.812, 2000230501, WEEK 3 CT:EOI

Given the following situation:

Drywell pressure 35 psig Drywell temperature 246 deg. Indicated suppression pool level 20 feet Suppression pool temperature 127 deg. F Suppression chamber temperature 130 deg. F RHR suction pressure 55 psig Test gauge pressure 35 psig

a. What is the actual primary containment water level? (.5)

b. State why drywell sprays should not be initiated under present conditons? (.5)

ANSWER : A. ( $\Delta P = 20$  psid) Level = 45 ft. <u>+</u> 2.5 ft.(.5) ( $\frac{1}{2}$  credit for  $\Delta f = \frac{1}{20}$  psid) . suppression pool level is greater than 18 feet. (0.5) •

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SECTION B RO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B-1 PAGE: 2

\*PV:1.0 Q#:4350 RT:3.0 LP:OPL174.812.1, OPL174.812.2 CT:EOI

A failure of the EHC pressure controller causes reactor pressure to increase to 1060 psig. The reactor automatically scrams on high pressure causing reactor water level to drop to -40 inches. Several minutes after the scram, level is normal and reactor pressure is being maintained by the turbine bypass valves.

a. Which sections of the EOI's should be entered? (.5)
b. What two plant parameters justify your selections? (.5)

ANSWER :

YER KEY

3)

Sections-RC/L, RC/P, RC/Q: (.5) Rx pressure >1043 psig (.25) Rx water level <+11 inches (.25)

\*PV:1.0 Q#:4353 RT:3.0 LP:OPL174.812.8 CT:EOI

Reactor pressure is 900 psig, suppression pool temperature is 152°F and suppression pool level is 13.8 feet.

a. Calculate the heat capacity level limit. (.5)

(.5)

b. Would emergency depressurization be required for these conditions?

<u>ANSWER</u>: a. HCLL is approx. 13 ft. (.5) (13 - 12, 7, 64, )

b. Emergency depressurization is not required. (.5)

ANGUER KEY

SECTION B RO FINAL EXAM 89 REQUAL WK. 1

EXAM: ROWEEK1B-1 PAGE: 3

#### 5) \*PV:1.0 Q#:4362 RT:3.0 LP:OPL171.042.4 CT:EOI

Due to a failure to scram, the SOS directs reactor water level be lowered to control power. What operator actions are required to stop the HPCI turbine and prevent its subsequent reinitiation upon lowering Rx. water level?

ANSWER :

Depress and hold the turbine trip pushbutton until the turbine speed is zero, (.5) then place the Auxiliary Oil Pump switch in pull-to-lock. (.5)

#### \*PV:1.75 Q#:4615 RT:5.0 LP:OPL173.812.2 CT:EOI 、 6)

During a reactor startup, the reactor mode switch is taken to RUN with reactor power at 8% and all other procedural requirements met. Due to a CIS circuitry failure, the MSIVs close. The reactor scrams on the MSIV closure. All control rods insert to position 00 except one which stops at position 04.

ANSWER THE FOLLOWING BASED ON THIS EVENT.

- a. What three systems would be available to control reactor water level? (.75)
- What four systems or components could be used to maintain b. reactor pressure below 1040 psig? (1.0)

#### ANSWER :

HPCI, RCIC, CRD a.

(.25 each total of .75) (.25 each total of 1.0)

SRV'S, HPCI, RCIC, RWCU b.

PAGE: 4

#### 7) \*PV:1.0 Q#:4616 RT:3.0 LP:0PL173.832 CT:EOI

In alternate level control step C1-7, when reactor water level drops to -150 inches (+20 inches on LI-3-52 or 62) and no system, injection subsystem, or alternate injection subsystem is lined up with at least one pump running, the operator is directed to enter C3 STEAM COOLING. C3 directs the operator to open one SRV when reactor water level drops to -90 inches on LI-3-52 or 62. Which one of the following best describes reactor pressure control for the time period when level is between +20 and -90 inches on LI-3-52 and 62?

- a. The operator manually opens SRVs to maintain pressure less than 1040 psig.
- b. The SRVs are allowed to cycle automatically to maintain pressure.
- c. The turbine bypass valves are manually opened to maintain 950 psig.
- d. HPCI is operated in test mode.

ANSWER :B

8)

#### \*PV:1.0 Q#:4619 RT:5.0 LP:0PL173.824 CT:EOI

With the reactor at 100% power a loss of all normal and emergency feedwater occurs. The reactor scrams on low water level at +12 inches, and all rods insert to position 00. The operator determines that water level cannot be maintained above -150 inches, and a short time later water level reaches -150 inches. Which one of the following statements is NOT an action to be taken?

- a. Disable ADS per Appendix 3.
- b. If NO injection system is available, the operator must now enter Steam Cooling, C-3.
- c. If ANY injection system is available, then Emergency Depressurization C-2, is required.
- d. The MSIV isolation contacts (Appendix 8) should be bypassed and the reactor rapidly depressurized to the main condenser.

ANSWER :D

ANCHER KEY

SECTION B RO FINAL EXAM 89 REQUAL WK. 1

EXAM: ROWEEK1B-1 PAGE: 5

9) \*PV:1.0 Q#:5269 RT:5.0 LP:OPL174.826/10 CT:GOI

Fuel loading on Unit 2 is to begin this shift. Below are the current SRM readings.

SRM A: 2 cps SRM B: 4 cps SRM C: 2 cps SRM D: 6 cps

Which one of the following most accurately describes the quadrants in which fuel can be loaded:

a. Quadrant A:

- b. Quadrant C.
- c. Quadrants B and D.
- d. None of the Quadrants.

NSWER :D

10) \*PV:1.0 Q#:5268 RT:3.0 LP:OPL174.826/22 CT:GOI

During fuel loading on Unit 2, a Fire alarm is received. If a fuel bundle is being moved, which one of the following describes what should be done with the fuel bundle?

- a. Bridge movement shall be stopped, and bundle held where it is.
- b. The bundle shall be taken back to SFSP where it came from.
- c. The bundle shall be lowered and placed in a safe condition.
- d. Bridge and bundle shall be moved to a location not over the Rx. vessel.

ANSWER :B

SECTION B RO FINAL EXAM 89 REQUAL WK. 1

EXAM: ROWEEK1B-1 PAGE: 6

11). \*PV:1.0 Q#:5270 RT:5.0 LP:OPL174.826 CT:GOI

During fuel loading on Unit 2, which one of the following describes the status of the RPS shorting links?

. a. red, green, and yellow removed.

b. blue, green, and yellow removed.

c. red, blue, green, and yellow removed.

d. red, blue, and yellow removed.

ANSWER :A

.12) \*PV:1.5 Q#:4541 RT:3.0 LP:OPL174.848.6, OPL174.848.4 CT:AOI

Uncontrolled reator power oscillations have been experienced at operating reactors similar to Browns Ferry's.

In which region (A-E) of the attached Recirculation System Operating Map is this most likely to occur? (.5)

b. How are abnormal power oscillations defined? (Include in your answer natural circulation and Recirc. pumps running). (1.0)

ANSWER :

a.

a. A (0.5)

b. Natural circulation: >5% peak to peak on APRM's or LPRM's. (.5)

Single Recirc pump operation: >8% peak to peak on APRM's or LPRM's (.5)



ANSWER KEY SECTION B RO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B-1 PAGE: 7 \*PV:1.5 Q#:4369 RT:5.0 LP:OPL174.819.9, 2120060101 13) CT:AOI The reactor is operating at 100% rated thermal power. RPS motor generator set 2B trips. After RPS bus B is transferred to the alternate power supply, the "MODE SWITCH SCRAM BYPASS" annunciator on panel 9-5 alarms. What action is required to correct this condition? a'. (1.0)If the reactor mode switch is placed in shutdown before the operator b. clears this condition, state the cause of the reactor scram which would result. (.5)ANSWER : Manually closing relay 5A-K17B (in the auxiliary Α. instrument room.) (1.0)(.5)B. APRM high flux scram. (15%)

14) \*PV:1.0 Q#:4592 RT:3.0 LP:OPL174.835.6 CT:AOI

During plant cooldown following Control Room evacuation, the procedure requires the operator to start a CRD pump powered from a 4KV shutdown board. If the Unit 1/2 control room had been abandoned, from what location would the CRD pump be started?

a. The Backup Control Panel

b. 4KV Shutdown Board 3EA

c. 4KV Shutdown Board A

d. Locally at the pump

ANSWER :C

SECTION B RO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B-1

PAGE: 8

15) \*PV:1.0 Q#:4373 RT:2.0 LP:0PL174.721.11, 2010090101 CT:0I

Choose the ONE best answer.

The reactor is operating at 70% rated thermal power and 70% rated core flow. How would you decrease reactor power to 60% of rated, while maintaining core flow constant (70%)?

a. Insert control rods

b. Withdraw control rods and decrease recirculation pump speed

c. Insert control rods and decrease recirculation pump speed

d. Insert control rods and increase recirculation pump speed

ANSWER :C

16)

\*PV:1.0 Q#:4613 RT:2.0 LP:OPL171.035.E, OPL171.035.F CT:OI

nit 2 is operating at 80% rated thermal power when an accident signal occurs. <u>Offsite power is available</u>. Which one of the following best describes the Unit 2 core spray system response?

a. Only the 2B and 2D Core Spray pumps start.

b. All Unit 2 Core Spray pumps start after 7 second.

c. 2B Core Spray pumps starts, in 7 secs, 2C Core Spray pump in 14 secs.

d. 2B and 2D Core Spray pumps start in 7 secs.; 2A and 2C Core Spray pumps start in 14 secs. ANSWER :C

SECTION B RO FINAL EXAM 89 REQUAL WK. 1

EXAM: ROWEEK1B-1 PAGE: 9

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17) \*PV:1.0 Q#:5232 RT:3.0 LP:OPL174.808/1 CT:OI

Diesel Generator "A" is sychronized to 4KV S/D Bd "A". The instrumentation readings for the diesel generator are as follows:

"A" D/G voltage 4160 VAC "A" D/G frequency 60 Hz "A" D/G current 260 amps "A" D/G vars 1750 Kvars "A" D/G watts 1000 Kw

Evaluate the above readings and state what action(s) should be taken.

<u>ANSWER</u>: The diesel generator Kvar load should be adjusted to obtain a 0.8 pf lagging. (1.0)

Mint har a har is a incorration 2. - or ledgust KW to 2250.

\*PV:1.0 Q#:5114 RT:3.0 LP:WEEK 3, 3410190302 CT:PMI

Which one of the following is <u>NOT</u> correct concerning the locked valves Inspection Program?

- a. Locked valves will be checked annually for proper position and locking device installation.
- b. Locked valves in the Drywell are required to be checked.
- c. Locked valves in areas greater than 100 mr/hr are not required to be checked.
- d. Any discrepencies between the locked valve position and system valve checklist requirement will be investigated.

ANSWER :B

SECTION B RO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B-1 PAGE: 10

19) \*PV:1.0 Q#:4761 RT:5.0 LP:0PL174.816/16, 3420040302, 3420050302 CT:SP

Maintenance is scheduled to work on the internals of a tagged closed motor operated valve which is serving as a physical boundary for other maintenance. Which one of the below listed statements best describes the action(s) necessary?

- a. Proceed with the required maintenance only if estimated repair time does not exceed one hour.
- b. Clear the tags and issue new tags as necessary before working on the valve.
- c. Clear the tag on the valve, continue with the maintenance, rehang the tag when maintenance is complete.
- d. Leave the tag on the valve but issue new tags in order to restablish a new boundary for the required maintenance.

ANSWER :B

\*PV:1.0 Q#:5592 RT:2.0 LP:OPL173.193, OPL171.075 CT:REP

For which one of the following is the ASOS (Incident Commander) responsible during a medical emergency?

- a. Lead the Medical Emergency Response Team in/out by the best route.
- b. Announce the medical emergency location over the plant public address system.
- c. Notify the nurse on duty, if available.
- d. Provide medical treatment to the injured person.

ANSWER : A

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ANCHER KEY

SECTION A FINAL EXAM 89 REQUAL WEEK 1

EXAM: 176.002 PAGE: 4

7 ) PV:1.0 Q#:5109 RT:3.0 LP:OPL176.002, OPL174.729/2 CT:SYS

Based on current plant conditions choose the correct statement concerning the RWM:

- a. Rod 46-43 could be selected and withdrawn to position 48.
- b. When attempting to select rod 46-43, a select error would illuminate on the RWM control panel and the rod could not be selected.
- c. Rod 46-43 could be selected and withdrawn to position 04 before any rod blocks would be imposed.
- d. RWM would have no effect on rod selection due to both steam flow and feedwater flow being <30%.

#### ANSWER :C

PV:1.0 Q#:5112 RT:3.0 LP:OPL176.002, OPL174.820/2 CT:SYS

For current plant conditions, an inadvertent PCIS Group 1 isolation (i.e. relay coil burnup) would result in which of the following plant responses:

- a. No effect to major plant parameters.
- b. No scram would occur since pressure is <850 psig.
- c. A decrease in condenser vacuum could be expected.

d. A Rx scram would occur.

ANSWER : A

9) PV:1.5 Q#:4723 RT:5.0 LP:OPL.178.002, OPL.171.045.K CT:SYS

Is the annunciator "Core Spray Sys I Sparger Break ", XA-55-3C-14 normal under current plant conditions. (yes/no) Justify your answer.

<u>ANSWER</u>: Yes (.5) comes in on decreasing  $\Delta P$ . During cold conditions,  $\Delta P$  between below core plate and CS sparger line is essentially zero. (1.0) ۰. ۱

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ANSWER KEY SECTION B RO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B-1 PAGE: 11

21) \*PV:1.0 Q#:5595 RT:3.0 LP:OPL173.193, OPL171.075 CT:REP

Select the lowest event classification at which an evacuation of essential personnel, not assigned specific duties, must be performed.

a. Notification of Unusual Event

b. Alert '

c. Site Area Emergency

d. General Emergency

ANSWER :D



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MASTER WK! PART & SRO

BFN OPERATOR TRAINING GROUP 1989 LICENSED REQUAL. FINAL EXAM COVER SHEET

NAME	ج روس روس روس روس	PREPARED BY	IRC
SOCIAL SECURITY NUMBER		REVIEWED BY:	
		INSTR. MZ	Neek
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SECTION A		····	- <u></u>
SECTION B	23.75	•	·
TOTALS	•		- :

#### EXAMINATION RULES

1. Cheating on the test is a demonstration of unsatisfactory progress, pending further disciplinary action and will not be tolerated.

P.Place your name on all pages of your answer sheet.

3.Do not talk with anyone during the test other than the test administrator.

- 4.Read and answer all questions completely. Show all work and state all assumptions.
- 5.Write legibly, use ONLY BLACK INK and do not write on the back of your paper.
- 6. The point value for each question is indicated next to the question number.

All work done on this examination is my own. I have neither given nor received aid.

Examinee Signature

# EXAM ROWEEK1B GENERAL INFORMATION

-- EXAM INFORMATION --

EXAM NO.: ROWEEK1B

DATE GENERATED: 06/23/89

TOTAL POINTS: 23.75

RÉSPONSE TIME (min): 81.0

MC QUESTIONS:	1 3	POINTS:	13.00
TF QUESTIONS:	0	POINTS:	0.00
ES QUESTIONS:	8	POINTS:	10.75

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SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B PAGE: 1

#### 1) \*PV:1.0 Q#:4350 RT:3.0 LP:OPL174.812.1, OPL174.812.2 CT:EOI

A failure of the EHC pressure controller causes reactor pressure to increase to 1060 psig. The reactor automatically scrams on high pressure causing reactor water level to drop to -40 inches. Several minutes after the scram, level is normal and reactor pressure is being maintained by the turbine bypass valves.

a. Which sections of the EOI's should be entered? (.5)

b. What two plant parameters justify your selections? (.5)

ANSWER :

Sections-RC/L, RC/P, RC/Q: (.5) Rx pressure >1043 psig (.25) Rx water level <+11 inches (.25)

PV:1.0 Q#:4353 RT:3.0 LP:OPL174.812.8 CT:EOL

Reactor pressure is 900 psig, suppression pool temperature is 152°F and suppression pool level is 13.8 feet.

- a. Calculate the heat capacity level limit. (.5)
- b. Would emergency depressurization be required for these conditions? (.5)

ANSWER :

a. HCLL is approx. 13 ft. (.5)

b. Emergency depressurization is not required. (.5)



ANGUER KEY

SECTION B SRO FINAL EXAM 89 REQUAL.WK. 1 EXAM: ROWEEK1B .

PAGE: 2

3) + PV:1.75 0#:4815 RT:5.0 LP:OPL173.812.2 CT:EOI

During a reactor startup, the reactor mode switch is taken to RUN with reactor power at 8% and all other procedural requirements met. Due to a PCIS circuitry failure, the MSIVs close. The reactor scrams on the MSIV closure. All control rods insert to position 00 except one which stops at position 04.

ANSWER THE FOLLOWING BASED ON THIS EVENT.

- a. What three systems would be available to control reactor water level? (.75)
- b. What four systems or components could be used to maintain reactor pressure below 1040 psig? (1.0)

ANSWER :<br/>a. HPCI, RCIC, CRD(.25 each total of .75)b. SRV's, HPCI, RCIC, RWCU(.25 each total of 1.0)

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MENER KEY

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In alternate level control step C1-7, when reactor water level drops to -150 inches (+20 inches on LI-3-52 or 62) and no system, injection subsystem, or alternate injection subsystem is lined up with at least one pump running, the operator is directed to enter C3 STEAM COOLING. C3 directs the operator to open one SRV when reactor water level drops to -90 inches on LI-3-52 or 62. Which one of the following best describes reactor pressure control for the time period when level is between +20 and -90 inches on LI-3-52 and 62?

- a. The operator manually opens SRVs to maintain pressure less than 1040 psig.
- b. The SRVs are allowed to cycle automatically to maintain pressure.
- c. The turbine bypass valves are manually opened to maintain 950 psig.
- d. HPCI is operated in test mode.

ANSWER :B

#### 5) +PV:1.0 Q#:4819 RT:5.0 LP:OPL173.824 CT:EO

With the reactor at 100% power a loss of all normal and emergency feedwater occurs. The reactor scrams on low water level at +12 inches, and all rods insert to position 00: The operator determines that water level cannot be maintained above -150 inches, and a short time later water level reaches -150 inches. Which one of the following statements is NOT.an action to be taken?

- a. Disable ADS per Appendix 3.
- b. If NO injection system is available, the operator must now enter Steam Cooling, C-3.
- c. If ANY injection system is available, then Emergency Depressurization C-2, is required.
- d. The MSIV isolation contacts (Appendix 8) should be bypassed and the reactor rapidly depressurized to the main condenser.

ANSWER :D
SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B PAGE: 4

#### 6) + PV:1.0 Q#:5268 RT:3.0 LP:OPL 174.828/22 CT:GOI

During fuel loading on Unit 2, a Fire alarm is received. If a fuel bundle is being moved, which one of the following describes what should be done with the fuel bundle?

a. Bridge movement shall be stopped, and bundle held where it is.

- b. The bundle shall be taken back to SFSP where it came from.
- c. The bundle shall be lowered and placed in a safe condition.
- d. Bridge and bundle shall be moved to a location not over the Rx. vessel.

ANSWER : B

\*PV:1.0 Q#:5270 RT:5.0 LP:OPL174.826 CT:GOI

During fuel loading on Unit 2, which one of the following describes the status of the RPS shorting links?

a. red, green, and yellow removed.

b. blue, green, and yellow removed.

c. red, blue, green, and yellow removed.

d. red, blue, and yellow removed.

ANSWER :A

8) • PV:1.5 Q#:4541 RT:3.0 LP:OPL174.848.6, OPL174.848.4 CT:AO

Uncontrolled reator power oscillations have been experienced at operating reactors similar to Browns Ferry's.

- .a. In which region (A-E) of the attached Recirculation System Operating Map.is.this most likely to occur? (.5)
  - b. How are abnormal power oscillations defined? (Include in your answer natural circulation and Recirc. pumps running). (1.0)

SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B

PAGE: 5

(.5)

ANSWER : a. A (0.5)

b. Natural circulation: >5% peak to peak on APRM's or LPRM's. (.5)

Single Recirc pump operation: >8% peak to peak on APRM's or LPRM's (.5)

9) • PV:1.5 Q#:4369 RT:5.0 LP:OPL174.819.9, 2120060101 CT:AOI

The reactor is operating at 100% rated thermal power. RPS motor generator set 2B trips. After RPS bus B is transferred to the alternate power supply, the "MODE SWITCH SCRAM BYPASS" annunciator on panel 9-5 alarms.

a. What action is required to correct this condition? (1.0)

If the reactor mode switch is placed in shutdown before the operator clears this condition, state the cause of the reactor scram which would result. (.5)

#### ANSWER

b.

A. Manually closing relay 5A-K17B (in the auxiliary instrument room.) (1.0)

B. APRM high flux scram. (15%)

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SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXA

EXAM: ROWEEK1B PAGE: 6

10) + PV:1.0 Q#:4592 RT:3.0 LP:OPL174.835.6 CT:AOI

During plant cooldown following Control Room evacuation, the procedure requires the operator to start a CRD pump powered from a 4KV shutdown board. If the Unit 1/2 control room had been abandoned, from what location would the CRD pump be started?

a. The Backup Control Panel

b. 4KV Shutdown Board 3EA

c. 4KV Shutdown Board A

d. Locally at the pump

#### ANSWER :C

+PV:1.0 Q#:4373 RT:2.0 LP:OPL174.721.11, 2010090101 CT:OF

Choose the ONE best answer.

The reactor is operating at 70% rated thermal power and 70% rated core flow. How would you decrease reactor power to 60% of rated, while maintaining core flow constant (70%)?

a. Insert control rods

b. Withdraw control rods and decrease recirculation pump speed

c. Insert control rods and decrease recirculation pump speed

d. Insert control rods and increase recirculation pump speed

ANSWER :C

12) \* PV:1.0 Q#:4813 RT:2.0 LP:OPL171.035.E, OPL171.035.F CT:OF

Unit 2 is operating at 80% rated thermal power when an accident signal occurs. <u>Offsite power is available</u>. Which one of the following best describes the Unit 2 core spray system response?

a. Only the 2B and 2D Core Spray pumps start.

b. All Unit 2 Core Spray pumps start after 7 second.

c. 2B Core Spray pumps starts, in 7 secs, 2C Core Spray pump in 14 secs.

d. 2B and 2D Core Spray pumps start in 7 secs.; 2A and 2C Core Spray pumps start in 14 secs. ANSWER :C

+ PV:1.0 Q#:5232 RT:3.0 LP:OPL174.808/1 CT:OF

Diesel Generator "A" is sychronized to 4KV S/D Bd "A". The instrumentation readings for the diesel generator are as follows:

"A" D/G voltage 4160 VAC "A" D/G frequency 60 Hz "A" D/G current 260 amps "A" D/G vars 1750 Kvars "A" D/G watts 1000 Kw

Evaluate the above readings and state what action(s) should be taken.

<u>ANSWER</u> : The diesel generator Kvar load should be adjusted to obtain a 0.8 pf lagging. (1.0)

Adjust KUAK or hw to meet Mustration I or adjust Ked to 2350

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SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B PAGE: 8

#### 14) • PV:1.0 Q4:5114 RT:3.0 LP:WEEK 3, 3410190302 CT:PMI

Which one of the following is <u>NOT</u> correct concerning the locked valves Inspection Program?

- a. Locked valves will be checked annually for proper position and locking device installation.
- b. Locked valves in the Drywell are required to be checked.
- c. Locked valves in areas greater than 100 mr/hr are not required to be checked.
- d. Any discrepencies between the locked valve position and system valve checklist requirement will be investigated.

#### ANSWER : B

#### PV:1.0 Q#:4761 RT:5.0 LP:OPL174.816/16, 3420040302, 3420050302 CT:SP

Maintenance is scheduled to work on the internals of a tagged closed motor operated valve which is serving as a physical boundary for other maintenance. Which one of the below listed statements best describes the action(s) necessary?

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- a. Proceed with the required maintenance only if estimated repair time does not exceed one hour.
- b. Clear the tags and issue new tags as necessary before working on the valve.
- c. Clear the tag on the valve, continue with the maintenance, rehang the tag when maintenance is complete.
- d. Leave the tag on the valve but issue new tags in order to restablish a new boundary for the required maintenance.

ANSWER :B

SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B PAGE: 9

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#### 16) +PV:2.0 Q#:4608 RT:3.0 LP:0PL174.821.12 CT:REP

A. Given the following information, calculate the stack release rate. (Two significant digits) (1.0)

RM 90-147 indicates 9.7 x  $10^5$  cps FI 90-271 indicates 15000 scfm

B. Given a release rate of  $1.5 \times 10^7$  uc/sec, which one of the following event classifications is most appropriate? (1.0)

1. Notification of Unusual Event

2. Alert

3. Site Area Emergency

4. General Emergency

ANSWER :

(RM 90-147) (FI 90-271) (1.23 X 10<sup>3</sup>) = stack release rate (9.7 X 10<sup>5</sup>) (15000) (1.23 X 10<sup>3</sup>) = 1.8 X 10<sup>7</sup> uc/sec (1.0)

B. Notification of Unusual Event (RETS Limit Exceeded > 1.4x10<sup>7</sup> uc/sec.) (1.0)

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SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B PAGE: 10

17) + PV:1.0 Q#:4565 RT:5.0 LP:OPL174.821.12 CT:REP

During refueling operations, a fuel transfer cask is dropped into the Unit 2 spent fuel storage pool, causing major damage to several fuel bundles, control rods, and the storage racks, with indication of radioactive release. Which one of the following event classifications is most appropriate?

a. Notification of Unusual Event

b. Alert

c. Site Area Emergency

d. General Emergency

ANSWER :C

PV:1.0 Q#:5243 RT:3.0 LP:OPL73.904/7 CT:SSI

Unit 2 has scrammed from 100% power, and is currently executing EOI-1 and EOI-2. The SOS has determined that the entry condition for the Safe Shutdown Instruction have been met. Which one of the following actions would be most appropriate?

- a. Continue with EOI-1, discontinue EOI-2 and execute Safe Shutdown Instruction concurrently.
- b. Discontinue EOI-1 and EOI-2 and enter Safe Shutdown Instruction.
- c. Discontinue EOI-1, continue with EOI-2 and execute Safe Shutdown Instruction concurrently.
- d. Continue with EOI-1 and EOI-2 and execute Safe Shutdown Instruction concurrently.

ANSWER :B

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ANS R KEY

SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B

PAGE: 11 .

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19) + PV:1.0 Q#:5779 RT:5.0 LP:NRC, OPL174.728 CT:SRO, TS

While operating Unit 2 at power, the Reactor Water Cleanup System (RWCU) Supply Isolation Valve (FCV 69-1) fails in the OPEN position.

Which one of the following most accurately describes the allowances and/or limitiations imposed by the Technical Specifications?

- a. Reactor power operation may continue provided that the RWCU outboard suction isolation (FCV 69-2) is shut and deactivated.
- b. Reactor power operation may continue provided that the RWCU Return Isolation Valve (FCV 69-12) is shut and deactivated.
- c. Reactor power operation may continue with no additional requirements.
- d. The Unit shall be placed in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

ANSWER : A

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SECTION B SRO FINAL EXAM 89 REQUAL WK. 1 EXAM: ROWEEK1B

PAGE: 12

20) \*PV:1.0 Q#:5780 RT:5.0 LP:NRC, OPL174.728 CT:SRO, TS

You have just assumed the 2300-0700 (3/23/89) shift as the Shift Operations Supervisor. Unit 2 is operating at 100% power, with 98% core flow and the following equipment out of service. Unit 1 and 3 are defueled.

EQUIPMENT	DATE 'OOS
SLC Tank Remote Level Indication	02/25/89
RHR Service Water Pump B2	03/20/89
RBCCW Pump C	03/12/89
CRD Pump 2A	02/28/89
Core Spray System I Room Coolers	03/18/89
Core Monitor	02/05/89
Turning Gear Motor (Main Turbine)	03/15/89
Condensate Pump 2A	02/05/89
RHR Pump 3C	03/14/89

Given that NO repairs are completed - which one of the following most accurately describes how long Unit 2 may remain in operation, as imposed by the Technical Specification?

- a. 24 hours
- b. 2 days
- c. 7 days
- d. 25 days

ANSWER :B

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21) + PV:1.0 Q#:4355 RT:7.0 LP:OPL174.812, 2000230501, WEEK 3 CT:EOI

Given the following situation:

Drywell pressure 35 psig Drywell temperature 246 deg. Indicated suppression pool level 20 feet Suppression pool temperature 127 deg. F Suppression chamber temperature 130 deg. F RHR suction pressure 55 psig Test gauge pressure 35 psig

- a. What is the actual primary containment water level?
- b. State why drywell sprays should not be initiated under present conditons? (.5)

#### ANSWER :

A.  $(\Delta P = 20 \text{ psid})$  Level = 45 ft.  $\pm 2.5$  ft.(.5)

suppression pool level is greater than 18 feet. (0.5)



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MASTER WK #2 PART A 176.003

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## EXAM 176.003 GENERAL INFORMATION

EXAM NO.: 176.003 DATE GENERATED: 07/09/89 TOTAL POINTS: 12.00 RESPONSE TIME (min): 28.0 MC QUESTIONS: 4 POINTS: 4.00 TF QUESTIONS: 0 POINTS: 0.00 ES QUESTIONS: 7 POINTS: 8.00

--- EXAM INFORMATION --

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SECTION A FINAL EXAM 1989 REQUAL WEEK 2 ' EXAM: 176.003 PAGE: 1

1) PV:1.0 Q#:5134 RT:2.0 LP:OPL176.003, OPL121.008/4 CT:SYS

For current plant conditions, which of the following most accurately describes the status of 480V Rx. MOV. Bd. 2E:

a. Powered by MG Set 2EN.

b. Powered by MG Set 2EA.

c. De-energized. <u>ANSWER : B</u>

#### 2) PV:2.0 Q4:4248 RT:3.0 LP:OPL176.003, OPL174.850.18 CT:SYS

State the actions that would occur with respect to the following if reactor water level decreased to -130" on LI-3-58 A&B:

a. RHR Div. I

b. RHR Div. II

ANSWER :

a. RHR Div. I: closure of 57 & 59 (torus cooling valves)(.25) A&C pumps would load shed(.25),then auto start and run on minimum flow (.5)

b. RHR Div. II: B RHR pump will start(at time zero)and run on minimum flow. (1.0) (D RHR pump will not start.)

3) PV:1.0 Q#:4258 RT:3.0 LP:OPL176.003, OPL174.844.6, OPL173.834 CT:SYS

Based on current plant conditions, state the action that would be required to return SBGT train "B" to service.

<u>ANSWER</u>: Transfer Diesel Aux. Board "B" to its alternate power source.(1.0)



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ANCHER KEY.

SECTION A FINAL EXAM 1989 REQUAL WEEK 2

EXAM: 176.003 PAGE: 2

4) PV:1.0 0#:4250 RT:2.0 UP:OPL176.003, OPL174.819.8, OPL173.829 CT:SYS

Based on current plant conditions, which one of the following describes why the Manual Scram pushbuttons red back lighting is off:

a. Mode switch is in Shutdown.

b. Pushbuttons have not been depressed.

c. RPS buses are de-energized.

d. Scram is not reset. ANSWER :C

5) PV:5 Q#:4254 RT:1.0 LP:OPL176.003, OPL174.705.13B, OPL174.808.13B CT:SYS

Based on current plant conditions, the "A" Diesel Generator mode of operation is

<u>ANSWER</u> : Single Unit.(.5)

6) PV:1.0 Q#:5127 RT:3.0 LP:OPL178.003, OPL171.047/4 CT:SYS

Which of the following most accurately describes the signal which closed the RBCCW 70-48 valve during this transient:

a. 480V load shed logic.

b. Low RCW header pressure.

c. Low RBCCW header pressure.

d. Undervoltage on 2B 480V S/D Board. ANSWER :C ANCHER KEY

SECTION A FINAL EXAM 1989 REQUAL WEEK 2 EXAM: 176.003 PAGE: 3

7) PV:1.0 Q#:5129 RT:2.0 LP:OPL176.003, OPL171.051 CT:SYS .

What equipment is running that tells the Unit 2 operator that at least two U-3 diesel generators started and tied to there shutdown boards?

<u>ANSWER</u>: A3 & C3 EECW pumps running (- red light on C.S. and indicates amps.) (1.0)

8) PV:1.5 Q#:4259 RT:4.0 LP:OPL176.003, OPL173.715.2, OPL173.834, 3450180102 CT:SYS

If 480V Shutdown Board "2B" were de-energized:

a. What is the alternate power supply for 2B and 2C Rx.Mov Bds.?

b. To energize 2B and 2C Rx.Mov Bds., where could the transfers be performed ?

<u>ANSWER :</u> a. 2A 480v S/D Bd. (.5)

b. 2C from panel 9-8(.4) or locally(.1) and 2B locally.(.5)



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ANSWER KEY

SECTION A FINAL EXAM 1989 REQUAL WEEK 2

EXAM: 176.003 · PAGE: 4

#### 9) PV:1.0 Q#:5131 RT:2.0 LP:OPL176.003, OPL174.717/7 CT:18C

If a plant cooldown was initiated, and Rx water level was maintained at +30" on the GEMAC's, choose the following which best describes the response of LI 3-58A & 58B as pressure is decreased to below 100 psig. Their indicated level would....

- a. decrease slightly as pressure decreased due to pressure compensation.
- b. remain essentailly the same as that indicated on the GEMAC's.
- c. not change due to having cold reference legs.
- d. increase and go offscale high as pressure decreased below 100psig.

ANSWER :D

PV:1.0 Q#:5793 RT:3.0 LP:OPL174.721, NRC CT:SYS

Briefly state the condition that each of the following recirculation pump trip signals is designed to prevent.

a. ATWS

b. RPT

#### ANSWER :

a. RPV overpressurization (.5) (or to reduce power during an ATWS event / failure to scram)

b. positive reactivity from voids outrunning negative reactivity from rods (.5)

ANSWER KEY.

SECTION A FINAL EXAM 1989 REQUAL WEEK 2

EXAM: 176.003 PAGE: 5

(.5)

11) PV:1.0 Q#:5789 RT:3.0 LP:OPL174.850, NRC, 3450120102 CT:SYS

Following a large break loss of coolant accident, what two (2) signals, OTHER THAN THE LPCI INITIATION SIGNAL, must be present to allow opening a containment spray valve (FCV-74-60/61) after placing the select-reset switch in the select position?

#### ANSWER\_:

Reactor level  $\geq$  to -39 inches (>2/3 core height) (.5)

Drywell pressure  $\geq$  to 1.96 psig

OPL176.003 Page 1 of 3

#### SECTION A PLANT OPERATIONS

EXAM NO: 176.003

DATE PREPARED: <u>9-10-88</u>

LOCATION STORED: ST-08

#### DESCRIPTION

A.

Loss of Offsite Power from 100% power.

#### B. <u>STORED SIMULATOR SETUP</u>

1. INITIAL CONDITION:

IC-17, 100% power.

RCIC out of service for bearing replacement.

#### 2. MALFUNCTIONS ACTIVE:

NUMBER	DESCRIPTION
089B	RCIC Turbine Trip
182 '	HPCI Flow Controller Failed Low in Automatic
142D /	D/G D Output Breaker fails to close.

#### 3. REMOTE FUNCTIONS:

NUHBER

#### DESCRIPTION

None.

05790

18 M 16-0

a. Mode Switch to Shutdown

b. Insert Nuclear Instrumentation

c. Clear rod drifts

d. Transfer 480V SC board 2B to alternate.

e. Place 1B CRDH pump in service.

f. Loop I of RHR in suppression pool cooling.

g. Drywell blowers restarted.

h. HSIV control switches placed in close.

i. Panel 9-8 and 9-23 "43" switches in manual.

j. SRV's controlling pressure/HPCI Level.

#### C. INSTRUCTOR ACTIONS:

1. Manually advance all recorders.

2. Playback Exam: <u>ST-08, 176.003</u>

3. Playback Time: ~11.5 mins.

4. Turn off Recorder Power.

5. Take out of freeze and acknowledge annunciators.

6. Tagout RCIC.

#### D. <u>EXAM INFORMATION</u>:

1. Total No. Questions: 15

2. Total Points: 18.0

3. Response Time: 34 minutes

#### E. <u>EXAM\_REVIEW/APPROVAL</u>:

 VALIDATED BY
 R. Miller/J. Lamb

 APPROVED BY
 MMOLO

 OPERATIONS TRAINING

APPROVED BY

OPERATIONS REPRESENTATIVE)



u <sup>-</sup>

east)

#### SECTION A PLANT OPERATIONS

EXAM NO: 176.003

STUDENT HANDOUT

#### A. INITIAL PLANT CONDITIONS

100% power for 1 month. RCIC out-of-service for bearing replacement.

#### B. INITIATING EVENT

Plant has experienced a loss of offsite power. Reactor scram initiated by "TURB GEN LOAD REJECT SCRAM TRIP." D D/G output breaker failed to close.

C. PROCEDURES IN USE

A0I-100-1, 0-A0I-57-1A.

EOI-1: RC/P-2.1, RC/L-2.

EOI-2: SP/T-2, PC/P-1, DW/T-1.

MASTER WE #2 PART B RO

# EXAM ROWEEK2B-1 GENERAL INFORMATION

-- EXAM INFORMATION --

EXAM NO.: ROWEEK2B-1

DATE GENERATED: 06/23/89

TOTAL POINTS: 23.25

RESPONSE TIME (min): 76.0

MC	QUESTIONS:	10		POINTS:	10.00
TF	QUESTIONS:	0	0	POINTS:	0.00
ES	QUESTIONS:	10		POINTS:	13.25

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SECTION B RO FINAL EXAM 89 REQUAL WK. 2

EXAM: ROWEEK2B-1 PAGE: 1

1) + PV:1.0 Q#:4592 RT:3.0 LP:OPL174.835.6 CT:AOI

During plant cooldown following Control Room evacuation, the procedure requires the operator to start a CRD pump powered from a 4KV shutdown board. If the Unit 1/2 control room had been abandoned, from what location would the CRD pump be started?

a. The Backup Control Panel

b. 4KV Shutdown Board 3EA

c. 4KV Shutdown Board A

d. Locally at the pump

ANSWER :C

2) PV:1.5 Q#:4369 RT:5.0 LP:OPL174.819.9, 2120060101 CT:AOI

The reactor is operating at 100% rated thermal power. RPS motor generator set 2B trips. After RPS bus B is transferred to the alternate power supply, the "MODE SWITCH SCRAM BYPASS" annunciator on panel 9-5 alarms.

a. What action is required to correct this condition?

(1.0)

2256

b. If the reactor mode switch is placed in shutdown before the operator clears this condition, state the cause of the reactor scram which would result.
 (.5)

ANSWER :

A. Manually closing relay 5A-K17B (in the auxiliary instrument room.) (1.0)

B. APRM high flux scram. (15%)

(.5)

ANSWER KEY

SECTION B RO FINAL EXAM 89 REQUAL WK. 2

EXAM: ROWEEK2B-1 PAGE: 2

(1.0)

11.95

#### 3) • PV:1.5 Q#:4808 RT:5.0 LP:OPL174.705.13 CT:AOI

With Unit 2 at 70% power and Unit 1 and 3 defueled, a loss of 500 KV system occurs, followed a minute later by a loss of the 161KV system. All diesel generators start and are operating properly. After 15 minutes, Unit 2 is shutdown with pressure and level under control. Can the operator parallel two diesel generators to restore the main condenser as a heat sink? If yes, state which diesel generators would be paralleled. If no, explain your answer.

ANSWER :

No, (.5) there is no accident signal present on the Unit (1.0)

IF YES (-1.0) A AND 3 EA (+0.5)

4) PV:2.5 Q4:4601 RT:5.0 LP:OPL174.835.5 CT:AOI

Assume a condition exists requiring control room abandonment, but no other abnormal events are in progress.

- a. Which of the EOI-1 (Reactor Control) entry conditions would be established while executing the initial operator actions of 1/2 AOI-100-2 Control Room Abandonment? (1.5)
- b. What actions, with regard to the Emergency Operating Instructions, should be taken while executing AOI-100-2, Control Room Abandonment?

#### ANSWER :

a. Condition requiring MSIV isolation (.5) Reactor pressure above 1043 psig (.5) Reactor water level below +11". (.5)

b. (The Backup Control System is designed to achieve and maintain cold shutdown from outside the control system.) No action should be taken in the Emergency Operating Instructions (solely as a result of executing the provisions of 1/2 AOI-100-2, Control Room Abandonment.) (AOT ACTIONS THAT ACCOMPLISH "NORMAL FOT (1.0) FUNCTIONS" MAY BE REFERENCED.)

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ANSWER KEY

SECTION B RO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B-1

## PAGE: 3

#### 5) •PV:1.0 Q4:4344 RT:5.0 LP:OPL174.822.6, 3440130302, 2090150301 CT:TS

Reactor power is 70% RTP; a steam leak in the drywell occurs and drywell pressure rises; the reactor scrams at 2 psig; diesel generator auto start (at 2.45 psig) does not occur, but manual start is successful; the reactor is brought to cold shutdown.

Which one of the following statements is correct concerning the above situation?

- a. The Thermal Power Safety Limit has been exceeded.
- b. The Power Transient Safety Limit has been exceeded.
- c. The Reactor Vessel Water Level Safety Limit has been exceeded.
- d. The Reactor Coolant Safety Limit has been exceeded.
- e. No Safety Limit has been exceeded.

ANSWER :E

#### 6.) + PV: 75 Q#:4348 RT:10 LP:OPL174.812.6, OPL174.812.7, OPL174.812.8 CT:EOI

Match each of the following drywell temperatures in Column 1 with the Column 2 required action for the specific temperature.

COLUMN 1 DRYWELL TEMPERATURE

a. 160 deg. F b. 210 deg. F c. 280 deg. F

#### COLUMN 2 REQUIRED ACTIONS

- 1. Emergency depressurization
- 2. Stop venting the containment
- 3. Enter EOI-2 and initiate all available drywell cooling
- 4. Start venting the containment
- 5. Enter C-4, Rx. Flooding

#### ANSWER :

Α.	3		
в.	2		
C.	1	(.25	each)

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ANSWER KEY

SECTION B RO FINAL EXAM 89 REQUAL WK. 2

EXAM: ROWEEK2B-1 PAGE: 4

7) \* PV:1.5 Q4:4351 RT:5.0 LP:OPL174.812.8 CT:EOI The following containment parameters are noted as a result of a pipe break inside conatinment: Drywell pressure is 20 psig Drywell temperture is 210 deg. F Suppression chamber pressure is 18 psig. Suppression chamber temperature is 155 deg. F. Suppression pool level is +2" Reactor water level is +30 inches Would initiation of drywell sprays be required? (.5)a. List three criteria which has to be evaluated to make your decision b. in part A. (1.0)ANSWER : (.5) a. Yes b. D/W spray initiation curve (supp. chamber temp. or D/W press.) .Suppression pool level Suppression chamber pressure Adequate core cooling (any 3 @ .33 each) 8) \* PV:1.0 Q#:4357 RT:3.0 LP:OPL174.812.8 CT:EOI From the following data, determine the Heat Capacity Level Limit (HCLL). Reactor pressure 500 psig Drywell pressure 7.2 psig -Suppression pool level 13.2 feet Suppression pool temperature 166 deg. F
SECTION B RO FINAL EXAM 89 REQUAL WK. 2

EXAM: ROWEEK2B-1 PAGE: 5

ANSWER : 13 feet ( $\pm$ .5 ft) (1.0) HCTL = 174°F  $\pm$ 2°F delta T<sub>he</sub> = 174° -166 deg F = 8°F ( $\pm$  2°F)

(Math error carried forward is minus .2)

9) + PV:1.0 Q#:4818 RT:5.0 LP:OPL173.813 CT:EOI

A turbine trip with a scram failure occurred. The main condenser remained available through the bypass valves. The operators entered EOI-1 and, as a result of the EOI actions, boron was injected and reactor water level was intentionally lowered to -88 inches. When the SLC tank level reached 58%, all control rods inserted to position 00. Which of the following statements is most accurate concerning operator action?

a. The operator may now begin a cooldown at the normal (<100 deg F/hr) rate.

Reactor water level may NOT be restored to +11 to +54 inches until the SLC tank level has dropped to 50%.

c. The MSIV interlocks (appendix 8) were NOT required to have been bypassed during this event.

d. SLC injection should NOT be stopped until tank level reaches 20%.

ANSWER : A



ANCWER KEY

SECTION B RO FINAL EXAM 89 REQUAL WK. 2

EXAM: ROWEEK2B-1 PAGE: 6

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10) PV:1.0 Q#:4625 RT:3.0 LP:OPL173.823 CT:EOF

Choose the ONE BEST answer.

Rapid depressurization of the reactor using the turbine bypass valves is allowed by the EOIs if . . .

a. . . emergency depressurization is anticipated and all control rods are at position 00 or 02.

b. . . emergency depressurization is anticipated and the reactor is shutdown.

c. . . the continuous air supply to the SRVs is lost.

d. . . . emergency depressurization is required and all control rods are at position 00 or 02.

ANSWER : A

PV:1.0 Q#:4627 RT:1.0 LP:OPL173.822 CT:EOI

EOI-1, Reactor Control, is being executed following a scram due to a turbine trip at high power. During the initial phase of the transient, pressure increased to the SRV lift setpoint, and one of the SRV's did not reclose. Suppression pool temperature has reached 95 deg. F. Which one of the following best describes the proper action?

a. Re-enter EOI-1 at the beginning.

b. Re-enter EOI-1 at the beginning and enter EOI-2.

c. Continue in EOI-1, and enter EOI-2.

d. Continue in EOI-1.

ANSWER :C

SECTION B RO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B-1

PAGE: 7

12) + PV:1.0 Q#:4628 RT:3.0 LP:OPL173.629 CT:EOI -

Reactor pressure is being maintained at 500 psig, and temperature near the water level instrument run in the drywell is 220 degrees F. The Shutdown Vessel Flooding Range Instrument (LI-3-55) is reading +30 inches.

- a. Can LI-3-55 be used to determine reactor water level? (.5)
- b. List the two criteria which had to be evaluated to make your decision in part A. (.5)

ANSWER : a. Yes (.5)

b. Drywell temp. < Rx sat. temp (.25) and instrument level/drywell temp limits are met (.25)

> temp near instr. runs water level indications

T + PV:1.0 Q#:5236 RT:3.0 LP:OPL173.830 CT:GOI

Prior to pulling control rods for a start-up on Unit 2, the following SRM readings were recorded.

SRM A: 35 cps

SRM B: 42 cps

SRM C: 40 cps

SRM D: 37 cps

When must continous notch withdrawal of control rods be stopped?

<u>ANSWER</u>: When SRM reachs 16X original reading. (1.0) (SRM A = 560, B = 672, C = 640, D = 592).

SECTION B RO FINAL EXAM 89 REQUAL WK. 2

EXAM: ROWEEK2B-1 PAGE: 8

 $(.5)^{\circ}$ 

#### 14) + PV:1.0 04:5271 RT:5.0 LP:OPL174.828/22 - CT:GOI

During fuel loading on Unit 2, the following SRM readings were taken before and after loading a bundle in quadrant B?

		Before	Alter				
SRM	Α	5 cps		'5 cps			
SRM	В	4 cps		6 cps			
SRM	С	1 cps		2 cps			
SRM	D	4 cps	5. ¥	• • • 5 cps			

Which one of the following most accurately describes the action to be taken:

a. Refueling stopped, and a subcriticality check performed.

b. Refueling can continue, but only in quadrant C.

c. Refueling can continue in quadrant B.

Refueling stopped and SRM A must be response checked.

ANSWER C

d.

\* 15) \*PV:1.5 Q#:4765 RT:5.0 LP:OPL174.816/13, 3420040302, 3420050302 CT:SP

List the requirements for tagging each of the following air operated valves in the closed position:

a.	Fails open	on	loss	of	air. (	!	5
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b. Fails closed on loss of air. (.5)

c. Fails as is on loss of air.

# ANSWER :

- a. It is required to be jacked closed with an installed jacking device.(.5)
- b & c. Air supply electrically or mechanically isolated,(.25) and the air operated valve visually checked to be closed.(.25)

Note: part b & c each worth .5



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SECTION B RO FINAL EXAM 89 REQUAL WK. 2

EXAM: ROWEEK2B-1 PAGE: 9

27 Mar

16) + PV:1.0 04:5208 RT:2.0 LP:OPL173.901/30, WEEK 3 CT:EOI

Which one of the following best describes the purpose of the Heat Capacity Temperature Limit?

- A. Assures the prevention of equipment failure due to unstable steam condensation during an ADS blowdown.
- b. Assures that actuation of ADS will not result in damage to the pool or any submerged structure within the suppression pool.
- c. Assures that any steam released in the drywell will be directed under water in the suppression pool.
- d. Assures that the drywell will not collapse or otherwise fail due to negative pressure.

ANSWER : A

PV:1.0 Q#:5264 RT:5.0 LP:OPL174.816/42, 3420050302 CT:SP

While conducting an audit of clearances, the AUO reports that tag number 2-89-080-5 was missing. The clearance has a total of 10 tags. What action is required?

ANSWER :

- 1. All work should stop. (.2)
- 2. New tag prepared(using the number 11.) (.4)
- 3. Note on clearance(stating tag 5 missing, replaced by tag 11.) (.4)

ANGWER KEY

SECTION B RO FINAL EXAM 89 REQUAL WK. 2 EXAM:

EXAM: ROWEEK2B-1 PAGE: 10

18) +PV:1.0 Q#:5266 RT:5.0 LP:OPL171.066, 3430290302 CT:SP

Valve line-up checklist are being conducted on Unit 2. Initial positioning of a valve inside the Drywell resulted in an exposure of 62 mrem.

Which one of the following most accurately describes the action to be taken?

- a. Independent verification can be waived by the ASOS.
- b. Both checkers should have gone into the Drywell together.
- c. Independent verification can be waived only if an alternate means of verification is available.
- d. Independent verification can be waived only if the valve is throttled.

ANSWER : A

19) PV:1.0 Q#:5587 RT:2.0 LP:OPL173.913, OPL171.075, WEEK 4 CT:REP

In the event that a site assembly is required, AUOs . . .

a. . . report to the Operations lunch room for accountability.

b. . . report to the Operations Control Center ASOS for accountability.

c. . . . report to the Unit 1 Reactor Building AUO for accountability.

d. .. . report to the Operations Support Center for accountability.

ANSWER :C

SECTION B RO FINAL EXAM 89 REQUAL WK. 2

EXAM: ROWEEK2B-1 PAGE: 11

20) PV:1.0 Q#:5596 RT:3.0 LP:OPL173.193, OPL171.075 CT:REP

Select the lowest event classification at which a precautionary evacuation must be performed.

a. Notification of Unusual Event

b. Alert

c. Site Area Emergency

d. General Emergency

ANSWER :C

# MASTER WK 11; PART B SRO

# EXAM ROWEEK2B GENERAL INFORMATION

RWM guestion on statics #11: accepted "A" or "D" -> OI-85 attached.

ATWS TRIP- Accepted as bases" to reduce power during AN ATWS event/failure to scram.

-- EXAM INFORMATION --

EXAM NO.: ROWEEK2B DATE GENERATED: 06/23/89 TOTAL POINTS: 23.25 RESPONSE TIME (min): 87.0 MC QUESTIONS: 10 POINTS: 10.00 TF QUESTIONS: 0 POINTS: 0.00

ES QUESTIONS: 10 POINTS:

13.25

ANGUER KEY

SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B PAGE: 1

#### 1) + PV:1.0 Q#:4592 RT:3.0 LP:OPL174.835.6 CT:AOI

During plant cooldown following.Control Room evacuation, the procedure requires the operator to start a CRD pump powered from a 4KV shutdown board. If the Unit 1/2 control room had been abandoned, from what location would the CRD pump be started?

a. The Backup Control Panel

b. 4KV Shutdown Board 3EA

c. 4KV Shutdown Board A

d. Locally at the pump

#### ANSWER :C

2) + PV:1.5 Q#:4608 RT:5.0 LP:OPL174.705.13 CT:AOI

With Unit 2 at 70% power and Unit 1 and 3 defueled, a loss of 500 KV system occurs, followed a minute later by a loss of the 161KV system. All diesel generators start and are operating properly. After 15 minutes, Unit 2 is shutdown with pressure and level under control. Can the operator parallel two diesel generators to restore the main condenser as a heat sink? If yes, state which diesel generators would be paralleled. If no, explain your answer.

ANSWER :

No, (.5) there is no accident signal present on the Unit (1.0)

IF , Yes (-1.0) A AND 3EA (+.5)

MASTER WK #2 PART A 176.006

# EXAM 176.006 GENERAL INFORMATION #1.

-- EXAM INFORMATION --

EXAM NO.: 176.006 DATE GENERATED: 07/09/89 TOTAL POINTS: 24.00 11.00 RESPONSE TIME (min): 24.0 MC QUESTIONS: 14-3 POINTS: 24.00 3.00 TF QUESTIONS: 0 POINTS: 0.00 ES QUESTIONS: 8 POINTS: 8.00

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SECTION A FINAL EXAM 1989 REQUAL WEEK 2

EXAM: 176.006 PAGE: 1

1) PV:1.0 Q#:5148 RT:2.0 LP:OPL174.849/3, 2550110101, OPL174.802/1, OPL176.008 CT:18C, SYS

What automatic action would occur that could result in the eventual loss of the unit if "A" condensate pump tripped resulting in a condensate pump discharge header pressure decreasing to 50 psig (as indicated on PI-2-17 on pnl 9-6)?

ANSWER : SJAE shuts down(at 60 psig.) (1.0)

· 2) PV:1.0 Q4:5769 RT:4.0 LP:OPL174.819.5, OPL176.006 CT:SYS

For current plant conditions, which IRM failure(s) would cause a half scram? (Specify channel and trip signal).

ANSWER : IRM E and G (.5) inop or hi-hi trip.(.5)

3) PV:1.0 Q4:5146 RT:2.0 LP:OPL171.035/2, OPL174.731/3, 2150380101, OPL176.006 CTJ&C, SYS

Based on current plant conditions what effect would bypassing APRM "E" have on RBM "A"?

ANSWER :

Shift reference APRM from "E" to "C"(.7) and initiate null sequence (.3).

4) PV:1.0 Q#:5261 RT:2.0 LP:OPL174.845.5, OPL176.008 CT:SYS

Why is the white "Rod Out Permit" light above HS-85-48, CRD Control, on panel 9-5 NOT illuminated?

#### SECTION A FINAL EXAM 1989 REQUAL WEEK 2

EXAM: 176.006 PAGE: 2

ANSWER :

Rod block due to APRM E downscale. (1.0)

5) PV:1.0 Q#:5145 RT:20 LP:OPL174.721, OPL174.807/6, OPL176.008 CT:88C, SYS

Based on current plant conditions, select the statement below which most , accurately describes why the white lights are illuminated above HS-68-32 and 41, RECIRC PUMP RUNBACK RESET, on pnl 9-4.

a. LI-3-53 failed downscale.

b. "C" reactor feedpump tripped.

c. Lights are normally illuminated and extinguish when a recirc pump runback occurs.

d. Reactor water level decreased to 27" after "C" RFPT tripped.

ANSWER\_:D

6) PV:1.0 Q#:4709 RT:2.0 LP:OPL176.008, OPL174.809.3B, BCA89-18 CT:SYS

What action, if any, would happen if 4KV S/D Board "D" 43 switch were placed in auto?

ANSWER : The shutdown board would transfer back to its normal supply, shutdown bus 2.(1.0)(Bkr. 1618 opens, Bkr. 1724 closes.)

7) PV:1.0 Q#:4283 RT:2.0 LP:OPL176.006 -CT:OI, SYS

Based on current plant conditions what would be the significance of "C" RFP discharge pressure indicating the same as RFP "A"?

SECTION A FINAL EXAM 1989 REQUAL WEEK 2

EXAM: 176.006 PAGE: 3

#### ANSWER :

The discharge check value on the "C" RFP has not seated.(1.0)

8), PV:1.0 Q4:5149 RT:2.0 LP:OPL174.850/4,19, OPL171.045/C,L, 2050030101, OPL176.006 CT:01, SYS, TS

What operator action would have to be taken to ensure the operability of the Core Spray and RHR systems if a fault in the breaker supplying FCV 75-57 resulted in the isolation of the valve and corrective maintenance could not be completed.

#### ANSWER :

Align condensate transfer to supply the keep fill system. (1.0)

9) PV:1.0 Q#:4702 RT:1.0 LP:OPL174.721.18, OPL176.008 CT:SYS

Based on current plant conditions, describe the initial response of Recirc. pumps A & B if HS-68-32 and 41 were depressed.

#### ANSWER :

Initially, both recirc pumps would speed up.(1.0) (They would increase in speed to the value demanded by the Recirc Master Controller).



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SECTION A FINAL EXAM 1989 REQUAL WEEK 2

EXAM: 176.006 PAGE: 4

10) PV:1.0 Q#:5150 RT:1.0 LP:OPL174.819/2, OPL174.809/2, OPL176.006 CT:SYS

For current plant conditions, if the alternate feeder breaker to D 4KV S/D bd. were opened, the:

2B RBCCW pump would trip on undervoltage. a.

**b**. 2B RPS circuit protector would trip.

2B 480V S/D board would transfer to C 4KV S/D Bd. c.

d. 2A2 Drywell cooling fan would trip.

ANSWER :B

11 X PV:1.0 04:5794 RT:2.0 LP:0PL174.729, NRC CT:SYS

Which one of the following correctly describes the operation of the RWM as power is reduced from its current level to 25 percent of rated?

The "auto" indicator light will extinguish when power is decreased below the LPAP.

The system will enforce the loaded rod sequence when power decreases b. below the LPAP.

- Both steam flow and feed Now must decrease below a designated c. setpoint to place the system in service.
- All system alarms and displays are operative while in the d. "transition zone." DELETED

ANSWER : A



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#### SECTION A FINAL EXAM 1989 REQUAL WEEK 2

EXAM: 176.006 PAGE: 5

# 12) PV:1.0 Q#:5788 RT:2.0 LP:OPL171.007, NRC CT:SYS

The following plant conditions exist:

Jet pumps 1-10 Differential Pressure (meter) = 3 psid.

Jet pumps 11-20 Differential Pressure (meter) = 15 psid

RECIRC LOOP B ONLY OUT OF SERVICE (annunciator) = ON

The TOTAL CORE FLOW recorder would calculate core flow by which one of the following methods?

a. Loop A jet pump flow + loop B jet pump flow

b. Loop A jet pump flow - loop B jet pump flow

c. Loop A jet pump flow only

d. Loop B jet pump flow only

ANSWER :B

#### SECTION A PLANT OPERATIONS

EXAM NO: 176.006

DATE PREPARED: 9-11-88

LOCATION STORED: SU-11

#### A. DESCRIPTION

Reactor Feed Pump trip from 100% power, APRH C downscale.

#### B. STORED SIMULATOR SETUP

1. INITIAL CONDITION:

IC-17, 100% power, "C" RFPT tripped.

"A" NR Level failed, E APRH downscale.

D S/D Bd 43 switch in manual.

2. MALFUNCTIONS ACTIVE:

NUMBERDESCRIPTION169-007"A" FWLC failed low.096"E" APRM downscale.

3. REMOTE FUNCTIONS:

#### NUMBER DESCRIPTION

None

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OPERATOR ACTIONS TAKEN:

Reset of annunciators.

# C. <u>INSTRUCTOR ACTIONS</u>:

Δ.

- 1. Manually advance all recorders.
- 2. Playback Exam: <u>SU-11, 176.006</u>
- 3. Playback Time: ~ <u>3 min.</u>
- 4. Turn off Recorder Power.
- 5. Take out of freeze and acknowledge annunciators.

#### D. EXAM INFORMATION:

- 1. Total No. Questions: 10
- 2. Total Points: 11.0
- 3. Response Time: 17 min.
- E. <u>EXAM REVIEW/APPROVAL</u>:

VALIDATED BY <u>M. Meek</u>

APPROVED BY

OPERATIONS TRAINING

APPROVED BY

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MIMECK (OPERATIONS REPRESENTATIVE)

#### SECTION A PLANT OPERATIONS

EXAM NO: 176.006

STUDENT HANDOUT

# A. INITIAL PLANT CONDITIONS

100% power steady state conditions. "A" Narrow Range Level indicator is out of service.

# <u>INITIATING EVENT</u>

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c.

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"C" RFPT tripped.

#### PROCEDURES IN USE

Verification of automatic actions and reset of annunciators are the only actions taken.

ANCHER KEY

SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B PAGE: 2

#### 3) PV:1.5 Q#:4369 RT:5.0 LP:OPL174.819.9, 2120060101 CT:AOI

The reactor is operating at 100% rated thermal power. RPS motor generator set 2B trips. After RPS bus B is transferred to the alternate power supply, the "MODE SWITCH SCRAM BYPASS" annunciator on panel 9-5 alarms.

- a. What action is required to correct this condition? (1.0)
- b. If the reactor mode switch is placed in shutdown before the operator clears this condition, state the cause of the reactor scram which would result.

#### ANSWER :

- A. Manually closing relay 5A-K17B (in the auxiliary instrument room.)
  - (1.0)

B. APRM high flux scram. (15%)

4) • PV:2.5 Q#:4601 RT:5.0 LP:OPL174.835.5 CT:AOI

Assume a condition exists requiring control room abandonment, but no other abnormal events are in progress.

 a. Which of the EOI-1 (Reactor Control) entry conditions would be established while executing the initial operator actions of 1/2 AOI-100-2 Control Room Abandonment? (1.5)

b. What actions, with regard to the Emergency Operating Instructions, should be taken while executing AOI-100-2, Control Room Abandonment? (1.0)

SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B

PAGE: 3

ANSWER :

- a. Condition requiring MSIV isolation (.5) Reactor pressure above 1043 psig (.5) Reactor water level below +11". (.5)
- b. (The Backup Control System is designed to achieve and maintain cold shutdown from outside the control system.) No action should be taken in the Emergency Operating Instructions (solely as a result of executing the provisions of 1/2 AOI-100-2, Control Room Abandonment.) (1.0)

Gave credit if reternced ADI Actions That accomplished "NORMAL EDI functions"

5) • PV::75 Q#:4348 RT:3.0 LP:OPL174.812.8, OPL174.812.7, OPL174.812.8 CT:EOI

Match each of the following drywell temperatures in Column 1 with the Column 2 required action for the specific temperature.

COLUMN 1 DRYWELL TEMPERATURE

a. 160 deg. F

b. 210 deg. F

c. 280 deg. F

# COLUMN 2 REQUIRED ACTIONS

- 1. Emergency depressurization
- 2. Stop venting the containment
- 3. Enter EOI-2 and initiate all available drywell cooling
- 4. Start venting the containment
- 5. Enter C-4, Rx. Flooding

ANS	WER	:	_	â
λ.	3		•	
в.	2			
c.	1		(.25	each)

SECTION B SRO FINAL EXAM .89 REQUAL WK. 2 EXAM: ROWEEK2B

PAGE: 4

(.5)

#### 6) + PV:1.5 Q#:4351 RT:5.0 LP:OPL174.812.8 CT:EOI

The following containment parameters are noted as a result of a pipe break inside conatinment: Drywell pressure is 20 psig Drywell temperture is 210 deg. F Suppression chamber pressure is 18 psig. Suppression chamber temperature is 155 deg. F. Suppression pool level is +2" Reactor water level is +30 inches

- a. Would initiation of drywell sprays be required?
- b. List three criteria which has to be evaluated to make your decision in part A. (1.0)

ANSWER :

b. D/W spray initiation curve ( Supp. Chamber temp. or D/Wpress.

Suppression pool level

Suppression chamber pressure

Adequate core cooling

(any 3 @ .33 each)

7) • PV:1.0 Q#:4357 RT:3.0 LP:OPL174.812.8 CT:EOI

From the following data, determine the Heat Capacity Level Limit (HCLL).

Reactor pressure 500 psig

Drywell pressure 7.2 psig

Suppression pool level 13.2 feet

Suppression pool temperature 166 deg. F

SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B

EXAM: ROWEEK21 PAGE: 5

\*:\*\*

<u>ANSWER</u>: 13 feet (<u>+</u>.5 ft) (1.0) HCTL =  $174^{\circ}F \pm 2^{\circ}F$ delta T<sub>hc</sub> =  $174^{\circ} - 166 \text{ deg } F = 8^{\circ}F (\pm 2^{\circ}F)$ 

(Math error carried forward is minus .2)

8.) • PV:1.0 Q#:4618 RT:5.0 LP:OPL173.813 CT:EOI

A turbine trip with a scram failure occurred. The main condenser remained available through the bypass valves. The operators entered EOI-1 and, as a result of the EOI actions, boron was injected and reactor water level was intentionally lowered to -88 inches. When the SLC tank level reached 58%, all control rods inserted to position 00. Which of the following statements is most accurate concerning operator action?

a. The operator may now begin a cooldown at the normal (<100 deg F/hr) rate.

Reactor water level may NOT be restored to +11 to +54 inches until the SLC tank level has dropped to 50%.

c. The MSIV interlocks (appendix 8) were NOT required to have been bypassed during this event.

d. SLC injection should NOT be stopped until tank level reaches 20%.

ANSWER : A

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#### SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B

PAGE: 6

# 9) PV:1.0 Q#:4625 RT:3.0 LP:OPL173.823 CT:EOI

Choose the ONE BEST answer.

Rapid depressurization of the reactor using the turbine bypass valves is allowed by the EOIs if . . .

- a. . . emergency depressurization is anticipated and all control rods are at position 00 or 02.
- b. . . . emergency depressurization is anticipated and the reactor is shutdown.
- c. . . . the continuous air supply to the SRVs is lost.
- d. . . emergency depressurization is required and all control rods are at position 00 or 02.

ANSWER : A

PV:1.0 Q#:4627 RT:1.0 LP:OPL173.822 CT:EOI

EOI-1, Reactor Control, is being executed following a scram due to a turbine trip at high power. During the initial phase of the transient, pressure increased to the SRV lift setpoint, and one of the SRV's did not reclose. Suppression pool temperature has reached 95 deg. F. Which one of the following best describes the proper action?

a. Re-enter EOI-1 at the beginning.

b. Re-enter EOI-1 at the beginning and enter EOI-2.

c. Continue in EOI-1 and enter EOI-2.

d. Continue in EOI-1.

<u>ANSWER :C</u>

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SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B PAGE: 7

11) + PV:1.0 Q#:4628 RT:3.0 LP:OPL173.829 CT:EOL

Reactor pressure is being maintained at 500 psig, and temperature near the water level instrument run in the drywell is 220 degrees F. The Shutdown Vessel Flooding Range Instrument (LI-3-55) is reading +30 inches.

- à. Can LI-3-55 be used to determine reactor water level? (.5)
- b. List the two criteria which had to be evaluated to make your decision in part A. (.5)

ANSWER : a. Yes (.5)

b. Drywell temp. < Rx sat. temp (.25) and instrument level/drywell temp limits are met (.25) stemp. near instrums.

water level indications.

7 \* PV:1,0 Q#:5238 RT:3.0 LP:OPL173.830 CT:GOI

Prior to pulling control rods for a start-up on Unit 2, the following SRM readings were recorded.

SRM A: 35 cps

SRM B: 42 cps

SRM C: 40 cps

SRM D: 37 cps

When must continous notch withdrawal of control rods be stopped?

<u>ANSWER</u>: When SRM reachs 16X original reading. (1.0) (SRM A = 560, B = 672, C = 640, D = 592). ANSWER KEY SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B PAGE: 8

# 13) + PV:1.0 Q#:5271 RT:5.0 LP:0PL174.826/22 CT:GO

During fuel loading on Unit 2, the following SRM readings were taken before and after loading a bundle in quadrant B?

	Before			•	<u>After</u>		
A	5 cps	•			5 cps		
В	4 cps	,			6 cps		
С	1 cps				2 cps		
D	4 cps				5 cps		
	A B C D	BeforeA5 cpsB4 cpsC1 cpsD4 cps					

Which one of the following most accurately describes the action to be taken:

a. Refueling stopped, and a subcriticality check performed.

b. Refueling can continue, but only in quadrant C.

c. Refueling can continue in quadrant B.

d. Refueling stopped and SRM A must be response checked.

ANSWER :C

14) \*PV:1.5 0#:4765 RT:5.0 LP:OPL174.816/13, 3420040302, 3420050302 CT:SP

List the requirements for tagging each of the following air operated valves in the closed position:

a.	Fails open	on	loss	of	air.	(.5	; )	l
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(.5)

(.5)

1002

120000

b. Fails closed on loss of air.

c. Fails as is on loss of air.

#### ANSWER :

- a. It is required to be jacked closed with an installed jacking device.(.5)
- b & c. Air supply electrically or mechanically isolated,(.25) and the air operated valve visually checked to be closed.(.25)

Note: part b & c each worth .5

SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B PAGE: 9

15) PV:1.0 Q4:5264 RT:5.0 LP:OPL174.816/42, 3420050302 CT:SP

While conducting an audit of clearances, the AUO reports that tag number 2-89-080-5 was missing. The clearance has a total of 10 tags. What action is required?

#### ANSWER :

- 1. All work should stop. (.2)
- 2. New tag prepared(using the number 11.) (.4)
- 3. Note on clearance(stating tag 5 missing, replaced by tag 11.) (.4)

16) + PV: 1.0 Q#:5268 RT:5.0 LP:OPL 17 1.068, 3430290302 CT:SP

Valve line-up checklist are being conducted on Unit 2. Initial positioning of a valve inside the Drywell resulted in an exposure of 62 mrem.

Which one of the following most accurately describes the action to be taken?

- a. Independent verification can be waived by the ASOS.
- b. Both checkers should have gone into the Drywell together.
- c. Independent verification can be waived only if an alternate means of verification is available.
- d. Independent verification can be waived only if the valve is throttled.

ANSWER :A



SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B PAGE: 10

#### 17) + PV:1.0 Q#:4604 RT:5.0 LP:OPL174.821.12 CT:REP

A large leak has occurred in the primary system on Unit 2. Several low pressure ECCS failures occur, resulting in level decreasing below the top of the active fuel. Core cooling without level restoration is established, in accordance with the Emergency Operating Instructions, to maintain adequate core cooling. Drywell pressure peaked at 44 psig, and is decreasing. Which one of the following event classifications is most appropriate?

a. Notification of Unusual Event

b. Alert

- c. Site Area Emergency
- d. General Emergency

#### ANSWER :C

• PV:1.0 Q#:5230 RT:5.0 LP:OPL174.821/9 CT:SRO, REP

Unit 2 had received an accident signal while operating at power. Based on conditions noted the SOS declared a General Emergency, among those conditions noted was Drywell Radiation Hi Alarm (XA-55-7C), RM 90-256 (Drywell cam) was approaching full upscale, and Drywell temperature is 300°F and increasing. Due to problems with electrical feeds there is no drywell cooling available. Which one of the following recommendation is most appropriate for the SOS to make?

- a. Recommendation 2
- b. Recommendation 4
- c. Recommendation 5
- d. Recommendation 6

#### ANSWER :D

SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B PAGE: 11

19) • PV:1.0 04:5781 RT:5.0 LP:NRC, OPL174.828 CT:TS, SRO

ANSWER KEY

Unit 2 is in HOT STANDBY CONDITION with a reactor pressure of 805 psig. Operability SI's are performed on all of the MSL Radiation Monitoring System Channels. Channels A and D test UNSAT, while Channels B and C test SAT. Maintenance has no estimate of repair time and will not be able to commence troubleshooting and repairs for 16 hours.

Which one of the following actions most accurately detail the allowances and/or limitations imposed by the Technical Specifications in this instance?

a. Be in Cold Shutdown Condition within the next 30 hours.

- b. Place one Trip System in the tripped condition within one hour; no additional action is required.
- c. Reduce load and have the Main Steam Lines isolated within 8 hours.

d. Insert all operable rods within four hours; no additional action is required. ANSWER :C SECTION B SRO FINAL EXAM 89 REQUAL WK. 2 EXAM: ROWEEK2B PAGE: 12

# 20) PV:1.0 Q#:4909 RT:8.0 LP:OPL173.901.2, WEEK3 CT:EOI

ANSWER KEY

A loss of coolant accident occurs from normal operating conditions. All emergency systems (RPS, PCIS, ECCS) respond normally. Use the following parameters to answer the question below.

Reactor pressure = 100 psig Reactor level = -20"

Drywell pressure = 26 psig Drywell Temperature = 180'F

Suppression Pool Level = 18.5 ft. Suppression Pool Temperature = 165'F

Suppression Chamber Temperature = 160°F

Suppression Chamber Pressure = 26 psig

Which one of the following actions is most appropriate?

a. Initiate Drywell and Suppression pool sprays.

b. Initiate Drywell spray, but not suppression pool spray.

. Initiate Suppression pool sprays, but not Drywell sprays.

d. Do not initiate Drywell or Suppression pool sprays. <u>ANSWER :C</u>


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TITLE: LOSS OF OFFSITE POWER (161 and 500 KV)

**REV 0003** 

UNIT 0 0-AOI-57-1A ATTACHMENT 2 (Page 2 of 7)

#### BACKFEEDING 4KV UNIT BOARD B AND ESTABLISHING MAIN CONDENSER AS A HEAT SINK

4.0 For the 480V board to be energized, PLACE all load breakers to OFF (local).

4.1 480V Unit Board B.

4.2 480V Water Supply Board.

4.3 480V Turbine MOV Board B.

4.4 480V Turbine MOV Board C.

#### NOTE:

Steps 5 and 6 are performed from Panel 9-23.

5.0 PLACE the diesel generator backfeed switches to BACKFEED (two switches on Unit 1 and 2 panel, and one switch on Unit 3 panel).

6.0 BACKFEED the desired unit(s) as follows:

6.1 To backfeed Unit. 1 using B and 3EB Diesel Generators PERFORM the following:

6.1.1 CLOSE Breaker 1714 on 4KV Shutdown Board B to energize Shutdown Bus 2.

6.1.2 ENERGIZE 4KV Unit Board 1B by closing Breakers 1712 and 1132.

6.2 To backfeed Unit 2 using A and 3EA Diesel Generators, PERFORM the following:

6.2.1 CLOSE Breaker 1614 on 4KV Shutdown Board A to energize Shutdown Bus 1.

6.2.2 ENERGIZE 4KV Unit Board 2B by closing Breakers 1622 and 1232.

- 6.3 To backfeed Unit 3 using D and 3ED Diesel Generators, CLOSE Breakers 1342 and 1332 to energize 4KV Unit Board 3B.
- 6.4 From 4KV Unit Board B, PLACE 480V Unit Board B and 480V Water Supply Board feeder breakers to ON.
- 6.5 From 480V Unit Board B, PLACE 480V Turbine MOV Boards B and C feeder breakers to ON.

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0-A0I-57-1A

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TITLE: CONTROL ROD DRIVE SYSTEM OPERATING INSTRUCTIONS

REV 0006

2-01-85 Q = 5794

#### 3.3 Rod Sequence Control System (RSCS)

- 3.3.1 [NRC/C] When the auxiliary instrument room RSCS logic is reset, the licensed operator on Panel 9-5 should be in communication with the person doing the resetting. [NRC/C Inspection Report 84-02]
- 3.3.2 Control rod reed switch position indicators should be checked to agree with the Full Out indication when a control rod is fully withdrawn.
- 3.3.3 When RSCS is bypassed on individual rods, the RWM must be operable and in service.
- 3.3.4 [NRC/C] Use of EMERG IN bypasses the Group Notch logic function of RSCS. When RSCS group notch logic is enforcing, its use is restricted to maintaining Group Notch logic as outlined in Section <u>8.16</u> and <u>8.17</u> of this instruction. [NRC Inspection Report 84-02]
- 3.3.5 Activities that can directly affect core reactivity are of a critical nature and strict procedural compliance, along with conservative actions must be followed.

## 3.4 Rod Worth Minimizer (RWM)

22050

- 3.4.1 The Low Power Set Point (LPSP) is 30% power, and the Low Power Alarm Point (LPAP) is 35% power, as determined by the Feedwater Control System. When the RWM is operating in the transition zone, between the LPSP and the LPAP, no rod blocks will be applied as a result of insert or withdraw errors, but the RWM will continue to provide alarm indications and insert error display.
- 3.4.2 The monitoring functions of the RWM are automatically bypassed at power levels above the LPAP.
- 3.4.3 All the RWM blocks will be applied in the event of a system bardware or software failure.
- 3.4.4 The RWM system Rod Test/Select pushbutton allows any one rod to be selected and moved to any position only if all other control rods are fully inserted.
- 3.4.5 When the RWM is bypassed, a second licensed operator is required to verify the Control Rod Sequence is followed.
- 1.4.5 <u>1-31-4.3.3.3.5.3</u> is used to document second person verification of the RWM energy the reactor is in startup or run, below 20% power and the RWM is inoperable.
- 3.4.7 Activities that can directly affect core reactivity are of a strictical nature and strict procedural compliance, along with conservative actions must be followed.

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#### 2 <u>BASES</u> (Cont'd)

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APR 13 1989 The operability of the meteorological instrumentation ensures that sufficient meteorological data is available for estimating potential radiation dose to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public.

The operability of the seismic instrumentation ensures that sufficient capability is available to promptly determine the seismic response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for Browns Ferry Nuclear Plant and to determine whether the plant can continue to be operated safely. The instrumentation provided is consistent with specific portions of the recommendations of Regulatory Guide 1.12 "Instrumentation for Earthquakes."

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments will be calculated in accordance with guidance provided in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. This instrumentation also includes provisions for monitoring the concentration of potentially explosive gas mixtures in the offgas holdup system. The operability and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with guidance provided in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20 Appendix B, Table II, Column 2. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

ATWS/RPT, Anticipated Transients without Scram/Recirculation Pump Trip system provides a means of limiting the consequences of the unlikely occurrence of a failure to scram during an ATWS event. The response of the plant to this postulated event (ATWS/RPT) follows the BWR Owners Group Report by General Electric NEDE-31096-P-A and the accompanying NRC Staff Safety Evaluation Report.

ATWS/RPT utilizes the engineered safety feature (ESF) master/slave analog trip units (ATU) which consists of four level and four pressure channels total. The initiating logic consists of two independent trip systems each consisting of two reactor dome high pressure channels and two reactor vessel low level channels. A coincident trip of either two low levels or two high pressures in the same trip system causes initiation of

BFN Unit 2

3.2/4.2-70

AMENDMENT NO. 16 3

#### BASES (Cont'd)

## APR 13 1989

ATWS/RPT. This signal from either trip system opens one of two EOC (end-of-cycle) breakers in series (the other system opens the other breaker) between the pump motor and the Motor Generator set driving each recirculation pump. Both systems are completely redundant such that only one trip system is necessary to perform the ATWS/RPT function. Power comes from the 250 VDC shutdown boards.

Setpoints for reactor dome high pressure and reactor vessel low level are such that a normal Reactor Protection System scram and accompanying recirculation pump trip would occur before or coincident with the trip by ATWS/RPT.

#### 4.2 BASES

The instrumentation listed in Tables 4.2.A through 4.2.F will be functionally tested and calibrated at regularly scheduled intervals. The same design reliability goal as the Reactor Protection System of 0.99999 generally applies for all applications of  $(1-out-of-2) \times (2)$  logic. Therefore, on-off sensors are tested once/3 months, and bistable trips associated with analog sensors and amplifiers are tested once/week.

Those instruments which, when tripped, result in a rod block have their contacts arranged in a 1-out-of-n logic, and all are capable of being bypassed. For such a tripping arrangement with bypass capability provided, there is an optimum test interval that should be maintained in order to maximize the reliability of a given channel (7). This takes account of the fact that testing degrades reliability and the optimum interval between tests is approximately given by:

$$i = \sqrt{\frac{2t}{r}}$$

i = the optimum interval between tests.

Where:

t = the time the trip contacts are disabled from performing their function while the test is in progress.

r = the expected failure rate of the relays.

To test the trip relays requires that the channel be bypassed, the test made, and the system returned to its initial state. It is assumed this task requires an estimated 30 minutes to complete in a thorough and workmanlike manner and that the relays have a failure rate of  $10^{-6}$  failures per hour. Using this data and the above operation, the optimum test interval is:

$$i = \sqrt{\frac{2(0.5)}{10^{-6}}} = 1 \times 10^{3}$$
  
= 40 days

3.2/4.2-71

# AMENDMENT NO. 16 3

BFN Unit 2

## - ENCLOSURE 5 .

#### REQUALIFICATION PROGRAM EVALUATION REPORT

#### Facility Generated Reference Material

The reference material supplied by the facility was reviewed to determine its adequacy for examination development and administration. The facility supplied an adequate number of open reference questions and their supporting static simulator scenarios for development of the written portion of the examination. One hundred ten Job Performance Measures (71 for Inside the Control Room Tasks and 39 for Outside the Control Room Tasks) and 15 dynamic simulator scenarios were provided for the development of the operating portion of the examination. A sufficient amount of additional reference material was provided to the examination team.

The facility developed a set of "Requalification Test Specifications" to use as a sampling plan for the examination. It was not correlated to NUREG 1123 (KA Catalog) rating factors, but instead was based upon the site specific task analysis. This precluded the use of a 3.0 Importance Rating as the basis for selecting test items, since only a handful of the site specific tasks were rated this high. (This was due to the facility's ratings being based almost exclusively on a task's direct potential to cause an off-site release.) However, the items selected by the facility seemed appropriate; selected comparisons to the KA Catalog showed the import of the test items to meet the 3.0 criterion.

NRC examiners met with members of the facility training staff on numerous separate occasions for the purpose of constructing the examination. This included the entire week of June 26, which was devoted exclusively to examination development activities. Minor changes in content and format were made to the Job Performance Measures (JPMs). The Simulator scenarios required more significant modifications, to ensure that measurable and appropriate performance criteria were in place and agreed upon. The written exam was developed by the exam team due to the lack of sufficient useable questions within the utility examination bank.

Specific lessons learned from this portion of the examination process include:

1. Definition and understanding of the Individual Simulator Critical Task (ISCT). The ISCTs provide the backbone for the individual simulator evaluations and, through their composite worth, the basis for the crew evaluations. ISCTs must be measurable and, therefore, are best evaluated when a definitive action is required of the operator. The inclusion of passive failures to ensure that critical tasks are actually being performed, as opposed to crediting them through an operator's non-action, is the preferable testing technique.

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- 2. Simulator scenarios need to have a greater depth, especially with respect to their investigation of the operator's capabilities to implement the Emergency Operating Instructions (EOIs). Specific component failures should be developed to ensure that the Contingency Procedures and the more off-normal portions of the EOIs are tested. Special attention should be given to the contingencies that were taught during the particular requalification cycle. No difference should be promulgated between the Shift Operations Supervisor (SOS) and Assistant Shift Operations Supervisor (ASOS). The difficulty of the scenario which they will receive when in the ASOS position should not be a factor in the development process.
- 3. Scenarios should be developed to exercise the crew's ability to use EOIs, Technical Specifications (TSs), and the Emergency Plan Implementing Procedures (EPIPs). Time should not be wasted on unnecessary normal and abnormal evolutions.
- 4. Time validation was not appropriately incorporated into JPM development. Transportation time during the JPMs should not count when designing the examination to meet a 2-1/2 hour time goal. Within the JPM itself, transportation time may be appropriate to count as part of the task accomplishment. The overall time verification should be that amount of time that the average operator would need to accomplish the task, from the point where he would normally receive the assignment to the completion of the job. In no case should the validation timing data be shared with the examinee.
- 5. Initiating and terminating conditions need to be better defined. This is especially true for JPMs which start in the middle of a procedure. The operator can then be held accountable for accomplishing the assigned task, and the evaluator will not have to interfere.
- 6. JPMs need to be in complete technical concurrence with the procedure guiding the task activity. Procedural steps should not be deleted from the JPM for reasons of convenience or irrelevance.
- 7. JPMs need to be written to handle all trains of the system being investigated with equal flexibility.
- 8. The JPMs need to take into account the expected annunciator responses which will occur during the task performance. Criteria need to be developed to evaluate the operator's response to these alarms. It is unacceptable to "write off" any alarms which will (intentionally or accidentally) occur during the examination process.
- 9. The scope of coverage in the Part B (Written Exam) questions was very limited. Those areas sampled were amply covered, but the breadth was too small. Questions need to be generated for the additional topics within this section, especially Technical Specification situational questions.
- 10. Emphasis should be placed on objective, machine-gradable questions.
- 11. While JPM follow-up questions may also be acceptable as written exam items, controls need to be in place to ensure that there is not replication between the JPM and the written questions when an exam is collated.

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The facility's administration of the examination was acceptable. Initial plans for maintaining examination security were not of sufficient depth to ensure compromise was precluded. However, corrective actions were appropriate and sufficient. Two areas of improvement were noted concerning the administration of JPMs.

- 1. In general, JPMs should be performed in the environment in which they are expected to be encountered. This includes the assignment of the task and its subsequent performance. Simulator JPMs should utilize an Initial Condition (IC) which is analogous to the plant conditions which would be occurring when this task would be performed.
- 2. All tools, equipment, procedures, etc., expected to be used during the JPM should be identified, located, and obtained by the operator. If not, specific follow-up questions by the evaluator should be used to ensure that the operator knows where and how to obtain the supporting materials needed.

An evaluation of the facility's evaluators was conducted. The evaluation consisted of assessing the evaluator's skills in the following areas:

- Detection Skills
- Probing of Examinee Weaknesses, as required
- Properly grading JPMs
- Differentiating Training Knowledges
- Judgment (Pass/Fail Decisions)
- Cues (Verbal and Non-Verbal)

The NRC examiners determined that no licensee evaluator was unsatisfactory; however, one evaluator did demonstrate significant shortcomings during the walk-through portion of the exam. Weaknesses in the evaluation process of specific note were:

- 1. Simulator examinations are dynamic and cannot be totally predictable between crews and individuals. Because of this, there is a need for flexibility in deleting and adding ISCTs. There should be a concensus on such changes between the NRC and facility team members.
- 2. The evaluation of the Shift Technical Advisor (STA) as part of the "team" on the dynamic simulator exam needs emphasis. Comments on STA performance were few, and almost as an afterthought. The STA is a vital component of the operating crew and must be integrated into the evaluation process.
- 3. The JPM examination must be consistent in its application to each operator. In particular, the exam should be specific with respect to trains of equipment, the particular plant conditions, verbal cues, and pre-written questions that are going to be used during the exam.

- 4
- 4. The facility evaluators must remove their "training hats" during the administration/evaluation process. The evaluator should be a non-entity to the process, as far as the operator is concerned. No assistance, either direct or implied, should enter the examination. This includes:
  - Disrupting operator performance during JPMs to ask detailed knowledge concerning a step or component;
  - Inattentiveness to the operator's actions (e.g., making the operator repeat steps, asking a question the operator had previously answered);
  - Prompting the operator in the performance of critical steps (e.g., adjusting potentiometers, finding procedures, turning on local lighting);
- 5. The evaluators need to be more circumspect in the evaluation methodology. It is unacceptable to "read" anything into an examinee's responses, either verbal or written. An evaluator cannot say "Oh, I know what he means" in grading an operator's response. Specific examples of this included:
  - Not holding an SOS accountable for the crew's non-aggressive pursuit of effective emergency operations. Whether the SOS is a normal shift-standing operator, or not, and what the normal supervisory relationship between personnel is, cannot become a factor in the evaluation process.
  - Not faulting either an operator, or the crew, for missing EOI entry conditions. This was caused when an operator "cleared" all of the annunciators which indicated that a primary boundary break had occurred.
  - Not applying "proportional grading" to a written exam response, when required. Proportional grading is necessitated when additional <u>incorrect</u> information is provided by an examinee.

## Regualification Program Evaluation

A satisfactory requalification program must meet each of the following criteria:

- (1) A 90 percent pass/fail decision agreement between the NRC and the facility grading of the written and operating examinations.
- (2) At least 75 percent of all operators must pass the examination.

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- (3) No crews rated as unsatisfactory by the NRC, but rated as satisfactory by the facility.
- (4) No more than one third of the crews are determined to be unsatisfactory on the simulator evaluations.

In addition, if three or more of the following are applicable to the requalification program, then the program shall be determined to be unsatisfactory. If one or two of the following are applicable, then the program may be determined to be unsatisfactory:

- (5) The same common JPM is missed by at least 50 percent of the examinees.
- (6) The same question on the same JPM is missed by at least 50 percent of the examinees.
  - (7) The facility failed to train and evaluate operators in all of the positions permitted by their individual licenses,
  - (8) The facility failed to train operators on "in-plant" JPMs.
  - (9) Less than 75 percent of the examinees correctly answer 80 percent of the common JPM questions.
- (10) More than one facility evaluator is determined to be unsatisfactory.

Based on the information provided in the report, above, the Browns Ferry Requalification Program did not meet all of the above criteria. It continues to be in an unsatisfactory status. The specific weaknesses which the program displayed were as follows:

- (1) Only 63 percent of all operators who took the examination passed all portions. (Criterion #2)
- (2) Overall pass/fail agreement between NRC and facility evaluators only met the minimum allowance. (Criterion #1)
- (3) The facility exacted different performance levels for their SOSs and ASOSs when in the ASOS position; however, SROs were trained in all positions for which they were licensed. (Criterion #7)
- (4) Facility evaluators displayed significant weaknesses, even though none were classified as unsatisfactory. (Criterion #10).

## ENCLOSURE 6

## SIMULATOR FACILITY REPORT

Facility Licensee:

Browns Ferry Nuclear Plant

Facility Docket Nos.: 50-259, 50-260, and 50-296

Operating Tests Administered On: July 11 - 13 and 18 - 20, 1989

During the conduct of the simulator portion of the operating tests, the following items were observed :

#### ITEM

## DESCRIPTION

HPCI ROOM TEMPERATURE . PANEL .

ARM METERS

TEMPERATURE RECORDER (Panel 9-47)

RPIS (OD-7) SLOWNESS

During simulator scenario 177.001, a HPCI ALARM steam leak was initiated. The back-panel temperature alarm on Panel 9-21 actuated, but cleared after HPCI isolated. This alarm is supposed to have a "lock-in" feature. Both the examination and evaluation processes were affected by this deficiency.

There is no modeling of the Area Radiation Monitor drawers in the simulator. (There is annunciation modeling.) This affects both the training and the evaluation mode of an operator's initial and requalification training. As indicators of a loss of primary system boundaries, this lack of modeling carries a significant potential for negative training.

The Temperature Recorder for the SRV 2-TR1-1 tailpipes on Panel 9-47 is different from that in the Control Room. It does not allow for acceptable reading (clarity) and does not allow for an accurate JPM task simulation.

The Process Computer printout of rod positions (OD-7) is unrealistic in its response. All variables have been set to their slowest allowable time. A verification of rod position after a scram can take over 3 minutes. This response caused numerous crews to question whether, or not, they were in an ATWS condition. Time response should be brought in line with the plant's actual operating characteristics.

In general, the simulator modeling is greatly lacking in its flexibility, especially in its capacity to investigate the operators' abilities to use and implement the Emergency Operating Instructions. Numerous limitations within the malfunctions and the instructor override capabilities have been noted during past exam trips. Essentially, these deficiencies remain uncorrected. The facility has recognized the limitations of the current simulation facility and has initiated corrective actions for obtaining an upgraded simulator. Emphasis on obtaining the improved hardware and software is encouraged. Without such improvements, it is doubtful if the simulation facility can be certified to ANSI 3.5 standards, as is required by 10 CFR 55.

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