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

REQUALIFICATION EXAMINATION REPORT NO. 50-423/87-23(OL)

FACILITY DOCKET NO. 50-423

FACILITY LICENSE NO. NPF-49

LICENSEE: Northeast Nuclear Energy Company
P.O. BOX 270
Hartford, Connecticut 06141-0270

FACILITY: Millstone 3 Nuclear Power Station

EXAMINATION DATES: June 12, July 31 and September 4, 1987

CHIEF EXAMINER: _____ 11-06-87
R.R. Temps, Operations Engineer Date

APPROVED BY: _____ 11/6/87
R.M. Keller, Chief Date
Pressurized Water Reactor Section
Division of Reactor Safety

SUMMARY: Requalification written examinations and operating tests were administered to six senior reactor operators (SRO's) and three reactor operators (RO's). All SRO's and RO's passed the operating portion of the examinations; however, two ROs and three SRO's failed the written examinations.

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R.R. Temps, Operations Engineer — Date

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R.M. Keller, Chief — Date
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DETAILS

TYPE OF EXAMINATIONS: Requalification

EXAMINATION RESULTS:

	RO Pass/Fail	SRO Pass/Fail
Written	1 / 2	3 / 3
Operating	3 / 0	6 / 0
Overall	1 / 2	3 / 3

1. CHIEF EXAMINER AT SITE: Robert R. Temps - Operations Engineer

2. OTHER EXAMINERS: David Silk - Operations Engineer
   Bill Hemming - EG&G Contract Examiner
   Frank Jaggar - EG&G Contract Examiner

3. The following is a summary of generic 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.

   DEFICIENCIES

   a. During control room discussions, several SRO's used the EPIP's for Unit 1 or 2 when asked to classify various emergencies.

4. The following is a summary of generic deficiencies noted from the grading of written examinations. This information is being provided to aid the licensee in upgrading license and requalification training programs. No licensee response is required.

DEFICIENCIES

RO Examination by Question Number

1.06a	Effect on shutdown margin when boron concentration is lowered while maintaining constant power and rod position.
1.08a.2	Effect on indicated pressurizer level when the water temperature in the pressurizer is changed.
1.10b	Effect of lowering steam pressure on enthalpy for the steam generator pressure maintained during normal operation.
2.02a	Unable to state both flowpaths for RCP #1 seal leakoff during safety injection.
2.03	Response of the Emergency Generator Load Sequencer when a CDA occurs following a loss of power.
2.04	Design basis for the interlocks associated with the RHR loop suction valves.
2.05	The three signals which will automatically close the Condensate Storage Tank supply valve to the AFW pumps.
3.03a	Operation of the steam dump system when lowering the setpoint of the pressure controller.
4.03	The four federal quarterly radiation exposure limits.
4.04b	Alternate lineups available to avoid a Reactor/RCP trip if seal injection drops to 6 gpm and only an CCW pump is available.
4.05	Basis for a precaution taken from OP 3335D, " Radioactive Liquid Waste System".

SRO Examination by Question Number

5.11	Unable to choose the one item from a list which was not an example of an evolution which could cause water hammer.
6.04	Same comment as 2.04.

6.07b Alarms/indications which alert an operator as to insufficient spray bypass flow.

7.02 Requirements for when an RWP is required for entry and work in low radiation areas.

7.04a The three conditions which require that the RCP's be stopped when in EOP 35 FR-H.1.

8.01 Shift Supervisor responsibilities in ACP 6.03 related to liquid waste discharges.

8.04 The three categories of individuals allowed access to the control room during emergencies.

8.08 Actions to be taken if during movement of irradiated fuel in the spent fuel pool, both emergency generators are determined to be inoperable.

5. Simulation Facility Fidelity Report.

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

a. The expected response described for simulator malfunction number RC11 does not model the actual simulator response to this malfuction. Specifically , the increase in system pressure is significantly lower than that described in the malfunction book.

6. Personnel Present at Exit Interview:

NRC Personnel

R.R. Temps, Operations Engineer
G.S. Barber, Resident Inspector

Facility Personnel

J. Harris, MP-3 Operations Supervisor
M. Moehlmann, ATS-Operating training
B. Ruth, Manager, Operator Training
R. Stotts, MP-3 Operator Training

7. Summary of NRC comments made at exit interview:

The chief examiner presented the number and type of examinations conducted over the previous three months. In addition, generic weaknesses noted from observation of the operating examinations were also presented.

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8. Examination Review

A review of the written examinations was conducted immediately following the examinations. Facility comments were discussed on a line item basis. The number of facility comments were minimal and were resolved to the satisfaction of the chief examiner and the licensee. Facility comments can be found in Enclosure 3. Additional changes to the examination key made as a result of grading are listed in Enclosure 4.

Enclosures:
1. Written Examination and Answer Key (RO)
2. Written Examination and Answer Key (SRO)
3. Facility Comments on Written Examinations
4. Additional NRC Changes to Written Examinations Answer Keys

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Enclosure 1

U. S. NUCLEAR REGULATORY COMMISSION
REACTOR OPERATOR REQUALIFICATION EXAMINATION

FACILITY: MILLSTONE 3
REACTOR TYPE: PWR-WEC4
DATE ADMINISTERED: 87/09/04
EXAMINER: ROESENER, S.
CANDIDATE: _____

Copy of

MASTER COPY

INSTRUCTIONS TO CANDIDATE:

Read the attached instruction page carefully. This examination replaces the current cycle facility administered requalification examination. Retraining requirements for failure of this examination are the same as for failure of a requalification examination prepared and administered by your training staff. 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 four (4) hours after the examination starts.

CATEGORY VALUE	% OF TOTAL	CANDIDATE'S SCORE	% OF CATEGORY VALUE		CATEGORY
15.00	25.00	_____	_____	1.	PRINCIPLES OF NUCLEAR POWER PLANT OPERATION, THERMODYNAMICS, HEAT TRANSFER AND FLUID FLOW
15.00	25.00	_____	_____	2.	PLANT DESIGN INCLUDING SAFETY AND EMERGENCY SYSTEMS
15.00	25.00	_____	_____	3.	INSTRUMENTS AND CONTROLS
15.00	25.00	_____	_____	4.	PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL
60.00		_____ Final Grade	_____%		Totals

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

_____
Candidate's Signature

MASTER COPY

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 1.01 (1.00)

Multiple Choice

During a reactor startup, the first reactivity addition caused the count rate to increase from 20 to 40 cps. The second reactivity addition caused the count rate to increase from 40 to 80 cps. Which ONE of the following answers is correct?

a. The first and second reactivity additions were equal.

b. The first reactivity addition was larger.

c. The second reactivity addition was larger.

d. There is not enough data given to determine.

QUESTION 1.02 (1.00)

Multiple Choice

Which ONE the following statements most correctly describes the change in the Fuel and Moderator Temperature Coefficients (FTC and MTC) as the core ages?

a. FTC becomes more negative and MTC becomes more negative.

b. FTC becomes more negative and MTC becomes more positive.

c. FTC becomes more positive and MTC becomes more negative.

d. FTC becomes more positive and MTC becomes more positive.

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

QUESTION 1.03 (2.00)

A Xe-free reactor startup is in progress with power leveled out at 10-8 amps for critical data. Describe the effects, if any, on the parameters listed below if rod D-4 (control bank D) drops to the bottom. Include in your description both the transient behavior and the final steady state condition. Initially Tave = 546 F and Primary Pressure = 2235 psig.

a. Tave (0.50)

b. Primary Pressure (0.50)

c. Reactor Power (1.00)

QUESTION 1.04 (1.00)

Multple Choice

Choose the correct phrase to correctly complete the sentence.

As the core ages from BOL to EOL, the ratio of PU-239 atoms to U-235 atoms increases. This changing ratio causes the _____.

a. reactor period to decrease.

b. void coefficient to become less negative.

c. moderator temperature coefficient to become less negative.

d. delayed neutron fraction to increase.

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

QUESTION 1.05 (1.00)

Multiple Choice

Reactor power is lowered to 80%, following 100 hours of continuous operation at 100% power. Which ONE the following statements best describes Xenon behavior during the first hour following the power decrease?
(NOTE: [Xe] denotes xenon concentration.)

a. Direct [Xe] increases, indirect [Xe] decreases, total [Xe] decreases.

b. Direct [Xe] increases, indirect [Xe] increases, total [Xe] increases.

c. Direct [Xe] decreases, indirect [Xe] decreases, total [Xe] decreases.

d. Direct [Xe] decreases, indirect [Xe] increases, total [Xe] increases.

QUESTION 1.06 (2.00)

State how each of the following will affect shutdown margin. Limit your answer to INCREASE, DECREASE, or NO CHANGE. Consider each case separately. Assume EOL.

a. Boron concentration is decreased 20 ppm while maintaining constant power and no rod motion

b. Bank D rod height is increased from 125 steps to 200 steps while maintaining constant power and boron concentration

c. Reactor trip

d. While shutdown, the RCS is cooled down by 40 degrees

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

QUESTION 1.07 (1.00)

Multiple Choice (Fill in the Blank)

During a Xenon-free reactor startup, critical data was inadvertently taken two decades below the required Intermediate Range (IR) level. Assuming RCS temperatures and boron concentrations were the same, the critical rod position taken at the proper IR level _____ the critical rod position taken two decades below the proper IR level.

a. Is Less Than

b. Is The Same As

c. Is Greater Than

d. Cannot be Compared To

QUESTION 1.08 (1.50)

a. At normal hot standby conditions, in which direction will INDICATED pressurizer level change as a result of the following transients? (INCREASES, DECREASES, STAYS THE SAME). Assume the letdown and charging flows are equalized and the pressurizer level control system is in manual. Consider each transient separately.

1. The reference leg heats up from 120 F to 200 F due to the relocation of a ventilation duct. (0.50)

2. The pressurizer heaters fail and the pressurizer water cools from normal operating temperature to 590 F. (0.50)

b. For case 2 above, following the cooldown, is the indicated level GREATER THAN, LESS THAN, or EQUAL TO the actual level? (0.50)

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

QUESTION 1.09 (1.00)

State how an INCREASE in each of the following parameters affects the Departure from Nucleate Boiling Ratio (DNBR). Limit your answer to INCREASE, DECREASE, or NO EFFECT.

a. Coolant temperature.

b. Coolant flow.

QUESTION 1.10 (1.50)

How will each of the following affect the results of a secondary calorimetric power calculation? Limit your answer to CALCULATED LOWER THAN ACTUAL, CALCULATED HIGHER THAN ACTUAL, or CALCULATED SAME AS ACTUAL. Consider each case separately.

a. Measured feedwater temperature is 10 degrees lower than actual feedwater temperature.

b. Measured steam generator pressure is 30 psig lower than actual steam generator pressure.

c. Measured feedwater flow is 1E5 lbm/hr higher than actual feedwater flow.

QUESTION 1.11 (1.00)

Multiple Choice

Assume the plant is in Mode 3 at a temperature of 535 F, and the steam dumps are NOT operable. To what value must Tavg rise before causing the power-operated steam generator pressure relief valves (MSS*PV-20A, B, C, & D) to lift? Assume the pressure setpoint controllers are set for normal power operation. (Choose the MOST CORRECT answer.)

a. 559.1 F

b. 560.7 F

c. 565.6 F

d. 567.2 F

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

QUESTION 1.12 (1.00)

State how an INCREASE in the following parameters affects Net Positive Suction Head (NPSH) available at the suction of a centrifugal pump. Limit your answer to INCREASE, DECREASE, or NO EFFECT.

a. System flow rate.

b. System temperature.

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

QUESTION 2.01 (2.00)

a. What TWO interlocks must be satisfied to allow the CVCS Orifice Isolation Valves to open?

b. What TWO conditions will cause the CVCS Orifice Isolation Valves to automatically shut other than the interlocks stated above?

QUESTION 2.02 (2.50)

a. Briefly describe how the No. 1 RCP shaft seal responds to an injection pressure increase of 50 psig over normal pressure. Include in your explanation a discussion of the change in forces on the top and bottom of the seal and the final equilibrium position of the seal. (1.50)

b. State the TWO flowpaths for the RCP #1 seal leakoff during a safety injection. (1.00)

QUESTION 2.03 (1.00)

Multiple Choice

Which ONE of the following statements best describes the response of the Emergency Generator Load Sequencer (EGLS) when a Containment Depressurization Actuation (CDA) occurs 45 seconds following a Loss Of Power (LOP)? There is no SI in Progress.

a. The EGLS will stop the load sequence, the loads will be stripped and the EGLS will start the CDA/LOP sequence at time 0.

b. The EGLS will stop the load sequence, the loads will be stripped and the EGLS will start the CDA/LOP sequence at time 45 sec.

c. The EGLS will stop the load sequence, the loads will be stripped that are not required by CDA/LOP , and the EGLS will start the CDA/LOP sequence at time 0.

d. The EGLS will stop the load sequence, the loads will be stripped that are not required by CDA/LOP , and the EGLS will start the CDA/LOP sequence at time 45 sec.

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

QUESTION 2.04 (2.00)

What is the design intent (basis) for the interlocks and automatic functions associated with the RHR loop suction valves (MV 8701A/B)?

QUESTION 2.05 (2.50)

a. What THREE signals will automatically close the Condensate Storage Tank supply valves (AOV 23A and B) to the Auxiliary Feedwater Pumps (AFW)? (1.50)

b. What is the purpose of the cavitating venturis just downstream of the flow elements in the AFW discharge lines? (1.00)

QUESTION 2.06 (1.00)

State the FOUR sources of makeup water to the Spent Fuel Pool. Identify between normal and emergency (or "last resort") sources of makeup, AND state any preferential order of use for the normal and/or the emergency sources.

QUESTION 2.07 (2.00)

List FOUR of the ~~five~~ SIX radioactive liquid effluent monitors which have automatic control functions, AND briefly describe the control function for each monitor listed.

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

QUESTION 2.08 (1.00)

Match the pressure at which injection starts in Column B to the component of Column A.

Column A	Column B
1. High Head Injection Pumps	a. 2680 psig
2. Medium Head Injection Pumps	b. 2540 psig
3. Residual Heat Removal Pumps	c. 2290 psig
4. Accumulators	d. 1550 psig
	e. 1160 psig
	f. 650 psig
	g. 200 psig
	h. 170 psig

QUESTION 2.09 (1.00)

State ~~the~~ TWO automatic functions provided by the P-11 interlock, (set at 1985 psig), when RCS pressure is being INCREASED. Do not include indication functions.

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

QUESTION 3.01 (2.00)

A leak develops in the reference leg associated with the automatic level controller of the Volume Control Tank (VCT). As a result the indicated level in that leg fails high. Describe the VCT level transient assuming that no operator action is taken and that the VCT is in the automatic makeup mode. Include the reasons WHY level changes.

[Note: The above wording was used for the test, however, review indicated that replacing the second sentence with, "As a result the associated level channel fails high," would result in less candidate confusion. This new wording is recommended if the question is asked in the future.]

QUESTION 3.02 (2.00)

Assume steady state operation at 100% power when the Master Pressure Controller setpoint for the pressurizer is inadvertently changed from 2250 psig to 2385 psig. Assume a step change in setpoint and assume that pressurizer pressure control is in automatic.

a. What automatic action(s), other than the actuation of alarms/annunciators, will occur immediately? (0.50)

b. Describe the pressurizer pressure transient that will occur if no operator action is taken. Include in your answer any other automatic actions, other than alarm/annunciator actuations, that take place. (1.50)

QUESTION 3.03 (3.00)

For each case below explain the resultant operation of the Steam Dump system AND indicate the approximate final RCS Tavg (+/- 2 F). Assume all systems are normal except as stated and that no operator action is taken. Consider each case separately.

a. The normal setpoint on the steam dump system steam pressure controller (MSS-PK-507) is reduced from 1092 psig to 1007 psig while in Hot Standby awaiting reactor startup. (2.00)

b. The Train A steam dump bypass interlock selector switch is taken to "OFF" while stable at 5% reactor power. (1.00)

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

QUESTION 3.04 (1.00)

With regard to the main feedwater pump speed control circuitry, what is the reason that the output from the steam flow summing amplifier is conditioned within a lag circuit?

QUESTION 3.05 (2.50)

State the FIVE uses of the output of the first stage impulse pressure transmitter (PT-505). Setpoints are NOT required.

QUESTION 3.06 (1.00)

Would INDICATED steam flow at 100% power be LESS THAN, GREATER THAN, or THE SAME AS, the ACTUAL steam flow if during the power increase to 100%, the associated steam pressure signal had stuck at its 50% value?

QUESTION 3.07 (1.50)

a. What instrument signal is sent to the Train A PORV programming circuit to develop the pressure setpoint when operating in the Cold Overpressure Protection (COPPS) mode? (0.50)

b. What TWO other conditions, in addition to exceeding setpoint, must be met in order for a PORV to open automatically in the COPPS mode? (1.00)

QUESTION 3.08 (2.00)

List FOUR of the functions of the P-10 permissive.

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

QUESTION 4.01 (1.50)

a. Change 4 to Rev. 1 of Procedure OP 3204, "At Power Operation," necessitates raising the Steam Generator Low-Low level trip setpoints to >/= 36.6% prior to achieving 70% reactor power. Why was this procedure change required? (1.00)

b. In conjunction with the change in Low-Low level trip setpoints, the operating water level for the steam generators was raised to 58%. Why was this higher water level adopted? (0.50)

QUESTION 4.02 (1.50)

Refer to attached Figure 7.1:

During a reactor startup, you notice that the reactor has achieved criticality, and that rod positions are as follows:

All shutdown banks fully withdrawn.
Control bank A fully withdrawn.
Control bank B at 138 steps withdrawn.
Control bank C at 25 steps withdrawn.
Control bank D fully inserted.

State the THREE actions which are required by procedure OP 3202 "Reactor Startup" in this condition.

QUESTION 4.03 (2.00)

State the FOUR federal (10CFR20) quarterly exposure limits for maximum permissible occupational exposure for individuals eighteen years or older, for whom current quarterly and lifetime exposures are known. Include in your answer the numerical limit and the effected portion of the body.

(***** CATEGORY 4 CONTINUED ON NEXT PAGE *****)

QUESTION 4.04 (3.00)

a. The following caution is found in AOP 3561, "Loss of Reactor Plant Component Cooling Water":

> On a loss of Reactor Plant Component Cooling Water (CCW), if the RCP thermal barrier cooling flow is lost AND the seal injection flow CANNOT be maintained greater than 6 gpm, then the reactor must be manually tripped and the affected RCP secured.

What is the basis for securing the RCP?

b. Considering the above caution, state TWO line-ups that can be used to avoid a reactor trip/RCP trip if only one CCW pump is available and seal injection flow drops below 6 gpm. (Valve numbers are not required.) (2.00)

QUESTION 4.05 (1.00)

State the basis for the following precaution of OP 3335D, "Radioactive Liquid Waste System":

Do not operate the waste evaporator during a plant cooldown when two RHR heat exchangers are in service.

QUESTION 4.06 (1.00)

What constitutes Adverse Containment? (Include specific parameters and values.)

QUESTION 4.07 (2.00)

The following concern EOP 35 FR-H.1, "Response to Loss of Secondary Heat Sink":

a. State THREE conditions, each of which require that the RCP's be stopped. (Adverse containment values NOT required.) (1.50)

b. State ONE adverse consequence of NOT stopping the RCP's, as required by this procedure. (0.50)

(***** CATEGORY 4 CONTINUED ON NEXT PAGE *****)

QUESTION 4.08 (3.00)

Answer the following in accordance with AOP 3566 "Immediate Boration":

a. List FOUR of FIVE conditions that require immediate boration. (2.00)

b. Describe the TWO flow paths available for immediate boration, indicate the preferred and alternate. (1.00)

(***** END OF CATEGORY 4 *****)
(********** END OF EXAMINATION **********)

ANSWER 1.01 (1.00)

b.

REFERENCE

MP3, Reactor Operations lesson plan, pp. 13-15
Neutron Sources and Subcritical Multiplication lesson plan, pp. 11-22
Objective-1986 RO, Reactor Theory 3. 1987 RO 4B-1

192008K104 193006K110 193006K104 ..(KA's)

ANSWER 1.02 (1.00)

a.

REFERENCE

MP3, Reactivity Coefficients and Defects lesson plan pp. 8 & 20
Objective-1986 RO, Reactor Theory 13 & 16. 1987 RO 9B-1.

192004K107 193003K125 ..(KA's)

ANSWER 1.03 (2.00)

a. Temperature is unaffected by the dropped rod. (0.50)

b. Pressure is unaffected by the dropped rod. (0.50)

c. The reactor power will initially drop promptly [0.25] and then slowly decrease [0.25] to a new steady state level as supported by subcritical multiplication [0.50].

REFERENCE

MP3, Reactor Operations lesson plan, pp. 5-18
Delayed Neutrons lesson plan, p. 21
Objective-1986 RO, Reactor Theory 36.

192008K112 192005K103 193009K107 ..(KA's)

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

ANSWER 1.04 (1.00)

a.

REFERENCE

MP3, Reactivity Coefficients & Defects lesson plan, p. 21
Delayed Neutrons lesson plan, p. 9
Objective-1986 RO, Reactor Theory 10 and 16.

192003K107 191004K114 191004K106 191004K101 ..(KA's)

ANSWER 1.05 (1.00)

d.

REFERENCE

MP3, Xenon and Samarium lesson plan, p. 17
Objective-1986 RO, Reactor Theory 33. 1987 RO 3A-1.

192006K106 193009K102 ..(KA's)

ANSWER 1.06 (2.00)

a. decrease
b. no change
c. no change
d. decrease

REFERENCE

MP3, Reactor Operations lesson plan, pp. 33-35
Objective-1986 RO, Reactor Theory 36. 1987 RO C-183.

192002K114 192002K113 192002K110 004000K519 001000K508
001000K104 ..(KA's)

ANSWER 1.07 (1.00)

b.

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

REFERENCE

MP3, Reactor Operations lesson plan, pp. 5-18
Objective-1986 RQ, Reactor Theory 28.

192008K110 001000K407 ..(KA's)

ANSWER 1.08 (1.50)

a.

1. INCREASES

2. STAYS THE SAME (1.00)

b. GREATER THAN (0.50)

REFERENCE

MP3, Mitigating Core Damage, pp. 6-8
NSSS Pzr Pressure & Level, pp. 20-23
Objective-1986 RQ, Describe the operation of the pzr press. & level control sys.

193001K103 012000K604 ..(KA's)

ANSWER 1.09 (1.00)

a. Decrease
b. Increase

REFERENCE

MP3 Boiling Process lesson plan, pp. 24 & 25
MP3 1987 RQ 9A-1A.

193008K103 059000K405 ..(KA's)

ANSWER 1.10 (1.50)

a. calculated higher than actual
b. calculated higher than actual
c. calculated higher than actual

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

REFERENCE

MP3, Plant Cycles lesson plan, pp. 27 & 28
Objective-1986 RO, Reactor Theory 5 & 7.

193007K108 193007K106 002020K501 ..(KA's)

ANSWER 1.11 (1.00)

b.

REFERENCE

Steam Tables
MP3 S.G. lesson plan, pp. 23-25.

193003K125 ..(KA's)

ANSWER 1.12 (1.00)

a. Decrease
b. Decrease

REFERENCE

MP3 Fluid Properties lesson plan, pp. 25 & 26
MP3 1987 RO 10A/B-4B.

191004K114 191004K106 191004K101 ..(KA's)

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

ANSWER 2.01 (2.00)

a. 1. >17 percent Pzr Level.
2. Letdown isolation valves (LCV-459 and 460) open.

b. 1. Loss of Power.
2. Loss of Instrument Air.

REFERENCE

MP3 NSSS CVCS, p. 4
Objective-1987 RO 1B-2

ANSWER 2.02 (2.50)

a. As pressure increases, a closing force is exerted on the top of the seal ring [0.5]. The narrowing between the seal faces restricts the flow and increases the pressure felt on the underside of the seal face [0.5]. The increased pressure pushes the seal ring back up, opening the flow passage which allows more flow to escape [0.5], thus re-establishing a correct equilibrium position.

b. Through #2 seal to the CDTT [0.5] and the #1 seal return line relief valve to the PRT. [0.5]

REFERENCE

MP3 NSSS RCP, pp.6-9
MP3 NSSS CVCS, p 19
Objective-1987 RO 2A-2

002000K602 ..(KA's)

ANSWER 2.03 (1.00)

c.

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

REFERENCE

MP3 BOP Diesel Generator Sequencer, p. 4
Objective-1986 RO, Describe the operation of the Diesel Generator Sequencer.

064000K411 064000K410 000056K301 ..(KA's)

ANSWER 2.04 (2.00)

To protect the low pressure RHR piping [1.00] and preclude the possibility of uncontrolled RCS depressurization[0.50] to the RWST [0.25] or containment sump [0.25].

REFERENCE

MP3 NSSS RHR, p. 2-4
Objective-1987 RO 10C-1

005000K407 073000K401 ..(KA's)

ANSWER 2.05 (2.50)

a. Safety Injection signal.

Loss of Power signal.

Auxiliary feedwater pump start signal. (1.50)

b. To limit the flow of water into a faulted steam generator. (1.00)

REFERENCE

MP3 NSSS AFW, pp. 7 & 16
Objective-1986 RO, Describe the operation of the AFW system.

061000K404 061000K101 061000K105 000011K312 ..(KA's)

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

ANSWER 2.06 (1.00)

Normal: Primary Grade Water System [0.2], and RWST [0.2].
Emergency: Fire Protection Water System [0.2] - Preferred [0.2], and Service Water System [0.2].

REFERENCE

MP3 1987 Requal Objectives, p. 30, Item 10C/5A.
MP3 procedure 3305, pp. 10-14.

033000K404 033000K401 194001K103 ..(KA's)

ANSWER 2.07 (2.00)

Any four of the following: (CND-RE~~3705~~ 07 V 012)

1. Waste Neutralization Sump Monitor (-Condensate Polishing Facility:) ~~Auxiliary condensate is diverted to the aerated drains.~~ Sump discharge is isolated. (terminated) (CWS-RE50)
2. Turbine Building Floor Drains: Turbine building sump effluent is diverted to the turbine plant component cooling drain sump.
3. Liquid Waste Monitor (LWS-RE70): Liquid waste effluent is isolated from the discharge canal.
4. Regenerate Evaporator Monitor (-Condensate Polishing Facility:) (LWC-RE65) Regenerate evaporator system effluent is diverted to the regenerate evaporator feed tank.
5. Steam Generator Blowdown Monitor (SS2-RE05): Steam generator blowdown is isolated.
6. (CNA-RE47) Auxiliary (condensate Monitor: Auxiliary condensate is diverted to the aerated drains (or to auxiliary building sump)

[Each monitor: 0.25. Each function: 0.25] (2.00)

REFERENCE

MP3 1987 RQ C-2B4.
MP3 TS Table 3.3-12.
MP3 BOP Rad Monitors lesson plan, pp. 46-47, 43 + 44.
mp3 BOP (condensate Demineralizers lesson plan, p 21
073000K401 000009K321 ..(KA's)

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

ANSWER 2.08 (1.00)

1-a
2-d
3-g
4-f

REFERENCE

MP3 NSSS ECCS lesson plan, pp. 113-117
Objective-1987 RQ 3C-2

006020K603 006020K601 000054K304 ..(KA's)

ANSWER 2.09 (1.00)

Any TWO of the following:

1. Sends an open signal to accumulator isolation valves. [0.50]
2. Unblocks the low pressure SI signal. [0.50]
3. Unblocks main steam line isolation on steam line low pressure. [0.50]
4. ~~Initiates~~ Blocks main steam line isolation on steamline negative high rate of pressure change [0.50]
5. Unblocks main steam line low pressure SI. [0.50]

REFERENCE

MP3 1987 Requal Objectives, p. 3, Item 2A-3.
MP3 "Pzr. Pressure & Level" Lesson Plan, p. 18.

012000K604 045000G001 ..(KA's)

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

ANSWER 3.01 (2.00)

With control level indicating high the actual VCT level will drop [0.50] because (charging continues but) letdown is diverted from the VCT [0.50]. The VCT will eventually be completely drained [0.50] because the charging pump suction will not shift to the RWST [0.50].

REFERENCE

MPS NSSS CVCS, pp. 8 & 9
Objective-1986 RQ, Describe the plant response in the event of an instrument failure with no operator response.

004000K605 004000K106 004000A301 004000A207 003000K614
..(KA's)

ANSWER 3.02 (2.00)

a. All pressurizer heaters energize. (0.50)

b. Primary pressure rises[0.5] and then stabilizes at the setpoint of the power operated relief valves[0.5].
A single PORV will automatically open[0.5].

REFERENCE

MPS NSSS Pzr Pressure and Level Instrumentation, pp. 6-16
Objective-1987 RQ 2A-3
1986 RQ, Describe the plant response in the event of an instrumen failure with no operator response.

010000K607 194001K103 ..(KA's)

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

ANSWER 3.03 (3.00)

a. (In Hot Standby Mode the Steam Dumps are being controlled in Steam Pressure Mode.) Reducing the setpoint to 1007 psi will cause the steam dumps to open to reduce pressure[0.50]. The Steam Dumps will close when primary temperature cools to the P-12 (or lo-lo Tavg) interlock setpoint (of 553 F)[0.50]. The Steam Dumps will then oscillate open and shut as RCS Tavg oscillates around the P-12 set/reset [0.50]. Thus, final RCS Tavg will be approximately 553 F (+/- 2 F)[0.50].

b. Steam dump operation would be blocked [0.50]. (Secondary pressure would rise to the setpoint of the secondary pressure relief valve which would operate to maintain pressure at 1125 psig). As a result the RCS Tavg will steady out at 561F (+/- 2 F) [0.50].

REFERENCE

Steam Tables
MP3 NSSS Steam Dump System, pp. 10-16
Objective-1987 RQ 2B-3
1986 RQ, Describe the plant response in the event of an instrument failure with no operator response.

039000K403 039000K404 039000K402 039000A204 045050K401
..(KA's)

ANSWER 3.04 (1.00)

Permits the feed regulating valve to provide fine control of feed flow; (makes the feed pump speed respond slowly during and after secondary plant transients).

REFERENCE

MP3 1987 Requal Objectives, p. 5, Item 3B-3.

059000K405 001000G001 ..(KA's)

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

ANSWER 3.05 (2.50)

1. Used to block automatic rod withdrawal. (C-5).
2. Used to develop the P-13 signal.
3. Used to generate Tref. (Rod Control / C-16 Selectable)
4. Used to generate steam generator water level program.
5. Used to generate a rate of change of power (in the automatic rod control circuit).
6. Steam dumps (Tref) load reject controller [any 5 @ 0.50 each]

REFERENCE

MP3 NSSS I & C Failures, pp. 41-42
Objective-1986 RQ, State all the instrument outputs, control functions and alarms for PT-505.

001000K407 001000K403 000056K101 ..(KA's)

ANSWER 3.06 (1.00)

GREATER THAN

REFERENCE

MP3 NSSS SGWLC, p. 12
Objective-1986 RQ, Describe the plant response in the event of an instrument failure with no operator response.

035010A203 068000G001 ..(KA's)

ANSWER 3.07 (1.50)

a. Auctioneered low [0.25] wide range loop ~~T~~ T_H [0.25].

b. The Train A (arm/block) switch is in ARM. [0.50]
The PORV (close/auto/open) control switch is in auto. [0.50]

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

REFERENCE

MP3 NSSS Pzr Pressure and Level, pp. 11-16
Objective-1986 RQ, State all the Pzr Pressure Control outputs, control functions, and alarms. State the interlocks. 1987 RQ 10A/B-3.

010000K403 194001A116 ..(KA's)

ANSWER 3.08 (2.00)

Any four of the following:

1. Allows manual blocking of the intermediate range high flux trip.

2. Allows manual blocking of the C-1 rod stop.

3. Allows manual blocking of the low setpoint power range trip.

4. Automatically restores intermediate range trip (when power falls below the P-10 setpoint).

5. Automatically restores the low setpoint power range trip (when power falls below the P-10 setpoint).

6. Automatically restores C-1 rod stop (when power falls below the P-10 setpoint).

7. Provides input to the P-7 circuit.

8. Serves as a back-up to P-6 (by preventing the operator from inadvertently reenergizing the source range high voltage with power above P-10).

REFERENCE

MP3 NSSS RPSAS, p.67
Objective-1986 RQ, State any RPSAS interlocks.

012000K610 194001A103 ..(KA's)

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

ANSWER 4.01 (1.50)

a. To assure that the amount of heatsink postulated in accident analysis is available to mitigate an accident (while an evaluation of steam generator level instruments is conducted).

or

Because design inadequacies in the SG reference legs can result in errors in indicated SG level. (1.00)

b. To lower the potential for challenging the SG level trips (by placing the operatung band between the high level turbine safety trip and the Low-Low level reactor trip). (0.50)

REFERENCE

MP3 OP 3204 Change 4 documentation.
MP3 LER 87-022-00.

045050K401 194001K105 ..(KA's)

ANSWER 4.02 (1.50)

1. Terminate the startup.
2. Drive rods in.
3. Commence boration.

REFERENCE

MP3 1987 RQ, C-3E2.
MP3 OP 3202, precaution 4.19.

*** Include MP3 Figure 7.1 from OP 3202 - "ROD BANK INSERTION LIMIT vs. THERMAL POWER, FOUR LOOP OPERATION" with examinee's package. ***

001000G001 194001K111 ..(KA's)

(***** CATEGORY 4 CONTINUED ON NEXT PAGE *****)

ANSWER 4.03 (2.00)

1. 1.25 R/qtr to the whole body,(gonads, head and trunk, blood forming organs and lens of the eye).

2. 7.5 R/qtr to the skin.

3. 18.75 R/qtr to the extremities.

4. 3 R/qtr to the whole body not to exceed a total lifetime exposure of 5(N-18) Rem.

REFERENCE

MP3 SHP 4902, pp. 6 & 7
Objective-1986 RQ, State the federal quarterly exposure limits.

194001K103 000036G003 ..(KA's)

ANSWER 4.04 (3.00)

a. (Loss of the RCP thermal barrier cooling flow and low seal injection flow represents a serious challenge to the RCP seals.) In order to preclude, or at least minimize, damage to the seals it is necessary to secure the affected RCP. (1.00)

b. Can cross-connect the CCW supplies to the RCP thermal barrier through the CCW pump suction and discharge valves (3CCP*V92,93,94,95 and 3CCP*V7,8,9,10) [1.00] or through the containment header cross connect valves (3CCP*AOV179A,179B,180A,180B) [1.00].

REFERENCE

MP3 NSSS, RCP p. 17, AOP 3561 step 2, OP 3301D step 6.2.
Objective-1986 RQ, State reasons behind steps of AOPs.

000026A203 000026K303 016000G005 ..(KA's)

(***** CATEGORY 4 CONTINUED ON NEXT PAGE *****)

ANSWER 4.05 (1.00)

To preclude exceeding flow limits (8100 gpm) on a CCW train.

or

To preclude experiencing adverse tube vibration affects on the shell side of a CCW heat exchanger.

REFERENCE

MP3 OP 3330A p. 33
Objective-1986 RQ, State reasons behind notes and precautions of OPs.

064000G005 ..(KA's)

ANSWER 4.06 (1.00)

Containment temperature [0.25] >180 F [0.25], containment radiation [0.25] >10E5 R/Hr [0.25].

REFERENCE

MP3 1987 Requal Objectives, p. 30, Item 10C-4.

000011K312 006000G005 ..(KA's)

ANSWER 4.07 (2.00)

a. 1. If total feed flow to S/G's cannot be maintained >525 gpm.
2. If WR level in any 3 S/G's is <39% (54% adv. cont.).
3. If pzr. pressure >/= 2350 psig. (1.50)

b. Dryout of the S/G's will occur earlier (less time available for establishing secondary heat sink or RCS feed and bleed);
- OR -
Causes RCS feed and bleed to be less effective. (0.50)
- OR -
Increases heat input into RCS.

(***** CATEGORY 4 CONTINUED ON NEXT PAGE *****)

REFERENCE

MP3 1987 Requal Objectives, p. 4, Item 2B-4.
MP3 EOP 35 FR-H.1.
MP3 EOP Development Training Text HO EOP 35 FR-H, pp.21-22.

000054K304 ..(KA's)

ANSWER 4.08 (3.00)

a. Any FOUR of the following:

1. Rod height below the Low-Low limit each).
2. Failure of one or more rod clusters to fully insert on a reactor trip or shutdown.
3. Uncontrolled cooldown following a reactor trip or shutdown.
4. Uncontrolled or unexplained reactivity increase.
5. Failure of the Makeup system to borate.

b. Preferred - Boric acid tanks to BAT pumps to Immediate boration valve (MV 8104) to suction of charging pumps. [0.50]
Alternate - Boric acid tanks to Gravity boration valves (MV 8507 A&B) to suction of charging pumps. [0.50]

REFERENCE

MP3 AOP-3566 pp. 2-3
Objective-1987 RQ 9A-5A, 1987 RQ 3B-2

004000K116 0000296011 ..(KA's)

(***** END OF CATEGORY 4 *****)
(********** END OF EXAMINATION **********)

QUESTION	VALUE	REFERENCE
1.01	1.00	ZZZ0000537
1.02	1.00	ZZZ0000538
1.03	2.00	ZZZ0000539
1.04	1.00	ZZZ0000540
1.05	1.00	ZZZ0000541
1.06	2.00	ZZZ0000542
1.07	1.00	ZZZ0000543
1.08	1.50	ZZZ0000544
1.09	1.00	ZZZ0000545
1.10	1.50	ZZZ0000546
1.11	1.00	ZZZ0000547
1.12	1.00	ZZZ0000548
	15.00	
2.01	2.00	ZZZ0000549
2.02	2.50	ZZZ0000550
2.03	1.00	ZZZ0000551
2.04	2.00	ZZZ0000552
2.05	2.50	ZZZ0000553
2.06	1.00	ZZZ0000554
2.07	2.00	ZZZ0000555
2.08	1.00	ZZZ0000556
2.09	1.00	ZZZ0000557
	15.00	
3.01	2.00	ZZZ0000558
3.02	2.00	ZZZ0000559
3.03	3.00	ZZZ0000560
3.04	1.00	ZZZ0000561
3.05	2.50	ZZZ0000562
3.06	1.00	ZZZ0000563
3.07	1.50	ZZZ0000564
3.08	2.00	ZZZ0000565
	15.00	
4.01	1.50	ZZZ0000566
4.02	1.50	ZZZ0000567
4.03	2.00	ZZZ0000568
4.04	3.00	ZZZ0000569
4.05	1.00	ZZZ0000570
4.06	1.00	ZZZ0000571
4.07	2.00	ZZZ0000572
4.08	3.00	ZZZ0000573
	15.00	
	60.00	

Enclosure 2

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

FACILITY: MILLSTONE 3

REACTOR TYPE: PWR-WEC4

DATE ADMINSTERED: 87/09/04

Copy of master copy

EXAMINER: JENSEN, N.

CANDIDATE

INSTRUCTIONS TO CANDIDATE:

Read the attached instruction page carefully. This examination replaces the current cycle facility administered requalification examination. Retraining requirements for failure of this examination are the same as for failure of a requalification examination prepared and administered by your training staff. 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 four (4) hours after the examination starts.

CATEGORY VALUE	% OF TOTAL	CANDIDATE'S SCORE	% OF CATEGORY VALUE		CATEGORY
15.00	25.00			5.	THEORY OF NUCLEAR POWER PLANT OPERATION, FLUIDS, AND THERMODYNAMICS
15.00	25.00			6.	PLANT SYSTEMS DESIGN, CONTROL, AND INSTRUMENTATION
15.00	25.00			7.	PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL
15.00	25.00			8.	ADMINISTRATIVE PROCEDURES, CONDITIONS, AND LIMITATIONS
60.00			%		Totals
		Final Grade			

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

_____

Candidate's Signature

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 (1.00)

For each of the conditions listed below, state whether the moderator temperature coefficient becomes MORE NEGATIVE, LESS NEGATIVE, or REMAINS THE SAME. Assume all other conditions are unchanged.

a. Control bank D is withdrawn.

b. Core age increases.

QUESTION 5.02 (1.00)

State how each of the following will affect the value of differential Boron worth, assuming all other conditions remain unchanged. Limit your answer to LESS NEGATIVE, MORE NEGATIVE, or NO EFFECT.

a. Reactor coolant temperature decreases.

b. Boron concentration increases.

QUESTION 5.03 (1.00)

State how each of the following will affect the value of shutdown margin, assuming all other conditions remain unchanged. Limit your answer to INCREASE, DECREASE, or NO EFFECT.

a. Reactor coolant temperature decreases.

b. Xenon concentration increases.

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

QUESTION 5.04 (1.00)

Multiple Choice

Which one of the following statements MOST CLOSELY describes the value of Xenon reactivity following a reactor trip from 100% power? Assume equilibrium BOL conditions.

a. Approximately 24 hours after the trip, Xenon reactivity worth will be approximately 4500 pcm.

b. Approximately 6 hours after the trip, Xenon reactivity worth will be approximately 5650 pcm.

c. Approximately 8 hours after the trip, Xenon reactivity worth will be approximately 4500 pcm.

d. Approximately 8 hours after the trip, Xenon reactivity worth will be approximately 5300 pcm.

QUESTION 5.05 (1.00)

Multiple Choice

During a startup it was determined that Keff was equal to 0.9 when the Source Range (SR) instrument was reading 50 cps. What would the source range instrument be reading if rods were withdrawn to bring Keff equal to 0.975? Assume BOL conditions.

a. 50 cps

b. 125 cps

c. 200 cps

d. 275 cps

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

QUESTION 5.06 (1.00)

Multiple Choice

During a reactor trip recovery, the initial 1/M data point was 1.0. After a 1-hour delay, rod withdrawal was commenced. Upon stopping rod withdrawal to take 1/M data, you find that the second 1/M point is 1.1. Which of the following explains this increase in the 1/M value?

a. This is not possible, the RO must have made an error when taking count rate data.

b. The buildup of Xenon during the 1-hour delay added more negative reactivity than the rod withdrawal had added in positive reactivity.

c. The source-detector geometry is incorrect.

d. An inadvertent dilution is in progress.

QUESTION 5.07 (1.00)

Multiple Choice

What is the startup rate if power increases from 3000 cps to 8000 cps in twenty seconds? (Choose the MOST CORRECT answer.)

a. 0.4 DPM

b. 0.7 DPM

c. 1.0 DPM

d. 1.3 DPM

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

QUESTION 5.08 (1.00)

Multiple Choice

Which one of the following statements is correct?

a. With all other conditions constant, the reactor responds MORE QUICKLY to a given reactivity change at EOL than at BOL, because the value of Beta-bar effective is GREATER.

b. With all other conditions constant, the reactor responds LESS QUICKLY to a given reactivity change at EOL than at BOL, because the value of Beta-bar effective is GREATER.

c. With all other conditions constant, the reactor responds MORE QUICKLY to a given reactivity change at EOL than at BOL, because the value of Beta-bar effective is LOWER.

d. With all other conditions constant, the reactor responds LESS QUICKLY to a given reactivity change at EOL than at BOL, because the value of Beta-bar effective is LOWER.

QUESTION 5.09 (1.00)

True or False?

a. Xenon oscillations are more likely to be DIVERGENT as the core ages, because fuel is depleted from the center regions of the core more rapidly than from the outer regions.

b. The primary method of dampening Xenon oscillations is to follow secondary load changes by boration and dilution while holding control rod position constant.

QUESTION 5.10 (1.00)

State how an INCREASE in each of the following parameters affects the Departure from Nucleate Boiling Ratio (DNBR). Limit your answer to INCREASE, DECREASE, or NO EFFECT.

a. Coolant temperature.

b. Coolant flow.

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

QUESTION 5.11 (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 an otherwise stable system.

d. Starting a pump on a partially empty system.

QUESTION 5.12 (1.00)

Multiple Choice

Assume the plant is in Mode 3 at a temperature of 535 F, and the steam dumps are NOT operable. To what value must Tavg rise before causing the power-operated steam generator pressure relief valves (MSS*PV-20A, B, C, & D) to lift? Assume the pressure setpoint controllers are set for normal power operation. (Choose the MOST CORRECT answer.)

a. 559.1 F

b. 560.7 F

c. 565.6 F

d. 567.2 F

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

QUESTION 5.13 (1.00)

Multiple Choice

Indicate which item below does NOT ENSURE that the Enthalpy Rise Hot Channel Factor ($F^N_{Delta-H}$) remains within prescribed limits:

a. Control rods in group move together within +/- 12 steps.

b. Axial flux difference (AFD) is maintained within limits.

c. Tavg vs. Tref are kept matched to within 5.0F.

d. Control rod groups are properly sequenced and overlapped.

QUESTION 5.14 (1.00)

State how an INCREASE in the following parameters affects Net Positive Suction Head (NPSH) available at the suction of a centrifugal pump. Limit your answer to INCREASE, DECREASE, or NO EFFECT.

a. System flow rate.

b. System temperature.

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

QUESTION 5.15 (1.00)

Multiple Choice

Choose the CORRECT definition of Axial Flux Difference (AFD).

a. The difference in normalized flux signals between the maximum upper excore detector calibrated output and the minimum lower excore detector calibrated output.

b. The difference in normalized flux signals between the minimum upper excore detector calibrated output and the maximum lower excore detector calibrated output.

c. The difference in normalized flux signals between the top and bottom halves of a two section excore neutron detector.

d. The ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs.

(***** END OF CATEGORY 5 *****)

QUESTION 6.01 (2.00)

State the SIX rod control system interlocks which inhibit outward rod movement. Indicate whether each is effective in the MANUAL mode, AUTOMATIC mode, or BOTH. Include setpoints and coincidence as applicable.

QUESTION 6.02 (1.00)

Assume steady state operation at 100% power when the Master Pressure Controller setpoint for the pressurizer is inadvertently changed from 2250 psig to 2385 psig. Assume a step change in setpoint and assume that pressurizer pressure control is in automatic.

a. What automatic action(s), other than the actuation of alarms/annunciators, will occur immediately? (0.25)

b. Describe the pressurizer pressure transient that will occur if no operator action is taken. Include in your answer any other automatic actions, other than alarm/annunciator actuations, that take place. (0.75)

QUESTION 6.03 (0.50)

With regard to the main feedwater pump speed control circuitry, what is the reason that the output from the steam flow summing amplifier is conditioned within a lag circuit?

QUESTION 6.04 (1.00)

What is the design intent (basis) for the interlocks and automatic functions associated with the RHR loop suction valves (MV 8701A/B)?

QUESTION 6.05 (1.50)

List SIX of the eight conditions which must be satisfied to energize the white "Ready To Auto Start" light on MB-8 for a diesel generator. (Do NOT include power available to indicating lamp.)

(***** CATEGORY 6 CONTINUED ON NEXT PAGE *****)

QUESTION 6.06 (2.00)

A leak develops in the reference leg associated with the automatic level controller of the Volume Control Tank (VCT). As a result the indicated level in that leg fails high. Describe the VCT level transient assuming that no operator action is taken and that the VCT is in the automatic makeup mode. Include the reasons WHY level changes.

[Note: The above wording was used for the test, however, review indicated that replacing the second sentence with, "As a result the associated level channel fails high," would result in less candidate confusion. This new wording is recommended if the question is asked in the future.]

QUESTION 6.07 (2.00)

a. What would be the MAIN consequence of inadequate spray bypass flow to the pressurizer, including the effect, the component(s) affected, and the reason this occurs. (Do not discuss boron or temperature equalizations.) (1.50)

b. State the provision made in the control room to warn the operator of insufficient spray bypass flow, including any applicable setpoint. (0.50)

QUESTION 6.08 (2.00)

Assume the plant is shutdown at 500 F and 2000 psig and the Cold Overpressure Protection System (COPPS) is inadvertently armed. Describe how EACH TRAIN of COPPS will respond if a loop wide range Tc instrument fails low. INCLUDE the inputs to each COPPS train, AND whether or not that train's associated PORV will open to reduce plant pressure.

QUESTION 6.09 (1.00)

State the FOUR sources of makeup water to the Spent Fuel Pool. Identify between normal and emergency (or "last resort") sources of makeup, AND state any preferential order of use for the normal and/or the emergency sources.

QUESTION 6.10 (2.00)

List FOUR of the ~~five~~ Six radioactive liquid effluent monitors which have automatic control functions upon activation of high radiation alarms, AND briefly describe the control function for each monitor listed.

(***** END OF CATEGORY 6 *****)

QUESTION 7.01 (1.00)

What constitutes Adverse Containment? (Include specific parameters and values.)

QUESTION 7.02 (1.50)

An operator needs to enter a posted neutron radiation area where the total measured neutron dose is 1.8 mr/hr. (The measured beta-gamma radiation levels are insignificant.) He will remain in the area for 1.5 hours. Is a Radiation Work Permit (RWP) required? Briefly EXPLAIN why or why not.

QUESTION 7.03 (2.00)

State the FOUR SI Termination Criteria as listed in EOP 35 E-1, "Loss of Reactor or Secondary Coolant." Be specific, and include ALL listed options for each criterion. Adverse containment values are NOT required.

QUESTION 7.04 (2.00)

The following concern EOP 35 FR-H.1, "Response to Loss of Secondary Heat Sink":

a. State the THREE conditions, each of which require that the RCP's be stopped. (Adverse containment values NOT required.) (1.50)

b. State ONE adverse consequence of NOT stopping the RCP's, as required by this procedure. (0.50)

QUESTION 7.05 (1.00)

The following concern procedure OP 3204, "At Power Operation":

1. In case of an emergency load reduction request from Convex, at what rate shall load be shed? (0.50)

2. What guidance is given concerning maintaining AFD within the target band during an emergency load reduction? (0.50)

(***** CATEGORY 7 CONTINUED ON NEXT PAGE *****)

QUESTION 7.06 (1.50)

According to OP 3301D, "Reactor Coolant Pump Operation", state the THREE conditions which require determining that the pump shaft is free, (by manual rotation of the shaft), prior to pump start.

QUESTION 7.07 (2.50)

A maintenance man is working inside the containment while the reactor is at power. He is working in a radiation field of 500 mrem/hr gamma and 45 mrad/hr combined (thermal and fast) neutron. The man is 35 years old and has a lifetime exposure through last quarter of 81.0 Rem on his NRC Form 4. Additionally, he has accumulated 1750 mrem so far this quarter.

a. How long can the man work in the area before he exceeds his 10CFR20 limits? Show all work and state all assumptions. Round off your answer to the nearest minute. (1.50)

b. During a declared emergency, this individual volunteers to enter a high radiation area and perform work necessary to prevent further effluent release. In accordance with the MP3 Procedures, what is his maximum allowed whole body exposure? (0.50)

c. In accordance with the Health Physics Procedures, whose authorization (by job title/position) is required in part b? (0.50)

QUESTION 7.08 (0.50)

Change 4 to Rev. 1 of Procedure OP 3204, "At Power Operation," necessitates raising the Steam Generator Low Level Trip setpoints to >/= 36.6% prior to achieving 70% reactor power. Why was this procedure change required?

(***** CATEGORY 7 CONTINUED ON NEXT PAGE *****)

QUESTION 7.09 (1.00)

Refer to attached Figure 7.1:

During a reactor startup, the Reactor Operator reports that the reactor has achieved criticality, and that rod positions are as follows:
All shutdown banks fully withdrawn.
Control bank A fully withdrawn.
Control bank B at 138 steps withdrawn.
Control bank C at 25 steps withdrawn.
Control bank D fully inserted.

State the THREE actions which are required by procedure OP 3202 "Reactor Startup" in this condition.

QUESTION 7.10 (2.00)

State the FIVE indications which are used to verify natural circulation flow in procedure EOP 35 ES-0.1, "Reactor Trip Response," if it is determined that NO Reactor Coolant Pumps can be started.

(***** END OF CATEGORY 7 *****)

QUESTION 8.01 (1.50)

The shift supervisor (SS) is responsible for complying with the limits and policies set forth in ACP 6.03, "Radioactive Liquid Waste Discharge Policy." State the other TWO items for which the SS is responsible, according to ACP 6.03, regarding radioactive liquid waste discharge.

QUESTION 8.02 (2.00)

The following concern information found in MP3 EPIP 4701, "Unit Incident Assessment, Clarification, And Reportability":

a. State the NRC emergency event classification levels AND their corresponding state posture codes, in order from the least to the most severe. (1.00)

b. What TWO determinations are made using the State of Connecticut Posture Code System in state and local emergency plans? (1.00)

QUESTION 8.03 (2.00)

The following concern information found in MP3 procedure ACP 1.19, "Overtime Controls For Personnel Working At The Operating Stations":

In cases of overtime to be worked in excess of established limits, briefly describe the THREE overtime situations for which only the first-level supervisor's approval is required. (1.50)

Include in your answer whether each situation described INCLUDES, or EXCLUDES shift relief/turnover time. (0.50)

QUESTION 8.04 (1.50)

Which individuals shall be allowed access to the Control Room during emergencies, according to ACP 6.01 Control Room Procedure? (List THREE categories of individuals.)

(***** CATEGORY 8 CONTINUED ON NEXT PAGE *****)

QUESTION 8.05 (1.50)

The following refers to procedure OP 3250, "Removing Equipment From Service For Maintenance."

Assume Train A of Safety Injection is being removed from service during Mode 1 operation to repair a pump cooling water leak. State the operators' responsibility with regard to the OTHER Safety Injection train (Train B). (1.00)

QUESTION 8.06 (1.00)

State the requirement in the MP3 Technical Specifications which exists to minimize the possibility of radioiodine release to atmosphere in the event that an irradiated fuel assembly were to rupture, while seated in its storage rack in the spent fuel storage pool. Specifically INCLUDE the parameter monitored, AND the required value for the parameter.

QUESTION 8.07 (2.00)

a. State FOUR of the five bases for the technical specification requirement that the lowest RCS loop Tavg be >/=551 F whenever the reactor is critical.

b. State the TWO surveillance items which must be performed to ensure that this requirement is met.

(***** CATEGORY 8 CONTINUED ON NEXT PAGE *****)

QUESTION 8.08 (2.00)

Assume that the plant is in Mode 6 during a refueling outage with water level 18 feet above the reactor vessel flange, and a gradual cooldown of RCS water in progress. No movement of core components is in progress in the containment. However, irradiated fuel is being moved in the spent fuel pool. The "B" emergency diesel generator (EDG) is disassembled for overhaul. Surveillance testing has just been performed on the "A" EDG, and it is determined that, due to an electrical problem, the "A" EDG will not automatically start on a loss of power signal.

In accordance with section 3.8.1.2 of the Technical Specifications, "A.C. Sources - Shutdown", state the FOUR actions which are required to be performed immediately in THIS situation.

QUESTION 8.09 (1.50)

Answer the following in accordance with Technical Specification 3.5.1, "Emergency Core Cooling Systems - Accumulators":

a. State the action which is required to be performed IMMEDIATELY, in the event that an ECCS accumulator is declared inoperable due to its isolation valve being shut. (0.50)

b. What TWO actions are required to be performed if ECCS accumulator water boron concentration has been 2400 ppm for greater than one hour? (1.00)

(***** END OF CATEGORY 8 *****)
(********** END OF EXAMINATION **********)

ANSWER 5.01 (1.00)

a. Less negative
b. More negative

REFERENCE

MP3 1986 Requal Objectives, Reactor Theory, #15 & #16.
MP3 "Reactivity Coefficients & Defects" Lesson Plan Rev. 1, pp. 19-21.
192004K106 ..(KA's)

ANSWER 5.02 (1.00)

a. More negative
b. Less negative

REFERENCE

MP3 1986 Requal Objectives, Reactor Theory, #26.
MP3 "Neutron Poisons" Lesson Plan Rev. 1, p. 12, Item 2.
192004K110 192004K109 ..(KA's)

ANSWER 5.03 (1.00)

a. Decrease (if shutdown) Increase (if at power) - if either Increase or Decrease is given without any assumptions, the candidate will be given full credit. for part a.
b. Increase

REFERENCE

MP3 1987 Requal Objectives, p. 10, Item C-1B3.
MP3 "Reactor Operations" Lesson Plan Rev. 1, pp. 33-35.
192002K114 ..(KA's)

ANSWER 5.04 (1.00)

d.

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

REFERENCE

MP3 Curve Book Cycle 1, OPS Form 3209-6 Rev. 0, Page 2 of 2.
MP3 1986 Requal Objectives, Reactor Theory, #31.
192006K112 ..(KA's)

ANSWER 5.05 (1.00)

c

REFERENCE

MP3 1986 Requal Objectives, Reactor Theory, #4.
MP3 "Neutron Sources & Subcrit. Mult." Lesson Plan Rev. 1, p. 17.
192003K102 192004K107 ..(KA's)

ANSWER 5.06 (1.00)

b

REFERENCE

MP3 1986 Requal Objectives, Reactor Theory, #4.
MP3 "Reactor Operations" Lesson Text Rev. 1, p. 19.
192008K106 192008K103 192004K107 ..(KA's)

ANSWER 5.07 (1.00)

d.

REFERENCE

MP3 1986 Requal Objectives, Reactor Theory, #5.
MP3 "Delayed Neutrons" Lesson Text Rev. 1, p. 15.
192003K109 192004K112 ..(KA's)

ANSWER 5.08 (1.00)

c.

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

REFERENCE

MP3 1986 Requal Objectives, Reactor Theory, #10.
MP3 "Delayed Neutrons" Lesson Plan Rev. 1, pp. 7-12.
192003K107 192005K107 ..(KA's)

ANSWER 5.09 (1.00)

a. True
b. False

REFERENCE

MP3 1987 Requal Objectives, p. 9, Item C-1A2.
MP3 "Xenon and Samarium" Lesson Plan Rev. 1, pp. 21 - 26.
192006K106 192005K107 ..(KA's)

ANSWER 5.10 (1.00)

a. Decrease
b. Increase

REFERENCE

MP3 1987 Requal Objectives, p. 25, Item 9A-1A.
MP3 "Boiling Processes" Lesson Plan Rev. 1, pp. 24-25.
193008K105 192005K109 ..(KA's)

ANSWER 5.11 (1.00)

c.

REFERENCE

MP3 1987 Requal Objectives, p. 13, Item C-1C1.
MP3 "Plant Processes" Lesson Plan Rev. 1, pp. 25 - 29.
193006K110 193006K104 192005105 ..(KA's)

ANSWER 5.12 (1.00)

b.

(***** CATEGORY 5 CONTINUED ON NEXT PAGE *****)

REFERENCE

Steam Tables
MP3 "S.G." Lesson Plan Rev. 0, pp. 23-25.
193003K125 192008K124 192008K121 ..(KA's)

ANSWER 5.13 (1.00)

c.

REFERENCE

MP3 1986 Requal Objectives, Heat Transfer and Fluid Flow, #25.
No Facility Reference Identified.
193009K107 192003K111 ..(KA's)

ANSWER 5.14 (1.00)

a. Decrease
b. Decrease

REFERENCE

MP3 1987 Requal Objectives, p. 29, Item 10A/B-4B.
MP3 "Fluid Properties" Lesson Plan Rev. 1, pp. 25-26.
191004K114 191004K106 191004K101 192003K101 ..(KA's)

ANSWER 5.15 (1.00)

c

REFERENCE

MP3 1986 Requal Objectives, Heat Transfer and Fluid Flow, #20.
MP3 TS, Definition 1.4.
193009K102 192006K108 ..(KA's)

(***** END OF CATEGORY 5 *****)

ANSWER 6.01 (2.00)

1. C-1 (Intermediate range overpower) - 1/2 [0.118] intermediate range channels exceeds 20% current equivalent power [0.118], both [0.118].

2. C-2 (Power range high flux) - 1/4 [0.118] power range channels exceeds 103% power [0.118], both [0.118].

3. C-3 (OT Delta-T) - 2/4 [0.118] OT Delta-T channels within 3% of their (continually variable) trip setpoint [0.118], both [0.118].

4. C-4 (OP Delta-T) - 2/4 [0.118] OP Delta-T channels within 3% of their (continually variable) trip setpoint [0.118], both [0.118].

5. C-5 (Turbine power) - One channel (PT-505) [0.118] of turbine impulse pressure indicates less than 15% power [0.118], auto [0.118].

6. C-11 (bank D withdrawal limit) - Control bank D at 223 steps [0.118], auto [0.118].

REFERENCE

MP3 1987 Requal Objectives, p. 5, Item 3A-3.
MP3 "Rod Control" Lesson Text Rev. 0, pp. 62-64.
001000K407 192006K103 ..(KA's)

ANSWER 6.02 (1.00)

a. All pressurizer heaters energize. (0.25)

b. Primary pressure rises[0.25] and then stabilizes at the setpoint of the power operated relief valves[0.25].
A single PORV will automatically open[0.25].

REFERENCE

MP3 NSSS Pzr Pressure and Level Instrumentation, pp. 6-16
Objective-1987 RQ 2A-3
1986 RQ, Describe the plant response in the event of an instrume failure with no operator response.
010000K607 192001K102 ..(KA's)

(***** CATEGORY 6 CONTINUED ON NEXT PAGE *****)

ANSWER 6.03 (0.50)

Permits the feed regulating valve to provide fine control of feed flow; (makes the feed pump speed respond slowly during and after secondary plant transients).

REFERENCE

MP3 1987 Requal Objectives, p. 5, Item 3B-3.
MP3 "SGWLC" Lesson Plan Rev. 0, pp. 18-19.
059000K405 192002K112 192002K110 ..(KA's)

ANSWER 6.04 (1.00)

To protect the low pressure RHR piping [0.50] and preclude the possibility of uncontrolled RCS depressurization[0.25] to the RWST [0.125] or containment sump [0.125].

REFERENCE

MP3 NSSS RHR, p. 2-4
Objective-1987 RQ 10C-1
005000K407 192007K104 ..(KA's)

ANSWER 6.05 (1.50)

1. Transfer switch not in MAINT.
2. 86 HBU backup lockout relay reset.
3. 86 HP primary lockout relay reset.
4. Start failure relay not energized.
5. Control power available to stop circuit.
6. Shutdown relay not energized.
7. Mechanical trip circuit control power available.
8. Barring device relay not actuated. [Any 6, @ 0.25 ea.]

REFERENCE

MP3 1987 Requal Objectives, p. 7, Item 4A-2.
MP3 "Diesel Gen. & Support Systems" Lesson Plan Rev. 0, pp. 28-29.
064000G007 193008K105 ..(KA's)

(***** CATEGORY 6 CONTINUED ON NEXT PAGE *****)

ANSWER 6.06 (2.00)

With control level indicating high the actual VCT level will drop [0.50] because (charging continues but) letdown is diverted from the VCT [0.50]. The VCT will eventually be completely drained [0.50] because the charging pump suction will not shift to the RWST [0.50].

REFERENCE

MP3 NSSS CVCS, pp. 8 & 9
Objective-1986 RQ, Describe the plant response in the event of an instrument failure with no operator response.
004000K605 004000K106 004000A301 004000A207 193009K107
..(KA's)

ANSWER 6.07 (2.00)

a. Thermal shock would occur [0.5] to the spray piping ~~[0.25] and the spray nozzle [0.25]~~ because the piping downstream of the spray valves would cool to containment ambient temperature [0.25] and then be subjected to (550 F) water when spray flow started [0.25]

[0.5] NOT

OR

b. Pressurizer spray line low temperature alarm [0.25], which is set at 530 F [0.25].

TO the spray nozzle [0.5] because the nozzle would rise to the temperature of the pzr [0.25] and then be exposed to cool (containment ambient and Then RCS, 530 F) water when spray flow started [0.25]

REFERENCE

MP3 "Pzr & PRT" Lesson Plan Rev. 0, p.8.
010000K401 193010K101 ..(KA's)

ANSWER 6.08 (2.00)

Train A inputs (PCV 455A) are auctioneered low Th (WR) [0.33] and wide range pressure (PT 405) [0.33]. Therefore, Train A PORV will not open [0.33]. Train B inputs (PCV 456) are auctioneered low Tc (WR) [0.33] and wide range pressure (PT 403) [0.33]. (Since COPPS is armed and the Train B pressure setpoint is low due to the failed Tc instrument,) PORV 456 (Train B PORV) will open [0.33].

(***** CATEGORY 6 CONTINUED ON NEXT PAGE *****)

REFERENCE

MP3 1987 Requal Objectives, p. 28, Item 10A/B3.
MP3 "Pzr. Pressure & Level" Lesson Plan Rev. 0, pp. 11-13.
010000K403 193010K105 ..(KA's)

ANSWER 6.09 (1.00)

Normal: Primary Grade Water System [0.2], and RWST [0.2].
Emergency: Fire Protection Water System [0.2] - Preferred [0.2], and Service Water System [0.2].

REFERENCE

MP3 1987 Requal Objectives, p. 30, Item 10C/5A.
MP3 procedure 3305, pp. 9-14.
033000K404 033000K401 193010K106 ..(KA's)

ANSWER 6.10 (2.00) (CND-RE~~ST~~ OR)

1. Waste Neutralization Sump Monitor (Condensate Polishing Facility): ~~Auxiliary condensate is diverted to the aerated drains.~~ Sump discharge is isolated (diverted) (DHS-RE50)
2. Turbine Building Floor Drains: Turbine building sump effluent is diverted to the turbine plant component cooling drain sump. (CWS-RE70)
3. Liquid Waste Monitor: Liquid waste effluent is isolated from the discharge canal. (LWC-RE65)
4. Regenerate Evaporator Monitor (Condensate Polishing Facility): Regenerate evaporator system effluent is diverted to the regenerate evaporator feed tank. (SSR-RE08)
5. Steam Generator Blowdown Monitor: Steam generator blowdown is isolated.

[Each monitor: 0.25; each function: 0.25; total of four each required. Function must match monitor.]

6. Auxiliary Condensate Monitor (CND-RE40): Auxiliary condensate is diverted to the aerated drains (or to the auxiliary building sump).

REFERENCE

MP3 1987 Requal Objectives, p. 15, Item C-2B4.
MP3 TS Table 3.3-12.
MP3 BOP Lesson Plans, Rad Monitors, pp. 46-47, 43 + 44.
073000K401 193001K103 ..(KA's)
MP3 BOP Lesson Plans, Condensate Demineralizers, pp 21.

(***** END OF CATEGORY 6 *****)

ANSWER 7.01 (1.00)

Containment temperature [0.25] >180 F [0.25], containment radiation [0.25] >10E5 R/Hr [0.25].

REFERENCE

MP3 1987 Requal Objectives, p. 30, Item 10C-4.
No Facility Reference Identified.
000011K312 193003K125 193003K117 ..(KA's)

ANSWER 7.02 (1.50)

No [0.5]. An RWP is required if entry is to be made into a posted neutron radiation area where neutron radiation >/= 2.5 mr/hr exists [1.0].

REFERENCE

MP3 1986 Requal Objectives, HP Procedures Objectives, #1.
MP3 SHP 4912, para. 3.1.4.
194001K103 193008K123 193008K122 ..(KA's)

ANSWER 7.03 (2.00)

1. RCS subcooling (based on core exit TC's) [0.20] >30 F [0.20] (90 F for adv. cont.).

2. a. Total feed flow to intact S/G's [0.20] >525 gpm [0.20], or

   b. NR level in at least one intact S/G [0.20] >4% [0.20] (34% for adv. cont.).

   (Both options -- i.e. feed flow & NR level -- required for full credit.)

3. RCS pressure [0.20] stable [0.10] or increasing [0.10]. (Both options required for full credit.)

4. Pzr. level [0.20] >7% [0.20] (50% for adv. cont.).

(***** CATEGORY 7 CONTINUED ON NEXT PAGE *****)

REFERENCE

MP3 1987 Requal Objectives, p. 2, Item 1B-4.
MP3 EOP 35 E-1, "Loss of Reactor or Secondary Coolant" Rev. 1, Step 6.
000009K321 ..(KA's)

ANSWER 7.04 (2.00)

a. 1. If total feed flow to S/G's cannot be maintained >525 gpm. [0.5]
2. If WR level in any 3 S/G's is <39% (54% adv. cont.). [0.5]
3. If pzr. pressure >/= 2350 psig. [0.5]

b. Dryout of the S/G's will occur earlier (less time available for establishing secondary heat sink or RCS feed and bleed);
- OR -
Causes RCS feed and bleed to be less effective. [0.5]

-OR-
Increases heat input into RCS.

REFERENCE

MP3 1987 Requal Objectives, p. 4, Item 2B-4.
MP3 EOP 35 FR-H.1.
MP3 EOP Development Training Text HO EOP 35 FR-H, pp.21-22.
000054K304 003000K608 ..(KA's)

ANSWER 7.05 (1.00)

1. 5% per minute. [0.50]
2. In no case should the load reduction be halted due to AFD going out of the target band. [0.50]

REFERENCE

MP3 1987 Requal Objectives, p. 8, Item 4A-5.
MP3 OP 3204, p. 13.
045000G001 004000K405 004000K123 004000K122 004000K108
..(KA's)

ANSWER 7.06 (1.50)

1. If the RCP has been idle for an extended period (30 days).
2. If RCP maintenance has been performed.
3. If the loop has been drained. [3, @ 0.5 ea.]

(***** CATEGORY 7 CONTINUED ON NEXT PAGE *****)

REFERENCE

MP3 1987 Requal Objectives, p. 17, Item C-2E3.
MP3 OP 3301D, p. 10.
003000K614 004000K603 ..(KA's)

ANSWER 7.07 (2.50)

a. 5(N-18) = 85 REM [0.30].

Total lifetime to date = 81.0 + 1.75 = 82.75 Rem.
Total lifetime available = 85 - 82.75 = 2.25 Rem [0.30].

Total this quarter available = 3 - 1.75 = 1.25 Rem [0.30].

Quarterly is more restrictive than lifetime limit [0.10].

0.50 Rem/Hr gamma + (.045 Rad/Hr)(10 QF) neutron =
0.95 Rem/Hr dose rate [0.30].

1.25 Rem/0.95 Rem/Hr = (1.32 Hrs) = 1 Hour, 19 Minutes [0.20].

b. 25 Rem whole body one time exposure [0.50].

c. Director of Site Emergency Operations (DSEO) [0.50].

REFERENCE

MP3 1986 Requal Objectives, HP Procedures Objectives, #2 & #4.
10 CFR 20
MP3 SHP-4902 , pp. 6-7 & 14-16.
194001K103 007000K100 007000K103 ..(KA's)

ANSWER 7.08 (0.50)

To assure that the amount of heatsink postulated in accident analysis is available to mitigate an accident (while an evaluation of steam generator level instruments is conducted). or

REFERENCE Because design inadequacies in the SG reference legs can result in errors in indicated SG level.

MP3 OP 3204 Change 4 documentation.
045050K401 005000K104 005000K102 ..(KA's)

(***** CATEGORY 7 CONTINUED ON NEXT PAGE *****)

ANSWER 7.09 (1.00)

1. Terminate the startup.
2. Drive rods in.
3. Commence boration. [3 @ 0.333 ea.]

REFERENCE

MP3 1987 Requal Objectives, p. 21, Item C-3E2.
MP3 OP 3202, precaution 4.19.

*** Include MP3 Figure 7.1 from OP 3202 - "ROD BANK INSERTION LIMIT vs. THERMAL POWER, FOUR LOOP OPERATION" with examinee's package. ***
001000G001 006000K601 ..(KA's)

ANSWER 7.10 (2.00)

1. RCS subcooling (based on core exit TC) - >30 F.
2. SG pressures - Stable or decreasing.
3. RCS hot leg (WR) temperatures - Stable or decreasing.
4. Core exit TCs - Stable or decreasing.
5. RCS cold leg (WR) temperatures - At saturation for SG pressure. [5, @ 0.4 ea.]

REFERENCE

MP3 1987 Requal Objectives, p. 25, Item 9A-4.
MP3 EOP 35 ES-0.1, Step 9.
000056K101 006020K404 ..(KA's)

(***** END OF CATEGORY 7 *****)

ANSWER 8.01 (1.50)

1. Reviewing and approving all discharges. [0.75]
2. Terminating the discharge permit, if he does not agree with the method of discharge. [0.75]

REFERENCE

MP3 1986 Requal Objectives, ACP 6.03 Objectives, #3.
MP3 ACP 6.03 Rev. 6, Para. 5.2.
068000G001 026020K401 026000K402 ..(KA's)

ANSWER 8.02 (2.00)

a. Least severe (1) to most severe (4):

	Classification Level	State Posture Code
1.	Unusual Event	Delta-One/Delta-Two
2.	Alert	Charlie-One
3.	Site Area Emergency	Charlie-Two
4.	General Emergency	Bravo/Alpha

[8 components, @ 0.125 ea.]

b. 1. Used to determine which off-site protective actions to implement. [0.50]

2. Used to determine when to man emergency operating centers. [0.50]

REFERENCE

MP3 1986 Requal Objectives, Emergency Plan Objectives, #1 & #2.
MP3 EPIP 4701, Sect. 3.1.2 & Table 4701-3.
194001A116 002000K109 002000K106 ..(KA's)

(***** CATEGORY 8 CONTINUED ON NEXT PAGE *****)

ANSWER 8.03 (2.00)

1. Work more than 16 hours straight [0.50], excluding shift relief/ turnover time [0.166].

2. Work more than 16 hours in a 24 hour period [0.50], excluding shift relief/turnover time [0.166].

3. Work without a break of 8 hours between work periods [0.50], including shift relief/turnover time [0.166].

REFERENCE

MP3 1986 Requal Objectives, ACP 1.19 Objectives, #1.
MP3 ACP 1.19, Sect. 6.2 & Fig. 7.2.
194001A103 008010K401 ..(KA's)

ANSWER 8.04 (1.50)

1. Authorized individuals responsible for direct operation of the unit.

2. Authorized personnel who may be required to support or advise the operation.

3. Resident NRC inspectors.

REFERENCE

MP3 1986 Requal Objectives, ACP 6.01 Objectives, #4.
ACP 6.01 p. 13.
194001K105 008000K102 ..(KA's)

ANSWER 8.05 (1.50)

Proper operation and indication of Train B SI must be verified (before taking Train A out of service).

REFERENCE

MP3 1986 Requal Objectives, ACP Objectives, "Removing Equipment From Service."
MP3 OP 3250, Sect. 6.11.
006000G001 008000K101 ..(KA's)

(***** CATEGORY 8 CONTINUED ON NEXT PAGE *****)

ANSWER 8.06 (1.00)

Spent fuel pool water level [0.50] shall be maintained >/=23 feet over the top of the irradiated fuel assemblies [0.50] (whenever irradiated fuel assemblies are in the storage pool).

REFERENCE

MP3 1987 Requal Objectives, p. 31, Item 10C-5B.
MP3 TS 3.9.11 & B3.9.11.
000036G003 061000SG4 061000K111 061000K105 061000K101
..(KA's)

ANSWER 8.07 (2.00)

a. This ensures that:
   1. MTC is within its analyzed temperature range.
   2. Trip instrumentation is within its normal temperature range.
   3. The P-12 interlock is above its setpoint.
   4. The pressurizer is capable of being operable, with a bubble.
   5. The reactor vessel is above its minimum nil-ductility temperature. [Any 4, @ 0.25 ea.]

b. 1. Within 15 minutes prior to achieving reactor criticality. [0.50]

   2. At least once per 30 minutes when the reactor is critical [0.166] and Tavg <561 F [0.166], with the Tavg-Tref Deviation Alarm not reset [0.166].

REFERENCE

MP3 1987 Requal Objectives, p. 7, Item 3C-5.
MP3 TS 3.1.1.4, 4.1.1.4, & B3.1.1.4.
016000G005 078000K301 ..(KA's)

(***** CATEGORY 8 CONTINUED ON NEXT PAGE *****)

ANSWER 8.08 (2.00)

1. Suspend all operations involving positive reactivity changes (cooldown).
2. Suspend movement of irradiated fuel.
3. Suspend crane operation with loads over the fuel storage pool.
4. Initiate corrective action to restore the required power sources to operable status as soon as possible. [4, @ 0.5 ea.]

NOTE: No credit given if candidate states, "Suspend all operations involving core alterations", because the conditions of the question stated no core component movement is in progress in the containment.

REFERENCE

MP3 1987 Requal Objectives, p. 19, Item C-3A6.
MP3 TS Sect 3.8.1.2.
064000G005 076000K403 076000K402 076000K401 ..(KA's)

ANSWER 8.09 (1.50)

a. Immediately open the isolation valve [0.5].

b. 1. Be in (at least) hot standby within 6 hours [0.5], and
2. Reduce pressurizer pressure to <1000 psig within the following 6 hours [0.5].

REFERENCE

MP3 1987 Requal Objectives, p. 18, Item C-3A2B.
MP3 TS Sect. 3.5.1.
006000G005 001010K603 ..(KA's)

(***** END OF CATEGORY 8 *****)
(********** END OF EXAMINATION **********)

QUESTION	VALUE	REFERENCE
5.01	1.00	ZZZ0000001
5.02	1.00	ZZZ0000002
5.03	1.00	ZZZ0000003
5.04	1.00	ZZZ0000004
5.05	1.00	ZZZ0000005
5.06	1.00	ZZZ0000006
5.07	1.00	ZZZ0000007
5.08	1.00	ZZZ0000008
5.09	1.00	ZZZ0000009
5.10	1.00	ZZZ0000010
5.11	1.00	ZZZ0000011
5.12	1.00	ZZZ0000012
5.13	1.00	ZZZ0000013
5.14	1.00	ZZZ0000014
5.15	1.00	ZZZ0000015
	15.00	
6.01	2.00	ZZZ0000016
6.02	1.00	ZZZ0000017
6.03	0.50	ZZZ0000018
6.04	1.00	ZZZ0000019
6.05	1.50	ZZZ0000020
6.06	2.00	ZZZ0000021
6.07	2.00	ZZZ0000022
6.08	2.00	ZZZ0000023
6.09	1.00	ZZZ0000024
6.10	2.00	ZZZ0000025
	15.00	
7.01	1.00	ZZZ0000026
7.02	1.50	ZZZ0000027
7.03	2.00	ZZZ0000028
7.04	2.00	ZZZ0000029
7.05	1.00	ZZZ0000030
7.06	1.50	ZZZ0000031
7.07	2.50	ZZZ0000032
7.08	0.50	ZZZ0000033
7.09	1.00	ZZZ0000034
7.10	2.00	ZZZ0000035
	15.00	
8.01	1.50	ZZZ0000036
8.02	2.00	ZZZ0000037
8.03	2.00	ZZZ0000038
8.04	1.50	ZZZ0000039
8.05	1.50	ZZZ0000040
8.06	1.00	ZZZ0000041
8.07	2.00	ZZZ0000042
8.08	2.00	ZZZ0000043
8.09	1.50	ZZZ0000044
	15.00	

60.00

Enclosure 3

NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

September 9, 1987
MP-10831
Re: NUREG-1021/ES-201/para H.1

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Reference: Facility Operating License No. NPF-49
Docket No. 50-423
September 4, 1987 NRC License Requalification Examination Comments

Gentlemen:

Attached is the compilation of comments on the written requalification examinations administered to Millstone Unit No. 3 license holders on September 4, 1987.

These comments were the result of a review of the examinations conducted by members of the Millstone Unit No. 3 training staff. Included are both the comments discussed during the exam review meeting of September 4, 1987 plus additional comments resulting from reviews conducted subsequent to this meeting. Attendees at the September 4, 1987 meeting were:

R. Stotts - Northeast Utilities
R. Temps - NRC
M. Moehlmann - Northeast Utilities

The exam reviews were conducted considering the following:

1. Does the question elicit the correct response?
2. Is the key answer correct?
3. Is there potential for additional correct responses?
4. Is the question appropriate?

References are provided, where necessary, to substantiate the comments.

Please contact Mr. Ron Stotts, Supervisor, Operator Training, Millstone Unit No. 3, with any questions concerning our comments.

Yours truly,

NORTHEAST NUCLEAR ENERGY COMPANY

Stephen E. Scace
Station Superintendent
Millstone Nuclear Power Station

SES/RFM:jas

Attachment: Reactor Operator and
Senior Reactor Operator Exam
Comments and applicable references

cc: S. Collins, Branch Chief, Region I
R. Temps, Operator Licensing Branch, Region I
B. W. Ruth, Manager Operator Training

REACTOR OPERATOR EXAM

2. PLANT DESIGN INCLUDING SAFETY AND EMERGENCY SYSTEMS

2.07 Agreed to change the Waste Neutralization Sump Monitor - Condensate Polishing Facility automatic action from "Auxiliary Condensate is diverted to the aerated drains" to "Discharge of sump contents is terminated" (Reference, OP 3336D, Rev 1, Pg 43 Section 8.9)

2.07 Agreed to include an additional acceptable answer stating "Auxiliary Condensate Monitor: Diverts Auxiliary Building auxiliary condensate to the Auxiliary Building Sump" (Reference, P & ID EM-135C Area M6)

2.09 Agreed to change part 2. of this answer from "Unblocks the low pressure SI signal" to "Unblocks steamline low pressure SI and blocks main steam line isolation on high steam pressure rate of change" (Reference, Westinghouse MP3 Functional Diagrams [Logics] Sheets 6 & 7)

3. INSTRUMENTS AND CONTROLS

3.05 Agreed to add "(C5)" as amplifying information to part 1. of this answer

3.05 Agreed to add "(Rod Control/C-16 selectable)" as amplifying information to part 3. of this answer

3.05 Agreed to include an additional acceptable answer stating "Steam dumps (T_{ref}) load reject controller" (Reference, NSSS Vol. 5, I&C Failures, pg 35 section 6.1)

3.07.a Agreed to change answer from "T_C" to "T_H" (Reference, NSSS Vol. 4, PZR press and level, pg 14)

SENIOR REACTOR OPERATOR EXAM

5. THEORY OF NUCLEAR POWER PLANT OPERATION, FLUIDS AND THERMODYNAMICS

5.03 Agreed to grade this question on a case by case basis depending on assumptions made by the examinee

6. PLANT SYSTEMS DESIGN, CONTROL AND INSTRUMENTATION

6.10 Agreed to change the Waste Neutralization Sump Monitor - Condensate Polishing Facility automatic action from "Auxiliary Condensate is diverted to the aerated drains" to "Discharge of sump contents is terminated" (Reference, OP 33367D, Rev 1, pg 43 Section 8.9)

6.10 Agreed to include an additional acceptable answer stating "Auxiliary Condensate Monitor: Diverts Auxiliary Building auxiliary condensate to the Auxiliary Building Sump" (Reference, P & ID EM-135C Area M6)

8. ADMINISTRATIVE PROCEDURES, CONDITIONS AND LIMITATIONS

8.09.b. Agreed to take into consideration the fact that the knowledge required to answer this question is not required knowledge per the 1987 Requalification Objectives. Millstone Unit 3 Technical Specification required memorization policies do not include 6 hour action statements. (Reference, 1987 Licensed Operator Requalification Objectives pg 18 and Ron Stotts letter OT3-87-030, to K. L. Burton, dated February 25, 1987)

Subsequent

1. Notify the Chemistry Department.
2. When the Chemistry Department has completed sampling Waste Neutralization Sump 3CND-TK11, remove it from recirculation as per Section 7.1 step 7.1.5.

8.9 WASTE NEUT SUMP DIS RADIATION HI CDX 2-4

Initiating Device

3CND-RIY07

Setpoint

Sample ± 2X Background/Analysis

Action

Auto

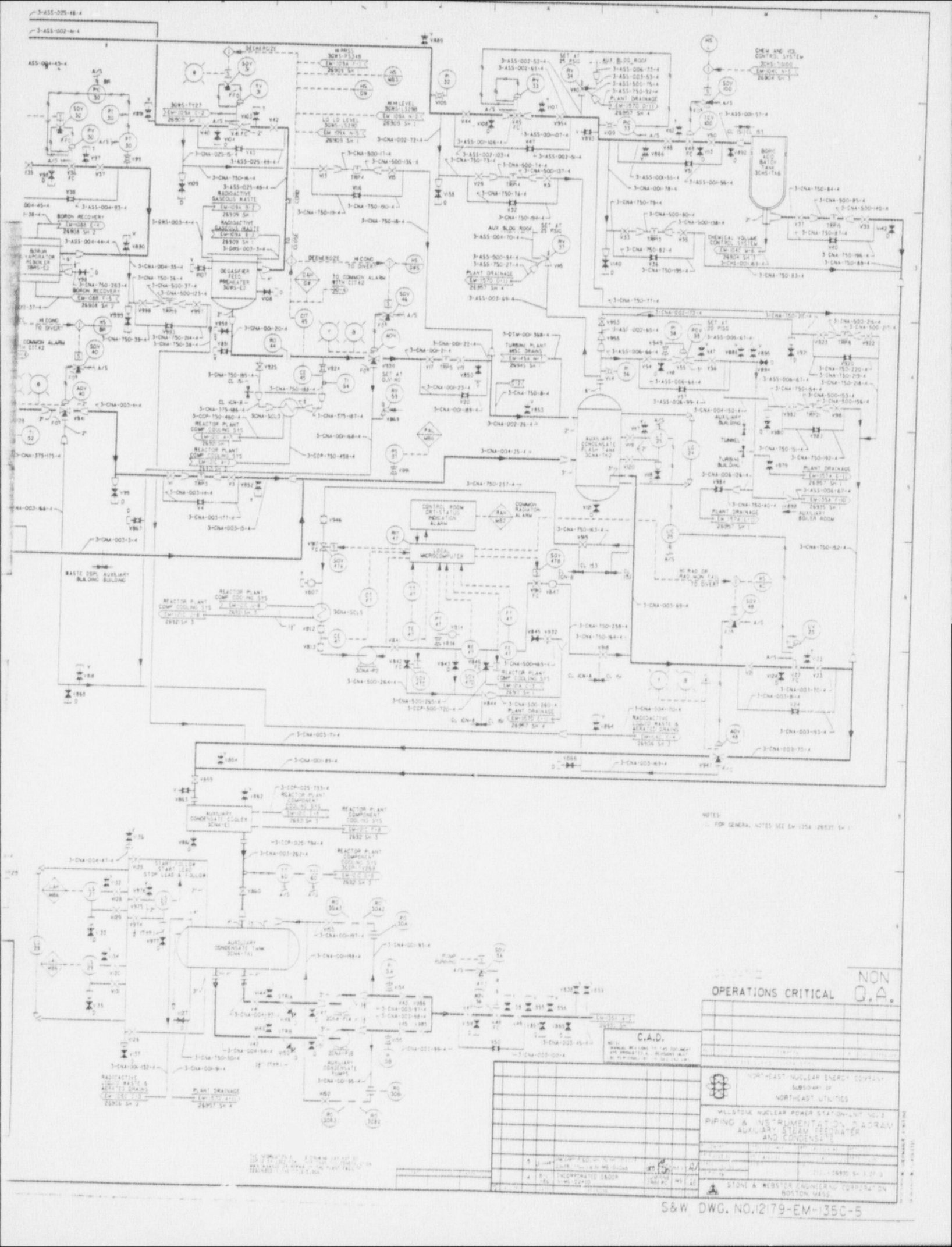
1. Waste Neutralization Sump to Circulating Water Discharge Tunnel 3CND-AOV245 CLOSES.

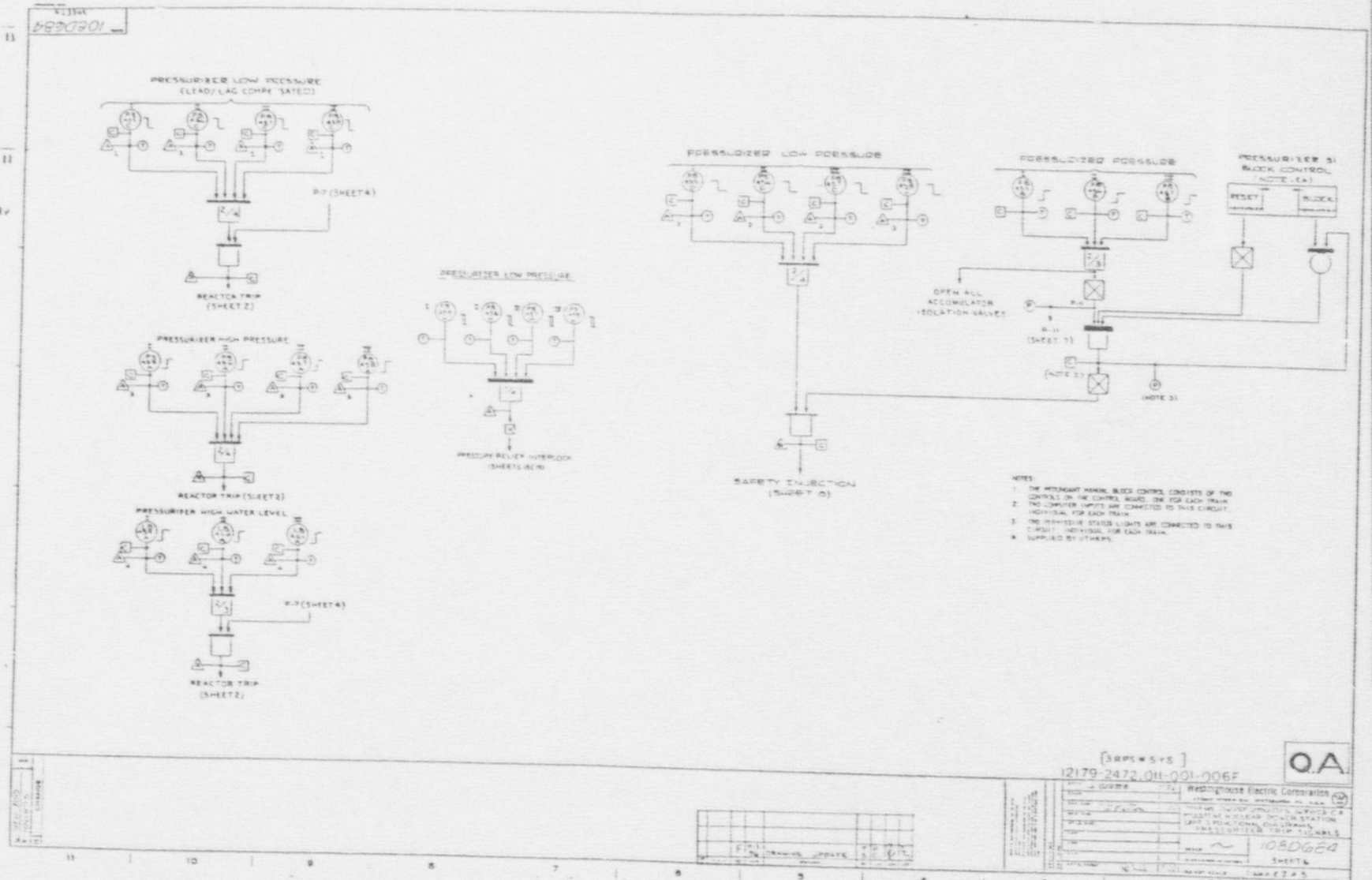
Initial

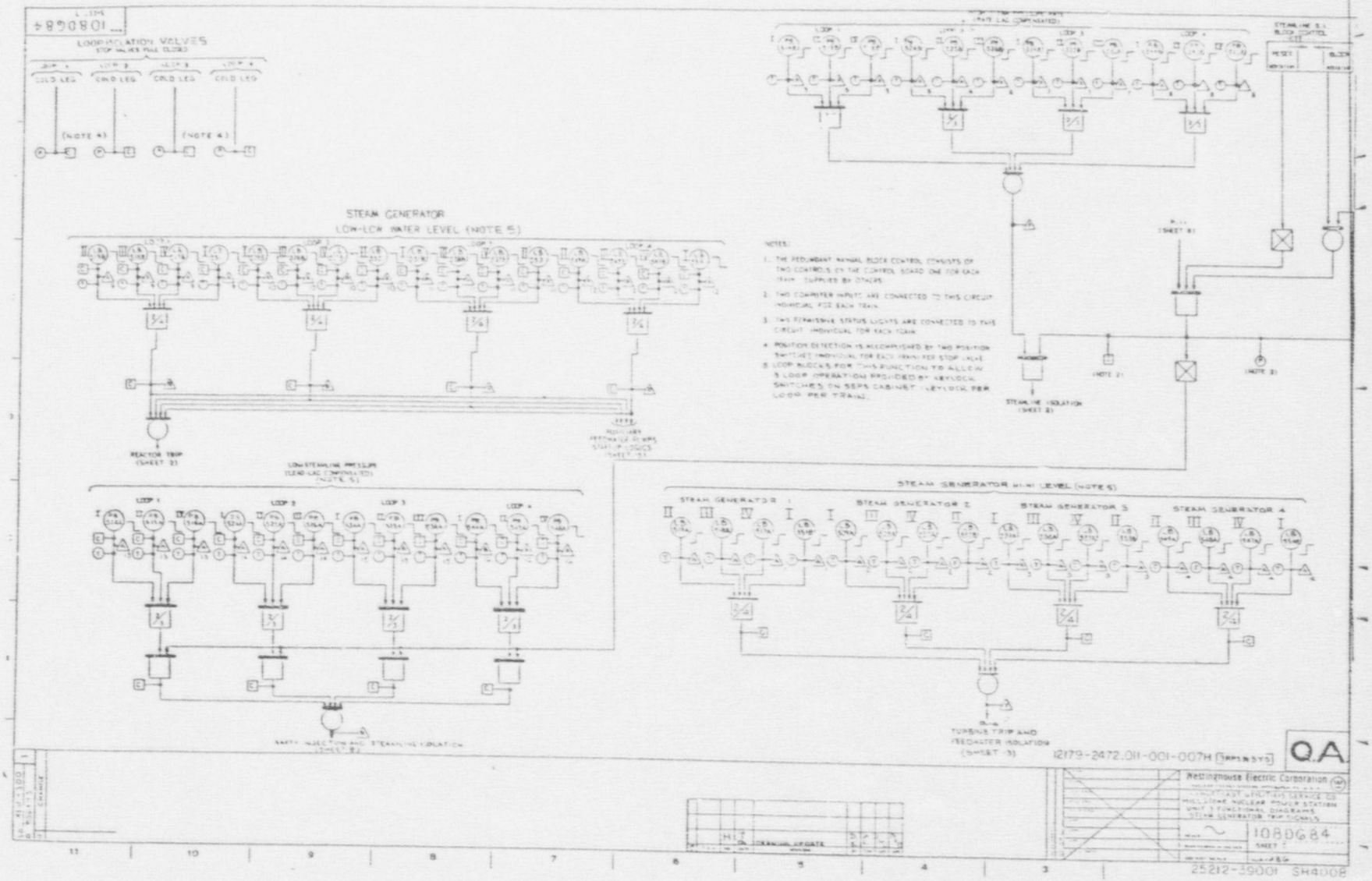
1. If Waste Neutralization Sump 3CND-TK10 (3CND-TK11) contents are being pumped to the Circulating Water Discharge Tunnel:
   a. OPEN Tank 10 (Tank 11) Waste Neutralization Sump Recirculation 3CND-AOV298A (3CND-AOV298B) at CDX
   b. CLOSE Tank 10 (Tank 11) Waste Neutralization Sump Discharge 3CND-AOV244A (3CND-AOV244B) at CDX.
   c. Note the final reading on Waste Neutralization Sump Discharge Flow Quantity Indicator 3CND-FQI246 (CDX)

Subsequent

1. Notify the Chemistry Department
2. When the Chemistry Department has completed sampling Waste Neutralization Sump 3CND-TK10 (3CND-TK11) if it was previously lined up for pumping the contents to the Circulating Water Discharge Tunnel, either
   a. Restore the lineup to the Circulating Water Tunnel if radiation levels are within specification as per Section 7.1 step 7.1.2.
   b. Pump the contents to the Regenerant Evaporator Feed Tanks as per Section 7.1 step 7.1.2


OPERATIONS CRITICAL
NON Q.A.
C.A.D.
NORTHEAST NUCLEAR ENERGY COMPANY
SUBSIDIARY OF
NORTHEAST UTILITIES
MILLSTONE NUCLEAR POWER STATION UNIT NO. 3
PIPING & INSTRUMENTATION DIAGRAM
AUXILIARY STEAM GENERATOR
AND CONDENSATE
STONE & WEBSTER ENGINEERING CORPORATION
BOSTON, MASS.
S&W DWG. NO. 12179-EM-135C-5


PRESSURIZER LOW PRESSURE
(LEAD/LAG COMPENSATED)
P-7 (SHEET 4)
REACTOR TRIP
(SHEET 2)
PRESSURIZER HIGH PRESSURE
REACTOR TRIP (SHEET 2)
PRESSURIZER HIGH WATER LEVEL
P-7 (SHEET 4)
REACTOR TRIP
(SHEET 2)
PRESSURIZER LOW PRESSURE
PRESSURIZER RELIEF INTERLOCK
(SHEETS 6 & 7)
PRESSURIZER LOW PRESSURE
SAFETY INJECTION
(SHEET 5)
PRESSURIZER PRESSURE
OPEN ALL
ACCUMULATOR
ISOLATION VALVES
P-11
(SHEET 7)
(NOTE 2)
(NOTE 3)
PRESSURIZER SI
BLOCK CONTROL
(NOTE 1 & 4)
RESET
BLOCK
NOTES:
1. THE MCB/SMART MANUAL BLOCK CONTROL CONSISTS OF TWO CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
2. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.
3. TWO PERMISSIVE STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.
4. SUPPLIED BY OTHERS.
[3 RPS M SYS]
12179-2472.011-001-006F
Q.A.
Westinghouse Electric Corporation
10800664
SHEET 6
25212-39001 SH4007


LOOP ISOLATION VALVES
STOP VALVES FULL CLOSED
LOOP 1 COLD LEG
LOOP 2 COLD LEG
LOOP 3 COLD LEG
LOOP 4 COLD LEG
(NOTE 4)
(NOTE 4)
STEAM GENERATOR
LOW-LOW WATER LEVEL (NOTE 5)
REACTOR TRIP (SHEET 2)
LOW STEAMLINE PRESSURE (LEAD-LAG COMPENSATED) (NOTE 5)
SAFETY INJECTION AND STEAMLINE ISOLATION
STEAM GENERATOR HI-HI LEVEL (NOTE 5)
STEAM GENERATOR 1
STEAM GENERATOR 2
STEAM GENERATOR 3
STEAM GENERATOR 4
TURBINE TRIP AND FEEDWATER ISOLATION (SHEET 3)
STEAMLINE ISOLATION (SHEET 2)
(NOTE 2)
(NOTE 3)
(SHEET 8)
NOTES:
1. THE REDUNDANT MANUAL BLOCK CONTROL CONSISTS OF TWO CONTROLS ON THE CONTROL BOARD ONE FOR EACH TRAIN SUPPLIED BY OTHERS.
2. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT INDIVIDUAL PER EACH TRAIN.
3. TWO REMOTE STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT INDIVIDUAL FOR EACH TRAIN.
4. POSITION DETECTION IS ACCOMPLISHED BY TWO POSITION SWITCHES INDIVIDUAL FOR EACH TRAIN PER STOP VALVE.
5. LOOP BLOCKS FOR THIS FUNCTION TO ALLOW 3 LOOP OPERATION PROVIDED BY KEYLOCK SWITCHES ON SEPS CABINET - KEYLOCK PER LOOP PER TRAIN.
QA
Westinghouse Electric Corporation
NORTHEAST UTILITIES SERVICE CO.
MILLSTONE NUCLEAR POWER STATION
UNIT 3 FUNCTIONAL DIAGRAMS
STEAM GENERATOR TRIP SIGNALS
10806 84
SHEET 7
12179-2472.011-001-007H
25212-39001 SH4008

NSSS Vol. 5, I & C Failures

6.1 PT 505

Consider first channel 505. The output from PT 505 is used to perform the following functions:

- Block automatic rod withdrawal when PT 505 senses that percent turbine load has dropped below 15 percent (if selected by PS 505Z switch on MB7)
- Sent to the reactor protection system to develop the P-13 signal. If both PT 505 and PT 506 sense that percent turbine load is below 10 percent, a signal is sent to P-7 (along with the 3 of 4 PR < P-10) to block the "at power" trips.
- Generate a reference temperature signal, Tref, (if selected by PS 505Z switch on MB7) for usage by the automatic rod control system, temperature error circuit (Tref-Tavg)
- Generate a reference temperature signal, Tref, for usage in the steam dump system.
- Be compared to auctioneered high nuclear power for use in the automatic rod control rate of change of power mismatch circuit (if selected by PS 505Z switch on MB7)

6.1.1. PT 505 Instrument Failure High

Consider first a high failure of PT 505. PT 505 provides an input to the Tref circuit for use in both the rod control and steam dump systems. The Tref circuit, however, is designed with a high limit on its output of 587°F - regardless of the magnitude of PT 505 impulse pressure. With the reactor plant already at 100-percent power, the rod control system should be maintaining auctioneered high Tavg very close to 587°F. Thus, no error

switches associated with the PORVs and block valves, there are two "arm/block" switches, train A and train B, on MB4. The switches are in the "block" position during normal operating conditions and are placed in "arm" when the plant is cooled down. The redundant train A and train B pressure protection circuits are identical; only the source of their pressure and temperature inputs differ. Temperature signals from each of the four hot leg wide-range RTDs (TE 413A, 423A, 433A, and 443A) are compared. The lowest temperature is auctioneered out and used for train A actuation of PCV 455A; the lowest reading cold leg RTD (TE 413B, 423B, 433B, 443B) passes through a similar auctioneering unit and is used for train B actuation of PCV 456. The two auctioneered outputs enter their own programming circuits. The programmers purpose is to develop a PORV pressure actuation setpoint as a function of RCS input temperature. Because of the nature of the brittle fracture phenomenon, the protection setpoint automatically lowers as wide-range temperature lowers. The characteristics of the pressure versus temperature program are directly related to the analyzed vessel fracture limitations. Actual reactor coolant system pressure, as measured by the wide-range transmitter PT 405 and wide-range transmitter PT 403 for train A and train B respectively, is compared to the programmed setpoint. As actual plant pressure rises, indicating that an unsafe condition is being approached, the following cold overpressure system events occur:

- When pressure comes to within approximately 30 psi of the current protection setpoint, a control board alarm alerts the operator to find and correct the source of the problem.

- When pressure reaches the setpoint, the "armed" PORVs open and relieve to the pressurizer relief tank.

The cold overpressurization protection system is placed in service on a plant cooldown. The train A and train B "arm/block" switches are selected to "arm". During heatup, the system is

1987 LICENSED OPERATOR REQUALIFICATION OBJECTIVES

C-3A2A

List the requirements for accumulator operability and state whether one inoperable accumulator involves a one hour action statement (Modes 1, 2, & 3).

C-3A2B

Describe the actions required for one accumulator inoperable due to the isolation valve being closed (Modes 1, 2, & 3).

C-3A3

State whether the accumulator isolation valves have Tech Specs associated with their thermal overload protection devices.

C-3A4

Describe the requirements for accumulator isolation valve A.C. circuit operability inside containment and state whether noncompliance involves a one hour action statement (Modes 1, 2, 3 & 4).

C-3A5A

Describe the minimum shift crew composition requirements for all modes of operation and include any exceptions or provisions to these requirements.

C-3A5B

Describe the action required for noncompliance with the minimum shift crew composition Tech Spec.

NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

MEMO

February 25, 1987
OT3-87-030

TO: Ken Burton
MP3 Operating Supervisor

FROM: Ron Stotts
MP3 Training Supervisor

SUBJECT: Application of Tech Specs Objectives

Attached are the general objectives for Tech Specs knowledge as approved by TPCC in September '86. You and I discussed as early as 1984 the expectations of station management in terms of required operator knowledge of Tech Specs.

I recommend that we revisit this important area, and that Licensed Operators should achieve the following minimum level of Tech Specs understanding:

1) Know what items/components are covered by some LCO or another (e.g., if a name, a system, or component, the student must recognize that there is something in Tech Specs about it)

2) Be able to locate anything in Tech Specs in a minimal amount of time (I suggest 5 minutes to look anything up, read it, and tell me what is required)

3) Operators should commit to memory any action required by Tech Specs that the time frame for initiating action precludes looking it up in the book.

While this last item may appear to be associated with #2 (above), the issue is not readily disposed. The time frame for demonstrating the ability to use and interpret the Specs assumes that this is the only task required, no other concurrent duties. For this reason, I believe we must arrive at guidance for Item #3 by one of the these two methods:

a. analyze situations that could lead to entry of each LCO action and determine whether or not there is sufficient time to allow reference to the book prior to taking action, or

b. Assign a general cut-off time (as we have traditionally done) within which we assume that reference to Tech Specs would not be convenient for any situation. To date, we have established this time to be less than one hour.

I believe we should implement the method of the general cut-off time, and perhaps devote attention to the other more detailed approach at a later date. If this is acceptable, I further propose the following modification to our existing criteria:

1) Operators with RO licenses should not be authorized to (or responsible for) take actions directed by Tech Specs from memory without direction by the SRO in the control room (i.e., SCO or SS). For those required actions that are "immediate", the RO should probably have a good understanding of what the SRO will be directing to be done; hence, to ensure our graduates of initial training have this solid base, they should be required to memorize action statements of 15 minutes or less.

2) Operators with Senior Reactor Operator licenses should commit to memory, as we had previously defined, actions to be taken in less than 1 hour.

If you concur with this proposal, I will initiate the required changes to our existing Tech Specs learning objectives and present them for our joint approval as soon as possible.

RGS/tap

c: R. Martin
M. Moehlmann
File 4.3.2.4

ENCLOSURE 4

Additional NRC Changes to Written Examinations Answer Keys

The following changes were made as a result of final review of the examinations.

Answer 2.07/6.10

Add the following radiation monitors to the indicated part of the answer:

1. "(CND-RE07)"
2. "(DAS-RE50)"
3. "(LWS-RE70)"
4. "(LWC-RE65)"
5. "(SSR-RE08)"
6. "(CNA-RE47)"

Comment: Acceptable alternate to noun name for radiation monitors.

Answer 4.07/7.04

Added the following:

"- OR -

Increases heat input into RCS."

Comment: An acceptable answer to the question.

Answer 6.07

Rewrite answer as follows:

Thermal shock would occur [0.5] as follows:

To the spray piping [0.5] because the piping downstream of the spray valve would cool to containment ambient temperature [0.25] and then be subjected to hot (550 F) water when spray flow started [0.25].

OR

To the spray nozzle [0.5] because the nozzle would rise to the temperature of the pressurizer [0.25] and then be exposed to cool (containment ambient and then RCS, 550 F) water when spray flow started [0.25].

Comment: Answer was incomplete.

Answer 6.10

See 2.07

Answer 7.04

See 4.07

Answer 7.08

Add the following:

"OR

Because design inadequacies in the SG reference legs can result in errors in indicated SG level."

Comment: Alternate correct answer.