U.S. NUCLEAR REGULATORY COMMISSION REGION I
OPERATOR LICENSING EXAMINATION REPORT

EXAMINATION REPORT NO.	50-277&278/88-16(OL)
FACILITY DOCKET NO.	50-277/278
FACILITY LICENSE NO.	DPR-44 and DPR-56
LICENSEE:	Philadelphia Electric Company 2301 Market Street Philadelphia, Pennsylvania 19101
FACILITY:	Peach Bottom Units 2 and 3
EXAMINATION DATES:	July 19 to July 21, 1988

CHIEF EXAMINER: Allen G. Howe, Senior Operations Engineer — Date: 9-1-88

APPROVED BY: David J. Lange, Chief, BWR Section, Operations Branch, Division of Reactor Safety — Date: 9-2-88

SUMMARY: Written examinations and operating tests were administered to one (1) senior reactor operator (SRO) candidate and eight (8) reactor operator (RO) candidates. A ninth RO candidate took only the written examination. One (1) SRO candidate and seven (7) RO candidates passed these examinations. One candidate failed the written examination and one candidate failed the operating test.

DETAILS

TYPE OF EXAMINATIONS: Replacement

EXAMINATION RESULTS:

	RO Pass/Fail	SRO Pass/Fail
Written	8/1	1/0
Operating	7/1	1/0
Overall	7/2	1/0

1. CHIEF EXAMINER AT SITE: T. Walker, Senior Operations Engineer

2. OTHER EXAMINERS: D. Lange, Chief, BWR Section
T. Fish, Operations Engineer
R. Miller, Sonalysts
M. Sullivan, Sonalysts

3. The following is a summary of generic strergths or deficiencies noted on operating tests. This information is being provided to aid the licensee in upgrading license and requalification training programs. No licensee response is required.

STRENGTHS

For systems discussed while out in the plant: Ability to explain operation of system components.

DEFICIENCIES

Ability to give typical, expected values of major plant parameters for 100% power conditions.

4. The following is a summary of generic strengths or deficiencies noted from the grading of the RO written examinations. No summary was made on the SRO exam as just one exam was administered. This information is being provided to aid the licensee in upgrading license and requalification training programs. No licensee response is required.

STRENGTHS

a. Knowledge of thermal hydraulic limits, (Question 1.01). Ability to calculate cooldown rates, (Question 1.02). Knowledge of Shutdown Margin and the ability to predict changes in SDM due to changes in other parameters, (Question 1.09).

b. Knowledge of the plant's automatic response to a loss of a condensate pump at 100% power; condenser over-pressure protection, (Question 2.07). Knowledge of the response of the HPCI system to various component failures and the consequences of continued HPCI operation, (Question 2.08).

c. Knowledge of RPS response to loss of various power supplies, (Question 3.02).

d. Knowledge of the rationale behind a particular operator action in OT-114, "Inadvertent Opening of a Relief Valve", (Question 4.07). Knowledge of the basis for two Cautions associated with TRIP procedures, (Question 4.10).

DEFICIENCIES

a. Knowledge of how RPV level indication is affected by various operating conditions, (Question 3.01). Knowledge of the response of the Off-Gas system to a Hi-Hi Radiation alarm, (Question 3.03). Knowledge of the conditions which generate an RPIS INOP condition, (Question 3.06).

5. PERSONNEL PRESENT AT EXIT INTERVIEW:

US Nuclear Regulatory Commission Personnel

D. Lange, Chief, BWR Section, DRS
T. Walker, Chief Examiner
T. Fish, Operations Engineer
L. Myers, Resident Inspector
J. Linville, Chief, Projects Section 2A

Philadelphia Electric Company Personnel

J. Franz, Manager, Peach Bottom
F. Polaski, Assistant Superintendent of Operations
K. Andrews, Supervisor, Operations Training
J. Lyter, Operations Training
R. Scheide, Compliance

6. SUMMARY OF NRC COMMENTS MADE AT EXIT INTERVIEW:

The chief examiner thanked the training and operations staffs for their cooperation during the examination.

The examiners felt site access was well coordinated and went smoothly.

The written examination review resulted in a few comments requiring resolution. The reviewers stated that the examination was a good test.

The generic strengths and weaknesses noted on the operating examinations were discussed.

Attachments:
1. Written Examination and Answer Key (RO)
2. Written Examination and Answer Key (SRO)
3. Facility Comments on Written Examinations after Facility Review
4. NRC Response to Facility Comments

ATTACHMENT # 1

U. S. NUCLEAR REGULATORY COMMISSION
REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: PEACH BOTTOM 2&3

REACTOR TYPE: BWR-GE4

DATE ADMINISTERED: 88/07/19

EXAMINER: NRC - REGION 1

CANDIDATE: MASTER

INSTRUCTIONS TO CANDIDATE:

Use separate paper for the answers. Write answers on one side only. Staple question sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires at least 70% in each category and a final grade of at least 80%. Examination papers will be picked up six (6) hours after the examination starts.

MASTER

CATEGORY VALUE	% OF TOTAL	CANDIDATE'S SCORE	% OF CATEGORY VALUE		CATEGORY
~~25.00~~ 23.5 *	25.00			1.	PRINCIPLES OF NUCLEAR POWER PLANT OPERATION, THERMODYNAMICS, HEAT TRANSFER AND FLUID FLOW
~~25.00~~ 24.5 *	25.00			2.	PLANT DESIGN INCLUDING SAFETY AND EMERGENCY SYSTEMS
~~25.00~~ 23.0 *	25.00			3.	INSTRUMENTS AND CONTROLS
25.00	25.00			4.	PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL
~~100.00~~ 96.0 *			%		Totals

Final Grade

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

MASTER
Candidate's Signature

* Parts of questions 2.09 and 1.07 were deleted. Question 3.08 deleted TP 8/24/88

QUESTION 1.01 (3.00)

Match the Failure Mechanism from column 1 and the Limiting Condition from column 2 with the associated Power Distribution Limits (a-c) below. (Your answer should have letter-number-number)

a. Linear Heat Generation Rate (LHGR) (1.0)

b. Average Planer Linear Heat Generation Rate (APLHGR) (1.0)

c. Critical Power Ratio (CPR) (1.0)

1-FAILURE MECHANISM	2-LIMITING CONDITION
1. Fuel clad cracking due to lack of cooling caused by DNB.	1. 1% Plastic Strain
2. Fuel clad cracking due to high stress from pellet expansion	2. Prevent Transition Boiling
3. Gross clad failure due to decay heat and stored heat following a LOCA	3. Limit clad temp to 2200 F

ANSWER 1.01 (3.00)

	FAILURE MECHANISM	LIMITING CONDITION
a. LHGR	2 (0.5)	1 (0.5)
b. APLHGR	3 (0.5)	3 (0.5)
c. CPR	1 (0.5)	2 (0.5)

REFERENCE
PBAPS LOT 1380 p.4, LOT 1400 p.7, LOT 1410 p.3

LO 1380-4, 1400-2, 1410-1

KA 293009K108(3.0) 293009K112(2.9) 293009K120(3.1)
293009K108 293009K110 293009K121 ...(KA'S)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.02 (2.50)

Reactor cooldown is in progress using the bypass valves. Your logs show that at 1800, reactor pressure was 735 psig. It is now 1900 (the same shift) and pressure is 325 psig. Is your cooldown rate within the TECHNICAL SPECIFICATION limit? SHOW all calculations. (2.5)

ANSWER 1.02 (2.50)

Yes. (0.5)
735 psig is approx 750 psia (0.25) 325 psig is approx 340 psia (0.25)
T sat for 750 is approx 510 F (0.5) T sat for 340 is approx 430 F (0.5)

(510 - 430) F =80 F in one hour: which is within TS limit (0.5) (2.5)

REFERENCE
PBAPS LOT 1160

LO 1160-2

KA 293003K123(2.8)
293003K123 ...(KA'S)

QUESTION 1.03 (2.00)

Regarding control rod worth:

a. (TRUE/FALSE) As moderator temperature increases, the worth of all the rods increases. (0.5)

b. (TRUE/FALSE) Fully inserting a rod from position 48 while at power inserts at least as much negative reactivity as the positive reactivity which would be added by dropping the same rod during a startup. (0.5)

c. (TRUE/FALSE) Rods have the greatest effect on reactivity when moving near the middle of their travel and the least effect when moving near the top and bottom of the core. (0.5)

d. (TRUE/FALSE) Although the flux shape changes over core life, individual rod worths and the worth of all rods remain approximately constant. (0.5)

ANSWER 1.03 (2.00)

a. True (0.5)
b. False (0.5)
c. True (0.5)
d. False (0.5)

REFERENCE
PBAPS LOT 1490 p.6-7

LO 1490-5.6.7

KA 292005K104(3.5) 292005K109(2.5)
292005K104 292005K109 ...(KA'S)

QUESTION 1.04 (2.50)

The reactor is brought critical at 40% on range 2 with the minimum permissible stable positive period allowed by procedure GP-2, "Normal Plant Startup". Heating power is determined to be 40% on range 8 of IRM's.

a. WHAT is doubling time if period remains constant? (1.0)

b. HOW LONG will it take for power to reach the point of adding heat if period remains constant? (1.5)

ANSWER 1.04 (2.50)

a. From GP-2, minimum period equals 50 seconds. (0.5)
Thus doubling time equals 50/1.44 = 34.7 seconds. (0.5) (1.0)

b. 40% range 2 is equal to 0.04% on range 8 (0.5)
P(0) = 0.04 P(t) = 40 Period = 50 seconds (0.25)
P(t) = P(0) e ^(t/period) (0.?5)
40 = 0.04 e ^(t/50 sec) (0.25)
Time = 345.4 seconds or 5 min. 45.4 sec (0.25) (1.5)

REFERENCE
PBAPS LOT-1430 p.4

LO 1430-1.a. 4

KA 292003K105(3.7)
292003K105 ...(KA'S)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.05 (3.00)

Power is 80%. For each of the following changes in plant conditions, STATE the INITIAL effect on reactor power (INCREASE, DECREASE, NO CHANGE). BRIEFLY EXPLAIN each answer.

a. Isolation of a feedwater heater string. (1.0)

b. One bypass valve fully opens. (1.0)

c. Fast closure of an MSIV. (1.0)

ANSWER 1.05 (3.00)

a. Increase (0.5)
Cooler inlet water to the core (0.5) (1.0)

b. Decrease (0.5)
Void fraction increases (pressure decreases) (0.5) (1.0)

c. Increase (0.5)
Voids collapse (pressure increases) (0.5) (1.0)

REFERENCE
PBAPS LOT 1440 p.3-4

LO 1440-3

KA 292008K122(3.5)
292008K122 ...(KA'S)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.06 (2.00)

You are performing a reactor startup. The reactor is slightly subcritical.

a. (TRUE/FALSE) For an equal amount of rod withdrawal, the change in count rate will be larger than when the reactor was greatly subcritical. (0.5)

b. (TRUE/FALSE) The larger the change in count rate, the longer the period. (0.5)

c. (TRUE/FALSE) The longer the period, the longer it takes to reach equilibrium power. (0.5)

d. (TRUE/FALSE) If a control rod is withdrawn that doubles the neutron level, the distance to criticality has been halved. (0.5)

ANSWER 1.06 (2.00)

a. True (0.5)
b. False (0.5)
c. False (0.5)
d. True (0.5)

REFERENCE
PBAPS LOT 970 p.8

LO 970-4

KA 292008K103(4.1) 292008K104(3.3)
292008K103 292008K104 ...(KA'S)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.07 ~~(3.00)~~ 3/17/88 (1.50)

The Residual Heat Removal pumps are being used in the Shutdown Cooling Mode. HOW will AVAILABLE and REQUIRED Net Positive Suction Head (NPSH) for the RHR pumps be affected (INCREASE, DECREASE, or NOT AFFECTED) by each of the following changes?

	NPSH AVAILABLE	NPSH REQUIRED
a. Reactor water temperature increases		
b. Reactor water level decreases		
c. RHR system flowrate decreases		

~~1.00~~ (0.5)
~~3/1.75~~ (0.5)
~~1.00~~ (0.5)

ANSWER 1.07 ~~(3.00)~~ (1.50) 3/17/88

	AVAILABLE	REQUIRED
a.	decrease	not affected
b.	decrease	not affected
c.	increase	decrease

(0.5 pts each) 3/17/88

REFERENCE
PBAPS LOT 1290

KA 202001K101(3.6) 202001K103(3.2) 202001K105(3.4) 202001K122(3.4)
202001K101 202001K103 202001K105 202001K122 ...(KA'S)

QUESTION 1.08 (1.50)

While operating at 70% power, an MSIV inadvertently closes. The reactor does not scram. Once the transient stabilizes, will reactor pressure be GREATER THAN, LESS THAN, or THE SAME AS reactor pressure was before the MSIV shut? BRIEFLY EXPLAIN your answer. (1.5)

ANSWER 1.08 (1.50)

Greater than (0.5)
Steam flow through the other three steam lines increases. (Head loss is proportional to the velocity squared.) Thus, the required driving head increases. (0.5) Therefore, a higher reactor pressure is required to force the same mass flow through 3 pipes, instead of 4. (0.5)
(1.5)

REFERENCE
PBAPS LOT 1270 p.9, LOT 120 p.16

LO 1270-7

KA 239001A108(3.8)
239001A108 ...(KA'S)

QUESTION 1.09 (2.50)

a. DEFINE Shutdown Margin (SDM). (1.0)

b. STATE how SDM will be affected (INCREASE, DECREASE, NO CHANGE) for the situations given below.

1. Moderator temperature decreases. (0.5)

2. Number of fully inserted control rods increases. (0.5)

3. Xenon concentration decreases. (0.5)

ANSWER 1.09 (2.50)

a. The amount of reactivity that the reactor is or could be made subcritical, from its present condition. (1.0)

b. 1. Decreases (0.5)

2. Increases (0.5)

3. Decreases (0.5)

REFERENCE
PBAPS LOT 950 p. 4-5

LO 950-6. 7

KA 292002K114(2.6) 292002K110(3.2)
292002K110 292002K114 ...(KA'S)

QUESTION 1.10 (3.00)

A load reject occurs while operating at 100% power. BRIEFLY DESCRIBE the INITIAL response and FINAL response (approximately 1 minute after the reject occurs) of the following parameters. BRIEFLY EXPLAIN the reason for each response. Assume no operator action is taken.

a. Reactor power (1.0)

b. Reactor pressure (1.0)

c. Reactor water level (1.0)

ANSWER 1.10 (3.00)

a. Power increases due to pressure increase (0.5)
then decreases due to scram (0.5) (1.0)

b. Pressure increases due to TCV's closing (0.5)
then decreases due to scram and BPV's opening (0.5) (1.0)

c. Water level decreases due to void collapse (0.5)
then increases as FWCS restores level (0.5) (1.0)

REFERENCE
PBAPS LOT-1600 p.T-1600-1

LO 1600-1, 4

KA 241000K101(3.8) 241000K102(3.9) 241000K103(3.6)
241000K101 241000K102 241000K103 ...(KA'S)

(***** END OF CATEGORY 01 *****)

QUESTION 2.01 (2.00)

Concerning the Control Rod Drive Hydraulic system:

a. STATE the two (2) conditions which give an accumulator trouble alarm. Include setpoints. (1.0)

b. DESCRIBE how you determine which of the two conditions applies. (1.0)

ANSWER 2.01 (2.00)

a. 1. low Nitrogen pressure (0.25), 940-970psig (0.25) or water in the Nitrogen side of flask (0.25), 37cc (0.25) (1.0)

2. Push the red button (0.4): if the light stays on, it's a Nitrogen problem;(0.3) if it goes out, it's a water problem. (0.3) (1.0)

REFERENCE
PBAPS LOT-70 pgs. 7-8, 12

LO 70-5,6,8

KA 201001K406(3.8) 201001G007(3.6) 201001A106(3.4)
201001A106 201001G007 201001K406 ...(KA'S)

QUESTION 2.02 (3.00)

a. BRIEFLY EXPLAIN WHY the Diesel Generators take longer to start using the manual start switch than when using the QUICK START button when starting the D/G's from the control room. Include applicable time differences. (1.0)

b. On a Maximum Credible Accident start, STATE four (4) D/G trips that are NOT bypassed. (2.0)

ANSWER 2.02 (3.00)

a. A manual start from the control room w/o QUICK START requires the prelube pump to start (0.5), thus delaying the D/G start for three minutes. (0.5) (1.0)

b. 1. engine overspeed trip (electrical or mechanical) (0.5)
2. generator phase differential overcurrent (0.5)
3. neutral overcurrent (0.5)
4. manual cardox injection (0.5) (2.0)

REFERENCE
PBAPS LOT-670 pgs.32, 39

LO 670-3,4

KA 264000K106(3.2) 264000K402(4.0)
264000K106 264000K402 ...(KA'S)

QUESTION 2.03 (2.50)

BRIEFLY DESCRIBE WHAT switches must be repositioned/reset and to WHAT POSITION in order to reset a Group I isolation. (2.5)

ANSWER 2.03 (2.50)

MSIV control switches (0.25) to close (0.25) (0.5)
RHR sample valve control switches (0.25) to close (0.25) (0.5)
MSL sample valve control switches (0.25) to close (0.25) (0.5)
Recirc loop sample valve control switches (0.25) to close(0.25) (0.5)
Isolation reset switches (0.25) to reset (0.25) (0.5)

REFERENCE
PBAPS LOT 180 pgs. 17-18

LO 180-5

KA 223002A403(3.6)
223002A403 ...(KA'S)

(***** CATEGORY 02 CONTINUED ON NEXT PAGE *****)

QUESTION 2.04 (2.25)

Concerning the Recirculation system:

a. WHAT interlock is associated with the LPCI system? Include applicable setpoints. (0.75)

b. (TRUE/FALSE) Recirculation pump speed is sensed by a tach-generator which is coupled directly to the pump shaft. (0.5)

c. DESCRIBE WHERE the high pressure tap used by a calibrated jet pump senses pressure and WHERE the high pressure tap used by a non-calibrated jet pump senses pressure (1.0)

ANSWER 2.04 (2.25)

a. Upon a LPCI initiation, the recirc discharge valve in loop 'A' (MO-53) receives a close signal (0.5) at 225 psig Rx pressure. (0.25) (0.75)

b. False (0.5)

c. The high pressure tap used by a calibrated jet pump senses pressure in the diffuser section of the jet pump (0.5); a non-calibrated jet pump senses below-core plate pressure. (0.5) (1.0)

REFERENCE
PBAPS LOT-30 pgs.7, 16, 21 LOT-T-0030-5

LO 30-6,10,12

KA 202001K116(3.9) 202001K107(3.1) 202001K112(3.6) 202001K106(3.6)
202001K106 202001K107 202001K112 202001K116 ...(KA'S)

QUESTION 2.05 (3.00)

WHAT AUTOMATIC ACTIONS would occur if the Stator Water Cooling outlet temperature increased from 75 degrees C to 82 degrees C? Include all alarms, setpoints, time delays, and trips which could occur. (3.0)

ANSWER 2.05 (3.00)

76 deg C Alarm (Stator liquid in/out high temperature) (0.5)

81 deg C decreases load limit to 25% (0.5)
Trips 'A' recirc pump after 1 second (0.5)
Trips 'B' recirc pump after 10 seconds (0.5)
Trips turbine if generator amps are not below 26.530 in two minutes. (0.5)
Trips turbine if generator amps are not below 7.726 in three and one half minutes. (0.5)

REFERENCE
PBAPS LOT 460 pgs. 6, 8

LO 460-6

KA 2450006008(3.4)
2450006008 ...(KA'S)

QUESTION 2.06 (2.50)

The plant is at 80% power and a Core Spray Surveillance Test is in progress.

a. WHAT CONDITIONS must be met in order to cycle the Inboard Injection valve? (0.5)

b. While testing the CS pump, DESCRIBE the expected response of the minimum flow valve. Setpoints required. (1.0)

c. During the surveillance, the test return valve AUTOMATICALLY closes. WHAT TWO signals could have caused this closure? (1.0)

ANSWER 2.06 (2.50)

a. The outboard injection valve (V-14-11A,B) must be closed. (0.5)

b. Auto opens on high pump d/p, 340 psid (0.5) and closes on low pump d/p, 320 psid (600gpm). (0.5) (1.0)

c. Closes on 2 psig drywell pressure (0.5) or -130 inches reactor water level. (0.5) -160 o-k (1.0)

REFERENCE
PBAPS LOT 350 pgs.5, 6, 9

LO 350-3, 5

KA 209001K401(3.2) 209001K403(3.0)
209001K401 209001K403 ...(KA'S)

QUESTION 2.07 (2.25)

a. While operating at 100% power, a condensate pump trips. STATE the two (2) automatic actions which occur directly because of this trip and STATE the purpose for these actions. (1.5)

b. HOW is the main condenser protected from an over pressure condition? Include applicable setpoints. (0.75)

ANSWER 2.07 (2.25)

a. Recirculation pumps runback to 60% (0.5) and a 90% maximum speed signal to the feed pumps is inserted. (0.5) This action reduces the feedwater requirements to a point that can be handled by two condensate pumps. (0.5) (1.5)

b. Two rupture diaphragms are provided on each LP turbine exhaust shroud, (0.5) set at 5psig. (0.25) (0.75)

REFERENCE
PBAPS LOT-520 pgs.5, 17

LO 520-10,11

KA 256000K304(3.6) 256000G007(3.4)
256000G007 256000K304 ...(KA'S)

(***** CATEGORY 02 CONTINUED ON NEXT PAGE *****)

QUESTION 2.08 (3.00)

For each HPCI System component failure listed below, STATE whether or not HPCI will AUTO INJECT into the reactor. If it will not auto inject, STATE WHY. If it will inject, GIVE ONE potential adverse effect of continued HPCI operation with the failed component. Assume NO OPERATOR ACTION, and that the component is in the failed condition at the time HPCI receives the auto initiating signal.

a. The GLAND SEAL EXHAUSTER fails to operate. (1.0)

b. The turbine AUXILIARY LUBE OIL PUMP fails to operate. (1.0)

c. The MINIMUM FLOW VALVE fails to auto open (STAYS SHUT) when system conditions require it to be open. (1.0)

ANSWER 2.08 (3.00)

a. Will inject (0.5) Turbine seal leakage resulting in potential airborne activity in the HPCI room (0.5). (1.0)

b. Will not inject (0.5) Turbine stop and control valves will not open. (0.5) (1.0)

c. Will inject (0.5) Pump overheating and seal damage may result during low or no flow conditions (0.5). (1.0)

REFERENCE
PBAPS LOT 340 pgs.5-6

LO 340-3

KA 206000K401(3.8) 206000K414(3.4) 206000K418(3.2)
206000K401 206000K414 206000K418 ...(KA'S)

(***** CATEGORY 02 CONTINUED ON NEXT PAGE *****)

QUESTION 2.09 (2.50)

For each of the following plant conditions, STATE (YES/NO) if ALL RUNNING drywell ventilation fans will trip off: (Consider each condition separately.)

a. 100% power, D/W temperature is 138 F. (0.5)

b. ~~Rx is shutdown, Rx water level is -135 inches.~~ ~~(0.5)~~

c. DW pressure is 2.1 psig, Rx water level is +38 inches. (0.5)

d. 50% power, torus bulk water temperature is 107 F. (0.5)

e. 100% power, #2 13.2KV bus is lost. (0.5)

ANSWER 2.09 (2.50)

a. no
b. yes
c. yes
d. no
e. no

REFERENCE
PBAPS LOT-140 p.6

LO 140-3

KA 223001K403(3.7) 223001K611(3.0)
223001K403 223001K611 ...(KA'S)

QUESTION 2.10 (2.00)

How will the Standby Gas Treatment System respond to the following conditions? (Include response of the filter train dampers in your answers.) Consider each situation separately.

a. 20 mr/hr refuel floor exhaust duct radiation level on Unit 2 (0.5)

b. RPS 'A' on Unit 3 is de-energized (0.5)

c. Fan 'C' fails to start after an automatic initiation signal is received (0.5)

d. Three (3) times normal full power background radiation levels in the steam tunnel of Unit 2. (0.5)

ANSWER 2.10 (2.00)

a. 'A' fan starts (0.25), both filter train damper sets open (0.25) (0.5)

b. 'C' fan starts (0.25), both filter train damper sets open (0.25) (0.5)

c. 'B' fan starts after 20 seconds (0.25), both filter train damper sets will remain open (should open from initiation signal to fan 'C') (0.25) (0.5)

d. no response (0.5)

REFERENCE
PBAPS LOT 210 p. 6

LO 210-2

KA 261000K401(3.8)
261000K401 ...(KA'S)

(***** END OF CATEGORY 02 *****)

QUESTION 3.01 (2.50)

a. For each of the following parameter changes and operational conditions, STATE if the INDICATED LEVEL will INCREASE, DECREASE, or REMAIN THE SAME for the specified level instrument if ACTUAL level REMAINS THE SAME.

1. The D/W temperature increases about 200 degrees. How will the NARROW RANGE level instrumentation respond? (0.5)

2. The D/W temperature increases about 45 degrees. How will the WIDE RANGE level instrumentation respond? (0.5)

3. A reactor startup is in progress. The head vent is closed. Vessel temperature and pressure are increased from atmospheric and 220 degrees to 800 psig and 518 degrees. How will the NARROW RANGE level instrumentation respond? (0.5)

4. A reactor startup is in progress. The head vent is closed. Vessel temperature and pressure are increased from atmospheric and 220 degrees to 800 psig and 518 degrees. How will the WIDE RANGE level instrumentation respond? (0.5)

b. WHAT level instrument(s) is/are responsible for initiating the main turbine and RFPT trips at +45 inches? (0.5)

ANSWER 3.01 (2.50)

a. 1. Increase (0.5)
2. Increase (0.5) or remain the same (See comments for Facility re modification
3. Remains the same (0.5)
4. Decrease (0.5) (2.0)

b. Feedwater Control (narrow range) (0.25) and Yarways (wide range) (0.25) (0.5)

REFERENCE
PRAPS LOT-50 pgs. 14, 17-18, 26

LO 50-4.6

KA 216000K501(3.1) 216000K507(3.6) 216000K510(3.1) 216000K113(3.4) 216000K116(3.0)
216000K113 216000K116 216000K501 216000K507 216000K510
...(KA'S)

(***** CATEGORY 03 CONTINUED ON NEXT PAGE *****)

QUESTION 3.02 (3.00)

a. (YES/NO) WILL a fast transfer of the 4KV bus supplying RPS cause a scram? Briefly EXPLAIN. (1.0)

b. (YES/NO) WILL a loss of all offsite power requiring a Diesel Generator start cause a scram? Briefly EXPLAIN. (1.0)

c. The reactor is at full power operation when the RPS Power Supply Selector Switch for one of the RPS buses is turned to the ALTERNATE power supply position. WHAT trip will occur (SCRAM, HALF-SCRAM, NONE)? EXPLAIN. (1.0)

ANSWER 3.02 (3.00)

a. No. (0.25) An internal flywheel provides the driving force for the RPS generator. The motor will auto restart if the voltage is returned within 5 secs.(0.75) (1.0)

b. Yes. (0.25) A start of the diesels requires longer than 5 seconds so the lockout assures that the motor will not auto restart. Thus, a resultant scram will occur on loss of RPS power.(RPS generator undervoltage or underfrequency) (0.75) (1.0)

c. A half scram will occur (0.5) due to loss of generator output. (0.5) (1.0)

REFERENCE
PBAPS LOT 300 pgs.7-8

LO 300-4, 5

KA 212000K104(3.4) 212000K404(3.1) 212000K601(3.6)
212000K104 212000K404 212000K601 ...(KA'S)

QUESTION 3.03 (1.50)

UNIT 3 is operating at 80% when an Off-Gas Hi-Hi Radiation alarm is received. Off-Gas is in automatic.

a. STATE the conditions necessary for an AUTOMATIC isolation of the Off-Gas system to occur. (0.5)

b. WHAT specific components will be isolates when the automatic isolation occurs? (1.0)

ANSWER 3.03 (1.50)

a. The Hi-Hi condition must persist for at least 15 minutes (0.5)
b. HEPA filter outlet (0.5)
loop seal outlet (0.5)

REFERENCE
PBAPS LOT 720 p.6

LO 720-3

KA 272000K402(3.7) 272000A302(3.6)
272000A302 272000K402 ...(KA'S)

QUESTION 3.04 (3.00)

Concerning the Recirculation Flow Control System:

a. STATE the two conditions which will initiate a 60% speed limiter. Setpoints required. (1.0)

b. BRIEFLY EXPLAIN how to RESET the 60% limiter, once the initiating condition clears. (1.0)

c. STATE the purpose of the starting signal generator. (0.5)

d. DESCRIBE the response of the scoop tube when its associated MG set is started with less than 10% speed demand. (0.5)

ANSWER 3.04 (3.00)

a. 1. Rx water level < 17 inches (0.25) and
individual feed pump flows < 20%. (0.25)

2. Total feed flow > 90% (0.25) and
individual condensate pumps not running. (0.25) (1.0)

b. Reduce speed demand from individual controller until it takes control of MG speed (0.5) and push the reset P/B on the control panel. (0.5) (1.0)

c. Positions the scoop tube for 50% speed to allow pump to overcome breakaway torque (without dragging the generator down.) (0.5)

d. The scoop tube will lock up (when the field breaker closes) (0.5)

REFERENCE
PBAPS LOT 40 pgs. 6-8

LO 40-1, 5, 8, 9

KA 202002K604(3.5) 202002k605(3.1) 202002G9(3.8) 202002G7(3.6)
202002A303(3.1)
202002A303 202002G007 202002G009 202002K604 202002K605
...(KA'S)

QUESTION 3.05 (2.00)

The reactor is being started up. All IRMs, except for IRM D, are on range 7. An I&C technician is about to troubleshoot IRM D and in preparation for this, the joystick on panel C05 has been positioned to bypass IRM D.

a. IRM A reads 11 when the operator inadvertently ranges DOWN to range 6. WHAT will it read on Range 6? WHAT TRIP, if any, will occur? (1.0)

b. IRM A has been ranged back to range 7. The I&C technician begins to troubleshoot IRM D but instead of opening the drawer for IRM D opens the drawer to IRM B. WHAT TRIP, if any, will occur? JUSTIFY your answer. (1.0)

ANSWER 3.05 (2.00)

a. 110 (0.5) A rod block will occur (0.5) (1.0)

b. A half-scram will occur (0.5) since IRM B will generate an inop condition. (0.5) (1.0)

REFERENCE
PBAPS LOT 250 p.9

LO 250-7

KA 215003K401(3.7) 215003K402(4.0)
215003K401 215003K402 ...(KA'S)

QUESTION 3.06 (2.50)

Concerning the Reactor Manual Control System:

a. While operating at 100% power the 'Rod Drift' light (red light) on the Full Core Display illuminates. DESCRIBE the two (2) conditions which generate this alarm. (1.0)

b. (TRUE/FALSE) The 'Emergency In' switch bypasses RWM insert blocks and any select blocks. (0.5)

c. WHAT are three (3) of the four (4) conditions which will generate an RPIS INOP condition. (1.0)

ANSWER 3.06 (2.50)

a. 1. No even reed switch picked up for a non-selected rod (0.5)
   2. odd reed switch picked up when a selected rod is not being driven (0.5) (1.0)

b. FALSE (0.5)

c. 1. Invalid probe data
   2. card pulled
   3. loss of power supply
   4. internal logic stall (3 required at 0.33 each) (1.0)

REFERENCE
PBAPS LOT 80 pgs. 7, 11 and 18

LO 80-4, 5

KA 201002K403(3.6) 201002K406(3.5) 201002S68(3.6)
201002G008 201002K403 201002K406 ...(KA'S)

QUESTION 3.07 (3.00)

Peach Bottom Unit 3 is operating at 80% power, in three element control, with the narrow range 'A' level instrument selected. NR level instrument 'A' loses power.

a. HOW does NR 'A' fail (HIGH or LOW)? (0.5)

b. BRIEFLY DESCRIBE the response of the FWCS (until a scram occurs) if no operator action is taken. Include any effects on RFP's, feedwater flow and reactor water level. (1.5)

c. With no operator action the reactor will scram. WHAT signal(s) cause the scram? EXPLAIN. (1.0)

ANSWER 3.07 (3.00)

a. NR level instrument 'A' fails low (0.5)
b. The RFP's will accelerate (to the High Speed Stop) due to the level error (0.5) causing feed flow to increase (0.25) and reactor water level to increase (0.25). RFPT's will trip on high level (45 ") (0.5)
c. Main turbine will trip on high level (45 inches) (0.5)
Reactor will scram (due to main turbine trip) (0.5)

REFERENCE
PBAPS LOT 550 pgs. 16-17

LO 550-16

KA 259002K301(3.8) 259002K302(3.7) 259002K605(3.5)
259002A203(3.6)
259002A203 259002K301 259002K302 259002K605 ...(KA'S)

QUESTION 3.08 (2.00)

You assume the shift, with the mode switch in STARTUP, and with the following rod position distribution:

All rods in RWM Groups 1-3 have been withdrawn to position 48 except for one rod in each Group: 22-27 in Group 1, 46-35 in Group 2, and 18-03 in Group 3: these three rods are still fully inserted. All rods in Groups 4-10 are fully inserted (position 00) except for rod 34-27 (Group 4) which has just been withdrawn two even notches past its insert limit. RSCS is bypassed.

STATE the Rod/Rod Group number you would see displayed in each RWM window. If nothing will appear in a window, write 'Blank'. (2.0)

1. Rod Group _____
2. Insert Error _____
3. Insert Error _____
4. Withdraw Error _____

ANSWER 3.08 (2.00)

1. 03 (0.5)
2. 22-27 (0.5)
3. 46-35 (0.5)
4. 34-27 (0.5) (2.0)

REFERENCE
PBAPS LOT-90 pgs. 4-6, 10, 13

LO 90-2.3

KA 201006K401(3.4) 201006K402(3.5)
201006K401 201006K402 ...(KA'S)

QUESTION 3.09 (3.00)

An ADS blowdown is in progress on Peach Bottom Unit 2.

a. For each of the following conditions, will the ADS valves CLOSE or REMAIN OPEN?

   1. Reactor pressure decays to 40 psig. (0.5)

   2. An operator shuts down all Core Spray pumps. (0.5)

   3. Rx water level recovers to +10 inches. (0.5)

b. During the ADS blowdown, the operator depresses the ADS A and B reset buttons. BRIEFLY DESCRIBE how the ADS valves and logic will respond ASSUMING the initiating signals still exist. Include applicable setpoints and time delays. (1.5)

ANSWER 3.09 (3.00)

a. 1. close (0.5)
2. close (0.5)
3. remain open (0.5)

b. The valves will close (0.5), the timer will restart (0.25), and at the end of the timer cycle, 105 sec (0.25), blowdown will recommence. (0.5) (1.5)

REFERENCE
PBAPS LOT-330 pgs. 7-8

LO 330-2.c. 5.b

KA 218000K403(3.8) 218000K501(3.3)
218000K403 218000K501 ...(KA'S)

QUESTION 3.10 (2.50)

For each of the conditions below, STATE what AUTOMATIC action will occur (SCRAM, HALF-SCRAM, ROD BLOCK). If none occurs, state NONE. If more than one action occurs, STATE the most severe action, i.e. half-scram is more severe than a rod block.

a. At 35% power, loss of voltage to 'A' APRM occurs. (0.5)

b. At 50% power, the APRM flow converter fails downscale. (0.5)

c. UNIT 2 is operating with 50% recirc flow, rods are pulled to increase power to 75%. (0.5)

d. UNIT 3 is operating with 50% recirc flow, rods are pulled to increase power to 75%. (0.5)

e. At 35% power, all four turbine stop valves trip shut. (0.5)

ANSWER 3.10 (2.50)

a. half-scram (0.5)
b. half-scram (0.5) ~~TP 260.5~~ U-2 : Red Blc
c. none (0.5) U-3 : half scram
d. rod block (0.5)
e. scram (0.5)

REFERENCE
PBAPS LOT 270 pgs. 6-7

LO 270-2

KA 212000K101(3.7) 212000K110(3.2) 212000K602(3.7)
212000K101 212000K110 212000K602 ...(KA'S)

(***** END OF CATEGORY 03 *****)

QUESTION 4.01 (3.00)

For each of the following information tags, DEFINE the USE of the tag, WHEN the tag is placed, and WHEN it may be removed.

a. Deficiency Tag (or sticker) (1.0)

b. Manila Information Tag (1.0)

c. Operation Verification Tag (1.0)

ANSWER 4.01 (3.00)

a. Used on nuclear safety related equipment, to indicate a component deficiency has been identified. (0.5)
Placed when an MRF has been written (BUT the component has not been blocked and the deficiency is not obvious.) (0.25)
Removed when the condition is known to have been corrected. (0.25) (1.0)

b. Used to note useful information in the operation of the plant (0.5)
(may be used in place of a deficiency tag, if there is not enough room to write all the info on the deficiency tag)
Placed when the deficiency is identified, or when more information is required. (0.25)
Removed when the condition is known to have been corrected. (0.25) (1.0)

c. Used as a reminder that the testing requirements which prove operability must be deferred due to plant conditions. (0.5)
Placed after the MRF has been completed, except for section 7. (0.25)
Removed when the operational verification has been completed (as documented on the MRF.) (0.25) (1.0)

REFERENCE
PBAPS A-27 p.7-8

LO 1570-3.g

KA 294001K102(3.9)
29400K102 ...(KA's)

(***** CATEGORY 04 CONTINUED ON NEXT PAGE *****)

QUESTION 4.02 (2.50)

a. INDICATE (YES/NO) whether or not each of the following plant conditions requires an RWP to be issued.

1. Entry into a Hi Radiation area. (0.5)

2. Transport of radioactive material (RAM) within an RCA. (0.5)

3. Performing radiography activities in an area where radiation levels are less than 25 mr/hr. (0.5)

b. Operations personnel have two General RWP's in effect at all times, one at each unit, allowing operators to perform certain functions. STATE TWO operations functions that General RWP's allow to be performed. (1.0)

ANSWER 4.02 (2.50)

a. 1. yes (0.5)
2. no (0.5)
3. yes (0.5)

b. 1. operator rounds
2. blocking
3. inspection (Two correct, 0.5 each, maximum of 1.0) (1.0)

REFERENCE
PBAPS LOT 1760 p.2

LO 1760-1, 4

KA 294001K103(3.3)
294001K103 ...(K/A'S)

(***** CATEGORY 04 CONTINUED ON NEXT PAGE *****)

QUESTION 4.03 (3.00)

Regarding Administrative Procedure A-7, "Shift Operations":

a. STATE which individual, by title, is required to authorize a startup subsequent to a shutdown or scram. (0.5)

b. STATE the THREE conditions under which the control room operator is responsible for and has the authority to shutdown the reactor. (1.5)

c. Section 7.1 contains guidance for "On-Duty" senior licensed operators and licensed operators concerning their PERSONAL CONDUCT while on shift. STATE TWO of these guidelines that help ensure the units are operated as safely and as reliably as possible. (1.0)

ANSWER 4.03 (3.00)

a. Plant Manager (0.5)

b. 1. The safety of the reactor is in jeopardy. (0.5)
2. Operating parameters exceed RPS setpoints and automatic shutdown does not occur. (0.5)
3. When there is doubt as to whether or not safe conditions exist. (0.5) (1.5)

c. 1. (On duty SLO's and LO's) shall be aware of and responsible for the plant status at all times. (0.5)
2. (On duty SLO's and LO's) must be alert and attentive at all times. (0.5)
3. (On duty SLO's and LO's) must prohibit distracting activities in the control room. (0.5)
Any two, 1.0 maximum (1.0)

REFERENCE
PBAPS A-7 pgs.3-4, 21

LO 1570-2a, 3b

KA 294001A111(3.3)
294001A111 ...(KA'S)

(***** CATEGORY 04 CONTINUED ON NEXT PAGE *****)

QUESTION 4.04 (1.00)

Note 1 of step 11 of GP-2A, "Reactor Startup and Heatup", states that when reactor pressure reaches the setpoint of the Turbine Pressure Control System, the heatup will be terminated.

BRIEFLY EXPLAIN how the Pressure Control System terminates the heatup. (1.0)

ANSWER 4.04 (1.00)

The Pressure Control System sequentially opens BPVs to maintain pressure constant at the selected pressure setpoint. (0.33) Any additional rod withdrawal will merely result in greater BPV steam flow (0.33) and vessel pressure, therefore temperature, will remain constant. (0.34) (1.0)

REFERENCE
GP-2A p.7

LO 1530-5

KA 2.1.1000K129(3.4)
2410(0K129 ...(KA'S)

QUESTION 4.05 (2.50)

In accordance with GP-2 Appendix I, "Startup Rod Withdrawal Sequence Instructions", individual control rod movements are to be verified, if the Rod Worth Minimizer is INOP below 25% power.

a. WHO must verify rod movement and HOW is this verification performed? (1.0)

b. WHAT ADDITIONAL VERIFICATION is required at the end of each group pull? HOW is this performed? (0.75)

c. WHAT DOCUMENTATION is required for the verification made at the end of a group pull? (0.75)

ANSWER 4.05 (2.50)

a. A second licensed operator, (0.25) with no other duties, (0.25) shall verify the correct rod is being moved to the correct position, in the required sequence, (0.25) by using the process computer. (0.25) (1.0)

Shift Supervisor ≡ Control Room Supt

b. The Reactor Operator, Second licensed Operator, and Control Room Superintendent (0.25) shall INDEPENDENTLY verify the rod pattern (0.25) by comparing the OD-7 Option 2 to the GP-2 Appendix I core map. (0.25) (0.75)

c. The Reactor Operator, Second Licensed Operator, and Control Room Superintendent (0.25) shall sign the OD-7 Option 2 and the GP-2 Appendix I core map (0.25) and attach it to the appropriate core map in GP-2-2. (0.25) (0.75)

REFERENCE
GP-2 Appendix I p.1

LO 1530-4

KA 201002K105(3.4) 201002G001(3.8) 201002G013(3.4)
201002G001 201002G013 201002K105 ...(KA'S)

QUESTION 4.06 (3.00)

Regarding ON-113, "Loss of RBCCW":

a. STATE ALL the actions the operator is required to verify when RWCU non-regenerative heat exchanger outlet temperature reaches 200 degrees. (1.5)

b. If RBCCW cannot be restored within 5 minutes, ON-113 specifies how to shutdown the recirc pumps. WHAT IS THE BASIS FOR:

1. Removing the recirc pumps from service? (0.5)

2. First reducing recirc flow to minimum and then tripping the pumps 10 seconds apart? (0.5)

3. Shutting their discharge valves? (0.5)

ANSWER 4.06 (3.00)

a. 1. MO-12-15 (0.166), MO-12-18 (0.166), and MO-12-68 close (0.168) or Group 2a isolation (0.5)
2. RWCU pump(s) trip (0.5)
3. RWCU demin hold pumps start (0.5) (1.5)

b. 1. to protect the pump (seals) (0.5)
2. to minimize the transient on the reactor (0.5)
3. to prevent the flow through the recirc lines from turning the pump after the trip (0.5) (1.5)

REFERENCE
PBAPS LOT 1550 pgs. 17-18

LO 1550-2

KA 295018K101(3.5) 295018K303(3.1) 295018G007(3.2)
295018G007 295018K101 295018K303 ...(K/A'S)

QUESTION 4.07 (2.50)

OT-114, "Inadvertent Opening of a Relief Valve", directs the operator to reduce turbine inlet pressure to 900 psig.

a. STATE the purpose of this step. (0.5)

b. STATE the adverse consequence which will occur if the operator reduces turbine inlet pressure too much. (setpoints required) (1.0)

c. STATE which pressure indicators the operator must monitor (EHC PANEL/REACTOR CONSOLE) when reducing turbine inlet pressure and BRIEFLY EXPLAIN why those indicators are chosen over the others. (1.0)

ANSWER 4.07 (2.50)

a. The relief valve may reseat itself. (0.5)
b. A Group I isolation occurs (0.5)
at 850 psig in the RUN mode. (0.5) (1.0)
c. Must monitor the pressure indication at the EHC panel (0.25)
because the Group I isolation sensors are located near
the turbine inlet. (0.75) (1.0)

REFERENCE
PBAPS OT-114 Bases p.2-3

LO LOT 1540-2

KA 239002A203(4.1) 239002G013(3.9)
239002A203 239002G013 ...(KA'S)

QUESTION 4.08 (2.00)

In accordance with OT-110, "Reactor High Level":

a. While operating at 80% power, reactor water level unexpectedly begins increasing. STATE the three methods that can be used to regain control of water level. (1.5)

b. STATE the concern with reactor water level exceeding 90 inches. (0.5)

ANSWER 4.08 (2.00)

a. 1. Lower the water level setpoint. (0.5)
2. Swap the FWCS from auto to manual. (0.5)
3. Remove a RFP from service. (0.5) (1.5)

b. There is potential for flooding the main steam lines. (0.5)

REFERENCE
PBAPS LOT 1540 p.9
Bases, OT-110 p.2

LO 1540-2

KA 295008G010(3.8) 295008G007(3.2)
295008G007 295008G010 ...(KA'S)

(***** CATEGORY 04 CONTINUED ON NEXT PAGE *****)

QUESTION 4.09 (3.00)

For the following plant conditions, STATE which TRIP procedures you would enter. More than one procedure may apply for a given plant condition. If no procedure applies, state NONE.

a. D/W pressure is 2.1 psig and Rx power is 65% (0.5)

b. Rx water level is +28 inches and Rx power is 50% (0.5)

c. Torus level is 14.4 feet (0.5)

d. D/W temperature is 151 F (0.5)

e. Rx water level is unknown (0.5)

f. Torus water temperature is 92 F (0.5)

ANSWER 4.09 (3.00)

a. 1. Scram (0.166)
   2. RPV (0.166)
   3. Containment (0.166)
b. None (0.5)
c. Containment (0.5)
d. Containment (0.5)
e. RPV (0.5)
F. None (0.5)

REFERENCE
PBAPS LOT-1560 p.6-7

LO 1560-9

KA 295024G011(4.3) 295031G011(4.2) 295028G011(4.2) 295030G011(4.3)
295024G011 295028G011 295030G011 295031G011 ...(KA'S)

(***** CATEGORY 04 CONTINUED ON NEXT PAGE *****)

QUESTION 4.10 (2.50)

Regarding TRIP procedure cautions:

a. Caution #3 directs the operator not to initiate D/W spray unless torus level is below 18.5 feet. BRIEFLY EXPLAIN the significance of 18.5 feet and STATE the potential danger if this limit is violated. (1.5)

b. Caution #7 directs the operator NOT to open RPS logic or motor generator set circuit breakers to de-energize scram solenoids. If this caution is ignored and an operator DOES perform either of these actions, WHAT AUTOMATIC isolation will result? BRIEFLY EXPLAIN why this action is undesirable. (1.0)

ANSWER 4.10 (2.50)

a. With level above 18.5 feet, the vacuum breakers will be submerged. (0.5) Therefore, if D/W sprays are initiated, the resulting negative internal pressure can't relieve back to the suppression chamber (0.5) and the maximum D/W negative internal pressure could be exceeded. (0.5) (1.5)

b. These actions will initiate a Group I isolation. (0.5) It is undesirable because it will eliminate the main condenser as a heat sink and instead the torus will have to absorb the energy being generated by the RPV. (0.5) (1.0)

REFERENCE
PBAPS LOT 1560 p.8
TRIP Cautions-Bases p.4, 8

LO 1560-3

KA 2950296007(3.6) 2950376007(3.7)
2950296007 2950376007 ...(KA'S)

ATTACHMENT 2

U. S. NUCLEAR REGULATORY COMMISSION
SENIOR REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: PEACH BOTTOM 2&3

REACTOR TYPE: BWR-GE4

DATE ADMINISTERED: 88/07/19

EXAMINER: USNRC - REGION I

CANDIDATE: _____

INSTRUCTIONS TO CANDIDATE:

Use separate paper for the answers. Write answers on one side only. Staple question sheet on top of the answer sheets, Points for each question are indicated in parentheses after the question. The passing grade requires at least 70% in each category and a final grade of at least 80%. Examination papers will be picked up six (6) hours after the examination starts.

CATEGORY VALUE	% OF TOTAL	CANDIDATE'S SCORE	% OF CATEGORY VALUE		CATEGORY
~~25.00~~ 23.00*	~~25.00~~ 23.53	_____	_____	5.	THEORY OF NUCLEAR POWER PLANT OPERATION, FLUIDS, AND THERMODYNAMICS
25.00	~~25.00~~ 25.57	_____	_____	6.	PLANT SYSTEMS DESIGN, CONTROL, AND INSTRUMENTATION
25.00	~~25.00~~ 25.57	_____	_____	7.	PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL
~~25.00~~ 24.75*	~~25.00~~ 25.32	_____	_____	8.	ADMINISTRATIVE PROCEDURES, CONDITIONS, AND LIMITATIONS
~~100.00~~ 97.75		_____ Final Grade	_____%		Totals

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

MASTER
_____
Candidate's Signature

* Part of question 5.03 deleted. Question 5.09 deleted. Part of question 8.09's answer modified.
TF 8/3/88

NRC RULES AND GUIDELINES FOR LICENSE EXAMINATIONS

During the administration of this examination the following rules apply:

1. Cheating on the examination means an automatic denial of your application and could result in more severe penalties.

2. Restroom trips are to be limited and only one candidate at a time may leave. You must avoid all contacts with anyone outside the examination room to avoid even the appearance or possibility of cheating.

3. Use black ink or dark pencil only to facilitate legible reproductions.

4. Print your name in the blank provided on the cover sheet of the examination.

5. Fill in the date on the cover sheet of the examination (if necessary).

6. Use only the paper provided for answers.

7. Print your name in the upper right-hand corner of the first page of each section of the answer sheet.

8. Consecutively number each answer sheet, write "End of Category __" as appropriate, start each category on a new page, write only on one side of the paper, and write "Last Page" on the last answer sheet.

9. Number each answer as to category and number, for example, 1.4, 6.3.

10. Skip at least three lines between each answer.

11. Separate answer sheets from pad and place finished answer sheets face down on your desk or table.

12. Use abbreviations only if they are commonly used in facility literature.

13. The point value for each question is indicated in parentheses after the question and can be used as a guide for the depth of answer required.

14. Show all calculations, methods, or assumptions used to obtain an answer to mathematical problems whether indicated in the question or not.

15. Partial credit may be given. Therefore, ANSWER ALL PARTS OF THE QUESTION AND DO NOT LEAVE ANY ANSWER BLANK.

16. If parts of the examination are not clear as to intent, ask questions of the examiner only.

17. You must sign the statement on the cover sheet that indicates that the work is your own and you have not received or been given assistance in completing the examination. This must be done after the examination has been completed.

18. When you complete your examination, you shall:

a. Assemble your examination as follows:

(1) Exam questions on top.

(2) Exam aids - figures, tables, etc.

(3) Answer pages including figures which are part of the answer.

b. Turn in your copy of the examination and all pages used to answer the examination questions.

c. Turn in all scrap paper and the balance of the paper that you did not use for answering the questions.

d. Leave the examination area, as defined by the examiner. If after leaving, you are found in this area while the examination is still in progress, your license may be denied or revoked.

QUESTION 5.01 (2.00)

Reactor power is decreased from 90% to 50% in one hour by decreasing Recirculation flow. No control rods are moved and no further change in Recirculation flow is made (Recirc Pumps in Individual Manual).

a. 6 hours after the decrease is reactor power LESS THAN, GREATER THAN or EQUAL TO 50% power? EXPLAIN WHY. (1.00)

b. 60 hours after the decrease is reactor power LESS THAN, GREATER THAN or EQUAL TO 50% power? EXPLAIN WHY. (1.00)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.02 (3.00)

a. STATE whether CRITICAL POWER will INCREASE, DECREASE, or REMAIN THE SAME for each of the following changes. EXPLAIN.

1. Increased core inlet subcooling (1.00)

2. Reactor pressure increases from 930 psig to 980 psig (1.00)

b. STATE whether the CRITICAL POWER RATIO will INCREASE, DECREASE, or REMAIN THE SAME for an INCREASE in the total recirculation flow rate which causes reactor power to increase from 70% to 90%. EXPLAIN. (1.00)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.03 (3.00)

The Residual Heat Removal pumps are being used in Shutdown Cooling Mode. HOW will AVAILABLE and REQUIRED Net Positive Suction Head for the Residual Heat Removal pumps be affected by each of the following changes (INCREASE, DECREASE, or NOT AFFECTED)?

		NPSH AVAILABLE	NPSH REQUIRED	
a.	Reactor Water temperature increases			(1.00)
b.	Reactor Water level decreases			(1.00)
c.	RHR System flowrate decreases			(1.00)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.04 (1.50)

EXPLAIN WHY delayed neutrons allow the chain reaction of fission to be controlled. If there were no delayed neutrons WHY would the reactor be uncontrollable? (1.50)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.05 (3.00)

The reactor is below the point of adding heat and is on a 100 second period. If the operator does not move the control rods, the period will eventually increase to infinity. How much will the moderator temperature increase during this time period? Given beta = 0.007, lambda = 0.1
(ASSUME A REASONABLE VALUE OF THE MODERATOR TEMPERATURE COEFFICIENT FOR PEACH BOTTOM AND STATE ALL ASSUMPTIONS.) (3.00)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.06 (2.50)

For the following conditions, STATE which reactivity coefficient reacts first.

a. A Recirculation pump trip, reactor is at 100% power. (0.50)

b. Inadvertent initiation of HPCI, reactor is at 100% power. (0.50)

c. A Safety Relief Valve opens and stays open, reactor is at 100% power. (0.50)

d. A Control Rod is dropped, reactor is at 25% power. (0.50)

e. RHR service water pump trips, RHR is in shutdown cooling mode. (0.50)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.07 (2.00)

During your Shift, a relief valve inadvertently opens. The reactor is at 100% power and 1000 psig. Use a Mollier Diagram or the Steam Tables to answer the following:

a. STATE the tailpipe temperature, assuming atmospheric pressure in the Suppression Pool and No Reactor Depressurization. (0.5)

b. If the Suppression Pool Pressure were to INCREASE, STATE whether the Tailpipe Temperature would INCREASE, DECREASE, or REMAIN THE SAME. (0.5)

c. If the reactor starts to depressurize when the valve is opened, STATE whether the Tailpipe Temperature will INITIALLY INCREASE, DECREASE, or REMAIN THE SAME. (0.5)

d. STATE the Reactor Pressure at which the Tailpipe Temperature would be at its MAXIMUM value (during the depressurization). (0.5)

(ASSUME A SATURATED SYSTEM AND INSTANTANEOUS HEAT TRANSFER)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.08 (1.50)

At 100% power the operator decreases power by driving rods in, (1.50)
WHAT will be the effect on core flow? WHY DOES THIS OCCUR?

a. increase

b. decrease slightly

c. decrease significantly

d. remain the same

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.09 (2.00)

During your Shift, a relief valve inadvertently opens. The reactor is at 100% power and 1000 psig. Use a Mollier Diagram or the Steam Tables to answer the following:

a. STATE the tailpipe temperature, assuming atmospheric pressure in the Suppression Pool and No Reactor Depressurization. (0.5)

b. If the Suppression Pool Pressure were to INCREASE, STATE whether the Tailpipe Temperature would INCREASE, DECREASE, or REMAIN THE SAME. (0.5)

c. If the reactor starts to depressurize when the valve is opened, STATE whether the Tailpipe Temperature will INITIALLY INCREASE, DECREASE, or REMAIN THE SAME. (0.5)

d. STATE the Reactor Pressure at which the Tailpipe Temperature would be at its MAXIMUM value (during the depressurization). (0.5)

(ASSUME A SATURATED SYSTEM AND INSTANTANEOUS HEAT TRANSFER)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.10 (2.00)

You are performing a reactor startup. The reactor is slightly subcritical.

a. (TRUE/FALSE) For an equal amount of rod withdrawal, the change in count rate will be larger than when the reactor was greatly subcritical. (0.5)

b. (TRUE/FALSE) The larger the change in count rate, the longer the period. (0.5)

c. (TRUE/FALSE) The longer the period, the longer it takes to reach equilibrium power. (0.5)

d. (TRUE/FALSE) If a control rod is withdrawn that doubles the neutron level, the distance to criticality has been halved. (0.5)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.11 (2.50)

STATE whether each of the following changes would INCREASE, DECREASE, or HAVE NO EFFECT on the HEAT TRANSFER RATE in the RBCCW heat exchangers.
(Justify each answer. Assume all other parameters are held constant and list any assumptions that you make.)

a. Heat Exchanger Tube failure (1.25)

b. Increase in RBCCW loads as the plant heats up (1.25)

QUESTION 6.01 (2.00)

Under WHAT CONDITIONS will the following SCRAM signals be bypassed?

a. Turbine Stop Valve Closure (0.50)

b. MSIV Closure (0.50)

c. Scram Discharge Volume Level (0.50)

d. IRM 'A' High-High (120/125 of full scale) (0.50)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.02 (2.50)

Concerning the Rod Block Monitor

a. LIST the setpoints of teh four (4) Flow biased trips. (1.00)

b. For each condition listed below, state whether an RBM INOP trip will occur.

   1. Module unplugged (0.25)

   2. Peripheral Rod selected (0.25)

   3. Failure to Null (0.25)

c. For each condition listed below, state whether the RBM will be bypassed?

   1. Mode switch not in operate (0.25)

   2. Reference APRM less than 30% (0.25)

   3. less than 50% of total inputs (0.25)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.03 (1.50)

WHAT are five (5) of the ten (10) AUTOMATIC ACTIONS ... ALWAYS (1.5)
occur as a direct result of a Main Generator Lockout R (86 Device)
actuation on Unit 2?

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.04 (3.00)

With the Unit operating at 75% power, an electrical fault causes the Maximum Combined Flow Setpoint of the EHC system to drop to minimum.

HOW WILL EACH OF the following RESPOND after the fault? WHY?

(Consider response through ONE MINUTE after the fault. Assume NO OPERATOR ACTION.)

ATTACHED FIGURE, EHC LOGIC, IS PROVIDED FOR REFERENCE

a. Turbine control valve position (1.00)

b. Bypass valve position (1.00)

c. Reactor power (1.00)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.05 (3.00)

STATE what will INITIALLY happen to the INDICATED reactor water level of the associated dector (INCREASE, DECREASE, REMAIN THE SAME) for each of the following conditions.

a. the equalizing valve leaks across a narrow range GEMAC. (0.5)

b. a rapid temperature increase occurs in the Reactor Building near the transmitter for a GEMAC sensor. (0.5)

c. the reference leg isolation valve packing glands leak. (0.5)

d. reactor pressure drops from 1000 psig to 450 psig in 10 seconds. (0.5)

e. drywell temperature increases from 130 deg. F to 250 deg. F. (0.5)

f. the reactor scrams (0.5)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.06 (2.00)

When paralleling a diesel generator with the 4KV bus:

a. WHAT do you use the governor control for

1. before the output breaker is closed? (0.50)

2. after the output breaker is closed? (0.50)

b. WHAT do you use the voltage regulator adjust for

1. before the output breaker is closed? (0.50)

2. after the output breaker is closed? (0.50)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.07 (2.00)

A reactor startup is in progress on Unit 2 and the operator is withdrawing rods to attain criticality.

a. The following errors are being displayed by the Rod Worth Minimizer (RWM):

Rod 32-35 withdraw error
Rod 48-19 insert error
Rod 40-15 insert error

No other errors exist.

STATE the ACTION that must be taken by the operator to clear the control rod block. (1.00)

b. MULTIPLE CHOICE
CHOOSE the ONE condition which will cause the RWM SELECT ERROR light to be lit. (1.00)

1. WHENEVER one insert error exists and a rod other than the rod causing the insert error is selected.

2. WHENEVER the operator selects a control rod which will result in an insert or a withdraw error.

3. ANYTIME a rod block has been initiated by the RWM and the rod selected is not one of the rods causing the block.

4. AFTER the operator has withdrawn or inserted a rod which is NOT in the presently latched RWM group.

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.08 (1.50)

Concerning the Standby Liquid Control System (SBLC):

The Standby Liquid Control System (SBLC) is required to add enough negative reactivity to meet five (5) requirements. What are these five (5) requirements? (0.3 points each)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.09 (3.00)

What AUTOMATIC ACTIONS would occur if the Stator Water Cooling outlet temperature increased from 75 deg C to 82 deg C. (Include all alarms, setpoints, time delays, and trips which could occur). (3.00)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.10 (2.50)

Concerning the Feedwater Level Control Circuitry:

a. DESCRIBE the level and power response to the following malfunctions (Consider each malfunction separately)

   1. feed flow signal from the 'A' feed pump fails downscale (1.00)

   2. the controlling water level signal fails downscale (1.00)

b. If the LOCKOUT RELAY POWER LAMP goes out, is a feedpump lockout possible? (0.50)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.11 (2.00)

How will the Standby Gas Treatment System respond to the following:
(Include response of the filter train dampers in your answers.
Consider each condition separately.)

a. 20 mr/hr refuel floor exhaust duct radiation level on Unit 2 (0.50)

b. RPS 'A' on Unit 3 is de-energized (0.50)

c. Fan 'C' fails to start after an automatic initiation signal (0.50)

d. three (3) times normal full power background radiation levels in the steam tunnel of Unit 2 (0.50)

(***** END OF CATEGORY 06 *****)

QUESTION 7.01 (2.50)

Two workers must perform work in the Drywell with the reactor at low power. Worker "A" is forty five (45) years old with a valid NRC Form 4 and a lifetime exposure of 7.5 REM. Worker "A" has had 2100 mrem exposure for the current quarter. Worker "B" is 23 years old with no NRC Form 4 and a current quarter exposure of 800 mrem.
Health Physics has established dose rates in the area as follows:

Gamma	35 mrem/hour
Beta	5 mrem/hour
Epithermal Neutrons	10 mrad

a What is the total dose rate in the area where the personnel will be working? (0.50)

b How long can workers "A" and "B" stay in the area without exceeding their respective quarterly limits? (1.00)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.02 (3.00)

For each of the following conditions, STATE which Emergency Procedure is entered (If more than one procedure is entered, state all Emergency Procedures that are entered. If none are entered, state NONE)

a RPV LEVEL BELOW -48" or unknown. (0.50)

b Drywell TEMPERATURE ABOVE 145 deg. F. (0.50)

c Drywell PRESSURE ABOVE 2 psig. (0.50)

d Conditions requiring a GROUP I ISOLATION. (0.50)

e Torus LEVEL OUTSIDE the 14.6' to 14.9' band. (0.50)

f SCRAM CONDITIONS with POWER LEVEL above 3% or unknown. (0.50)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.03 (3.00)

The reactor is at full power when an ATWS occurs with no control rod motion.

As part of T-101 you are directed:

IF NOT SHUT DOWN WITH
RODS
THEN INJECT SLC
BEFORE TORUS TEMP.
REACHES 110 DEG. F

a. DEFINE NOT SHUT DOWN. (0.50)

b. Once boron injection is started, the operator is directed to perform T-117 (REACTOR LEVEL/POWER CONTROL) concurrently with T-101. What is the basis for using reactor water level to control reactor power while boron is being injected? (1.00)

c. What is the basis for the Maximum Standby Liquid injection time? (0.75)

d. What is the basis for the Minimum Standby Liquid injection time? (0.75)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.04 (2.75)

A Control Room Ventilation High High Radiation alarm has occurred. Answer the following questions in accordance with ON-115, Control Room Ventilation High Radiation.

a What automatic actions occur as a result of this alarm condition? (1.25)

b If the source of the radiation in the control room cannot be isolated, WHAT two (2) conditions would require a rapid shutdown of both units per ON-115? (1.50)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.05 (2.00)

A large steam LOCA, with a failure to scram (ATWS) has occurred, requiring entry into T-101, RPV Control. Reactor water level cannot be determined, and T-112, Emergency Blowdown, has been entered and is being performed in conjunction with T-101. BORON INJECTION HAS been initiated.

Step EB-2 of T-112 states "if boron injection has been initiated, then verify all injection, except from CRD and Boron Injection, has been terminated, and prevented, prior to depressurization.

a What is the BASIS for terminating injection? (1.00)

b WHY is injection from CRD NOT terminated? (1.00)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.06 (3.00)

Special Event Procedure SE-2 "Cardox Injection Into The Cable Spreading Room", lists immediate operator actions required prior to leaving the Control Room. For the listed operator actions, EXPLAIN the BASES for taking the actions.

TWO (2) ANSWERS REQUIRED FOR EACH PART (a, b, and c)

a Runback Recirc Flow on both units. (1.00)

b Transfer house loads on both units. (1.00)

c Manual scram on both units. (1.00)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.07 (2.50)

In accordance with GP-2 Appendix I, Startup Rod Withdrwal Sequence Instructions, individual control rod movements are to be verified, if the Rod Worth Minimizer is INOP below 25% power.

a DESCRIBE how this verification to be performed? (1.00)

b WHAT ADDITIONAL VERIFICATION is required at the end of each group pull? HOW is this performed? (0.75)

c WHAT DOCUMENTATION is required for the verification made at the end of a group pull? (0.75)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.08 (2.00)

One of the immediate operator actions for OT-103, Main Steam Line High Radiation, is to scram the reactor if a "Channel A or B Group 1 Isolation Relays Not Reset" alarm annunciates.

a What is the BASIS for scramming the reactor manually, prior to the reactor scram on high radiation? (1.00)

b What operator action is required if the Main Steam Line High Radiation alarm (1.5 times normal background) annunciates? WHAT IS THE BASIS for this action? (1.00)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.09 (3.00)

Peach Bottom unit 2 is in STARTUP, with heatup and pressurization is progress. Reactor pressure is 450 psig and CRD Pump "A" is out of service.

CRD Pump "B" trips and cannot be restarted.

a After the pump trip three (3) accumulator low pressure indicator lights are received. Is a SCRAM required? WHY or WHY NOT? (1.50)

b If the Reactor had been in RUN when the second CRD pump had tripped, would a scram be required after the third accumulator low pressure indicator light had been received? WHY or WHY NOT? (1.50)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.10 (1.25)

Answer the following questions in accordance with PBAPS FH-6C (FUEL MOVEMENT AND CORE ALTERATIONS PROCEDURE DURING A FUEL HANDLING OUTAGE)

a. How often do the fuel pool and reactor tag boards need to be updated during fuel assemply movement? (0.25)

b. STATE the immediate actions you would take as REFUEL SLO if a spent fuel assembly was dropped during fuel relocation. (1.00)

QUESTION 8.01 (2.75)

In accordance with Administrative Procedure A-84, Control of High Radiation Area Keys.

a DEFINE a "Locked High Radiation Area". (0.50)

b STATE the difference between a LEVEL II Locked High Radiation Area and a LEVEL I Locked High Radiation Area. (1.00)

c 1 WHO, by title, MAINTAINS CONTROL of the high radiation area MASTER KEYS? (Three answers required) (0.75)

2 WHEN would the MASTER KEYS be used? (0.50)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.02 (2.50)

During a refueling outage, a Control Room Operator has worked twelve (12) hour days for the last five (5) days. On the sixth (6) day he is scheduled to work only eight (8) hours. His relief called in sick and no other personnel are available to fill the operator position.

a HOW LONG can the operator continue to work and STATE the two (2) limits restricting his work hours in accordance with Administrative Procedure A-40 (1.50)

b 1 What documentation is required for an individual to exceed the work hour criteria of A-40? (0.50)

2 Who, by title, may authorize exceeding the overtime guidelines? (0.50)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.03 (1.00)

A fire is reported in the diesel generator area, requiring the implementation of Off Normal Procedure ON-114. The Outside Shift Supervisor is not available to act as the Fire and Damage Team Leader.

List Two (2) methods available to the Shift Superintendent to temporarily fill the position of Fire and Damage Team Leader.
(1.00)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.04 (3.00)

An operator is performing a procedure on a safety related system when he determines a procedural step cannot be performed as written. Shift Supervision determines that a temporary change must be written in order to complete the procedure. According to Peach Bottom Technical Specifications:

a What criteria must be established before the change can be made? (0.50)

b What approvals must be obtained before implementing the step effected by the change? (1.00)

c What post-performance reviews and approvals are required? (Include the time frame of any such review and approvals) (1.50)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.05 (3.00)

The Technical Specification states limits for TORUS WATER TEMPERATURE during specific plant conditions. Fill in the table below with the limiting Torus water temperatures, the PLANT CONDITION during which the temperature limit applies, AND the CORRECTIVE ACTION to be taken if the limit is exceeded.

TEMP. LIMIT	PLANT CONDITION	CORRECTIVE ACTION
95 deg F.	(a.)	Restore to <95 deg F within 24 hours or HOT SHUTDOWN within the next 12 hours and COLD SHUTDOWN within the next 24 hours
(b.)	During Testing which adds heat to the torus	(c.)
120 deg F.	(d.)	Depressurize to < 200 psig at normal cooldown rates
(e.)	Any Operating Condition	(f.)

(****** CATEGORY 08 CONTINUED ON NEXT PAGE ******)

QUESTION 8.06 (2.50)

In accordance with Technical Specification 3.6.f (attached) Core Flow and Reactor Power are restricted in certain operating regions.

a WHY is two (2) loop operation NOT PERMITTED with a core flow of 30% and reactor power at 40%? (0.25)

b On a trip of one Recirculation Pump, core flow drops to 35% and power decreases to 50%.

1 WHY is single loop operation NOT PERMITTED in this region? (0.25)

2 DESCRIBE the two (2) actions required to place the reactor within the thermal power and core flow limits of figure 3.6.5. Include the time limit for performing these actions. (0.50)

c During operation in Region I, WHY is monitoring required. Include in your answer when the monitoring is to start and how often it is to be performed. (1.50)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.07 (2.50)

Peach Bottom Unit II has been operating with the following control rod problems. (Figure one in the attachments shows the location of the rods) Rod #1 has an inoperable accumulator. Rod #2 has excessive scram time, but is otherwise operable.

An attempt has just been made to move rod #3 from notch 24 to notch 26, and it has been determined it cannot be moved with drive pressure.

Answer the following by referring to Figure one and the Technical Specification attached.

a Assuming Shutdown Margin requirements are satisfied, STATE whether control rods #1 and #2 are OPERABLE or INOP and if they are required to be inserted and/or disarmed. (1.00)

b STATE the Technical Specifications LCOs entered by the failure of the #3 control rod. Include in your answer ALL applicable LCOs (Not just the most limiting LCO), the action statements required and the time reqired to take the action. (1.50)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.08 (2.50)

A transient is in progress at Peach Bottom 2 which requires implementation of the ERP's (Emergency Response Procedures).

a As Shift Management Emergency Director, LIST three (3) of the five (5) factors to be considered for activation of the Emergency Response Facility. (1.50)

b STATE the LOWEST emergency level at which the Technical Support Center (TSC) is activated. (0.50)

c STATE the LOWEST emergency level at which the Emergency Operations Facility (EOF) is activated. (0.50)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.09 (2.25)

During plant operations at 80% power, RBM "B" has failed and is bypassed. APRM "E" has also failed and is bypassed.

APRM "A" fails downscale.

Utilizing the Technical Specification provided in the attachments, DETERMINE any LCO's entered by the failure of APRM "A". Indicate the DURATION of the LCO's and the ACTION required if the specified LCO time elapses. (2.25)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.10 (3.00)

For each of the following listed information tags, DEFINE the USE of the tag, WHEN the tag is placed and WHEN it may be removed.

a Deficiency Tag (or sticker). (1.00)

b Manila Information Tag. (1.00)

c Operation Verification Tag. (1.00)

(***** END CATEGORY 08 *****)
(********** END EXAMINATION **********)

ANSWER KEY

PEACH BOTTOM 2&3

SRO EXAM

USNRC - REGION I

88/07/19

MASTER

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 5.01 (2.00)

A. Less than 50% (0.5)
Xenon concentration is higher than just after the power reduction (0.5)

B. Greater than 50% (0.5)
Xenon concentration is lower than just after the power reduction (0.5)

REFERENCE
LOT 1510 p. 9
3.2 ...(KA VALUES)
292006K114 ...(KA'S)

ANSWER 5.02 (3.00)

a. 1. Increase (0.50) Since the incoming water is colder, more heat can be added to the coolant before OTB occurs, therefore the power at which transition boiling occurs will increase. (0.50)

2. Decrease (0.50) As pressure increases the amount of heat required for vaporization decreases; therefore, the bundle power required to cause transition boiling decreases. (0.50)

b. The Critical Power Ratio, CP/AP, will decrease (0.50) because an increase in core flow results in a larger increase in the actual power of a bundle than the increase in critical power of the bundle. (0.50)

REFERENCE
LOT 1370 p. 10
3.3 3.2 ...(KA VALUES)
293009K122 293009K124 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

(1.50)
ANSWER 5.03 ~~(3.00)~~

	Avail.	Required
a.	DECREASE	REMAIN THE SAME
b.	DECREASE	REMAIN THE SAME
c.	INCREASE	DECREASE

(0.5 pts each) ~~NK~~ 8/16/89

REFERENCE
LOT 1290

3.7	3.3	3.4	3.6	...(KA VALUES)
202001K101	202001K103	202001K105	202001K122	...(KA'S)

ANSWER 5.04 (1.50)

To maintain the reactor critical without delayed neutrons, the reactor would have to be prompt critical (0.5) (critical on prompt neutrons only). The average generation time of prompt neutrons is very short (10E-4 seconds) (0.5). Because of the short time between neutron generations, the reactor would not be controllable (0.5)

Alternate wording acceptable

REFERENCE
LOT 1420

3.7	...(KA VALUES)
292003K106	...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 5.05 (3.00)

Assume alpha T = -1 X 10E-04 (+ 5 X 10E-05 / - 4 X 10E-4) (0.5)

$$\frac{\text{delta K}}{\text{K}} = \frac{1*}{\text{T*Keff}} + \frac{\text{beta}}{(1+\text{lambda*T})} \quad (0.5)$$

rho = insignificant + (0.007)/(1 + 0.1*100)

rho = 6.4 X 10E-04 delta K/K (0.5)

The moderator temperature must increase to add enough negative reactivity to overcome the 100 second period. (-6.4 X 10E-04) (0.5)

$$(-6.4 \text{ X } 10\text{E-}04 \text{ delta K/K}) \;/\; \frac{(-1 \text{ X } 10\text{E-}04 \text{ delta K/K})}{\text{deg. F change in Mod Temp}} \quad (0.5)$$

= 6.4 deg F change in Mod Temp. (0.5)

alternate answers will be acceptable depending on the assumed value of alpha T

REFERENCE

LOT 1430 & 1440

2.8	3.2	...(KA VALUES)
292003K108	292004K101	...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 5.06 (2.50)

a. void coefficient (0.5)
b. moderator temperature coefficient (0.5)
c. void coefficient (0.5)
d. doppler coefficient (0.5)
e. moderator temperature coefficient (0.5)

REFERENCE
LOT 1440
3.2 ...(KA VALUES)
292004K110 ...(KA'S)

ANSWER 5.07 (2.00)

a. 295 deg F (+- 15 deg F) (0.5)

b. Increase (0.5)

c. Increase (0.5)

d. 450 psia (+- 50 psia) (0.5)

REFERENCE
LOT 1150, 1160
3.1 ...(KA VALUES)
293003K123 ...(KA'S)

ANSWER 5.08 (1.50)

a. (0.75) decreased 2 phase flow resistance, so the system flow resistance decreases. (0.75)

REFERENCE
LOT 1860
3.7 ...(KA VALUES)
202002K103 ...(KA'S)

ANSWER 5.09 (2.00)

a. 295 deg F (+- 15 deg F) (0.5)

b. Increase (0.5)

c. Increase (0.5)

d. 450 psia (+- 50 psia) (0.5)

REFERENCE
LOT 1150,1160

3.6	3.7	3.6	3.7	...(KA VALUES)
218000A101	218000A302	218000A406	239002K406	...(KA'S)

duplicate of question 5.07 TP 8/1/88

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 5.10 (2.00)

a. True (0.5)
b. False (0.5)
c. False (0.5)
d. True (0.5)

REFERENCE
PBAPS LOT 970 p.8

LO 970-4

KA 292008K103(4.1) 292008K104(3.3)
292008K103 292008K104 ...(KA'S)

ANSWER 5.11 (2.50)

a. Decrease (0.50), high pressure fluid will mix with low pressure fluid and lower the temperature difference between the cooling medium and the cooled medium OR decrease in mass flow rate (0.75)

b. Increase (0.50), as the loads on the RBCCW system increase, more heat will be added to the RBCCW water in the form of sensible heat (temperature of the RBCCW water will increase). This will increase the temperature differential across the heat exchanger fluids. (0.75)

REFERENCE
LOT 1240
291006K104 291006K108 293007K106 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 6.01 (2.00)

a. First Stage Pressure < 30% of rated pressure (126 psig)

b. Mode Switch in Refuel, Shutdown, or Startup
also accept Mode Switch not in Run

c. Mode Switch in Refuel or Shutdown and Bypass Switch in Bypass

d. Mode Switch in Run with APRM 'A' not downscale

(0.5) per answer

REFERENCE
LOT 0300 Fig. 0300-4
LOT 0300 L.O. 8
4.1 ...(KA VALUES)
212000K412 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 6.02 (2.50)

a. 0.66W + 41 High
0.66W + 33 Intermediate
0.66W + 25 Low
0.60W + 60 (clamped at 107%) Backup
(0.25) each

b. 1. yes (0.25)
2. no (0.25)
3. yes (0.25)

c. 1. no (0.25)
2. yes (0.25)
3. no (0.25)

REFERENCE
LOT 0280 pp. 5-8
L.O. 4,5

2.8	3.5	...(KA VALUES)
215002A403	215002K401	...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 6.03 (1.50)

Trip the Main Generator Output Breakers
Trip the Exciter Field Breaker
Trip the Main Turbine
Transfers voltage regulator from Auto to Manual
Trip auxiliary switchgear main circuit breakers
Fast transfer of unit auxiliary switchgear
Trip D & E cooling towers
Trip reactor recirculation pumps if powered from unit
Trip main and aux transformer fans and oil pumps
Trip the stator coolant pumps
(5 required @ 0.3 each)

REFERENCE
LOT 0600 p. 23
3.1 ...(KA VALUES)
262001K404 ...(KA'S)

ANSWER 6.04 (3.00)

a. The TCVs will close to 50% flow position (0.5)
The TCV low value gate passes a MCF signal of 50%
rather than the signal from the pressure controller (0.5)

b. The BPVs will remain closed through the transient (0.5)
the MCF summer will send a zero signal to the BPV LVG (0.5)

c. Reactor power (and pressure) will rapidly increase following (0.5)
the fault.
The reactor will scram on High Flux and/or high pressure (0.5)
because of the closure of the TCVs

REFERENCE
LOT 0590 pp. 12-15
3.7 ...(KA VALUES)
245000K602 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 6.05 (3.00)

indicated level will initially

a. increase (0.5)
b. remain the same (0.5)
c. increase (0.5)
d. increase (0.5)
e. increase (0.5)
f. decrease (0.5)

REFERENCE
LOT 0050

3.2	3.1	3.5	3.4	3.5
4.1	3.6	3.8	3.3	...(KA VALUES)
216000A201	216000A203	216000A207	216000A208	216000A210
216000K324	216000K506	216000K507	216000K512	...(KA'S)

ANSWER 6.06 (2.00)

a. 1. diesel speed (frequency) (0.5)
2. load control (0.5)
b. 1. voltage control (0.5)
2. VAR control (0.5)

REFERENCE
LOT 0670

3.6	3.1	3.4	3.9	3.4
...(KA VALUES)				
264000A201	264000A304	264000A401	264000G009	264000K505
...(KA'S)				

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 6.07 (2.00)

a. Rod 32-35 must be inserted (1.0)

b. 3 (1.0)

REFERENCE
LOT 0090

3.5	3.5	3.5	3.4	...(KA VALUES)
201006A205	201006K401	201006K402	201006K403	...(KA'S)

ANSWER 6.08 (1.50)

1. decay of Xenon
2. make the reactor subcritical from 100% power
3. allow for uneven mixing
4. overcome net positive reactivity due to cooling down
5. maintain at least 3% shutdown margin
(5 required @ 0.2 each)

REFERENCE
LOT 0310 pp. 3,4 L.O. 3

4.1	3.6	3.9	...(KA VALUES)
211000G004	211000K105	211000K407	...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 6.09 (3.00)

76 deg C	Alarm (Stator liquid in/out high temperature)	(0.5)
81 deg C	decreases load limit to 25%	(0.5)
	Trips 'A' Recirc Pump after 1 second	(0.5)
	Trips 'B' Recirc Pump after 10 seconds	(0.5)
	trips turbine if generator amps are not below 26,530 in two minutes	(0.5)
	trips turbine if generator amps are not below 7,726 in three and one half minutes	(0.5)

REFERENCE

LOT 0460 pp. 6,8 L.O. 6
2.9 3.5
245000K605 245000A312 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 6.10 (2.50)

a.1. The level control system sees a mismatch between feedwater flow and steam flow. (0.25) The system increases feedwater flow in an attempt to match feedwater flow and steam flow (0.15) Level starts to increase causing a level error signal (0.10) Level will stabilize several inches above the reference point where the level error will equal the steam flow/feed flow mismatch error (0.25) Power will not change (0.25)

a.2. The Level control system sees a large level deviation (0.25) and increases feedwater flow (0.25) Actual water level increases to the turbine trip level (both main turbine and feedpump turbine) (0.25). The reactor will scram due to a turbine trip if power is > 30% or due to a low level after the feedpump turbine trip if power is < 30% (0.25)

b. (This indicates that the lockout relay does not have power available) and therefore a lockout cannot occur (0.5)

REFERENCE

LOT G550 pp. 15,16 L.O. 10,16

3.6 3.1 3.4 4.3 3.0

...(KA VALUES)

259002K104 259002K604 259002A202 259001A309 259002A310

...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 6.11 (2.00)

a. 'A' fan starts, (0.25) both filter train damper sets open (0.25)

b. 'C' fan starts, (0.25) both filter train damper sets open (0.25)

c. 'B' fan starts after 20 seconds, (0.25)
both filter train damper sets will remain open (0.25)
(should open from initiation signal to fan 'C')

d. No response (0.5)

REFERENCE
LOT 0210 p. 6 L.O. 2
3.8 ...(KA VALUES)
261000K401 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 7.01 (2.50)

a 35 mrem Gamma
5 mrem Beta
10 mrad Epithermal neutrons 10 X 3 (QF)= 30 (0.25)
Total dose 70 mrem (0.25)

b Worker "A" limit 2500 mrem/quarter (0.50)
Present dose 2100 mrem
2500 - 2100 = 400 mrem (0.25)
400/70 = 5.71 hours or 5 hours 42 minutes (0.25)

Worker "B" limit 1000 mrem/quarter (0.50)
Present dose 800 mrem
1000 - 800 = 200 mrem (0.25)
200/70 = 2.86 hours or 2 hours 52 minutes (0.25)

REFERENCE
LOT-1730 B1 and B4
Learning Objective LOT 1730 -2
3.8

294001K103 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 7.02 (3.00)

a T-101 (0.50)

b T-102 (0.50)

c T-101 (0.25) AND T-102 (0.25)

d T-101 (0.50)

e T-102 (0.50)

f T-101 (0.50)

REFERENCE
Systematic EOP Flow Path T-101
Learning Objective LOT 1560-9

4.5	4.5	4.6	4.7	
295025G011	295026G011	295031G011	295037G011	...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION :

ANSWER 7.03 (3.00)

a The reactor is not shut down when the reactor is not subcritical (0.50)
(The definition does not reference any power to allow the operator to inject boron during any condition in which the reactor is not shutdown
on rods including power levels less than three percent.)

b For the worst case ATWS, the Heat Capacity Temperature Limit (HCTL) of the torus may be exceeded before the reactor is shutdown by SLC. (0.50)
The operator will reduce level to reduce power (and therefore, the amount of heat rejected to the torus) to maintain the torus temperature below the HCTL. (0.50)

c. The maximum injection time produces the specified minimum concentration in approximately 125 minutes, which is substantially less time than the cooldown time which will take several hours. (0.75)

d The minimum injection time allows for sufficient mixing so the boron doesn't recirculate through the core in uneven concentrations which could cause power excursions (0.75)

*REFERENCE

REFERENCE
LOT-0310 p 6,7
TRIP T-101,T-102 (BASES)

4.5	4.3	4.5	4.2	
295037A104	295037G003	295037K204	211000A208	...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 7.04 (2.75)

a 1 Fresh Air Supply Fans (OAV-79 and OBV-79) trip. (0.25)

2 Air Conditioning Supply Fans (OAV-28 and OBV 28) trip (0.25)

3 Return Air Fans (OAV-29 and OBV-29) trip (0.25)

4 Emergency Vent Fans (OAV-30 and OBV-30) trip (0.25)

5 Toilet Exhaust Fan (OOV-30) trips (0.25)

(Either the fan numbers or a functional word description of the fans are acceptable as answers)

b 1. control room radiation levels exceed 300 mrem/hr (0.75)

2. respiratory equipment is required in the control room for more than 2 hours (0.75)

REFERENCE
Off Normal Procedure ON-115
LOT-1550
Learning Objective LOT 1550 #1
3.1 3.4

295016K203 295017K207 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 7.05 (2.00)

a Rapid depressurization of the reactor will result in injection of large amounts of cold unborated water, resulting in an uncontrolled power increase. (1.00)

b CRD is left on because under these conditions, the operator should be trying to insert rods. (1.00)

REFERENCE
EB Flow Paths T-101 and T-112
EB T-112 bases
Learning Objective LOT 1560 #3

4.4	4.1	3.8	3.9	
295015G012	295015K102	295015K104	295012K201	...(KA'S)

ANSWER 7.06 (3.00)

a 1 Minimizes plant transient on subsequent scram. (0.50)

2 Provides an additional signal to maintain the Recirc Pumps at minimum speed, should the 30% speed limiter circuit fail, following Cardox discharge. (0.50)

b 1 Prevents Recirc Pumps from tripping during the automatic 13 KV transfer that normally occurs after a scram and turbine trip. (0.50)

2 Assures continuous power supply to all house loads without reliance on automatic breaker operation (0.50)

c 1 Minimizes plant transients as systems become uncontrollable following Cardox discharge. (0.50)

2 The Safety Analysis for Automatic Cardox Discharge in the Cable Spreading Room, assumes the units are shut down prior to discharge. (0.50)

REFERENCE
GE-2 Bases
4.2 3.7

295016K301 295016K303 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 7.07 (2.50)

a A second licensed operator, (0.25) with no other duties, (0.25) shall verify the correct rod is being moved, to the correct position, in the required sequence, (0.25) by using the process computer. (0.25)

b The Reactor Operator, Second Licensed Operator and the Control Room Superintendent (0.25) shall INDEPENDENTLY verify the control rod pattern (0.25) by comparing the OD 7 Option 2 to the GR-2 Appendix I core map. (0.25)

c The Reactor Operator, Second Licensed Operator and Control Room Shift Superintendent (0.25) shall sign the OD 7 Option 2 and the GP-2 Appendix I core map (0.25) and attach it to the appropriate core map in GP-2-2. (0.25)

REFERENCE
GP-2-2 Appendix I
LOT 1530
Learning Objective LOT 1530 #4
3.5 3.8 3.2

201002K105 201002G001 201002G013 ...(KA'S)

ANSWER 7.08 (2.00)

a The 3 times normal background scram also closes the isolation valves which removes the heat sink. (0.50) Scramming the reactor prior to the isolation allows the condenser to be used for decay heat dissipation. (0.50)

b Reduce reactor power until the radiation level is below 1.5 time normal background. (0.50) This reduction below the alarm level assures the release rates will be acceptable. (0.50)

REFERENCE
OT-103 BASES
LOT-1540
Learning Objective LOT-1540 B-2
3.7 3.9

223002G014 223002K101 ...(KA'S)

ANSWER 7.09 (3.00)

a Per ON-107 the Scram is required if three or more CRD accumulator low pressure alarms are received. (0.50) The scram is inserted prior to accumulator depressurization beacause the accumulators are required to assure adaquate scram speeds on the rods. (1.00)

b Per ON-107 the Scram is not required. (0.50) With reactor pressure above 550 psig, the Scram is required only when all HCU accumulators alarm (1.00)

REFERENCE
LOT-70
Learning Objective LOT-70 #2
3.4 3.9

295022K101 295022K301 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 7.10 (1.25)

a. These status boards must be updated after EACH FUEL ASSEMBLY RELOCATION (0.25)

b. Suspend fuel handling operations (0.50)
Evacuate the refuel floor (0.50)

REFERENCE
FH-6C
3.8 3.9
234000G001 234000G002 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.01 (2.75)

a Any area, accessible to personnel, where there exists radiation at such levels that a major portion of the whole body could receive in one hour, a dose in excess of 1000 mREM. (0.50)

b A LEVEL II Locked High Radiation Area has a dose rate in excess of 30 Rem per hour, or has the potential for an extremely high dose rate (0.50)

A LEVEL I Locked High Radiation Area is a Locked High Radiation Area not considered a LEVEL II Locked High Radiation Area (0.50)

c 1 The high radiation Master Keys are kept in the custody of;
Security Supervision (0.25)
Shift Supervision (0.25)
Health Physics Supervision (0.25)

2 Master Keys are used for emergencies only. (0.50)

REFERENCE
LOT 1570
Administrative Procedure A-84
Learning Objective LOT 1570-5-m
3.8 3.7

294001K103 294001K105 ...(KA'S)

ANSWERS - PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.02 (2.50)

a The operator can continue to work for the following 4 hours (0.50)
If he worked more than four (4) hours he would exceed 72 hours in seven (7) days (0.50) and, he would exceed working more than 24 hours in 48 hours. (0.50)

b 1 A Personnel Staffing Deviation Form shall be filled out. (0.50)

2 The overtime shall be authorized by the Station Superintendent, (his alternate, or higher level of management.) (0.50)

REFERENCE
Administrative Procedure A-40
Learning Objective LOT 1570 3-h
4.5

294001A011 ...(KA'S)

ANSWER 8.03 (1.00)

a Assign a Utility Shift Supervisor, or Utility Shift Superintendent to be the team leader. (0.50)

b Relieve the Control Room Supervisor so he can become the team leader. (0.50)

REFERENCE
Abnormal Procedure ON-114
Administrative Procedure A-7-6
Learning Objective 1550-1
4.2

294001A112 ...(KA'S)

ANSWERS - PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.04 (3.00)

a The procedure change must not alter the intent of the procedure. (0.50)

b The change must be approved by two (2) members of the Plant Management Staff (0.50) one (1) of whom holds an SRO license (0.50)

c The change must be approved by PORC (0.50) and approved by the Manager Nuclear Plant (0.50) within 14 days. (0.50)

REFERENCE
Technical Specification 6.8.3
LOT-1570 II.C
Learning Objective LOT 1570-1, 3a
4.2 3.7
294001A101 294001A103 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.05 (3.00)

a. Limit applies any time the plant is in STARTUP, HOT STANDBY, OR RUN mode. (0.50)

b. 105 deg F. (0.50)

c. Stop testing (0.125) reduce temperature to less than 95 deg F within 24 hours (0.125) OR be in HOT SHUTDOWN within the next 12 hours (0.125) and COLD SHUTDOWN within the next 24 hours. (0.125)

d. Limit applies during reactor isolation conditions. (0.50)

e. 110 deg. F (0.50)

f. Scram the reactor. (0.50)

REFERENCE
Technical Specification 3.7.A
3.6 3.8 4.0 4.1 4.0
4.3

223001A109 223001A212 223001G001 223001G005 223001G006
295026G003 ...(KA'S)

ANSWERS - PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.06 (2.50)

a 1 Single loop operation not permitted in Region I to prevent thermal hydraulic instabilities (0.50) which could cause neutron flux oscillations (0.50)

2 Reduce reactor power to less than the power described by line "A" on figure 3.6.5 (0.125) OR increase flow to 39% or greater (0.125) within four (4) hours. (0.25)

b 1 After entering Region I, determine APRM and LPRM noise levels (0.25) within one (1) hour (0.25) and at least every eight (8) hours thereafter. (0.25)

2 After increasing power by at least 5% (0.25) determine APRM and LPRM noise levels (0.25) within one (1) hour. (0.25)

REFERENCE
Technical Specification 3.6.F
Lot 0030
Learning Objective LOT 0030 SRO 2
3.7 4.2

202001A203 202001GC11 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.07 (2.50)

a Control rod #1 is INOP (0.25) and must be inserted and disarmed. (0.25)
Control Rod #2 is INOP (0.25) but not required to be disarmed or inserted. (0.25)

b Control rod #3 by Technical specification, is INOP (0.25) and requires a reactor shutdown within 48 hours. (0.50)
(or investigation must demonstrate that the failure is not due to a failed control rod drive mechanism collet housing)

Control rod #3 by Technical specification, does not meet the 5 X 5 array (4 operable rods between inoperable rods) with control rod #2 (0.25) and requires a reactor shutdown within 24 hours. (0.50)

REFERENCE
Technical Specification 3.3.A.F
LOT-0070
Learning Objective LOT-0070 #1 and #2
4.2 3.9

201001G005 201001G011 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.08 (2.50)

a 1 The plant conditions and degree of accident control.

2 Emergency classification.

3 The potential for emergency escalation.

4 Staff augmentation and technical assistance requirements.

5 The need for long term support.
(Three required at 0.50 ea)

b ALERT level. (0.50)

c SITE EMERGENCY level. (0.50)

REFERENCE
ERP-200 Emergency Director SEC 2.1.5, 2.1.6 and 2.1.7
4.7

294001A116 ...(KA'S)

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.09 (2.25)

Failure of APRM "A" results in less than two (2) instrument channels for trip channel "A". (0.25) The Technical Specification requires two (2) instrument channels for each trip channel. APRM "E" is already bypassed, so APRM "A" cannot be bypassed. (0.25) Trip system "A" shall be placed in the tripped condition. (0.50)

APRM "A" is also the normal reference APRM for RBM "B" (0.25). Since APRM "E" is the alternate reference APRM for RBM "B", RBM "B" is INOP. (0.50) A seven (7) day LCO was in effect due to RBM "B" being INOP. RBM "A" is now INOP and shall be placed in a tripped condition. (0.50)

REFERENCE
Technical Specifications 3.1 and 3.2

3.0 3.5	3.0 3.3	3.3	4.3	
215002K101	215002K604	215002A203	215002G011	215005K103
215005K307	...(KA'S)			

ANSWERS -- PEACH BOTTOM 2&3 -88/07/19-USNRC - REGION I

ANSWER 8.10 (3.00)

a 1 A Deficiency Tag (or sticker) is used on nuclear safety related equipment, to indicate a component deficiency has been identified. (0.50)

2 The tag is placed when an MRF has been written BUT the component has not been blocked and the deficiency is not obvious. (0.25)

3 The tag chall be removed when the condition is known to have been corrected. (0.25)

b 1 A Manila Information Tag may be used to note useful information in the operation of the plant (0.50). (It may also be used in place of a Deficiency Tag, if there is not enough room to write all the information on the Deficiency Tag.)

2 It is placed when the deficiency is identified, or a need for more information is required. (0.25)

3 It shall be removed when the condition is known to have been corrected. (0.25)

c 1 The Operation Verification Tag, is hung as a reminder that the testing requirements which prove operability (required by section 7 of the MRF), must be deferred due to plant conditions. (0.50)

2 The tag is hung after the MRF has been completed, (except for section 7, in order to clear the blocking permit.) (0.25)

3 The tag is removed when the operational verification has been completed as documented on the MRF. (0.25)

REFERENCE
Administrative procedure A-26, Procedure for Corrective Maintenance
pgs 7 and 8
4.5

294001K102 ...(KA'S)

ATTACHMENT 3

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM ATOMIC POWER STATION
R. D. 1, Box 208
Delta, Pennsylvania 17314
(717) 456-7014

PEACH BOTTOM—THE POWER OF EXCELLENCE

D. M. Smith
Vice President

July 25, 1988

Mr. Robert M. Gallo, Chief
Operations Branch
Division of Reactor Safety
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Dear Mr. Gallo:

SUBJECT: Facility Comment on License Examination (Report #88-16)
Administered at Peach Bottom Atomic Power Station July 19, 1988

The attachment to this letter documents the complete formal comment summary of the Senior and Reactor Operator License Examinations administered on July 19, 1988.

In the vast majority, comments have been limited to those questions and/or answers which were specifically addressed during the post-examination review session conducted on July 19.

In the majority of cases, the referenced supporting documentation can be found in the materials forwarded to your office for exam preparation. In several cases specific references are not appropriate due to the nature of the reviewer's comments.

Sincerely,

DMS/RGA:bgh

Attachments

cc: J. F. Franz
D. J. Lange
File

QUESTION 1.07 (3.00)

The Residual Heat Removal pumps are being used in the Shutdown Cooling Mode. HOW will AVAILABLE and REQUIRED Net Positive Suction Head (NPSH) for the RHR pumps be affected (INCREASE, DECREASE, or NOT AFFECTED) by each of the following changes?

	NPSH AVAILABLE	NPSH REQUIRED
a. Reactor water temperature increases		
b. Reactor water level decreases		
c. RHR system flowrate decreases		

ANSWER 1.07 (3.00)

	AVAILABLE	REQUIRED
a.	decrease	not affected
b.	decrease	not affected
c.	increase	decrease

(0.5 pts each)

REFERENCE
PBAPS LOT 1290

KA 202001K101(3.6) 202001K103(3.2) 202001K105(3.4) 202001K122(3.4)
202001K101 202001K103 202001K105 202001K122 ...(KA'S)

FACILITY COMMENT:

Required NPSH is not taught within lesson plan subject matter or listed as an Objective. Many candidates may assume "required" varies inversely as "available" and answer accordingly.

REFERENCE: LOT 1290

RESOLUTION: Reduce weight of "Required NPSH" portion to 0.25 pts each, therefore reducing total question value to 2.25.

QUESTION 2.07 (2.25)

a. While operating at 100% power, a condensate pump trips. STATE the two (2) automatic actions which occur directly because of this trip and STATE the purpose for these actions.

b. HOW is the main condenser protected from an over pressure condition? Include applicable setpoints.

ANSWER 2.07 (2.25)

a. Recirculation pumps runback to 60% speed (75% flow) (0.5) and a 90% maximum speed signal to the feed pumps is inserted. (0.5) This action reduces the feedwater requirements to a point that can be handled by two condensate pumps. (0.5)

b. Two rupture diaphragms are provided on each LP turbine exnaust shroud, (0.5) set at 5 psig. (0.25)

REFERENCE
PBAPS LOT-520 pgs 5, 17

LO 520-10, 11

256000K304(3.6) 256000G007(3.4)
6000G007 256000K304 ...(KA'S)

FACILITY COMMENT AND RESOLUTION

2.07 b. Other means are available for main condenser over pressure protection and should be accepted. Such items could include automatic actions as condenser vacuum decreases. For example, reactor scram, main turbine trip, reactor feed pump turbine trip and bypass valve open permissive removed.

REFERENCE
1. PBAPS LOT-0300 page 12
2. PBAPS Technical Specifications page 23
3. PBAPS LOT-0590 page 15

QUESTION 2.09 (2.50)

For each of the following plant conditions, STATE (YES/NO) if ALL RUNNING drywell ventilation fans will trip off: (Consider each condition separately.)

a. 100% power, D/W temperature is 138 F.

b. Rx is shutdown. Rx water level is -135 inches.

c. DW pressure is 2.1 psig, Rx water level is +38 inches.

d. 50% power, torus bulk water temperature is 107 F.

e. 100% power, #2 13.2KV bus is lost.

ANSWER 2.09 (2.50)

a. no
b. no
c. yes
d. no
e. no

REFERENCE
PBAPS LOT-140 P.C

LO 140-3

KA 223001K403(3.7) 223001K611(3.0)
223001K403 223001K611 ...(KA'S)

FACILITY COMMENT AND RESOLUTION

2.09 b. Either yes or no or both should be acceptable answers since the LOCA signal of triple low reactor vessel water level is -130" for Unit 3 and -160" for Unit 2.

REFERENCE PBAPS LOT-0140 page 6

QUESTION 3.01 (2.50)

a. For each of the following parameter changes and operational conditions, STATE if the INDICATED LEVEL will INCREASE, DECREASE, or REMAIN THE SAME for the specified level instrument if ACTUAL level REMAINS THE SAME.

1. The D/W temperature increases about 200 degrees. How will the NARROW RANGE level instrumentation respond?

2. The D/W temperature increases about 45 degrees. How will the WIDE RANGE level instrumentation respond?

3. A reactor startup is in progress. The head vent is closed. Vessel temperature and pressure are increased from atmospheric and 220 degrees to 800 psig and 518 degrees. How will the NARROW RANGE level instrumentation respond?

4. A reactor startup is in progress. The head vent is closed. Vessel temperature and pressure are increased from atmospheric and 220 degrees to 800 psig and 518 degrees. How will the WIDE RANGE level instrumentation respond?

b. WHAT level instrument(s) is/are responsible for initiating the main turbine and RFPT trips at +45 inches?

ANSWER 3.01 (2.50)

a. 1. Increase (0.5)
2. Increase (0.5)
3. Remains the same (0.5)
4. Decease (0.5)

b. Feedwater Control (narrow range) (0.25) and
Yarways (wide range) (0.25)

REFERENCE
PBAPS LOT-50 pgs. 14, 17-18, 26

LO 50-4, 6

KA 216000K501(3.1) 216000K507(3.6) 216000K510(3.1) 216000K113(3.4)
216000K116(3.0)
216000K113 216000K116 216000K501 216000K507 216000K510
...(KA'S)

FACILITY COMMENT AND RESOLUTION
3.01 a.2. Remain the same is also an acceptable answer. The students were taught MOD 1457 Yarway Level Modification which is installed in Unit 2. Changes in indicated level due to changes in drywell temperature are essentially eliminated.

REFERENCE PBAPS LOR-8704 page 6 3)a)

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM ATOMIC POWER STATION
1987 PBAPS OPERATOR REQUALIFICATION LECTURE SERIES
LESSON PLAN

TITLE:

Unit 2 Modifications

PURPOSE:

To familiarize RO/SRO with modifications performed on Unit 2 prior to the hydrostatic test.

OBJECTIVES:

Upon successful completion of this lesson, the trainee will be able to:

1. Discuss the importance of the Yarway level modification.
2. State whether a given instrument in the control room is fed from the wide range compensated instrument.
3. State the conditions that will cause the 18" vent and purge lines to isolate.
4. List the alternate power sources available to the Unit 2 RPS BUS.
5. List the conditions that will cause an ADS blowdown on Unit 2.
6. State why the addition of the 9 minute low level timer is important.
7. List the indications available on the HPCI ACS for ADS.
8. Discuss why the change to the Unit 2 RHR minimum flow valves is important.

REFERENCES:

Associated modification packages and Shift Training bulletins.

MATERIALS:

Instructor:

1. Whiteboard, markers, and erasers
2. Transparencies and Overhead Projector

DURATION:

7/50 Minute Sessions

SUBJECT MATTER OUTLINE	SUPPORT INFORMATION

I. Yarway Level Modifications — MOD 1457

A. Purpose

1. To improve the accuracy and reliability of the water level measurement under accident, transient and normal operating conditions.

2. Decreases the need for operator diagnosis due to instrument inaccuracies.

B. Components Affected/Changed

1. Removed the two Yarway temperature compensated reference columns and the associated reference leg piping from the reference columns to drywell penetrations N-28 and N-29.

   a. The piping through penetrations N-28 & N-29 is capped on both sides of the penetration.

   b. The variable leg piping is sloped continuously down from the vessel nozzle to the remainder of the variable leg piping.

2. Installed two new condensing chambers which are not temperature compensated.

   a. The piping is routed through drywell penetration N-26.

   b. The new condensing chambers are located above their respective reactor nozzles to allow proper sloping of the reference column piping to their penetrations.

3. Moved the two fuel zone water level reference legs from the current GEMAC cold reference legs to the new cold reference legs.

4. Return the level 1 (Triple low) trip point to 160 inches.

5. Recalibrated the instruments connected to the modified reference legs to compensate for the revised elevation of the condensing chamber and the new reference leg ambient conditions.

SUBJECT MATTER OUTLINE	SUPPORT INFORMATION

6. Four independent micro-processor compensation instruments are installed in Unit 2 cable spreading room as follows:

   a. Differential pressure signals from

      LT-2-3-72A,B,C,D HPCI, RCIC, ADS, C.S. & RHR initiation, and indication on the CO5 panel 2185

      LT-2-3-73A,B Containment spray permissive, LI 91A&B

      LT-2-3-73C,D* LR 110A & 110B

      *LT-2-3-111A,B have been retagged LT-2-3-73C and D

      are connected from the instrument racks to the new compensation instruments. The Rosemount trip units presently associated with these transmitters are removed.

   b. Reactor pressure signals from PT-2-3-404A,B PT-2-3-404C,D*

      *PT-2-3-52C,D have been retagged to these PT-2-3-404C,D

   c. Compensated level indication signals from the compensation instruments are connected to the existing indicators LI 2-3-85A and B (CO5 panel) LI-2-3-85 AX and BX (Emergency Shutdown panel) and LI-2-3-91 (CO3 panel). The spare red pen of recorder PR-2-3-404A (CO4C RCIC) is used for indication of fuel zone level. LR-2-3-110A and B both receive inputs from the compensated unit.

      T-LOR-87-04-1

      LI-2-3-91B is retagged to LI-2-3-91 and LI-2-3-91A is retagged LI-2-3-113

   d. Pressure and level contact outputs from the Rosemount trip units that input the ECCS systems have been replaced by contact outputs from the new level compensation instruments.

SUBJECT MATTER OUTLINE	SUPPORT INFORMATION
e. Transmitters LT-2-3-110A and B and PT-2-3-52A and B have been removed.	
f. Contacts have been provided from the compensated instrument for the Alternate Rod Insertion Modification.	Not installed at this time.
g. Four meters have been installed in cabinets 20C818 and 20C819 to provide indication of actual differential pressure of the fuel zone transmitters. This indication can be used to determine if the equalizing valves for the LT-2-373A-D are open or closed.	These do not provide level indication.
1) If the equalizing valves are closed (normal operation) the indicator will have an upscale reading maximum differential pressure.	
2) If the equalizing valves are open the indicators will indicate zero.	
h. Wide range level indication is rescaled for +60 to -165 inches indication (LI-2-3-85A and B, LI-2-3-85AX and BX). Fuel zone range level indicators LI 2-3-91 and the red pen of PR-2-3-404A are rescaled for +60 to -325 inches indication. The LR 2-3-110A and B will be rescaled for both wide and fuel zone range	
i. The accuracy of the fuel-zone range has been improved by taking into account when the recirc pumps are running.	Since the fuel-zone range variable leg uses the jet pump diffuser tap, this measurement is inaccurate whenever jet pump flow is present
1) Outputs for fuel-zone level indication will use the compensated wide range instrument whenever level is above -162.5 inches.	This signal will not be affected by jet pump flow.
2) Outputs for the fuel-zone level indication will use the fuel-zone range transmitter signal whenever level is below -162.5 and will provide accurate level indication to levels of -325 inches.	Recirc pumps will not be operating below -48"

SUBJECT MATTER OUTLINE	SUPPORT INFORMATION

j. The power supplies to the compensation system will be a 125 Vac safeguard feed and a 125Vdc feed.

1) The outputs from the A & C supplies are bused together to form a redundant system. — Either power supply can feed both channels

2) The outputs from the B & D supplies are bused together to form a redundant system. — Either power supply can feed both channels

3)

Channel	120VAC	125VDC
A,C	20Y35 BKR#2	20D23 BKR#1
B,D	00Y03 BKR#2	20D24 BKR#16

4) There is a small battery backup that will supply the micro-processor memory in case of a complete loss of power.

a) This battery has approx a 2 year life.

b) Indication of battery failure is on the microprocessor panel.

C. Discussion

1. Because of concerns over inaccuracies of the Yarway instruments during high drywell temperature conditions two major changes were made.

a. The Yarway temperature compensating reference columns are removed and replaced with cold reference columns with piping that has a minimum elevation drop in the drywell.

b. Electronic reactor pressure compensation is installed to replace the Yarway self-compensation.

1) This also improves the accuracy of the instrument over its entire operating pressure range.

2) The new pressure compensation instruments compensate the level measurement by approximating the steam table values for the density of water and steam as a function of reactor pressure.

SUBJECT MATTER OUTLINE	SUPPORT INFORMATION
3) Errors caused by variations in drywell and reactor building temperatures are not compensated.	
a) Changes in indicated level due to changes in drywell temperature are essentially eliminated by the repiping that makes the variable and reference legs have similar elevation drops inside the drywell.	The change in water density will affect both lines equally.
b) Calculations indicate errors due to reactor building temperature changes will be about .35 inches per 10°F. temperature change.	EE 1457-1 this error was based on a change in temperature from 70°F. - 90°F.
2. Reference Leg Boil Off is a condition that can occur at high drywell temperature and low reactor pressure.	
a. The reference leg elevation drop in the drywell will be 30 inches.	
b. Under these conditions level indication could be as much as 40 inches high.	This amount of error meets the acceptance criteria established by the NRC in Generic letter No. 84-23.
1) Since the bottom tap (variable leg) is at approximately -172 inches it is possible that there will be no LPCI/Core Spray initiation signals.	
2) NRC Generic letter states that, "under all reactor and Drywell conditions, reactor level measuring systems shall provide, at a minimum, an Operator alert".	The old Yarway system would not do this.
3) The Compensated Reactor Level system will produce a Reactor double low (-48 inch) alarm at an actual level of -90 inches.	
4) The operator needs to recognize that under these conditions, LPCI and Core Spray should be manually initiated.	if initiation is not done by D.W. pressure
5) The operator needs to remember that under these conditions level indication of the wide range and fuel zone will indicate up to 40 inches high.	

SUBJECT MATTER OUTLINE	SUPPORT INFORMATION
3. ECCS Activations	
a. The level 8 (+45 inch) trips off HPCI and RCIC turbines, the main turbine stop valves and the feedwater turbines will occur at a higher and more conservative reactor water level with the compensation than with the Yarway measurement for reactor pressures less than 1000 psig.	T-LOR-87-04-2
1) Since these trips occur on increasing level, the trip at a higher level is conservative as considered from an ECCS aspect and will result in maintaining a greater volume of water in the reactor.	
2) This level will be close to 45 inches for all reactor pressures.	
3) The operator should remember that if HPCI trips on high level it will auto reset. The reset set point is set at 29 inches.	
b. The level 2 (-48 inch) initiation of HPCI & RCIC and tripping of the recirculation pumps will occur at a higher and more conservative water level with pressure compensation. This is conservative from an ECCS perspective in that these systems will maintain a greater volume of water in the reactor.	T-LOR-87-04-3
c. The level 1 (-160 inch) which had previously been set at -130 is now being moved to -160.	T-LOR-87-04-4 T-LOR-87-04-5 Postulated high temp. is 340°F.
1) Removal of the Yarway columns reduced the error associated with high drywell temperature to 2.7 inches.	Initiation assumes no change in reactor pressure.
2) For measurements at the design bases operating temperature of 135°F., the -160 inch activation point will assure operation above the Technical Specification limit.	

QUESTION 3.05 (2.00)

The reactor is being started up. All IRMs, except for IRM D, are on range 7. An I&C technician is about to troubleshoot IRM D and in preparation for this, the joystick on panel C05 has been positioned to bypass IRM D.

a. IRM A reads 11 when the operator inadvertently ranges DOWN to range 6. WHAT will it read on Range 6? WHAT TRIP, if any, will occur?

b. IRM A has been ranged back to range 7. The I&C technician begins to troubleshoot IRM D but instead of opening the drawer for IRM D opens the drawer to IRM B. WHAT TRIP, if any, will occur? JUSTIFY your answer.

ANSWER 3.05 (2.00)

a. 110 (0.5) A rod block will occur (0.5)

b. A half-scram will occur (0.5) since IRM B will generate an inop condition. (0.5)

REFERENCE
PBAPS LOT 250 p.9

LO 250-7

KA 215003K401(3.7) 215003K402(4.0)
215003K401 215003K402 ...(KA'S)

FACILITY COMMENT AND RESOLUTION

3.05 b. If opening the IRM drawer results in High voltage supply less than 125VDC or a module being unplugged or if the drawer select switch is placed out of operate in preparation for troubleshooting, an inop condition results along with a half scram.

REFERENCE PBAPS LOT-0250 pages 9, 10, 11.

QUESTION 3.08 (2.00)

You assume the shift, with the mode switch in STARTUP, and with the following rod position distribution:

All rods in RWM Groups 1-3 have been withdrawn to position 48 except for one rod in each Group: 22-27 in Group 1, 46-35 in Group 2, and 18-03 in Group 3; these three rods are still fully inserted. All rods in Groups 4-10 are fully inserted (position 00) except for rod 34-27 (Group 4) which has just been withdrawn two even notches past its insert limit. RSCS is bypassed.

STATE the Rod/Rod Group number you would see displayed in each RWM window. If nothing will appear in a window, write "Blank".

1. Rod Group _____
2. Insert Error __ ____
3. Insert Error _____
4. Withdraw Error _____

ANSWER 3.08 (2.00)

1. 03 (0.5)
2. 22-27 (0.5)
3. 46-35 (0.5)
4. 34-27 (0.5)

REFERENCE
PBAPS LOT-90 pgs. 4-6, 10, 13

LO 90-2, 3

KA 201006K401(3.4) 201006K402(3.5)
201006K401 201006K402 ...(KA'S)

FACILITY COMMENT AND RESOLUTION

3.08 The stated scenario is not possible, violates procedure and Technical Specifications and therefore should be removed from the exam. Since the mode switch is in start up, power must be less than 21%, under these conditions RSCS is required to be operable or the reactor shall be brought to a shutdown condition immediately.

REFERENCE

1. PBAPS LOT-G100 pages 8, 11
2. Procedure S.4.3.L Revision 6 page 2
3. PBAPS Technical Specifications pages 102, 102a

QUESTION 3.09 (3.00)

An ADS blowdown is in progress on Peach Bottom Unit 2.

a. For each of the following conditions, will the ADS valves CLOSE or REMAIN OPEN?

   1. Reactor pressure decays to 40 psig.

   2. An operator shuts down all Core Spray pumps.

   3. Rx water level recovers to +10 inches.

b. During the ADS blowdown, the operator depresses the ADS A and B reset buttons. BRIEFLY DESCRIBE how the ADS valves and logic will respond ASSUMING the initiating signals still exist. Include applicable setpoints and time delays.

ANSWER 3.09 (3.00)

a. 1. close
   2. close
   3. remain open

b. The valves will close (0.5), the timer will restart (0.25), and at the end of the timer cycle, 105 sec (0.25), blowdown will recommence. (0.5)

REFERENCE
PBAPS LOT-330 pgs. 7-8

LO 330-2.c, 5.b

KA 218000K403(3.8) 218000K501(3.8)
218000K403 218000K501 ...(KA'S)

FACILITY COMMENT AND RESOLUTION

3.09 a.2. The ADS valves will remain open if any RHR pump is running. Accept either answer based on status of RHR pump.

REFERENCE
PBAPS LOT-0330 page 8

QUESTION 3.10 (2.50)

For each of the conditions below, STATE what AUTOMATIC action will occur (SCRAM, HALF-SCRAM, ROD BLOCK). If none occurs, state NONE. If more than one action occurs, STATE the most severe action, i.e., half-scram is more severe than a rod block.

a. At 35% power, loss of voltage to "A" APRM occurs.

b. At 60% power, the APRM flow converter fails downscale.

c. UNIT 2 is operating with 50% recirc flow, rods are pulled to increase power to 75%.

d. UNIT 3 is operating with 50% recirc flow, rods are pulled to increase power to 75%.

e. At 35% power, all four turbine stop valves trip shut.

ANSWER 3.10

a. half-scram (0
b. half-scram (0
c. none (0
d. rod block (0.5)
e. scram (0.5)

REFERENCE
PBAPS LOT 270 pgs. 6-7

LO 270-2

KA 212000K101(3.7) 212000K110(3.2) 212000K602(3.7)
212000K101 212000K110 212000K602 ...(KA'S)

FACILITY COMMENT AND RESOLUTION
3.10 b. Due to a change in the Unit 2 APRM Flux Scram Trip Setting (Run Mode) to:

$$S \leq 0.58W + 62\% - 0.58\ \Delta W,$$

when an APRM flow converter fails downscale, W goes to zero. Therefore the scram setpoint is equal to 62% which is greater than the current 60% power. The most severe action for Unit 2 is a rod block, not half-scram.

REFERENCE PBAPS Technical Specifications page 9 (Unit 2)
Amendment 123, 12/31/87

SAFETY LIMIT

1.1 FUEL CLADDING INTEGRITY

Applicability:

The Safety Limits established to preserve the fuel cladding integrity apply to those variables which monitor the fuel thermal behavior.

Objectives:

The objective of the Safety Limits is to establish limits which assure the integrity of the fuel cladding.

Specification:

A. Reactor Pressure ≥ 800 psia and Core Flow ≥ 10% of Rated

The existence of a minimum critical power ratio MCPR less than 1.07 for two recirculation loop operation, or 1.08 for single loop operation, shall constitute violation of the fuel cladding integrity safety limit.

To ensure that this safety limit is not exceeded, neutron flux shall not be above the scram setting established in specification 2.1.A for longer than 1.15 seconds as indicated by the process computer. When the process computer is out of service this safety limit shall be assumed to be exceeded if the neutron flux exceeds its scram setting and a control rod scram does not occur.

LIMITING SAFETY SYSTEM SETTING

2.1 FUEL CLADDING INTEGRITY

Applicability:

The Limiting Safety System Settings apply to trip setting of the instruments and devices which are provided to prevent the fuel cladding integrity Safety Limits from being exceeded.

Objectives:

The objective of the Limiting Safety System Settings is to define the level of the process variables at which automatic protective action is initiated to prevent the fuel cladding integrity Safety Limits from being exceeded.

Specification:

The limiting safety system settings shall be as specified below:

A. Neutron Flux Scram

1. APRM Flux Scram Trip Setting (Run Mode)

When the Mode Switch is in the RUN position, the APRM flux scram trip setting shall be:

$$S \leq 0.58W + 62\% - 0.58\Delta W$$

where:

S = Setting in percent of rated thermal power (3293 MWt)

W = Loop recirculating flow rate in percent of design. W is 100 for core flow of 102.5 million lb/hr or greater.

QUESTION 4.05 (2.50)

In accordance with GP-2 Appendix I, "Startup Rod Withdrawal Sequence Instructions", individual control rod movements are to be verified, if the Rod Worth Minimizer is INOP below 25% power.

a. WHO must verify rod movement and HOW is this verification performed?

b. WHAT ADDITIONAL VERIFICATION is required at the end of each group pull? HOW is this performed?

c. WHAT DOCUMENTATION is required for the verification made at the end of a group pull?

ANSWER 4.05 (2.50)

a. A second licensed operator, (0.25) with no other duties, shall verify the correct rod is being moved to the correct position, in the required sequence, (0.25) by using the process computer. (0.25)

b. The Reactor Operator, Second licensed operator, and Control Room SRO (0.25) shall INDEPENDENTLY verify the rod pattern (0.25) by comparing the OD-7 Option 2 to the GP-2 Appendix I core map. (0.25)

c. The Reactor Operator, Second Licensed Operator, and Control Room SRO (0.25) shall sign the OD-7 Option 2 and the GP-2 Appendix I core map (0.25) and attach it to the appropriate core map in GP-2-2. (0.25)

REFERENCE
GP-2 Appendix I p.1

LO 1530-4

201002K105(3.4) 201002G001(3.8) 201002G013(3.4)
201002G001 201002G013 201002K105 ...(KA'S)

FACILITY COMMENT AND RESOLUTION

4.05 b,c The Shift Supervisor is the same as the Control Room SRO and either should be accepted.

REFERENCE Procedure S.5.5.D Manual Bypass of RWM
Revision 5 page 2

QUESTION 4.06 (3.00)

Regarding ON-113, "Loss of RBCCW":

a. STATE ALL the actions the operator is required to verify when RWCU non-regenerative heat exchanger outlet temperature reaches 200 degrees.

b. If RBCCW cannot be restored within 5 minutes, ON-113 specifies how to shutdown the recirc pumps. WHAT IS THE BASIS FOR:

   1. Removing the recirc pumps from service?

   2. First reducing recirc flow to minimum and then tripping the pumps 10 seconds apart?

   3. Shutting their discharge valves?

ANSWER 4.06 (3.00)

a. 1. MO-12-15 (0.166), MO-12-18 (0.166), and MO-12-68 close, or Group 2a isolation (0.5)
   2. RWCU pump(s) trip (0.5)
   3. RWCU demin hold pumps start (0.5)

b. 1. to protect the pump seals (0.5)
   2. to minimize the transient on the reactor (0.5)
   3. to prevent the flow through the recirc lines from turning the pump after the trip (0.5)

REFERENCE
PBAPS LOT-1550 pgs. 17-18

LO 1550-2

KA 295018K101(3.5) 295018K303(3.1) 295018G007(3.2)
295018G007 295018K101 295018K303 ...(KA'S)

FACILITY COMMENT AND RESOLUTION

4.06 b.1. The candidates should not be penalized if they do not use the term <u>seals</u> since the lesson plan Subject Outline and ON-113 do not.

REFERENCE
1. PBAPS LOT-1550 page 18
2. OFF NORMAL BASES ON-113 Loss of RBCCW, page 1.

QUESTION 4.08 (2.00)

In accordance with OT-110, "Reactor High Level":

a. While operating at 80% power, reactor water level unexpectedly begins increasing. STATE the three methods that can be used to regain control of water level.

b. STATE the concern with reactor water level exceeding 90 inches.

ANSWER 4.08 (2.00)

a. 1. Lower the water level setpoint. (0.5)
2. Swap the FWCS from auto to manual. (0.5)
3. Remove a RFP from service. (0.5)

b. There is potential for flooding the main steam lines (and introducing water into the turbine).

REFERENCE
PBAPS LOT 1540 p.9
Bases, OT-110 p.2

LO 1540-2

KA 295008G010(3.8) 295008G007(3.2)
295008G007 295008G010 ...(KA'S)

FACILITY COMMENT AND RESOLUTION

4.08 a. Other methods of regaining control of water level should be accepted since the decision is left up to the operator according to the Bases of OT-110. For example, use of MSC, swap to alternate level instrument, trip HPCI and/or RCIC if running, etc.

b. Besides introducing water into the turbine, there are other concerns with reactor water level exceeding 90 inches and these answers should also be accepted. For example, the weight of water in the main steam lines and flooding out HPCI and RCIC supply lines.

REFERENCE
PBAPS OT-110 Reactor High Level-Bases pages 1 & 2

QUESTION 5.03 (3.00)

The Residual Heat Removal pumps are being used in Shutdown Cooling Mode. HOW will AVAILABLE and REQUIRED Net Positive Suction Head for the Residual Heat Removal pumps be affected by each of the following changes (INCREASE, DECREASE, or NOT AFFECTED)?

	NPSH AVAILABLE	NPSH REQUIRED	
a.	Reactor Water temperature increases		(1.00)
b.	Reactor Water level decreases		(1.00)
c.	RHR System flowrate decreases		(1.00)

ANSWER 5.03 (3.00)

	Avail.	Required
a.	DECREASE	REMAIN THE SAME
b.	DECREASE	REMAIN THE SAME
c.	INCREASE	DECREASE

(0.5 pts each)

REFERENCE

LOT 1290

3.7	3.3	3.4	3.6	...(KA VALUES)
202001K101	202001K103	202001K105	202001K122	...(KA'S)

FACILITY COMMENT:

Required NPSH is not taught within Lesson Plan subject matter or listed as an Objective. Many candidates may assume 'required' varies inversely as 'available' and answer accordingly.

REFERENCE: LOT 1290

RESOLUTION:

Reduce weight of 'Required NPSH' portion to 0.25 pts each therefore reducing total question value to 2.25.

QUESTION 6.04 (3.00)

With the Unit operating at 75% power, an electrical fault causes the Maximum Combined Flow Setpoint of the EHC system to drop to minimum.

HOW WILL EACH OF the following RESPOND after the fault? WHY?

(Consider response through ONE MINUTE after the fault. Assume NO OPERATOR ACTION.)

ATTACHED FIGURE, EHC LOGIC, IS PROVIDED FOR REFERENCE

a. Turbine control valve position (1.00)

b. Bypass valve position (1.00)

c. Reactor power (1.00)

ANSWER 6.04 (3.00)

a. The TCVs will close to 50% flow position (0.5)
The TCV low value gate passes a MCF signal of 50% rather than the signal from the pressure controller. (0.5)

b. The BPVs will remain closed through the transient (0.5)
the MCF summer will send a zero signal to the BPV LVG (0.5)

c. Reactor power (and pressure) will rapidly increase following the fault. (0.5)
The reactor will scram on High Flux and/or high pressure because of the closure of the TCVs (0.5)

REFERENCE
LOT 0590 pp. 12-15
3.7 ...(KA VALUES)
245000K602 ...(KA'S)

FACILITY COMMENT:
Although minimum value for Max. Combined Flow Potentiometer is 50% in Manual, wording of question "Electrical Fault" was interpreted as failed to Zero. This would be interpreted as a full closure of the Turbine Control Valves.

REFERENCE: LOT 0590

RESOLUTION:
Accept either interpretation (faulted to zero or 50%) as correct.

QUESTION 7.02 (3.00)

For each of the following conditions, STATE which Emergency Procedure is entered (If more than one procedure is entered, state all Emergency Procedures that are entered. If none are entered, state NONE).

a. RPV LEVEL BELOW -48" or unknown (0.50)

b. Drywell TEMPERATURE ABOVE 145 deg. F. (0.50)

c. Drywell PRESSURE ABOVE 2 psig. (0.50)

d. Conditions requiring a GROUP I ISOLATION. (0.50)

e. Torus LEVEL OUTSIDE the 14.6' to 14.9' band. (0.50)

f. SCRAM CONDITIONS with POWER LEVEL above 3% or unknown. (0.50)

ANSWER 7.02 (3.00)

a. T-101 (0.50)

b. T-102 (0.50)

c. T-101 (0.25) AND T-102 (0.25)

d. T-101 (0.50)

e. T-102 (0.50)

f. T-101 (0.50)

REFERENCE
Systematic EOP Flow Path T-101
Learning Objective LOT 1560-9

4.5	4.5	4.6	4.7	
295025G011	295024G011	295031G011	295037G011	...(KA'S)

FACILITY COMMENT:
For parts a, c, and f the operator actually enters Procedure T-100 briefly, THEN proceeds to T-101 and/or T-102. Some candidates omit this due to the short amount of time involved, realizing they are quickly into a more involved procedure.

REFERENCE: Trip Charts

RESOLUTION:
Accept answers which include brief entries into T-100 in addition to T-101 and T-102.

QUESTION 7.03 (3.00)

The reactor is at full power when an ATWS occurs with no control rod motion.

As part of T-101 you are directed:

IF NOT SHUT DOWN WITH
RODS
THEN INJECT SLC
BEFORE TORUS TEMP.
REACHES 110 DEG. F.

a. DEFINE NOT SHUT DOWN. (0.50)

b. Once boron injection is started, the operator is directed to perform T-117 (REACTOR LEVEL/POWER CONTROL) concurrently with T-101. What is the basis for using reactor water level to control reactor power while boron is being injected? (1.00)

c. What is the basis for the Maximum Standby Liquid injection time? (0.75)

d. What is the basis for the Minimum Standby Liquid injection time? (0.75)

ANSWER 7.03 (3.00)

a. The reactor is not shut down when the reactor is not subcritical (0.50) (The definition does not reference any power to allow the operator to inject boron during any condition in which the reactor is not shutdown on rods including power levels less than three percent.)

REFERENCE
LOT 0310 p 6, 7
TRIP T-101, T-102 (BASES)

4.5	4.3	4.5	4.2	
295037A104	295037G003	295037K204	211000A208	...(KA'S)

FACILITY COMMENT:
In part a. the candidate can use various methods to define or determine "NOT SHUTDOWN" other than key.

REFERENCE: N/A

RESOLUTION: Alternate methods used to determine shutdown could be accepted -- APRMs not downscale, reactor period, steam flow not consistent with decay heat.

QUESTION 8.02 (2.50)

During a refueling outage, a Control Room Operator has worked twelve (12) hour days for the last five (5) days. On the sixth (6) day he is scheduled to work only eight (8) hours. His relief called in sick and no other personnel are available to fill the operator position.

a. HOW LONG can the operator continue to work and STATE the two (2) limits restricting his work hours in accordance with Administrative Procedure A-40? (1.50)

b.1. What documentation is required for an individual to exceed the work hour criteria of A-40? (0.50)

2. Who, by title, may authorize exceeding the overtime guidelines? (0.50)

ANSWER 8.02 (2.50)

a. The operator can continue to work for the following 4 hours (0.50)

If he worked more than four (4) hours he would exceed 72 hours in seven (7) days (0.50) and, he would exceed working more than 24 hours in 48 hours. (0.50)

b.1. A Personnel Staffing Deviation Form shall be filled out. (0.50)

2. The overtime shall be authorized by the Station Superintendent, (his alternate, or higher level of management.) (0.50)

REFERENCE
Administrative Procedure A-40
Learning Objective LOT 1570 3-h
4.5
294001A011 ...(KA'S)

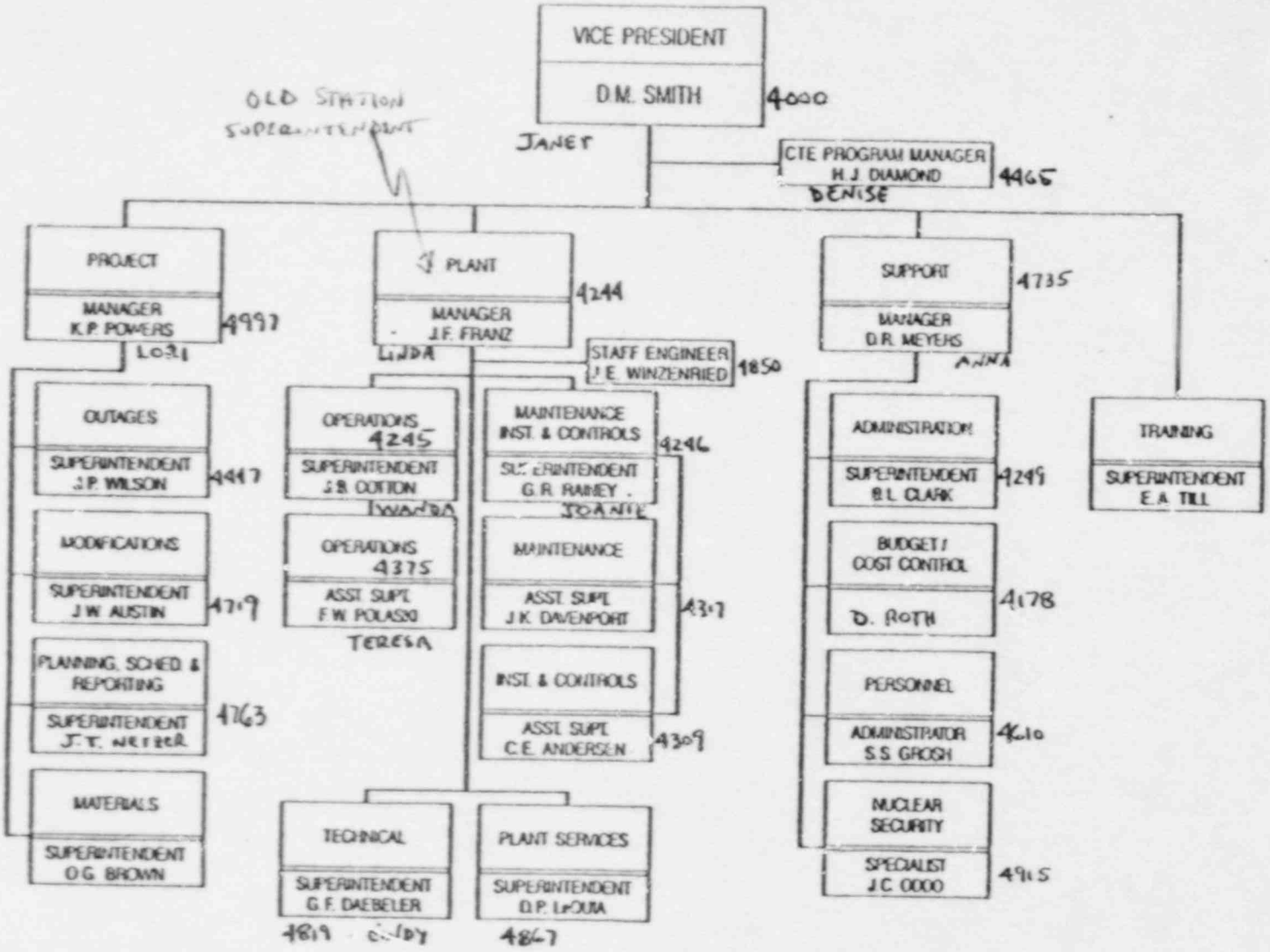
FACILITY COMMENT:
Part b.2. Title of Authorization has changed to Plant Manager vs. Station Superintendent; but the Procedure A-40 has not been changed.

REFERENCE: Admin. Procedure A-40 (See attached Station Organization Chart)

RESOLUTION: Accept Plant Manager vs. Station Superintendent.

INCLUDES ORGANIZATIONAL CHANGES COVERED BY BULLETIN NO 2021

NO 1947 IV REV. 4



ORGANIZATION CHART

PEACH BOTTOM ATOMIC POWER STATION

PHILADELPHIA ELECTRIC COMPANY

VICE PRESIDENT

QUESTION 8.09 (2.25)

During plant operations at 80% power, RBM "B" has failed and is bypassed. APRM "E" has also failed and is bypassed.

APRM "A" fails downscale.

Utilizing the Technical Specification provided in the attachments, DETERMINE any LCO's entered by the failure of APRM "A". Indicate the DURATION of the LCO's and the ACTION required if the specified LCO time elapses. (2.25)

ANSWER 8.09 (2.25)

Failure of APRM "A" results in less than two (2) instrument channels for trip channel "A". (0.25) The Technical Specification requires two (2) instrument channels for each trip channel. APRM "E" is already bypassed, so APRM "A" cannot be bypassed. (0.25) Trip system "A" shall be placed in the tripped condition. (0.50)

APRM "A" is also the normal reference APRM for RBM "B" (0.25). Since APRM "E" is the alternate reference APRM for RBM "B", RMB "B" is INOP. (0.50) A seven (7) day LCO was in effect due to RBM "B" being INOP. RBM "A" is not INOP and shall be placed in a tripped condition. (0.50)

REFERENCE
Technical Specifications 3.1 and 3.2

3.0	3.0	3.3	4.3	
3.5	3.3			
205002K101	215002K604	215002A203	215002G011	215005K103
215005K307	...(KA'S)			

FACILITY COMMENT:
The second part of the answer is wrong. The reference APRM for the A Rod Block Monitor is the "E" APRM, "C" is the backup. The reference for the "B" RBM is the "B" APRM and "D" is the backup. When the "E" APRM becomes INOP, the reference APRM for "A" RBM becomes the "C" APRM. This leaves the "A" RBM still operable. No LCO's are in effect for the RBM.

REFERENCE: LOT 0280, page 4, Lower right.

RESOLUTION: Eliminate second part of question.

ATTACHMENT 4

NRC RESPONSE TO FACILITY COMMENTS

1.07 Comment accepted. The "NPSH REQUIRED" portion will be deleted and the question value lowered to 1.5.

2.07 Comment partially accepted. Credit will only be given for rupture diaphragms and their correct setpoint.

2.09(b) Comment partially accepted. Question (b) is to be deleted since it does not distinguish between knowledge of the LOCA signal and just guessing. Point value of the question is 2.0; Section value 24.5.

3.01 Comment accepted. This material was not provided in what was submitted to the region for exam preparation.

3.05 Comment partially accepted. Placing the drawer select switch to out of operate is not part of the information given in the question and therefore requires the candidate to make assumptions in order to answer the question. Taking the drawer select switch to out of operate will not be allowed as an acceptable answer.

3.08 Comment accepted.

3.09 Comment partially accepted. "Remain Open" is to be considered correct only if the candidate states that RHR is presumed to be running; otherwise "Close" is the correct answer.

3.10 Comment accepted. Unit 2 receives a Rod Block.
Unit 3 a half scram.

4.05 Comment accepted. No change to answer key is required.

4.06 Comment accepted.

4.08 Comment noted. However, since the question tests knowledge of immediate operator actions, the answer key remains unchanged.

5.03 Same response as for question 1.07.

6.04 Comment not accepted. The question explicitly states that the Maximum Combined Flow setpoint drops to minimum, and not to zero.

7.02 Comment accepted. Answer key has been modified accordingly.

7.03 Comment not accepted. The question asks for a definition of NOT SHUT DOWN, not how to determine if the reactor is not shut down.

8.02 Comment accepted. Answer key has been modified accordingly.

8.09 Comment partially accepted. Answer key for part (b) has been modified as follows: No LCOs for the RBM. Additionally, the point value of the question was reduced to 2.0.