U.S. NUCLEAR REGULATORY COMMISSION
REGION I

OPERATOR LICENSING EXAMINATION REPORT

EXAMINATION REPORT NO.	50-289/89-03(OL)
FACILITY DOCKET NO.	50-289
FACILITY LICENSE NO.	DPR-50
LICENSEE:	GPU Nuclear Corporation P. O. Box 480 Middletown, Pennsylvania 17057
FACILITY:	Three Mile Island, Unit 1
EXAMINATION DATES:	February 13-16, 1989

CHIEF EXAMINER: _____ 4 May 89
Barry S. Norris — Date
Senior Operations Engineer

APPROVED BY: _____ 5/4/89
for Ronald B. Eaton, Chief — Date
PWR Section, Operations Branch, DRS

SUMMARY: Written and operating examinations were administered to twelve Reactor Operator (RO) candidates. Three ROs failed the written examination, and two ROs failed the operating examination. All others passed the examinations and were issued licenses.

DETAILS

TYPE OF EXAMINATIONS: Replacement

EXAMINATION RESULTS:

	RO Pass/Fail
Written	9 / 3
Operating	10 / 2
Overall	7 / 5

CHIEF EXAMINER AT SITE: B. S. Norris, USNRC

OTHER EXAMINERS: W. M. Dean, USNRC
B. F. Gore, PNL
N. C. Jensen, INEL

1. GENERIC DEFICIENCIES:

A generic deficiency is defined as: at least half of the candidates missed at least half of the credit for that area.

1.1 Operating Examinations:

The following is a summary of generic deficiencies noted on the operating examinations. This information is being provided to aid the licensee in upgrading license and requalification training programs.

a. The candidates were weak with respect to operation of the Heat Sink Protection System (HSPS) and the Smart Automatic Selection System (SASS).

b. The candidates were slow to use redundant indications to verify instrument malfunctions.

c. The candidates were unable to demonstrate the ability to implement the function of communicator with respect to the Emergency Plan Implementing Procedures.

d. The candidates did not refer to the Radiation Work Permits and survey maps prior to entering the radiologically controlled area of the plant.

e. The candidates were unfamiliar with refueling procedures.

1.2 Written Examination:

The following is a summary of generic deficiencies identified during the grading of the written examinations. This information is being provided to aid the licensee in upgrading license and requalification training programs.

a. The candidates were unable to provide the range that the main steam safety valves are set for.

b. The candidates were unable to correctly associate a rapid increase in pressurizer level with void formation in the reactor coolant system.

c. The candidates were unable to list the reasons for maximizing letdown during an ATWS condition.

d. The candidates were unable to correctly determine the response of main feedwater when there was an instrument failure within the ICS system. Nor were the candidates able to determine why the ICS system went into "Track."

e. No candidates were able to select the correct choice when asked for the approximate time it would take the spent fuel pool to reach an alarm condition upon loss of spent fuel pool cooling.

2. REVIEW OF OPEN ITEMS:

2.1 Open Item Number 87-01-01:

Under the terms of the then existing requalification program, no provision existed to ensure that the simulator evaluation would require the operator to be examined in a position and at a level commensurate with the license issued to the individual. Additionally, one SRO oral examination observed by the NRC was conducted at an RO level of knowledge and that operator was not evaluated as an SRO during the simulator examination.

Closure:

The TMI-1 Licensed Operator Requalification Training (LORT) Program (Document Number 6211-PGD-2613), Revision 6, was reviewed and found to have incorporated the requirement to examine SRO licensed individuals at the SRO level (paragraph 4.4). Additionally, the evaluation forms for control room operators who are licensed SROs (normally licensed as ROs) were reviewed and found acceptable. This item is considered closed.

2.2 Open Item Number 87-01-02:

Evaluations made during the simulator portion of the requalification examination did not result in complete documentation of individual weaknesses identified. This information is necessary to determine eligibility for license renewal.

Closure:

The TMI-1 LORT Program was reviewed and found to have incorporated the requirement for individual evaluations and documentation (paragraph 4.4.3.2). Additionally, two individual evaluations were reviewed and found satisfactory. This item is considered closed.

3. SIMULATION FACILITY REPORT:

During the conduct of the simulator portion of the operating examinations, the following performance and/or human factors discrepancies were observed:

3.1 Performance:

a. The core model in the simulator is Core 5, this is not consistent with the plant.

b. The simulator core model does not support a dropped rod scenario.

c. The simulator has not yet installed the Smart Automatic Selector Switch (SASS) system.

3.2 Human Factors:

a. During initial/requalification training, the simulator instructors silence the back panel alarms for the candidates/operators. This practice carried over to the examination process and could provide negative training in that the operators may not respond to back panel alarms in the control room.

b. Due to the layout of the simulator area, there is no physical separation between the instructor's console and the candidates. While this arrangement may have some advantages during training, it detracts from the concept that the simulator should replicate the actual control room.

4. EXIT MEETING (February 16, 1989):

NRC Personnel:

B. S. Norris - Senior Operations Engineer, Region I
W. M. Dean - Senior Operations Engineer, NRR-OLB

Facility Personnel:

H. D. Hukill - Director, TMI-1
R. Knight - Licensing Engineer, TMI-1
R. H. Maag - Supervisor, Operator Training
L. L. Ritter - Administrator, Plant Operations
M. J. Ross - Plant Operations Director, TMI-1

5. SUMMARY OF COMMENTS MADE AT THE EXIT MEETING:

a. The generic deficiencies noted on the operating examinations (reference paragraph 1.1) and the deficiencies noted for the simulator (reference paragraph 3.0) were discussed with the licensee's representatives.

b. It was noted to the licensee that the electrical drawings in the control room were difficult to use due to poor indexing and labeling.

6. MANAGEMENT MEETING (May 2, 1989):

A meeting was held at the NRC Region I office to discuss the results of this examination and the facility's response to the higher than normal failure rate.

NRC Personnel:

R. M. Gallo - Chief, Operations Branch, DRS
C. J. Cowgill - Chief, Section 1A, DRP
L. E. Briggs - Senior Operations Engineer, DRS
B. S. Norris - Senior Operations Engineer, DRS

Facility Personnel:

O. J. Shalikashvili - Manager, Plant Training, TMI
R. H. Maag - Supervisor, Operator Training, TMI-1
M. J. Ross - Plant Operations Director, TMI-1
W. W. Thompson - Operator Training Manager, TMI-1

7. SUMMARY OF COMMENTS MADE AT THE MANAGEMENT MEETING:

a. The facility stated that it was their intention to disenroll the two individuals who failed the operating examination. Additionally, an evaluation will be made of the three individuals who failed the written examination to determine if they should be retained in the program. If so, they will receive training to upgrade their knowledge on those areas identified as less than satisfactory, and may then be nominated for a second examination.

b. The facility presented information that showed a ranking of the twelve candidates prior to the NRC examination. The two operating failures were the bottom two individuals on the ranking. The next two bottom individuals were two of the three written failures on this examination. The third written failure was in the top half of the class.

c. The facility stated that the training program used for this class was basically the same as that used for previous classes. They identified several items which may have contributed to the failure rate being higher than normal:

(1) Unlike previous classes, the candidates may have been hesitant to drop themselves from the program due to the imminent completion of the work at Unit 2 and the resultant reduction in force at the TMI site.

(2) This class was larger than normal, and the weaker candidates may not have received the needed individual attention.

(3) The process for selecting who is admitted into the training program is controlled by seniority only.

d. The facility identified three possible strategies for improving the screening process of who would be administered an NRC examination.

(1) Closer management attention with respect to an individual's performance during the training program.

(2) Addition of a subjective "hurdle" to the criteria for taking the NRC examination.

(3) Raising the minimum passing criteria on the weekly quizzes and addition of intermediate comprehensive examinations.

e. Specific written questions were identified by the NRC that were not considered "generic weaknesses," but caused a concern that certain individuals had less than adequate knowledge in these areas.

Attachments:

1. RO Written Examination and Answer Key
2. Facility Comments on Written Examination & NRC Response

U. S. NUCLEAR REGULATORY COMMISSION
REACTOR OPERATOR LICENSE EXAMINATION
REGION 1

MASTER COPY
ATTACHMENT 1

FACILITY: Three Mile Island 1

REACTOR TYPE: PWR-B&W177

DATE ADMINSTERED: 89/02/13

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
24.00 ~~25.00~~	~~25.50~~ ~~25.38~~ 24.7			1. REACTOR PRINCIPLES (7%) THERMODYNAMICS (7%) AND COMPONENTS (11%) (FUNDAMENTALS EXAM)
25.50 ~~26.00~~	26.3 ~~26.00~~ ~~26.40~~			2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS (27%)
47.50	49.0 ~~48.50~~ ~~48.22~~			3. PLANT SYSTEMS (38%) AND PLANT-WIDE GENERIC RESPONSIBILITIES (10%)
97.00 ~~98.00~~ ~~98.50~~			%	TOTALS
		FINAL GRADE		

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

Candidate's Signature

Start Time: _____

Stop Time: _____

MASTER COPY

Candidate's Printed Name

NRC RULES A' GUIDELINES FOR LICENSE EX 'NATIONS

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.

1. REACTOR PRINCIPLES (7% THERMODYNAMICS
(7%) AND COMPONENTS ( ) (FUNDAMENTALS EXAM)

QUESTION 1.01 (1.50)

List FIVE of the seven items which are used when performing a shutdown margin calculation per OP 1103-15A, "Shutdown Margin and Reactivity Balance," when RCS Tave equals 400F. Assume all control rods are operable.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.02 (1.00)

Multiple Choice

The reactor trips from full power, equilibrium xenon conditions. Six hours later, the reactor is brought critical and power level is maintained at 10E-08 amps for two hours. Which one of the following statements is correct concerning control rod motion during the two-hour time period?

a. Rods will have to be rapidly withdrawn, since the critical reactor will cause a higher than normal rate of xenon build-in.

b. Rods will have to be rapidly inserted, since the critical reactor will cause a high rate of xenon burnout.

c. Rods will have to be withdrawn, since xenon will closely follow its normal build-in rate following a trip.

d. Rods will have to be inserted, since xenon will closely follow its normal decay rate following a trip.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7% THERMODYNAMICS
(7%) AND COMPONENTS ((FUNDAMENTALS EXAM)

QUESTION 1.03 (1.00)

Multiple Choice

A reactor startup is being performed 15 hours after a trip using an estimated critical position calculated just before the startup commenced. Which one of the following events would RAISE the actual critical rod position compared to the estimated critical position?

a. The startup is delayed for approximately two hours.

b. The turbine bypass valve setpoint is increased.

c. A reactor coolant pump is stopped.

d. RCS boron concentration is lowered ten ppm.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.04 (1.00)

Multiple Choice

Which one of the following statements is correct?

a. At full power, with equilibrium xenon conditions, approximately one half of the xenon is produced by iodine decay, and the other half is produced directly from fission.

b. When the reactor is shutdown, xenon burnup effectively stops while the decay of iodine continues. Therefore, the xenon concentration starts to increase.

c. The production of xenon from iodine decay continues for approximately 35 hours after a reactor shutdown. Because all production of xenon has ceased at this time, xenon concentration reaches its minimum level in the reactor core.

d. Xenon production and removal increase linearly as power level increases; i.e., the value of 100 percent equilibrium xenon is twice the value of 50 percent equilibrium xenon.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.05 (1.00)

Multiple Choice

Which one of the following statements best describes the change in count rate resulting from a short rod withdrawal with Keff at 0.99, as compared to an identical rod withdrawal, which adds the same amount of reactivity, with Keff at 0.95?

a. LESS time will be required to reach steady-state following the rod withdrawal, and the change in count rate will be GREATER with Keff at 0.99.

b. MORE time will be required to reach steady-state following the rod withdrawal, and the change in count rate will be LESS with Keff at 0.99.

c. LESS time will be required to reach steady-state following the rod withdrawal, and the change in count rate will be LESS with Keff at 0.99.

d. MORE time will be required to reach steady-state following the rod withdrawal, and the change in count rate will be GREATER with Keff at 0.99.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.06 (1.00)

An incident at ANO-1 (Arkansas Nuclear) resulted in fuel damage when a control rod was found to be 90 inches further into the core than the remaining rods in its group for a period of 12 days. Within one hour, the rod was withdrawn to align it with the rest of the group, while the plant continued to operate at full power. Why is fuel damage likely to occur in such a situation?

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.07 (1.00)

Multiple Choice

Which one of the following choices best describes the temperature/ pressure conditions associated with pressurized thermal shock?

a. High temperature, low pressure

b. Low temperature, low pressure

c. High temperature, high pressure

d. Low temperature, high pressure

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.08 (1.00)

With respect to the reactor vessel's material characteristics, state two adverse effects of bombardment by fast neutrons, (disrupting the steel's crystal lattice structure).

Deleted

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.09 (1.00)

Multiple Choice

Which one of the following is NOT an example of a circumstance which can cause water hammer?

a. Sudden closure of a valve in a system in which there is water flow.

b. Cavitation occurring at a flow orifice in a closed system.

c. Rapid pressurization of a properly filled and vented system.

d. Starting a pump on a partially empty system.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.10 (1.50)

The reactor is in the heatup mode with pressure in OTSG-A at 805 psig.

a. What is the steam temperature in the steam generator? (0.50)

b. If an atmospheric relief valve is opened for 1 minute, what will be the temperature of the discharged steam at the valve outlet? (Assume discharge pressure is atmospheric.) (0.50)

c. Will the discharged steam (at the valve outlet) be superheated, saturated, or a mixture of saturated steam and water? (0.50)

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7% THERMODYNAMICS
(7%) AND COMPONENTS (7% (FUNDAMENTALS EXAM)

QUESTION 1.11 (1.00)

State the effect on CALCULATED reactor power with respect to ACTUAL reactor power, if, when collecting heat balance data in accordance with OP 1103-16, "Heat Balance," the detected (sensed) value of feedwater temperature is erroneously higher than actual feedwater temperature.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.12 (1.00)

Multiple Choice

Which one of the below listed heat transfer equations MOST ACCURATELY describes the method of determining the approximate reactor power level in accordance with Section 3.1 of OP 1103-16, "Heat Balance Calculations - Approximate Indication of Reactor Power?" (NOTE: This procedure is used when the computer is unavailable, and time does not permit the use of a digital voltmeter to obtain readings from the modules directly.)

a. $\dot{Q} = \dot{m} c_p$ Delta-T

b. $\dot{Q} = \dot{m}$ Delta-h

c. $Q = u A$ Delta-T

d. $Q = u A$ Delta-h

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7% (7%) AND COMPONENTS (1 THERMODYNAMICS (FUNDAMENTALS EXAM)

QUESTION 1.13 (1.50)

List three RCS parameters which DIRECTLY affect Departure From Nucleate Boiling Ratio (DNBR).

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.14 (1.00)

Multiple Choice

Which one of the following statements is CORRECT, with regard to centrifugal pump cavitation? Assume proper valve lineups.

a. Cavitation can be diagnosed from control board indications of pump discharge pressure, pump suction pressure, and pump flow.

b. The point where cavitation is most likely to begin is the high-pressure discharge area of the pump.

c. If available net positive suction head (NPSH) is negative, cavitation will not occur.

d. The system fluid velocity does not affect the probability of pump cavitation.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.15 (1.50)

State three adverse consequences of tube fouling in the OTSGs.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.16 (1.00)

Referring to attached Figure C-3, explain why illustration "B" represents the most correct way of applying force to a valve handwheel.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.17 (1.00)

Multiple Choice

Which one of the following choices best describes the response of Source Range NI-1, if voiding occurs in the core, in the vicinity of the NI-1 detector?

a. Indicated count rate is HIGHER than actual count rate, because of the INCREASED THERMAL neutron flux sensed at the detector.

b. Indicated count rate is HIGHER than actual count rate, because of the INCREASED FAST neutron flux sensed at the detector.

c. Indicated count rate is LOWER than actual count rate, because of the DECREASED THERMAL neutron flux sensed at the detector.

d. Indicated count rate is LOWER than actual count rate, because of the DECREASED FAST neutron flux sensed at the detector.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.18 (1.00)

Multiple Choice:

Which one of the following statements best describes the correct method of changing a direct loading diaphragm-actuated Bailey valve positioner from Remote Control to Local Manual Control:

a. Turn the bypass valve to "Closed-Hand," then turn the supply valve to "Open-Auto."

b. Turn the bypass valve to "Open-Hand," then turn the supply valve to "Closed-Auto."

c. Turn the bypass valve to "Closed-Auto,"then turn the supply valve to "Hand-Open."

d. Turn the bypass valve to "Open-Auto," then turn the supply valve to "Hand-Closed."

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7% AND COMPONENTS (7%) AND THERMODYNAMICS) (FUNDAMENTALS EXAM)

QUESTION 1.19 (1.00)

Multiple Choice

Which one of the following choices best describes the response of RCS loop hot leg temperature indication if the associated resistance temperature detector (RTD) becomes open-circuited? Assume normal power operation and all circuits operating properly prior to the failure:

a. Hot leg temperature indication will become erratic, oscillating around actual hot leg temperature.

b. Hot leg temperature indication will fail to the value which existed when the open circuit developed.

c. Hot leg temperature indication will fail to a value higher than actual hot leg temperature.

d. Hot leg temperature indication will fail to a value lower than actual hot leg temperature.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.20 (1.00)

Multiple Choice

Primarily, what type of radiation is measured by a self-reading pocket dosimeter?

a. Alpha

b. Beta

c. Gamma

d. Neutron

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

QUESTION 1.21 (1.00)

Fill in the blanks:

The main steam safety valves _____ (do/do not) _____ have to be combined with the atmosperic dump valves to have a capacity of 100%. The main steam safety valve settings range from _____ psig to _____ psig.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7% THERMODYNAMICS
(7%) AND COMPONENTS ( ) (FUNDAMENTALS EXAM)

QUESTION 1.22 (1.00)

Why is there a concern about limiting the number of starts for large motors (such as RCP motors) during a given time period, AND what motor characteristic causes this concern?

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7% THERMODYNAMICS
(7%) AND COMPONENTS ( ) (FUNDAMENTALS EXAM)

QUESTION 1.23 (1.00)

In procedure OP 1104-2, Section 3.6, "Makeup & Purification System - Demineralizer Saturation," there is a caution which states, "Monitor N.I. for reactivity change." WHY would there be a reactivity change while placing a new demineralizer in service, in accordance with this procedure?

(***** END OF CATEGORY 1 *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

THIS PAGE INTENTIONALLY BLANK

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.01 (1.00)

Explain what is occurring if, during natural circulation cooldown, pressurizer level increases rapidly after the initiation of pressurizer spray. No other changes have been made, and pressurizer level was constant prior to the spray valve operation.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.02 (1.50)

According to EP 1202-08, "CRD Equipment Failures - CRD Malfunction Action," what SIX immediate manual actions are required to be taken in the event that rod position indication shows a group of rods being driven in the OUT direction, with no demand for out motion present, coupled with an unexpected increase in reactor power, temperature, and pressure? (State ALL the immediate actions listed in the procedure.)

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL LANT EVOLUTIONS
(27%)

QUESTION 2.03 (1.00)

Multiple Choice

According to steps in AP 1203-15, "Loss of R.C. Makeup," why must letdown flow be restored GRADUALLY, if it has been isolated?

a. To minimize the possibility of pressure surges in the letdown cooler.

b. To minimize the possibility of flow oscillations in the letdown cooler.

c. To minimize the possibility of water hammer in the letdown cooler.

d. To minimize the possibility of thermal shock to the letdown cooler.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMA' PLANT EVOLUTIONS
(27%)

QUESTION 2.04 (1.00)

Multiple Choice:

Assume the unit is at full load. If RC-RV-2 (pressurizer pilot operated relief valve) has opened for ten seconds and subsequently shut, proper reseating of the valve (with no leakage) can be MOST POSITIVELY verified by observation of:

a. Control room position indicating lights for RC-RV-2, immediately after the event.

b. The behavior of pressurizer level for approximately ten minutes after the eve..t.

c. The behavior of RCDT temperature for approximately one hour after the event.

d. The behavior of tailpipe differential temperature approximately two hours after the event.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.05 (2.00)

According to EP 1202-2A, "Station Blackout with loss of both Diesel Generators," state the TWO primary objectives of the procedure.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.06 (1.50)

According to EP 1202-37, "Cooldown from Outside the Control Room," what manual actions are to be performed prior to leaving the control room?

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.07 (1.00)

If boron concentration of the RCS and the pressurizer were equalized BEFORE the occurence of a pressurizer steam space leak event, why would they be different AFTER the event? Assume all other conditions remain unchanged.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

QUESTION 2.08 (2.00)

The following pertain to ATP 1210-5, "OTSG Tube Leak/Rupture:"

a. Why is Subcooling Margin of the RCS minimized?

b. Why is it desirable to utilize the affected OTSG for cooldown, if at all feasible?

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.09 (1.00)

What emergency procedure would you implement for the following symptoms? Assume all other conditions are normal, and the unit is operating at full load.

1. Makeup pump discharge header pressure low, as indicated on P.I. MU2 on console "CC."

2. Makeup flow indication low, as indicated on MU24FI on console "CC."

3. Low seal injection flow to RCP seals, less than 22 gpm, as indicated by annunciator alarm.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.10 (2.00)

What two actions are required if, during a normal reactor startup (OP 1103-8, "Approach to Criticality"), with Intermediate Range (IR) NI-4 out of service, IR NI-3 fails low? INCLUDE the overall reason for these actions.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS (27%)

QUESTION 2.11 (1.50)

In accordance with AP 1203-16, "Reactor Coolant Pump and Motor Malfunction," on a loss of nuclear services closed cooling water (NSCCW), state the three conditions which require the operator to trip the affected reactor coolant pump. Include specific parameters and values.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.12 (1.50)

If a condition exists requiring a reactor trip, but the rods do not insert, and power remains above 10% full power, procedure ATP 1210-1, "Reactor Trip," directs the operator to initiate HPI and maximize letdown.

State ONE reason for initiating HPI, and TWO reasons for maximizing letdown.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.13 (2.50)

According to the immediate action steps of ATP 1210-1, "Reactor Trip," state the five operator actions which are required, if it is determined that subcooled margin is 19 degrees farenheit.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS (27%)

QUESTION 2.14 (1.50)

According to precaution 2.1-1 of OP 1103-4, "Soluble Poison Concentration Control," list the THREE flow paths available to inject boric acid to the reactor coolant system, when running a boric acid injection pump (CA-P-1A or CA-P-1B).

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

QUESTION 2.15 (1.00)

Multiple Choice

Which one of the below-listed radiation monitor instruments is required by the technical specifications to be operable during refueling operations?

a. RM-G5 (RB Personnel Access Door)

b. RM-G8 (RB High Range)

c. RM-A2 (RB Atmosphere)

d. RM-A9 (RB Purge Exhaust)

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

QUESTION 2.16 (2.00)

State the reason for EACH of the following immediate action steps, which are found in ATP 1210-8, "RCS Superheated:"

1. Verify OTSG levels are 75%-85%.

2. Maintain secondary Tsat 100F less than Tsat for the RCS by decreasing OTSG pressure.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS (27%)

QUESTION 2.17 (1.00)

In accordance with AP 1203-16, Section 4.0, "Reactor Coolant Pump and Motor Malfunction - Pump and Motor Vibration," state the TWO immediate manual actions which are required if excessive RCP shaft vibration is detected. Assume normal full power operation, RCP 1A is the affected pump, and no other malfunctions exist.

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

QUESTION 2.18 0.50 ~~(1.00)~~

According to EP 1202-17, "Loss of Intermediate Cooling System," what immediate manual action is required, in addition to ensuring that the standby IC pump is operating? ~~AND WHY is this action required?~~ Assume normal full power operation.

(***** END OF CATEGORY 2 *****)

THIS PAGE INTENTIONALLY BLANK

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) AND PLANT-WIDE GENERIC RESPONSIBILITIES (1

QUESTION 3.01 (2.00)

The following pertain to the controlling OTSG-A pressure instrument failing HIGH. Assume 80% initial power, no reactor trip occurs, all systems are in normal lineup and automatic, and SASS is NOT operable.

a. What will be the INITIAL response of feedwater flow to OTSG-B (the opposite OTSG)? (1.00)

b. What will cause the ICS to go into TRACK? (1.00)

NOTE: BTU Limit curves are attached to this examination.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) A) PLANT-WIDE GENERIC RESPONSIBILITIES (1C

QUESTION 3.02 (1.00)

Briefly describe the interlock between the "Bleed Tank Select Switch" and the "Feed Tank Select Switch," both of which are located on the vertical LWDS panel in the control room.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.03 (1.00)

Multiple Choice

The source range (NI-1 and NI-2) backup high voltage cutoff is actuated by:

a. Power range channels NI-5 and NI-6 OR power range channels NI-7 and NI-8 greater than or equal to 10% full power.

b. Power range channels NI-5 or NI-6 AND power range channels NI-7 or NI-8 greater than or equal to 10% full power.

c. Power range channels NI-5 and NI-6 OR power range channels NI-7 and NI-8 greater than or equal to 3% full power.

d. Power range channels NI-5 or NI-6 AND power range channels NI-7 or NI-8 greater than or equal to 3% full power.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.04 (1.50)

What three indications/conditions are used by the reactor operator to DECLARE the reactor critical during a startup?

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) AND PLANT-WIDE GENERIC RESPONSIBILITIES (1

QUESTION 3.05 (2.00)

State the FOUR conditions that will cause automatic closure of Waste Gas Decay Tank Discharge Valve WDG-V47. Do not include setpoints.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) A... PLANT-WIDE GENERIC RESPONSIBILITIES (1...

QUESTION 3.06 (1.50)

What TWO radiation monitoring instruments are capable of causing automatic isolation of liquid discharge to the Mechanical Draft Cooling Towers by shutting Liquid Waste Discharge Isolation Valve WDL-V257? INCLUDE in your answer whether or not each monitor you list is related to a specific technical specification. (Identification of Tech. Spec. is not required.)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.07 (2.00)

State the FOUR Emergency Feedwater Pump auto-start conditions.
Include parameter or signal monitored, AND setpoints as appropriate.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.08 (2.00)

Refer to the attachments labeled Diagram-5 and Diagram-8 as necessary, to answer the following:

a. Describe how an ESAS channel BYPASS BISTABLE functions to allow plant cooldown/depressurization. Do not include setpoints. (1.00)

b. Describe how HPI is initiated upon an automatic LPI actuation, even though HPI automatic initiation was bypassed prior to pressure falling below 1600 psig. Assume RCS pressure is 500 psig when LPI actuates. (1.00)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.09 (1.00)

Multiple Choice

Which one of the following conditions would result in an Out Inhibit being generated in the Rod Control Logic?

a. Safety Rod Groups at the out limit.

b. Asymmetric fault with power level at 50%.

c. A startup rate of 2.0 DPM in the Source range.

d. High neutron error signal (2.5%).

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.10 (2.00)

Answer the following concerning the Absolute Position Indication instrumentation:

a. What type of sensor is used to determine position? (0.5)

b. State five applications of the system output. (1.5)

NOTE: Consider multiple uses of the same indication, interlock, control, etc., as one application.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.11 (1.00)

Multiple Choice

Assume normal conditions, with spent fuel being stored and cooled in the spent fuel pools in accordance with normal operating procedures.

Which one of the following choices BEST completes the statement below?

If both spent fuel cooling chains go out of service simultaneously, the heat capacity of both pools is such that approximately _____ will elapse before the water contained within them will heat up to an excessive temperature (i.e., above 180F).

a. one hour

b. one day

c. one week

d. one month

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) AND PLANT-WIDE GENERIC RESPONSIBILITIES (1

QUESTION 3.12 (1.50)

Describe the lineup used to inject cooling water into the RCS after the BWST has emptied, following a small-break LOCA. Assume RCS pressure is 300 psig.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.13 (1.00)

Multiple Choice

Select the answer below which correctly completes the following statement, assuming normal at-power operations and no equipment malfunctions:

For a 70 gpm letdown rate,

a. Letdown Control Valve MU-V5 MUST be in service, and ONE letdown demineralizer (MU-K-1A or -1B) must be in service.

b. Letdown Control Valve MU-V5 MUST be in service, and BOTH letdown demineralizers (MU-K-1A and -1B) must be in service.

c. Letdown Control Valve MU-V5 is NOT required, but ONE letdown demineralizer (MU-K-1A or -1B) must be in service.

d. Letdown Control Valve MU-V5 is NOT required, but BOTH letdown demineralizers (MU-K-1A and -1B) must be in service.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.14 (2.00)

a. Under what type of circumstance would Reactor Coolant Makeup Control Bypass Valve MU-V217 be used instead of Reactor Coolant Makeup Control Valve MU-V17? Assume all plant valves and controllers are working properly.

b. Why is the flow path through MU-V217 advantageous over the flow path through High Pressure Injection Line Flow Control Isolation Valve MU-V16A? (1.00)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.15 (1.50)

Given the simultaneous appearance of the below listed symptoms, operators are dispatched to the DC Switchgear Room and EG-Y-1B. STATE the immediate actions which EACH of the dispatched operators are required to take.

1. Annunciator alarms:

   a. A-2-8 Station Battery Charger 1A/1D/1F Trouble

   b. A-1-8 Station Battery 1B Ground

   c. D-2-5 Battery Discharging (Rate above 100 amps)

   d. C-2-2 4 KV Bus PT Trouble

   e. C-1-2 7 KV Bus PT Trouble

   f. C-3-2 480V Bus PT Trouble

   g. A-3-8 1B/1D Inverter System Trouble

   h. H&V A-3-2 Cont. Bldg. Batt. Chargers B Damper Tbl, Fire-Smoke

2. Loss of breaker status lights at control switches

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) AND PLANT-WIDE GENERIC RESPONSIBILITIES (10

QUESTION 3.16 (2.00)

Answer the following with respect to ATP 1210-4, "Lack of Primary to Secondary Heat Transfer." Consider each case independently.

a. Describe the effect a total loss of subcooled margin will have on natural circulation flow, including WHY this occurs. (1.00)

b. Assuming EFW is available, but RCPs are NOT available, what is the purpose of attempting to remove steam voids in the hot leg piping, by opening the hot leg vents? (1.00)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.17 (1.00)

Multiple Choice

Which one of the following best describes the response of indicated pressurizer level upon the failure LOW of the compensating pressurizer temperature instrument? Assume normal full power operation, with pressurizer level at 220 inches prior to the failure.

a. Indicated level will increase to the upper end of the scale.

b. Indicated level will increase to approximately 250 inches.

c. Indicated level will decrease to approximately 150 inches.

d. Indicated level will decrease to the lower end of the scale.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.18 (2.00)

State the actuation setpoints, as specified in the Technical Specifications, for each of the following Engineered Safety Features:

1. High Pressure Injection
2. Low Pressure Injection
3. Reactor Building Isolation
4. Reactor Building Spray

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) AND PLANT-WIDE GENERIC RESPONSIBILITIES (10

QUESTION 3.19 (1.00)

State the reason the operator is required to maintain pressurizer level in accordance with the attached curve, "Figure 6 - Minimum Pressurizer Level At Power."

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.20 (1.00)

Multiple Choice

Select the answer below which correctly completes the following statement, regarding the Reactor Building Spray System.

Reactor building spray is designed to limit post-accident building pressure to:

a. 95 psig, and then reduce building pressure to approximately 25 psig, following a LOCA.

b. 55 psig, and then reduce building pressure to approximately 25 psig, following a LOCA.

c. 95 psig, and then reduce building pressure to approximately 1 psig, following a LOCA.

d. 55 psig, and then reduce building pressure to approximately 1 psig, following a LOCA.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.21 (1.00)

Choose the phrase below which BEST completes the following statement, regarding the Limiting Conditions for Operation listed in the Technical Specifications for the Reactor Building Spray System. (Assume no equipment malfunctions, and no testing is in progress.)

For critical reactor operation,

a. TWO reactor building spray pumps must be operable, and the manual valves in the discharge lines of the sodium hydroxide tank shall be OPEN.

b. at least ONE reactor building spray pump must be operable, and the manual valves in the discharge lines of the sodium hydroxide tank shall be OPEN.

c. TWO reactor building spray pumps must be operable, and the manual valves in the discharge lines of the sodium hydroxide tank shall be LOCKED OPEN.

d. at least ONE reactor building spray pump must be operable, and the manual valves in the discharge lines of the sodium hydroxide tank shall be LOCKED OPEN.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.22 (1.00)

Multiple Choice

Which one of the following statements correctly describes plant behavior during a reactor startup, when power is being raised above the point of adding heat? Assume a linear reactor power increase to about 3% power.

a. Tave will not rise above the corresponding saturation temperature of 532 degF.

b. Tave will rise and the steam temperature will tend to follow Th.

c. The OTSGs will remain at saturated conditions and no superheat will be added.

d. The steam is superheated at zero power conditions and superheat will rise proportionally with power.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.23 (1.50)

1. What is the primary purpose of aspirating steam in the OTSG? (0.50)

2. Describe how the flow of aspirating steam in the OTSG is regulated by the flow of feedwater. (1.00)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) AND PLANT-WIDE GENERIC RESPONSIBILITIES (10'

QUESTION 3.24 (1.00)

The Nuclear Service Closed Cooling Water System surge tank is normally pressurized to 38-42 psig. Describe the possible adverse consequence if this pressure drops below normal, AND during what situation is this of concern?

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.25 (1.00)

Multiple Choice

Choose the phrase below which BEST completes the following statement regarding the prescribed method for starting Decay Heat Removal Pump (DH-P-1A), in accordance with OP 1104-4, "Decay Heat Removal System." Assume normal system startup during a normal RCS cooldown.

NOTE: DH-V-4A = DH Pump Discharge Isolation to Containment Vessel

DH-V-18A = DH Pump Discharge Relief Valve

DH-P-1A should be started with DH-V-4A:

a. jogged partially open, to minimize challenge to DH-V-18A.

b. jogged partially open, to minimize pump starting current.

c. fully shut, to minimize challenge to DH-V-18A.

d. fully shut, to minimize pump starting current.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.26 (2.00)

List the four loads on the Intermediate Closed Cooling Water (ICCW) system. NOTE: Multiple channels or trains of redundant components count as only one load.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

3. PLANT SYSTEMS (38%) AND PLANT-WIDE GENERIC RESPONSIBILITIES (10%

QUESTION 3.27 (1.00)

In accordance with AP-1002 "Rules for the Protection of Employees Working on Electrical and Mechanical Apparatus," what TWO system conditions make double valve isolation desirable, when working on mechanical systems?

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.28 (2.00)

a. Assuming a valid and up-to-date Form NRC-4 is on file, what is the maximum permissible whole body dose of ionizing radiation to which you may be exposed in any one calendar quarter? Assume your previous lifetime accumulated whole body dose is 1.2 Rem, and appropriate management approval has been obtained.

b. State the TMI-1 Administrative Dose Limit, per procedure 9000-ADM-4000.01, for whole body ionizing radiation, assuming no special supervisory authorization has been obtained.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.29 (1.00)

With respect to work inside a radiologically hazardous area, state FOUR specific items, contained on the radiation work permit, which assist a worker in maintaining his/her exposure as low as reasonably achievable (ALARA). Do NOT include time, distance, or shielding.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.30 (2.00)

State TWO circumstances, as described in AP 1011, "Controlled Key Locker Control," which allow the Shift Foreman or delegated Control Room Operator to issue the Control Room key for an individual to gain access to a Locked High Radiation Area. Assume Shift Supervisor permission has been granted.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.31 (1.00)

Multiple Choice

Which one of the following is a valid method of performing an independent verification?

a. One individual checking that a valve is in the correct position, and then a second individual obtaining a report from the first individual that the position is correct.

b. One individual observing that a valve is in the correct position locally, and another individual independently using a remote position demand indicator to verify valve position.

c. Two individuals independently verifying valve position from a remote position indicator only (direct component position).

d. One individual actually placing a breaker in its required position, then the same individual verifying from a remote indicator that the breaker is in the correct position.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.32 (1.00)

Multiple Choice

Choose the phrase below which BEST completes the following statement, in accordance with AP 1002, "Rules For The Protection Of Employees Working On Electrical And Mechanical Apparatus."

Approved grounding devices are required where circuits could be energized to:

a. 250 volts or greater, AND shall be applied by Electrical Maintenance Personnel.

b. 250 volts or greater, AND shall be applied by the working group requesting the clearance, under the direct supervision of Electrical Maintenance Personnel.

c. 600 volts or greater, AND shall be applied by Electrical Maintenance Personnel.

d. 600 volts or greater, AND shall be applied by the working group requesting the clearance, under the direct supervision of Electrical Maintenance Personnel.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.33 (1.00)

Describe ONE circumstance which requires a CONTINUOUS fire watch to be established.

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

QUESTION 3.34 (1.00)

Multiple Choice

Which one of the following statements is MOST correct with regard to the TMI-1 Communications System?

a. The Redundant Communication System (red phones) is designated to be used for routine communications whenever all channels of the Main Plant Communications System (gray phones) are busy.

b. The volume level of large re-entrant speakers is preset, and should not be reduced except in case of a communications system malfunction.

c. The sound powered phone system is designated to be used by maintenance personnel in calibration and testing of EFW system flow circuits.

d. The redundant communications system (red phones) is powered from a vital AC source, to ensure availability during emergency conditions.

(***** END OF CATEGORY 3 *****)
(********** END OF EXAMINATION **********)

FIGURE-6 MINIMUM PRESSURIZER LEVEL AT POWER

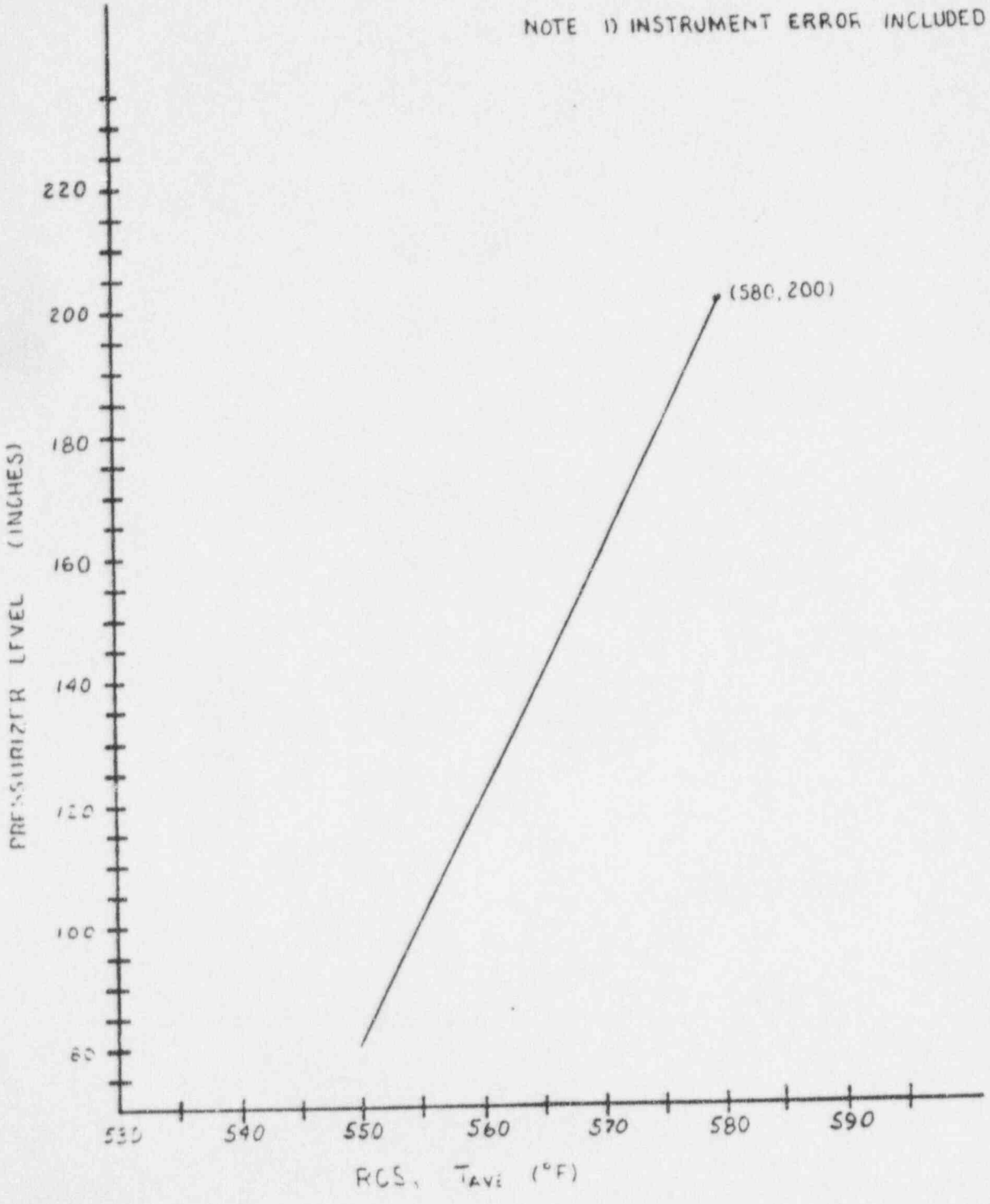
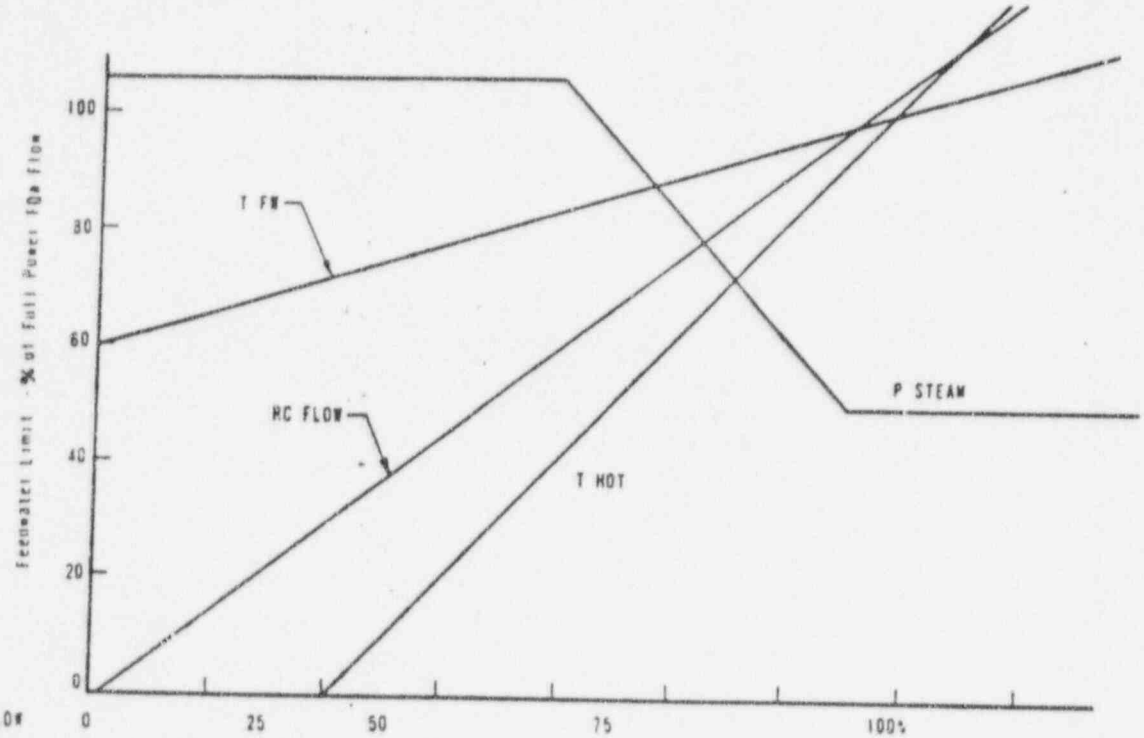
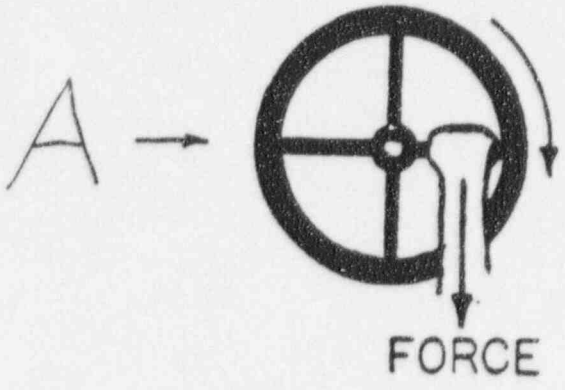


FIGURE-15 BTU LIMITS



RC FLOW	0	25	50	75	100%				
T HOT	570	575	580	585	590	595	600	605	°F
P STEAM	850	900	950	1000	1050	1100	1150	1200	PSIG
T FW	150	200	250	300	350	400	450	500	°F



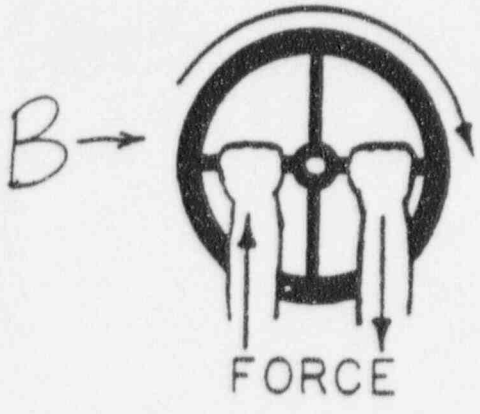


Figure C-3

DIAGRAM - 5 1600# AUTO HPI ACTUATION

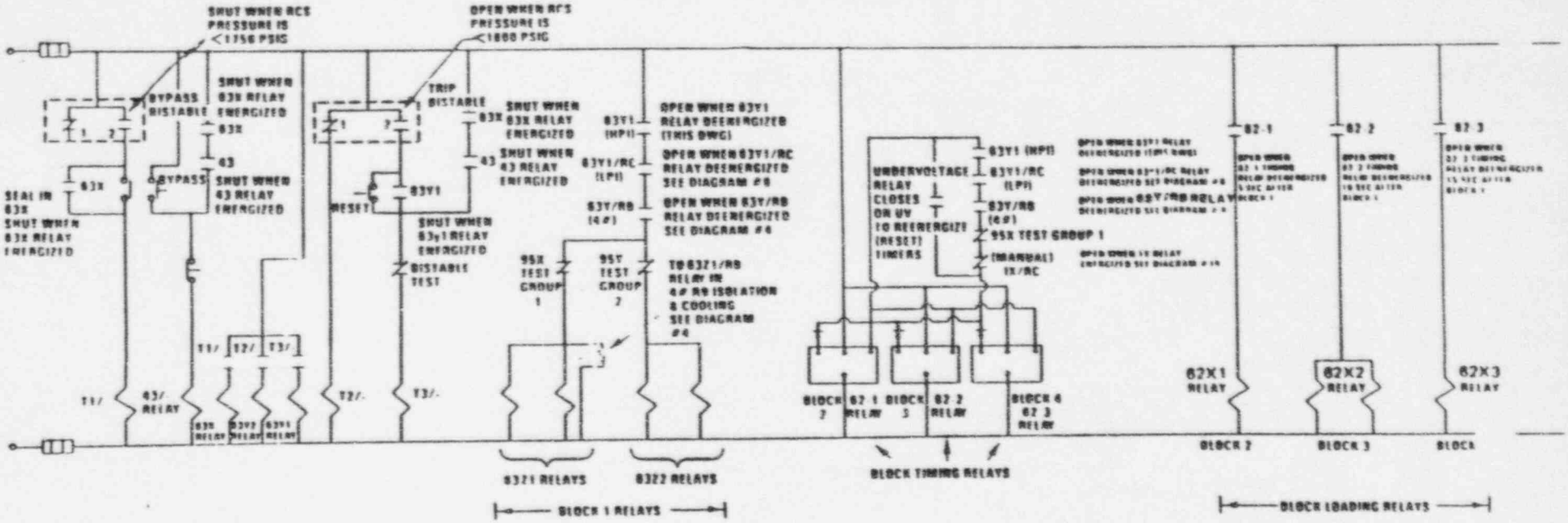
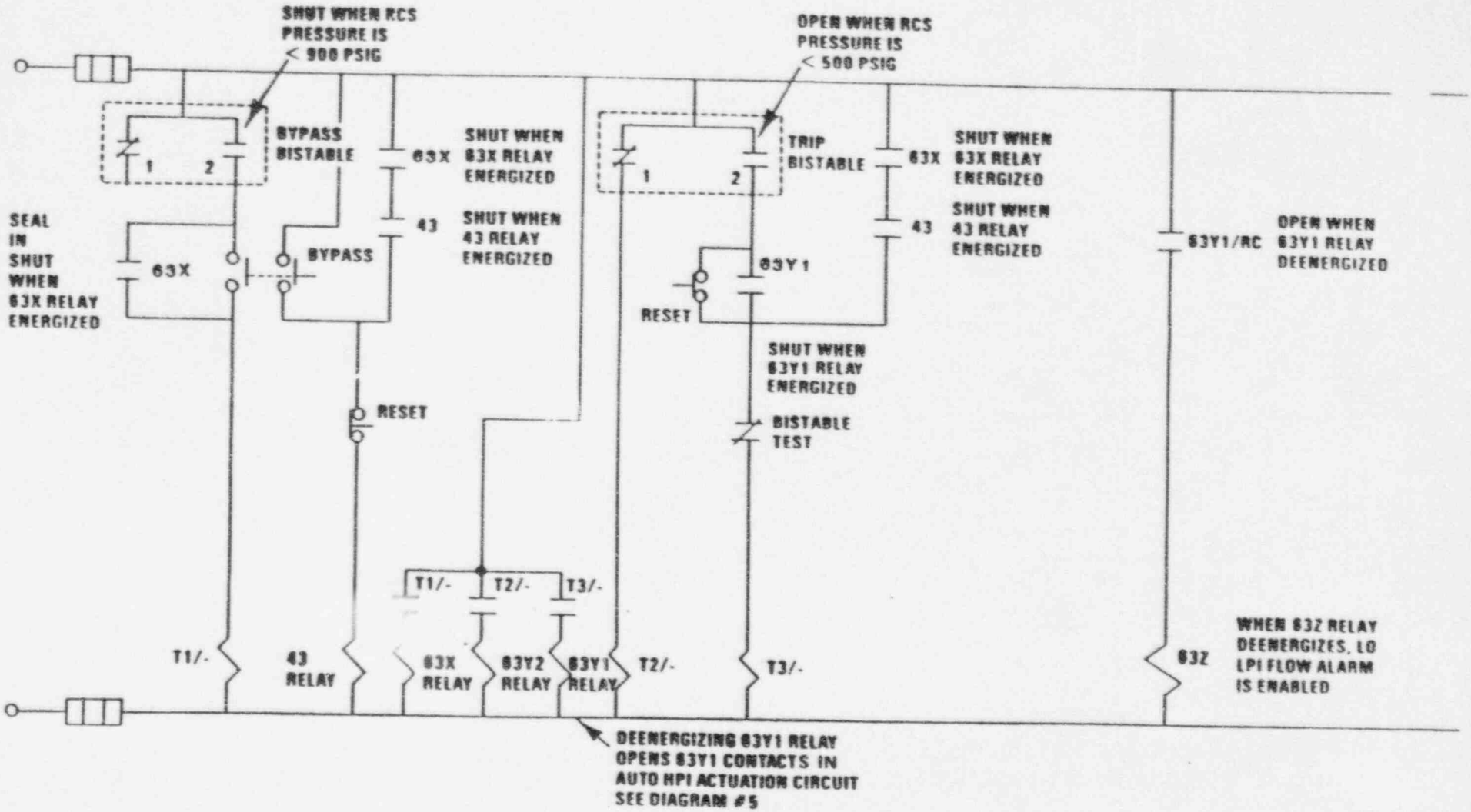


DIAGRAM - 8 500# LPI AUTO ACTUATION



ANSWER 1.01 (1.50)

[Any 5, @ 0.3 ea.]:
1. RCS temperature (Tave)
2. Boron concentration OR boron reactivity worth
3. Xenon concentration OR xenon reactivity worth
4. Samarium (Sm) (and plutonium (Pu)) buildup OR Sm (& Pu) reactivity worth
5. Control rod group (CRG) 8 position OR CRG 8 reactivity worth
6. Fuel burnup (cycle burnup)
7. Excess reactivity

REFERENCE

No facility objective identified.
OP 1103-15A, pp. 8-10, E1-1.

(3.8/3.9)
192002K114 ..(KA's)

ANSWER 1.02 (1.00)

c

REFERENCE

EO III.B.11.07.
OPM N-7, pp. 83-88.

(3.2/3.3)
192006K114 ..(KA's)

ANSWER 1.03 (1.00)

b

REFERENCE

No facility objective identified.
OPM N-7, Sect. IV.F & IV.I.

(2.8/3.1)
192008K102 ..(KA's)

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

ANSWER 1.04 (1.00)

b

REFERENCE

EO III.B.11.03.
OPM N-7, pp. 79-80.

(2.9/3.0)
192006K113 ..(KA's)

ANSWER 1.05 (1.00)

d

REFERENCE

EO III.B.07.04
OPM N-6, pp. 61-65.

(3.9/4.0)
192008K103 ..(KA's)

ANSWER 1.06 (1.00)

(Fuel in the vicinity of the inserted rod experiences lower Xe (and Iodine) concentrations due to flux depression.) When the rod is withdrawn to group position, flux in the region increases markedly [0.5]. (Xenon burns out due to higher flux.) This results in severe power peaking in the region [0.5]. (Partial credit may be given for an answer that talks about the rest of the core being at higher power because flux is suppressed in the region with the misaligned rod.)

REFERENCE

EO III.B.10.26
OPM N-7, p. 21.

(2.8/3.1)
192005K116 ..(KA's)

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7%) THERMODYNAMICS (7%) AND COMPONENTS %) (FUNDAMENTALS EXAM)

ANSWER 1.07 (1.00)

d

REFERENCE

EO III.H.02.05
Lesson Plan 11.2.01.176, p. 5.0.

(3.6/3.8)
193010K106 ..(KA's)

ANSWER 1.08 (1.00)

Deleted

[Any two, @ 0.5 ea.]:
1. The material can swell.
2. Ductility (ability to deform and then return to original shape) is reduced.
3. Toughness (ability to absorb energy without breaking) is reduced.

REFERENCE

EO III.H.01.08.
Lesson Plan 11.2.01.176, p. 6.0.

(2.9/3.0)
193010K105 ..(KA's)

ANSWER 1.09 (1.00)

c

REFERENCE

No facility reference identified.
EO III.A.15.05.

(3.3/3.4)
193006K110 ..(KA's)

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7%) THERMODYNAMICS (7%) AND COMPONENTS ( ) (FUNDAMENTALS EXAM)

ANSWER 1.10 (1.50)

a. 521F (acceptable range 519 to 523) [0.5]
b. 315F (acceptable range 310 to 320) [0.5]
c. Superheated [0.5]

REFERENCE

Steam Tables/Mollier diagram.

(2.8/2.8)
193004K115 ..(KA's)

ANSWER 1.11 (1.00)

Calculated reactor power will be lower than actual reactor power.

REFERENCE

No facility objective identified.
OP 1103-16, pp. 6.0-8.0

(3.1/3.4)
193007K108 ..(KA's)

ANSWER 1.12 (1.00)

a

REFERENCE

No facility objective identified.
OP 1103-16, pp. 4.0-5.0

(3.1/3.3)
193007K106 ..(KA's)

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

ANSWER 1.13 (1.50)

[Any 3, @ 0.5 ea.]:
1. Coolant temperature
2. Coolant pressure
3. Coolant flow
4. Reactor power level (heat generation rate)

REFERENCE

EO III.C.05.15
OPM N-2, pp. 177.0-178.0

(3.4/3.6)
193008K105 ..(KA's)

ANSWER 1.14 (1.00)

a

REFERENCE

No facility objective identified.
OPM N-3, p. 95.

(3.3/3.5)
191004K101 ..(KA's)

ANSWER 1.15 (1.50)

[Any three, @ 0.5 ea.]:
1. Decreased heat transfer.
2. Increased corrosion of OTSG components (heat transfer surfaces & tube supports).
3. Increased pressure drop across the OTSG (increased OTSG level).
4. Decreased plant efficiency.

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7%) THERMODYNAMICS (7%) AND COMPONENTS (7%) (FUNDAMENTALS EXAM)

REFERENCE

No facility objective identified.
OPM B-4, p. 21.
OPM N-2, p. 142.0.

(2.5/2.7)
191006K112 ..(KA's)

ANSWER 1.16 (1.00)

This method minimizes the possibility of bending the valve stem.

REFERENCE (Note to grader: +½ credit if candidate says "less damage;" + 8/10 credit if candidate "describes" illustration — (e.g. torgue is equalized)).

EO III.D.03.09
OPM N-3, pp. 39, 47.

NOTE: Include Figure C-3 from OPM N-3.

(3.4/3.4)
191001K108 ..(KA's)

ANSWER 1.17 (1.00)

X b

REFERENCE

~~CAF for enabling objective~~. Lesson Plan 11.2.01.[illegible]5, "Recognizing Core Damage,"
~~CAF for facility reference~~. EO's 5.5, 5.7.

Lesson Plan 11.2.01.355, pp. 31, 37.

(3.3/3.5)
191002K117 ..(KA's)

ANSWER 1.18 (1.00)

b

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

1. REACTOR PRINCIPLES (7%) THERMODYNAMICS (7%) AND COMPONENTS ( ) (FUNDAMENTALS EXAM)

REFERENCE

EO III.D.03.18
OPM N-11, p. 127.0.

(3.1/3.1)
191003K103 ..(KA's)

ANSWER 1.19 (1.00)

c

REFERENCE

EO IV.E.01.02
OPM N-11, pp. 56-60.

(2.9/3.0)
191002K114 ..(KA's)

ANSWER 1.20 (1.00)

c

REFERENCE

EO III.F.02.05.
OPM O-3, pp. 19-20.

(3.1/3.3)
191002K119 ..(KA's)

ANSWER 1.21 (1.00)

Do not [0.4].

1040 (+/- 5) psig to 1092.5 (+/- 5) psig [0.3 ea.]; order may be reversed).

(***** CATEGORY 1 CONTINUED ON NEXT PAGE *****)

REFERENCE

No facility objective identified.
OPM G-3, p. 10.

(3.3/3.4)
191001K101 ..(KA's)

ANSWER 1.22 (1.00)

Want to prevent motor winding damage (overheating) [0.5], caused by the high motor starting current [0.5] (with no corresponding "cooldown" time). (Additional information will be graded on a case basis.)

REFERENCE

No facility objective identified.
OP 1103-6, p. 8.0.

(3.0/3.1)
191005K106 ..(KA's)

ANSWER 1.23 (1.00)

Because the new (non-borated) resin removes boron from the RCS (adding positive reactivity), as it becomes saturated (equalized with the RCS boric acid concentration).

REFERENCE

No facility objective identified.
OP 1104-2, p. 19.0.

(3.0/3.1)
191007K108 ..(KA's)

(***** END OF CATEGORY 1 *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

ANSWER 2.01 (1.00)

Voids are forming elsewhere in the primary system (forcing water into the pressurizer as spray flow condenses the vapor space).

REFERENCE

EO III.C.07.04.
No facility reference identified.

(3.5/4.1)
000028K303 ..(KA's)

ANSWER 2.02 (1.50)

1. Verify that the CRD operators console is in manual [.25].
2. Select jog speed [.25].
3. Verify that the GROUP and SINGLE select switches are OFF [.25].
4. Select sequence override [.25].
5. If out motion continues, select the affected group with the GROUP select SWITCH, and place the Manual Demand Switch in the INSERT position (i.e., attempt to manually drive in the affected group) [.25].
6. If uncontrolled out motion continues, trip the reactor [.25].

REFERENCE

EO V.D.03.02
EP 1202-08, pp. 13.0-14.0.
AP 1001G, pp. 11-12.

(3.9/4.0)
000001G010 ..(KA's)

ANSWER 2.03 (1.00)

d

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMA' PLANT EVOLUTIONS
(27%)

REFERENCE

No facility objective identified.
AP 1203-15, p. 3.0.

(3.5/3.8)
000022K302 ..(KA's)

ANSWER 2.04 (1.00)

d

REFERENCE

No facility objective identified.
EP 1202-29, pp. 3.0-4.0 and E5-1.

(4.0/4.2)
000008A107 ..(KA's)

ANSWER 2.05 (2.00)

1. Keep the RCS loops full (conserve RCS inventory, or minimize shrink of RCS) [1.0].
2. Establish natural circulation cooling [1.0].
3. Establish electrical power, if possible. pl7.is

REFERENCE

No facility objective identified.
EP 1202-2A, p. 2.0

(4.3/4.6)
000055K302 ..(KA's)

ANSWER 2.06 (1.50)

[0.3 ea.]:
1. Trip the reactor.
2. Trip the turbine.
3. Trip the main feedwater pumps.
4. Perform ATP 1210-1 (to the extent time and equipment control is available).
5. Make announcement over the page (if available. - "Fire in the Control/Relay Room; commencing Remote Shutdown Sequence.")

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

REFERENCE

EO V.D.18.02
EP 1202-37

(3.8/4.0)
000068G012 ..(KA's)

ANSWER 2.07 (1.00)

The removal of steam from the pressurizer vapor space causes water in the liquid space to flash to steam [0.5], concentrating the boron which is left behind in the remaining liquid [0.5].

REFERENCE

No facility objective identified.
EP 1202-29, Symptom #6, and Followup Action #5.

(4.1/4.6)
000008K303 ..(KA's)

ANSWER 2.08 (2.00)

a. To minimize the delta-P across the tube (minimize the amount of leakage).

b. To minimize the affected OTSG's shell-tube delta-T (minimize the tensile stress on the affected tube, which can enlarge a crack in a tube, worsening the leak, OR minimize the dose received at the site boundary).

REFERENCE

Lesson Plan 11.2.01.213, pp. 12.0-15.0.
EO V.E.05.04
EO V.E.05.05

(4.2/4.5)
000038K306 ..(KA's)

ANSWER 2.09 (1.00)

Loss of R.C. makeup (AP 1203-15).

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS (27%)

REFERENCE

EO V.C.05.01
AP 1203-15, p. 2.0.

(3.3/3.6)
000022G011 ..(KA's)

ANSWER 2.10 (2.00)

Actions:
1. Terminate the startup [0.75]
2. Maintain the reactor at least 1% shutdown (rod insertion and/or boration, as necessary) [0.75].

Reason: Tech Specs (Table 3.5-1) require at least one operable intermediate range (as part of Reactor Protection System) during reactor startup conditions (OR: because now there is no way to monitor core power between the source range and the power range) [0.5].

REFERENCE

EO IV.E.11.15
TS Table 3.5-1.
OP 1103-8, p. 3.0.

(3.2/3.6)
000033K302 ..(KA's)

ANSWER 2.11 (1.50)

1. Motor stator temperature [0.25], (>) 150C (302F) [0.25].
2. Motor radial bearings temperature [0.25], (>) 185F [0.25].
3. Motor thrust bearings temperaure [0.25], (>) 195F [0.25].

REFERENCE

EO V.C.06.03
AP 1203-16, pp. 6.0-7.0.

(3.3/3.3)
000026G012 ..(KA's)

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

ANSWER 2.12 (1.50)

Initiate HPI: To provide an additional source of boron to the reactor (insert negative reactivity) [0.5].

Maximize letdown:
1. To ensure space available in the RCS for the HPI water (preclude taking the plant solid and/or lifting reliefs) [0.5].
2. To promote the mixing of boron [0.5].

REFERENCE

EO V.E.01.06
Lesson Plan 11.2.01.210, p. 5.0.

(4.4/4.7)
000029K312 ..(KA's)

ANSWER 2.13 (2.50)

[5, @ 0.5 ea.]
1. Trip all RCPs.
2. initiate HPI.
3. Initiate EFW.
4. Raise OTSG level to 75%-85%.
5. Enter ATP 1210-2 (Loss of 25F Subcooled Margin).

REFERENCE

EO V.E.01.03.
ATP 1210-1, p. 4.0.

(4.0/4.6)
000007K301 ..(KA's)

ANSWER 2.14 (1.50)

[3, @ 0.5 ea]
1. Normal injection route (WDL-V-61 & batch totalizer controller MU12-FT).
2. To the R.C. Bleed Tank (thru WDL-V-62).
3. Emergency injection route (MU-V-51).

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

REFERENCE

No facility objective identified.
OP 1103-4, p. 6.0.

(3.6/3.7)
000024G007 ..(KA's)

ANSWER 2.15 (1.00)

d

REFERENCE

EO IV.E.06.02, & IV.E.06.07.
TS Sect. 3.8.
OPM F-7, pp. 48-50

(3.4/3.9)
000036K202 ..(KA's)

ANSWER 2.16 (2.00)

1. To assure sufficient water is available to act as a heat sink (i.e., to assure a heat sink is available. Or - to establish the Boiler-Condenser mode of cooling.)

2. To assure a thermal driving head exists for heat transfer (across the OTSG tubes).

REFERENCE

EO V.E.08.01
No facility reference identified.

(4.0/4.4)
000074K311 ..(KA's)

ANSWER 2.17 (1.00)

Reduce power to 75% [0.5], and trip the affected RCP (RCP 1A) [0.5].

(***** CATEGORY 2 CONTINUED ON NEXT PAGE *****)

2. EMERGENCY AND ABNORMAL PLANT EVOLUTIONS
(27%)

REFERENCE

EO V.C.06.03
AP 1202-16, pp. 7.0-8.0

(2.9/3.2)
000015G012 ..(KA's)

ANSWER 2.18 0.50 ~~(1.00)~~

Monitor surge tank level (maintain an indicated level; normal - 18.5 inches) [0.5], ~~to ensure NPSH available to the IC pump(s) [0.5].~~

REFERENCE

EO V.D.10.02
EP 1202-17, p. 2.0

(4.0/4.2)
000026K303 ..(KA's)

(***** END OF CATEGORY 2 *****)

ANSWER 3.01 (2.00)

a. Will initially increase.
b. Feedwater crosslimits (to reactor demand).

REFERENCE

EO IV.E.27.05, IV.E.27.28
OPM F-3, pp. 47-49, 158-159.

NOTE: Include the BTU Limit curves OR the BTU Limit formula as an attachment to the exam (see pp. 47 & 48 of OPM F-3).

(3.4/3.6)
016000K312 ..(KA's)

ANSWER 3.02 (1.00)

Whichever switch is operated FIRST to select a tank for its function preempts subsequent selection of THAT tank from the other of the two switches.

REFERENCE

OPM E-2, p. 15.
EO IV.B.09.02

(3.4/4.1)
068000K401 ..(KA's)

ANSWER 3.03 (1.00)

b

REFERENCE

EO IV.E.11.11
OPM F-4, p. 46

(3.1/3.2)
015000K604 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

ANSWER 3.04 (1.50)

[0.5 ea.]:
1. Positive SUR.
2. Increasing source range count rate.
3. No positive reactivity addition (or no outward rod motion).

REFERENCE

Terminal Objective Task No. 3418010101.
No facility reference identified.

(4.1/4.4)
015000K505 ..(KA's)

ANSWER 3.05 (2.00)

[0.5 ea.]
1. High radiation sensed by RM-A7 (waste gas discharge monitor).
2. High radiation sensed by RM-A8 (Auxiliary and Fuel Building exhaust monitor).
3. High flow sensed by FT-123 (waste gas decay tank discharge flow).
4. Trip of all Auxiliary and Fuel Handling Exhaust Fans (i.e., no fans running - AH-E-14A, 14B, 14C, or 14D).

REFERENCE

EO IV.B.08.08
OPM E-4, p. 26
OP 1104-27, p. 22.0

(2.9/3.4)
071000K404 ..(KA's)

ANSWER 3.06 (1.50)

1. RM-L6 (Liquid Radioactive Waste Discharge Monitor) [0.5], is TS-related [0.25] (TS 3.21.1).

2. RM-L7 (Plant Water Discharge Monitor) [0.5], is NOT TS-related [0.25].

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

REFERENCE

EO IV.E.06.02
OPM F-7, pp. 34, 47.

(3.6/3.6)
068000A302 ..(KA's)

ANSWER 3.07 (2.00)

1. Delta-P across main feedwater pumps [0.25], (<) 50 psid [0.25].
2. RB pressure [0.25], (>) 4 psig [0.25].
3. OTSG startup level (either OTSG) [0.25], (<) ~~15~~ 10 inches [0.25].
4. Reactor coolant pump power monitor [0.25], senses loss of all Reactor Coolant Pumps [0.25].

REFERENCE

EO IV.C.05.11
OPM I-1, p. 14.
OP 1105-19, Step 3.7.1.1
(4.5/4.6)
061000K402 ..(KA's)

ANSWER 3.08 (2.00)

a. When tripped, prevents HPI (& LPI) injection [0.5], by allowing the operator to manually bypass the HPI (& LPI) actuation bistable [0.5].

b. When LPI initiates, a set of contacts (63Y1 - LPI) opens in the HPI actuation circuitry [0.5], which directly deenergizes the HPI circuit (Block 1 (63Z1 & 63Z2) relays) [0.5].

REFERENCE

No facility objective identified.
OPM F-6, pp. 7, 10-11, and Diagrams #5 & #8 on pp. 30 & 33.

(3.7/3.9)
013000K412 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

ANSWER 3.09 (1.00)

c

REFERENCE

EO IV.E.13.22.
OPM F-1 p. 64.

(3.7/3.8)
001000K407 ..(KA's)

ANSWER 3.10 (2.00)

a. (45) reed switches (strapped to the motor tube) [0.5].

b. 1. Position indication in the contol room.

2. Individual rod position indication is used to determine group average position.

3. Asymmetric rod detection circuitry.

4. Group in-limits and out-limits.

5. Provides input to the sequence enable circuitry.

6. Auto-inhibit and out-inhibit circuits.

7. Bleed and feed permits. [5 at 0.3 ea]

REFERENCE

EO IV.E.13.15.
OPM F-1, pp. 47-49.

(3.5/3.8)
001000K401 ..(KA's)

ANSWER 3.11 (1.00)

b

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

REFERENCE

EO IV.B.10.04
OPM C-1, p. 11.

(3.0/3.3)
033000K303 ..(KA's)

ANSWER 3.12 (1.50)

The DHR pumps can be lined up to draw a suction on the RB Sump [0.5], and discharge to the suction of the makeup (HPI) pumps [0.5], which then inject into the RCS [0.5].

REFERENCE

EO IV.A.11.03
OPM B-6, p. 8.

(3.1/3.5)
005000K408 ..(KA's)

ANSWER 3.13 (1.00)

a

REFERENCE

EO IV.A.06.09
OPM B-5, p. 55

(3.3/3.2)
004000K405 ..(KA's)

ANSWER 3.14 (2.00)

a. Used when a need exists to deliver a higher volumetric flow rate of water to the RCS (up to approx. 350 gpm @ 1800 psig backpressure) than that which is available through MU-V17 alone (e.g., during an overcooling transient. Other examples may receive full credit, and will be graded on a case basis.) [1.0]

b. No thermal shock of injection nozzles (because flow is through "B" HPI nozzle, which is normally used) [1.0].

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

REFERENCE

EO IV.A.09.03
OPM B-5, p. 41

(3.0/3.3)
004000K407 ..(KA's)

ANSWER 3.15 (1.50)

a. The operator sent to the DC Switchgear Room is to determine cause of failure [0.5].

b. The operator sent to EG-Y-1B is to:
1. Locally trip DG if necessary [0.5].
2. Close EG-V15B (to allow starting air receiver to repressurize) [0.5].

REFERENCE

EO V.D.05.01
EP 1202-9B, pp. 3.0-4.0

(3.1/3.3)
063000G014 ..(KA's)

ANSWER 3.16 (2.00)

a. Will cause natural circulation to stop [0.5], because of steam voiding (vapor lock, in the vessel or loops, which blocks the flow path) [0.5].

b. Reestablish primary-to-secondary heat transfer (establish natural circulation) [1.0].

REFERENCE

EO III.C.07.01
Lesson Plan 11.2.01.219, pp. 8.0-9.0
ATP 1210-4, p. 3.0

(4.2/4.6)
002000K515 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

ANSWER 3.17 (1.00)

c

REFERENCE

EO IV.E.09.02
OPM B-1, p. 10

(3.6/3.9)
002000A102 ..(KA's)

ANSWER 3.18 (2.00)

[0.5 ea.]:
1. 1600 psig
2. 500 psig
3. 4 psig
4. 30 psig

REFERENCE

EO IV.E.24.04
OPM F-6, p. 26

(4.3/4.4)
006000K405 ..(KA's)

ANSWER 3.19 (1.00)

To prevent uncovering the pressurizer heaters [0.5] on a reactor trip [0.5].
(deenergizing)

REFERENCE

No facility objective identified.
OPM B-1, p. 21
010000K403 ..(KA's)

ANSWER 3.20 (1.00)

d

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

REFERENCE

EO IV.A.15.01
OPM B-9, p. 3

(3.7/4.1)
026000K404 ..(KA's)

ANSWER 3.21 (1.00)

c

REFERENCE

EO IV.A.15.07
TS 3.3.1.1

(3.3/3.9)
026000G005 ..(KA's)

ANSWER 3.22 (1.00)

b

REFERENCE

EC IV.A.08.16
OPM B-4, p. 13

(3.8/4.0)
035010K109 ..(KA's)

ANSWER 3.23 (1.50)

1. Used to heat the feedwater which enters the OTSG (to prevent the OTSG shell from being thermally shocked by cold feedwater) [0.5].

2. The low pressure area formed by the condensing action of cold feedwater [0.5] draws aspirating steam (through the space between the upper & lower vertical baffle) at a rate consistent with the feedwater flow [0.5].

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

REFERENCE

EO IV.A.08.10
OPM B-4, p. 20.

(4.2/4.5)
035010K101 ..(KA's)

ANSWER 3.24 (1.00)

Prevents leakage from the containment through the NSCCW system [0.5] during (any phase of) a maximum LOCA [0.5].

REFERENCE

EO IV.B.05.09
OPM B-11, p. 3

(2.9/2.7)
008010K401 ..(KA's)

ANSWER 3.25 (1.00)

a

REFERENCE

No facility objective identified.
OP 1104-4, p. 17.0

NOTE: OP 1104-4, p. 6.0 (Precaution #5) gives contradictory information, which would make "d" correct. Only one of these answers (a or d) will be accepted as correct, based upon utility feedback.

Delete, prior to loading to EQB.

(3.6/3.4)
005000A401 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

ANSWFR 3.26 (2.00)

[0.5 ea.]:
1. Letdown coolers (2).
2. RCP thermal barriers.
3. RCDT coolers.
4. Control rod drive cooling coils.

REFERENCE

EO IV.B.03.01
OPM B-10, p. 3

(3.3/3.4)
008000K102 ..(KA's)

ANSWER 3.27 (1.00)

1. >200F [0.5]
2. >200 psig [0.5]

REFERENCE

EO V.A.01.06
AP-1002, p. 7.0.

(3.7/4.1)
194001K102 ..(KA's)

ANSWER 3.28 (2.00)

[1.0 EA.]
a. 3.0 Rem

b. 1.0 Rem

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

REFERENCE

EO III.F.02.01.
10 CFR 20.101.
9000-ADM-4000.01 Administrative Dose Limits (NOT supplied to examiners with TMI-1 reference materials...)

(2.8/3.4)
194001K103 ..(KA's)

ANSWER 3.29 (1.00)

[Any 4, @ 0.25 ea.]:
1. General area dose rates.
2. Contact readings on hot spots.
3. Contamination levels.
4. Airborne radioactivity levels.
5. Dosimetry required.
6. Protective clothing required.
7. Location of safety equipment.
8. Specific requirements of RWP (or foreman).

REFERENCE

EO III.F.01.08
OPM O-3, p. 41.

(3.3/3.5)
194001K104 ..(KA's)

ANSWER 3.30 (2.00)

[1.0 ea.]
1. As warranted by an emergency.
2. The Radiological Controls key is unavailable OR (the Radiological Controls key is lost, OR the Radiological Controls key has been inadvertently taken home).

REFERENCE

EO V.A.05.04.
AP 1011, p. 5.0.

(3.1/3.4)
194001K105 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

ANSWER 3.31 (1.00)

c

REFERENCE

EO V.J.01.01, .02, .04, and .09
AP 1067, pp. 5.0-6.0

(3.6/3.7)
194001K101 ..(KA's)

ANSWER 3.32 (1.00)

c

REFERENCE

EO V.A.01.05, V.A.01.08
AP 1002, pp. 7.0, 19.0

(3.6/3.7)
194001K107 ..(KA's)

ANSWER 3.33 (1.00)

[Any 1, @ 1.0]:
1. When a deluge/sprinkler system is inoperable.
2. When a CO2 system is inoperable.
3. When a fire penetration seal barrier (cable/pipe barriers, fire doors, fire dampers) is inoperable.
4. Welding, Burning, or Cutting (Hot Work)

REFERENCE

No facility objective identified.

AP 1038, pp. E2-11, -12, -19. ~~(CAP)~~.

(3.5/4.2)
194001K116 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

ANSWER 3.34 (1.00)

d

REFERENCE

EO IV.D.30.02
OP 1105-12, pp. 3.0, 11.0, & 13.0

(3.0/3.2)
194001A104 ..(KA's)

(***** END OF CATEGORY 3 *****)
(********** END OF EXAMINATION **********)

ATTACHMENT 2

FACILITY COMMENTS
ON WRITTEN EXAMINATIONS
& NRC RESPONSE

Question 1.17

Facility Comment

Statement "b" would be the best answer. Lesson Plan 11.2.01.355 Recognizing Core Damage objectives 5.5 and 5.7 cover this event on page 31 paragraph 6.b and page 37 paragraph 3.e.3. Lesson Plan 11.2.01.124 Reactivity Coefficients objective N covers this event on pages 17.0 and 18.0 paragraphs 8.b & 8.c.

NRC Response

Comment accepted, answer key changed.

Question 3.07

Facility Comment

Answer 3 setpoint should be 10 inches for OTSG startup level. This level is referenced in Operating Procedure 1105-19 Heat Sink Protection System in step 3.7.1.1.

NRC Response

Comment accepted, answer key changed; additionally, the reference list was modified to include the above material. The facility needs to update the Operating Plant Manuals (OPMs), as necessary, to ensure they are correct and consistent with operating procedures and actual plant equipment.

Question 3.25

Facility Comment

Agree with answer a. Reference is correct as given.

NRC Response

Comment noted. The facility needs to make the necessary changes to OP1104-4, precaution #5.

Question 3.33

Facility Comment

Add "Welding, Burning or Cutting (Hot Work)" as a possible correct answer. Procedure 1410-Y-26 Control of Hot Work requires a continuous firewatch during these operations as covered on pages 5.0 & 6.0 section 5.6 and step 6.6.

NRC Response

Comment accepted, answer key changed; additionally, the reference list was modified to include the above material.

Additional changes made during grading:

Question 1.08

This question was deleted due to the close relationship between ductility and toughness. Many of the candidates appeared to consider these two characteristics as synonymous.

Question 2.05

An additional answer was added to the key based on further review of the respective procedure.

Question 2.18

During the grading process, it was determined that this question was a "double-jeopardy" question. Therefore, its point value was reduced from 1.00 to 0.5., and the candidate was required to state the immediate manual action only.

Question 3.19

An alternative answer was added to the key.