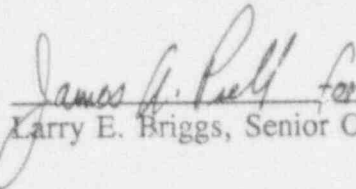


U.S. NUCLEAR REGULATORY COMMISSION REGION I  
OPERATOR LICENSING EXAMINATION REPORT


EXAMINATION REPORT NO. 50-317/92-11 and 50-318/92-11 (OL)  
FACILITY DOCKET NO. 50-317 and 50-318  
FACILITY LICENSE NO. DPR-53 and DPR-69  
LICENSEE: Baltimore Gas and Electric Company  
Post Office Box 1475  
Baltimore, Maryland 21203  
FACILITY: Calvert Cliffs Nuclear Power Plant, Units 1 and 2  
EXAMINATION DATES: April 27 through May 1, 1992

CHIEF EXAMINER:

  
Larry E. Briggs, Senior Operations Engineer

6/2/92  
Date

APPROVED BY:

  
Paul Bissett, Chief, PWR Section  
Operations Branch, DRS

6/2/92  
Date

SUMMARY: Written examinations and operating tests were administered to eight senior reactor operator (SRO) and seven reactor operator (RO) candidates. Seven SROs and seven ROs passed all parts of the examinations and were issued licenses. One SRO candidate did not pass the operating portion of the examination and was denied a license.

A written requalification examination retake was administered to one licensed reactor operator who had failed the written portion of the NRC requalification examination given in October 1991. The licensed RO passed the written requalification examination retake.

## DETAILS

1.0 TYPE OF EXAMINATIONS: Replacement and requalification retake

EXAMINATION RESULTS: Replacement

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

Requalification retake (written only)

NRC Grading	RO Pass/Fail	Total Pass/Fail
Written	1 / 0	1 / 0
Overall	1 / 0	1 / 0

Facility Grading	RO Pass/Fail	Total Pass/Fail
Written	1 / 0	1 / 0
Overall	1 / 0	1 / 0

### Examiners and NRC Personnel:

- \*Larry E. Briggs, Senior Operations Engineer (Chief Examiner)
- Peter Eselgroth, Chief, PWR Section, Region I
- Ivan Kingsley, Sonalysts, NRC Examiner
- James Prell, Senior Operations Engineer
- Robert Temps, Senior Operations Engineer
- Frank Victor, Sonalysts, NRC Examiner
- \*Gary Weale, Sonalysts, NRC Examiner
- \*Peter Wilson, Senior Resident Inspector

Licensee Personnel:

Marvin Coon, Supervisor, Initial Training Unit  
 \*John Hill, General Supervisor, Nuclear Plant Operations  
 Raymond Hoffman, Initial Licensing Class Coordinator  
 \*David Holm, Assistant General Supervisor, Nuclear Training  
 \*D. Lynch, Senior Reactor Operator  
 \*D. McCafferty, Senior Reactor Operator  
 \*Thomas O'Meara, Supervisor, Requalification Training  
 \*K. Umphrey, Senior Reactor Operator  
 \*Raymond Wenderlich, Supervisor, Nuclear Operations

\*Denotes those personnel present at the exit meeting on May 1, 1992.

**2.0    PREEXAMINATION REVIEW**

Prior to the administration of the Senior Reactor Operator (SRO) and the Reactor Operator (RO) written examinations, one Calvert Cliffs (CC) training department staff member, under security agreement, reviewed the examinations at the NRC office in King of Prussia, Pennsylvania. The review was conducted on April 8, 1992. This review was performed to ensure that the examinations to be administered were content valid and performance based.

All simulator scenarios were reviewed and exercised by the NRC on the CC simulator prior to their use. Verification was performed with the assistance of a simulator operator and training staff personnel who were also under security agreement.

**3.0    POST-TEST LICENSEE COMMENTS AND NRC RESPONSE**

Subsequent to the Exit Meeting on May 1, 1992, the licensee provided written comments concerning three questions in the written examination. These comments and their resolution are addressed in Attachment 3 of this report.

**4.0    WEAKNESSES IDENTIFIED DURING POST-WRITTEN EXAMINATION REVIEW**

During a review of the graded written examination the following generic areas of weakness were identified. A weakness is considered generic if three or more ROs or SROs miss the same question. Question numbers are provided in parentheses.

### Reactor Operator Examination

- A. Effect of CVCS charging and letdown flow on Calorimetric calculation (16)
- B. Type of detector used for Power Range Safety Instrumentation (25c)
- C. Components actuated by ESFAS signals (41d)
- D. Location of the TSC (75b)

### Senior Reactor Operator Examination

- A. Setpoint for disabling Unit 1 turbine bypass valves (12b)
- B. Effect of CVCS charging and letdown flow on Calorimetric calculation (21)
- C. Effect of changes in release conditions on setpoint of liquid radwaste effluent monitor (35)
- D. Composition of the Fire Brigade (75)

### 5.0 WRITTEN REQUALIFICATION EXAMINATION RETAKE

On Friday, May 1, 1992, one licensed RO, who had not passed the written portion of the October 1991 NRC Requalification Examination, was reexamined. The RO successfully passed the written examination.

### 6.0 SUMMARY OF NRC COMMENTS MADE AT THE EXIT MEETING

- A. The NRC expressed appreciation to the Training and Operations Staff for providing assistance in expediting the examination process.
- B. The following comments apply to observed procedure and print deficiencies.
  1. Operating Instruction (OI)-3B, Section X, Step B.8, incorrectly refers the operator to step 3. It should refer to step 1.
  2. OI-26A, 125 Volt Vital DC, does not make note in the body of the procedure that all breakers and disconnects are identified in Attachment (1) of the procedure. To perform the evolution of placing a battery charger in service the candidates took a copy of the procedure body, which did not contain Attachment (1). When directed to check the DC disconnect in the on position (Step II.B.3), the candidates experienced considerable difficulty locating it. The disconnect is not labeled as a disconnect on the panel and the body of the procedure does not identify it by number and location, as it is in Attachment (1).
  3. Print OM 98, Sheet 1 of 2, Rev. 29, incorrectly identified the Page 2 entry location of the Component Cooling System radiation monitor piping.

C. The following was noted during the simulator and walk-through examinations.

1. The simulator performed well during the dynamic simulator examinations.
2. Some candidates did not appear to recognize the magnitude of reported or calculated values. For example, at the start of one simulator scenario, Chemistry reported that Iodine 131 activity level in the reactor coolant system (RCS) was 100 microcuries per gram dose equivalent. The Control Room Supervisors (CRS) continued to make plans for a power increase both times the scenario was performed. The power increase was not actually started in either case because the CRS subsequently checked the limit in Technical Specifications. When dose equivalent Iodine 131 is greater than 1 microcurie per gram, operation is restricted to the limits of Figure 3.4-1.

A second example occurred when a candidate was given some information to calculate a site boundary dose rate. It was calculated incorrectly at greater than 30 Roentgens per hour. The candidate did not recognize this value as being quite high.

3. Some of the JPMs used for the walk-through that were selected from the licensee's JPM bank caused temporary confusion among the candidates and the examiners. This was due to the format, layout, and inappropriate cues of the JPMs. For example, one JPM which dealt with an overcooling event (JPM task 020070444) also contained steps to address an undercooling event. A second example during the performance of a loss of Component Cooling Water JPM (JPM task 020400302) involved cues that were not indicative of simulated plant conditions.

D. The following comment applies to the reference material supplied by the licensee in preparation for the examination.

The majority of the materials provided for preparation of the initial examination were high quality, well indexed, and divided. P&IDs within the system descriptions were a major improvement over those provided last year. However, two minor problems were noted. The first problem was the JPM banks, which were not indexed or divided and did not have any apparent order of organization. The second problem was separate, full size P&IDs which did not have an index to identify which prints were provided and were not in sequential order. These problems cause an undue delay in exam preparation while hunting for the desired reference material.

The question bank provided for the preparation of the written requalification examination was not indexed or divided. This resulted in considerable time lost hunting through the material in search of replacement questions.

E. The following comments apply to the general plant conditions and personnel observed by the examiners.

1. Plant cleanliness was noted as being acceptable in the areas toured, which included, but was not limited to, the Spent Fuel Pool area, the Turbine building, the Auxiliary and Control Building.
2. All on-shift crews were cooperative and professional.
3. Security and Health Physics access was very good.

ATTACHMENT 1

SRO WRITTEN EXAMINATION AND ANSWER KEY

# MASTER

U. S. NUCLEAR REGULATORY COMMISSION  
SITE SPECIFIC EXAMINATION  
SENIOR OPERATOR LICENSE  
REGION 1

CANDIDATE'S NAME: \_\_\_\_\_

FACILITY: Calvert Cliffs 1 & 2

REACTOR TYPE: PWR-CE

DATE ADMINISTERED: 92/04/27

INSTRUCTIONS TO CANDIDATE:

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires a final grade of at least 80%. Examination papers will be picked up four (4) hours after the examination starts.

<u>TEST VALUE</u>	<u>CANDIDATE'S SCORE</u>	<u>%</u>	
<u>95.5 *</u>			
<u>96.50</u>			
	<u>FINAL GRADE</u>	<u>%</u>	<u>TOTALS</u>

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

\_\_\_\_\_  
Candidate's Signature

*Attach 1*

*\* Question 23 deleted  
JTB*



A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

MULTIPLE CHOICE

- 001 a b c d \_\_\_\_
- 002 a b c d \_\_\_\_
- 003 a b c d \_\_\_\_
- 004 a b c d \_\_\_\_
- 005 a b c d \_\_\_\_
- 006 a b c d \_\_\_\_

MATCHING

- a \_\_\_\_
- b \_\_\_\_
- c \_\_\_\_
- d \_\_\_\_

MATCHING

- a \_\_\_\_
- b \_\_\_\_
- c \_\_\_\_
- d \_\_\_\_

MULTIPLE CHOICE

- 009 a b c d \_\_\_\_

010 MATCHING

- a \_\_\_\_
- b \_\_\_\_
- c \_\_\_\_
- d \_\_\_\_

MULTIPLE CHOICE

- 011 a b c d \_\_\_\_

012 MATCHING

- a \_\_\_\_
- b \_\_\_\_
- c \_\_\_\_
- d \_\_\_\_

MULTIPLE CHOICE

- 013 a b c d \_\_\_\_
- 014 a b c d \_\_\_\_
- 015 a b c d \_\_\_\_
- 016 a b c d \_\_\_\_

017 MATCHING

- a \_\_\_\_
- b \_\_\_\_
- c \_\_\_\_
- d \_\_\_\_

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

018 MATCHING

- a \_\_\_\_\_
- b \_\_\_\_\_
- c \_\_\_\_\_
- d \_\_\_\_\_

MULTIPLE CHOICE

019 a b c d \_\_\_\_\_

020 a b c d \_\_\_\_\_

021 a b c d \_\_\_\_\_

022 a b c d \_\_\_\_\_

023 a b c d \_\_\_\_\_

024 a b c d \_\_\_\_\_

025 a b c d \_\_\_\_\_

026 a b c d \_\_\_\_\_

027 MATCHING

- a \_\_\_\_\_
- b \_\_\_\_\_
- c \_\_\_\_\_

MULTIPLE CHOICE

028 a b c d \_\_\_\_\_

029 a b c d \_\_\_\_\_

030 COMPLETION

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_

MULTIPLE CHOICE

031 a b c d \_\_\_\_\_

032 a b c d \_\_\_\_\_

033 a b c d \_\_\_\_\_

034 a b c d \_\_\_\_\_

035 a b c d \_\_\_\_\_

036 a b c d \_\_\_\_\_

037 a b c d \_\_\_\_\_

038 MATCHING

- a \_\_\_\_\_
- b \_\_\_\_\_
- c \_\_\_\_\_
- d \_\_\_\_\_

MULTIPLE CHOICE

039 a b c d \_\_\_\_\_

040 a b c d \_\_\_\_\_

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

041 MATCHING

- a    \_\_\_
- b    \_\_\_
- c    \_\_\_
- d    \_\_\_

MULTIPLE CHOICE

- 042 a    b    c    d    \_\_\_
- 043 a    b    c    d    \_\_\_
- 044 a    b    c    d    \_\_\_
- 045 a    b    c    d    \_\_\_
- 046 a    b    c    d    \_\_\_
- 047 a    b    c    d    \_\_\_
- 048 a    b    c    d    \_\_\_
- 049 a    b    c    d    \_\_\_
- 050 a    b    c    d    \_\_\_
- 051 a    b    c    d    \_\_\_
- 052 a    b    c    d    \_\_\_
- 053 a    b    c    d    \_\_\_
- 054 a    b    c    d    \_\_\_
- 055 a    b    c    d    \_\_\_
- 056 a    b    c    d    \_\_\_
- 057 a    b    c    d    \_\_\_
- 058 a    b    c    d    \_\_\_

059 a    b    c    d    \_\_\_

060 a    b    c    d    \_\_\_

061 a    b    c    d    \_\_\_

062 a    b    c    d    \_\_\_

063 a    b    c    d    \_\_\_

064 a    b    c    d    \_\_\_

065 a    b    c    d    \_\_\_

066 a    b    c    d    \_\_\_

067 a    b    c    d    \_\_\_

068 a    b    c    d    \_\_\_

069 a    b    c    d    \_\_\_

070 a    b    c    d    \_\_\_

071 a    b    c    d    \_\_\_

072 a    b    c    d    \_\_\_

073 a    b    c    d    \_\_\_

074 a    b    c    d    \_\_\_

075 a    b    c    d    \_\_\_

076 a    b    c    d    \_\_\_

077 a    b    c    d    \_\_\_

078 MATCHING

- a    \_\_\_
- b    \_\_\_
- c    \_\_\_

## A N S W E R   S H E E T

Multiple Choice    (Circle or X your choice)

If you change your answer, write your selection in the blank.

## MULTIPLE CHOICE

- |     |   |   |   |   |     |
|-----|---|---|---|---|-----|
| 079 | a | b | c | d | ___ |
| 080 | a | b | c | d | ___ |
| 081 | a | b | c | d | ___ |
| 082 | a | b | c | d | ___ |
| 083 | a | b | c | d | ___ |
| 084 | a | b | c | d | ___ |
| 085 | a | b | c | d | ___ |
| 086 | a | b | c | d | ___ |
| 087 | a | b | c | d | ___ |

## 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. After the examination has been completed, you must sign the statement on the cover sheet indicating that the work is your own and you have not received or given assistance in completing the examination. This must be done after you complete the examination.
3. Restroom trips are to be limited and only one applicant 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.
4. Use black ink or dark pencil ONLY to facilitate legible reproductions.
5. Print your name in the blank provided in the upper right-hand corner of the examination cover sheet and each answer sheet.
6. Mark your answers on the answer sheet provided. USE ONLY THE PAPER PROVIDED AND DO NOT WRITE ON THE BACK SIDE OF THE PAGE.
7. Before you turn in your examination, consecutively number each answer sheet, including any additional pages inserted when writing your answers on the examination question page.
8. Use abbreviations only if they are commonly used in facility literature. Avoid using symbols such as < or > signs to avoid a simple transposition error resulting in an incorrect answer. Write it out.
9. The point value for each question is indicated in parentheses after the question.
10. Show all calculations, methods, or assumptions used to obtain an answer to any short answer questions.
11. Partial credit may be given except on multiple choice questions. Therefore, ANSWER ALL PARTS OF THE QUESTION AND DO NOT LEAVE ANY ANSWER BLANK.
12. Proportional grading will be applied. Any additional wrong information that is provided may count against you. For example, if a question is worth one point and asks for four responses, each of which is worth 0.25 points, and you give five responses, each of your responses will be worth 0.20 points. If one of your five responses is incorrect, 0.20 will be deducted and your total credit for that question will be 0.80 instead of 1.00 even though you got the four correct answers.
13. If the intent of a question is unclear, ask questions of the examiner only.

14. When turning in your examination, assemble the completed examination with examination questions, examination aids and answer sheets. In addition, turn in all scrap paper.
15. Ensure all information you wish to have evaluated as part of your answer is on your answer sheet. Scrap paper will be disposed of immediately following the examination.
16. To pass the examination, you must achieve a grade of 80% or greater.
17. There is a time limit of four (4) hours for completion of the examination.
18. When you are done and have turned in your examination, leave the examination area (EXAMINER WILL DEFINE THE AREA). If you are found in this area while the examination is still in progress, your license may be denied or revoked.

QUESTION: 001 (1.00)

Unit 2 is recovering from a LOCA in accordance with EOP-5 (Loss of Coolant Accident), with current conditions as follows:

- RCP status: All OFF
- RCS pressure: 1200 psia and stable
- Highest T-hot: 525 degrees F and stable
- Highest CET: 530 degrees F and stable
- KVIMS: 100 percent (all lights out)
- Pressurizer level: 108 inches and increasing
- 11 S/G level: (-)85 inches and increasing
- 12 S/G level: (-)50 inches and increasing

Do plant conditions meet the criteria for throttling HPSI flow in accordance with step M.4 of EOP-5 (attached)? Select the correct answer and reason from the following choices.

- a. Yes, but only if at least one S/G has a steaming path
- b. Yes, but only if S/G levels continue to increase
- c. No, because pressurizer level criteria is not satisfied
- d. No, because subcooling criteria is not satisfied

QUESTION: 002 (1.00)

Unit 2 is operating at rated load with RCS boron concentration at 800 ppm when a reactor trip (no SIAS) occurs. The RO determines that ONE CEA failed to fully insert and begins emergency boration.

In accordance with EOP-0 (Post-Trip Immediate Actions), emergency boration must continue until RCS boron concentration is at least which one of the following?

- a. 1000 ppm
- b. 1200 ppm
- c. 1700 ppm
- d. 2300 ppm

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- NOTE -

A break on top of Pressurizer will result in an uncontrollable increase in pressurizer level until Pressurizer is solid.

4. Maintain pressurizer level between 101 and 160 inches.

- CAUTION -

Do not throttle HPSI flow unless 30°F subcooling can be maintained.

- a. IF the following conditions can be maintained:

- (1) At least 30°F subcooling.
- (2) Pressurizer level greater than 101 inches.
- (3) At least one S/G available for heat removal.
- (4) RVLMS indicates that the Core is covered.

THEN throttle HPSI flow or operate Charging Pumps as necessary to maintain pressurizer level between 101 and 160 inches.



QUESTION: 003 (1.00)

Unit 1 was manually tripped from rated load because of a slow uncontrollable decrease in RCS pressure. A SIAS automatically initiated a short while ago and current indications are as follows:

- RCS pressure: 1700 psia and slowly decreasing
- Highest CET: 537 degrees F
- Pressurizer level (LIC-110X): 30 inches and decreasing
- Pressurizer level (LIC-110Y): 30 inches and decreasing
- Containment pressure: 1.5 psig and increasing
- Normal containment sump: high level alarm
- Quench tank level: 28 inches and stable
- Quench tank temperature: 100 degrees F and stable
- Pressurizer heaters: All ON

What failure could have caused the above events and indications?

- a. A pressurizer reference leg has ruptured
- b. A pressurizer spray valve has failed open
- c. A pressurizer PORV has failed open
- d. A pressurizer heater well has ruptured

QUESTION: 004 (1.00)

A small feedline break inside Unit 1 containment has resulted in a reactor trip and has caused containment temperature to increase from 100 degrees F to 160 degrees F. Disregarding any effects from RCS or containment pressure changes, what effect will this increase in containment temperature have on the pressurizer level indicated by LIC-110X/Y? Select the correct answer and reason from the following choices. (Assume the plant remains at 100% power.)

- a. Indicated level will be HIGHER than actual level because the reference leg fluid density decreases
- b. Indicated level will be LOWER than actual level because the reference leg fluid density decreases
- c. Indicated level will be HIGHER than actual level because the elevated containment temperature causes flashing in the reference leg
- d. Indicated level will be LOWER than actual level because of the high temperature effects on the differential pressure detectors

QUESTION: 005 (1.00)

OI-16 (Component Cooling System) Section III, Shifting Operating Pumps, contains the following Note:

"Two component cooling water pumps should not be run for extended periods with only one CC HX in service."

Which of the following is the reason for this Note?

- a. Minimize possibility of accelerated tube erosion in the on-service CCW heat exchanger
- b. Minimize possibility of one pump being at shutoff head if pump discharge pressures are not equal
- c. Provide greater CCW system reliability since Technical Specifications require both CCW loops to be operable
- d. Minimize possibility of pump with higher discharge pressure reaching near-runout conditions

QUESTION: 006 (1.00)

If RCS specific activity exceeds the limits of Technical Specification 3.4.8 for Dose Equivalent I-131, the required action is to go to Hot Standby and reduce Tavg to less than 500 degrees F.

Which one of the following is the reason Tavg must be reduced to less than 500 degrees F?

- a. This temperature has a saturation pressure that is below the lift pressure of the main steam safety valves
- b. This temperature will contract small fuel defects and prevent further release of fission products to the RCS
- c. Reducing RCS temperature will increase the efficiency of the CVCS letdown ion exchangers
- d. Reducing RCS temperature will increase the adherency of the RCS corrosion film and minimize any crud burst in progress

QUESTION: 007 (2.00)

MATCH each operator in column A with their INITIAL plant location assignment from column B when the control room is evacuated due to a fire. (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only a single number may occupy each answer space.)

Column A (OPERATORS)	Column B (LOCATION ASSIGNMENTS)
_____ a. Shift Supervisor	1. Unit 1 45-foot switchgear room
_____ b. Unit 1 CRO	2. Unit 2 45-foot switchgear room
_____ c. Unit 1 RO	3. Unit 1 27-foot switchgear room
_____ d. Control Room Supervisor	4. Unit 2 27-foot switchgear room
	5. 1C43
	6. NIs in the AFW pump room
	7. Main Turbine front standard

QUESTION: 008 (2.00)

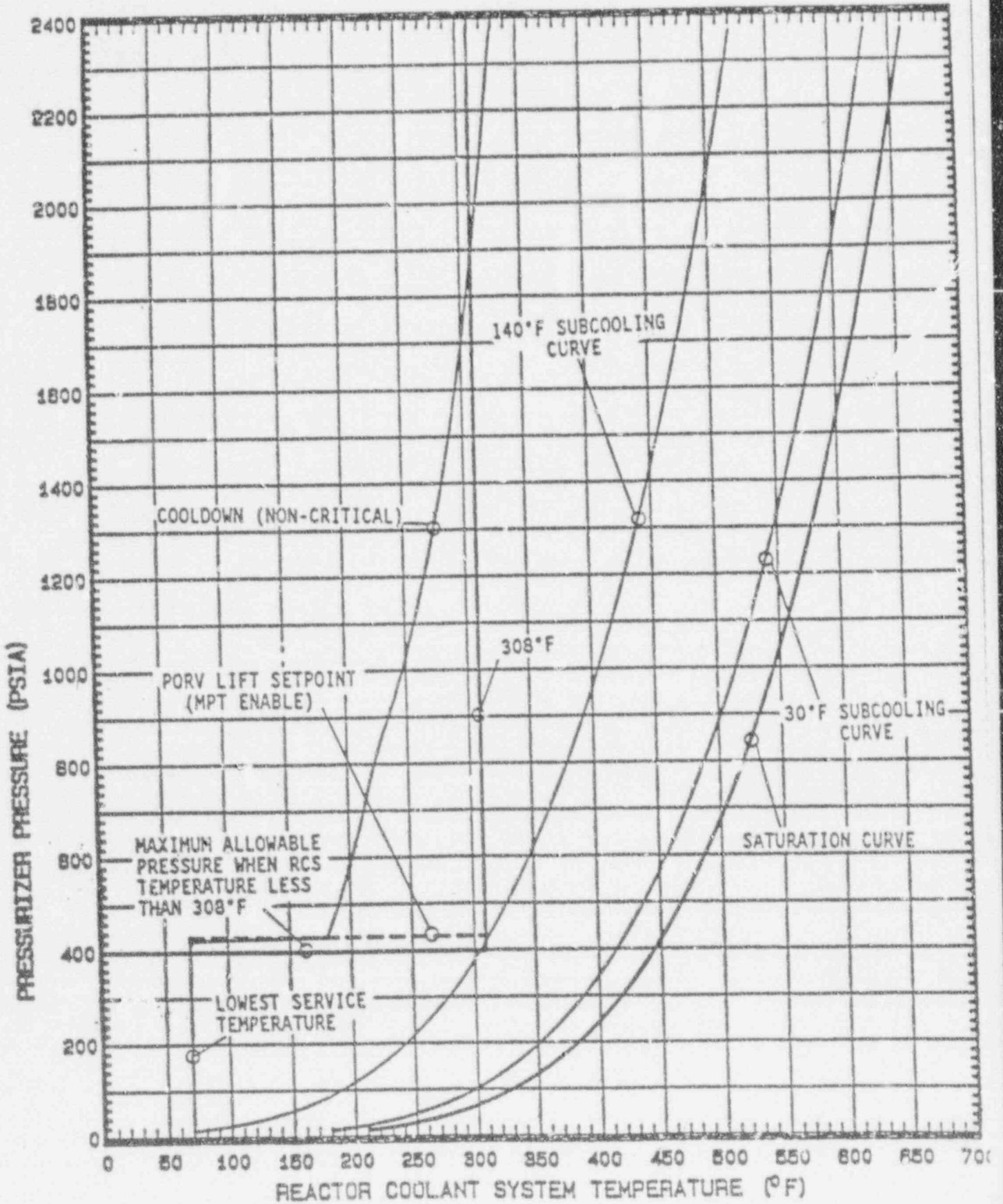
For each of the post-trip situations in column A, match the number of Unit<sup>2</sup> RCPs to be stopped from column B per EOP-0 (Post-Trip Immediate Actions). (0.5 each)

Assume all RCPs are initially operating and RCS cold leg temperature is 540 degrees F for each situation. EOP-0, Attachment 1 is attached for your reference if needed.

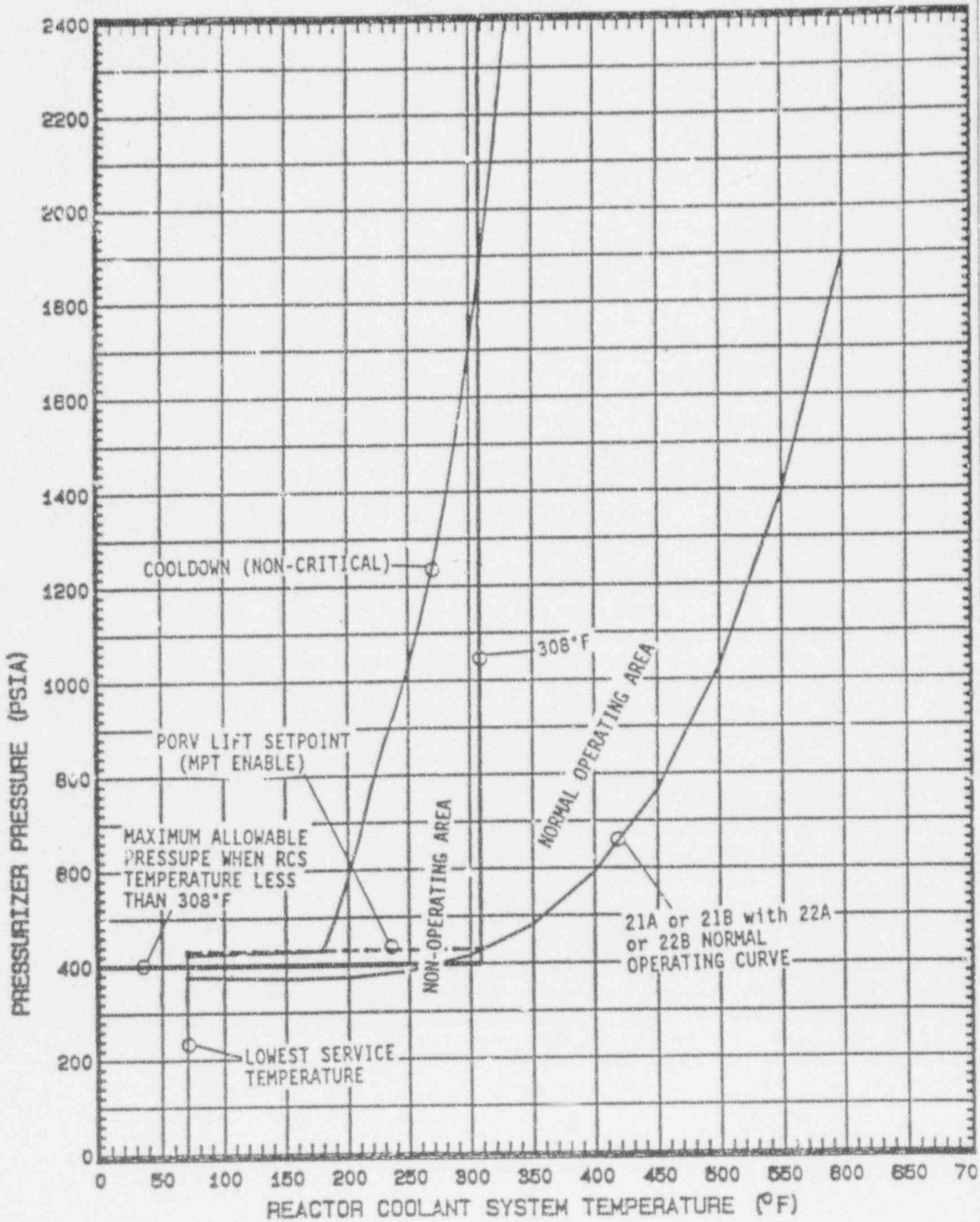
(Numbers in column B may be used once, more than once, or not at all, but only one number may occupy each answer space.)

Column A (SITUATIONS)	Column B (RCPs TO BE STOPPED)
_____ a. LOCA with RCS pressure decreasing through 1650 psia and CIS actuated	1. One
_____ b. LOCA with RCS pressure decreasing through 1625 psia	2. Two
_____ c. Stuck open pressurizer PORV with RCS pressure decreasing through 1250 psia	3. Three
_____ d. SGTR with RCS pressure decreasing through 1400 psia	4. Four

ATTACHMENT (1)  
RCS PRESSURE TEMPERATURE LIMITS  
12 EFPY

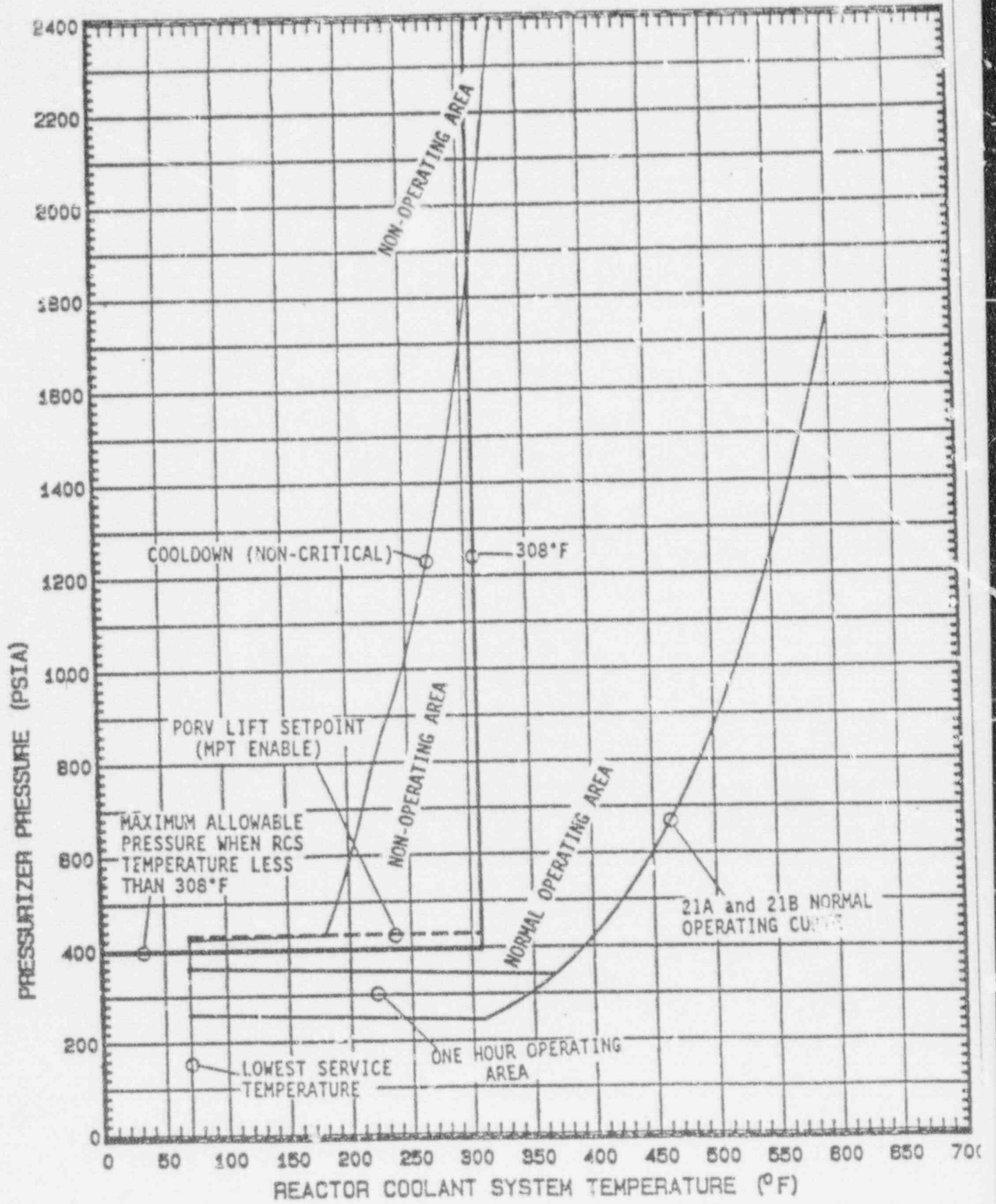


# ATTACHMENT (1) ONE RCP EACH LOOP OPERATING LIMITS

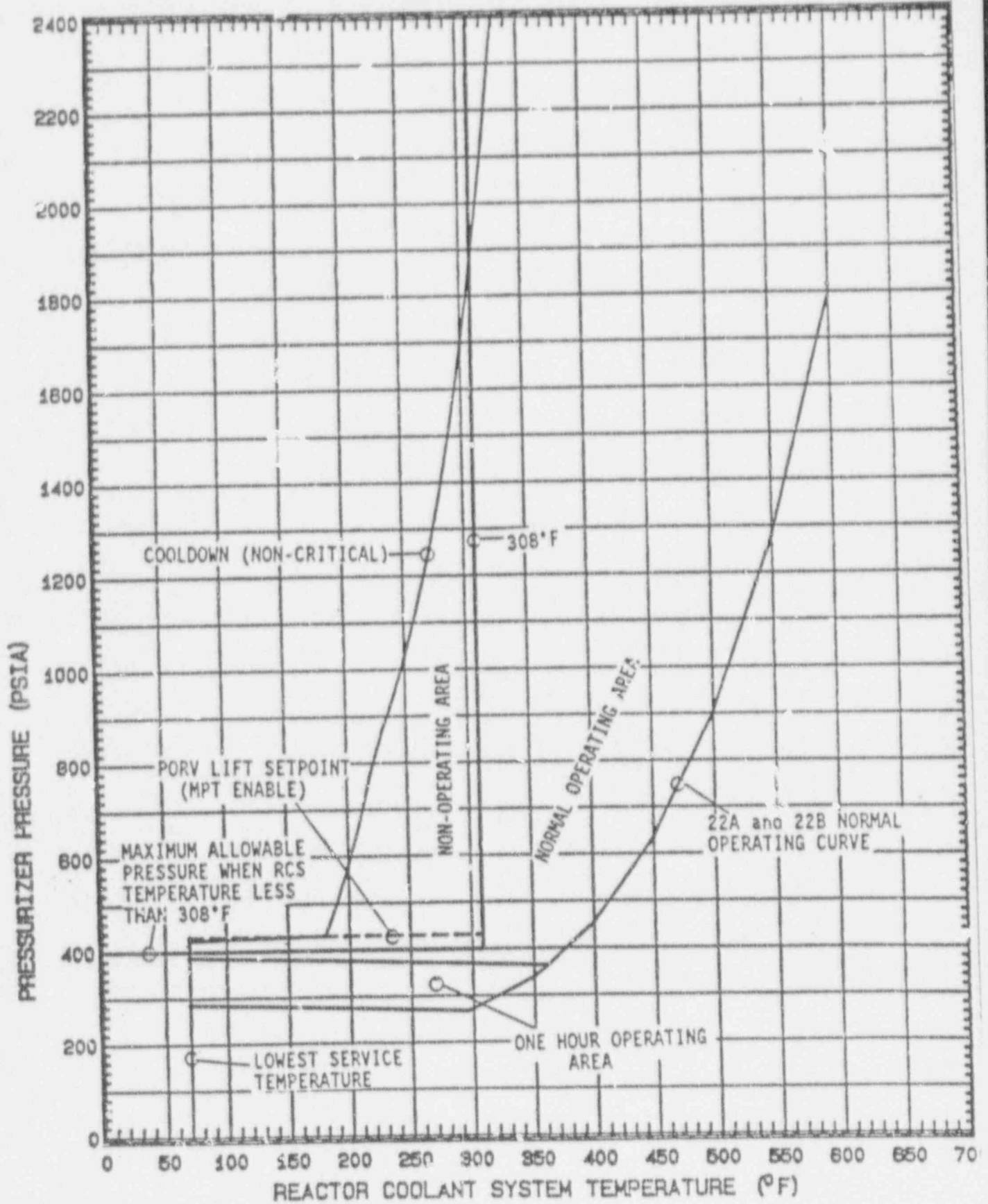




# ATTACHMENT (1) 21A AND 21B RCPs OPERATING LIMITS

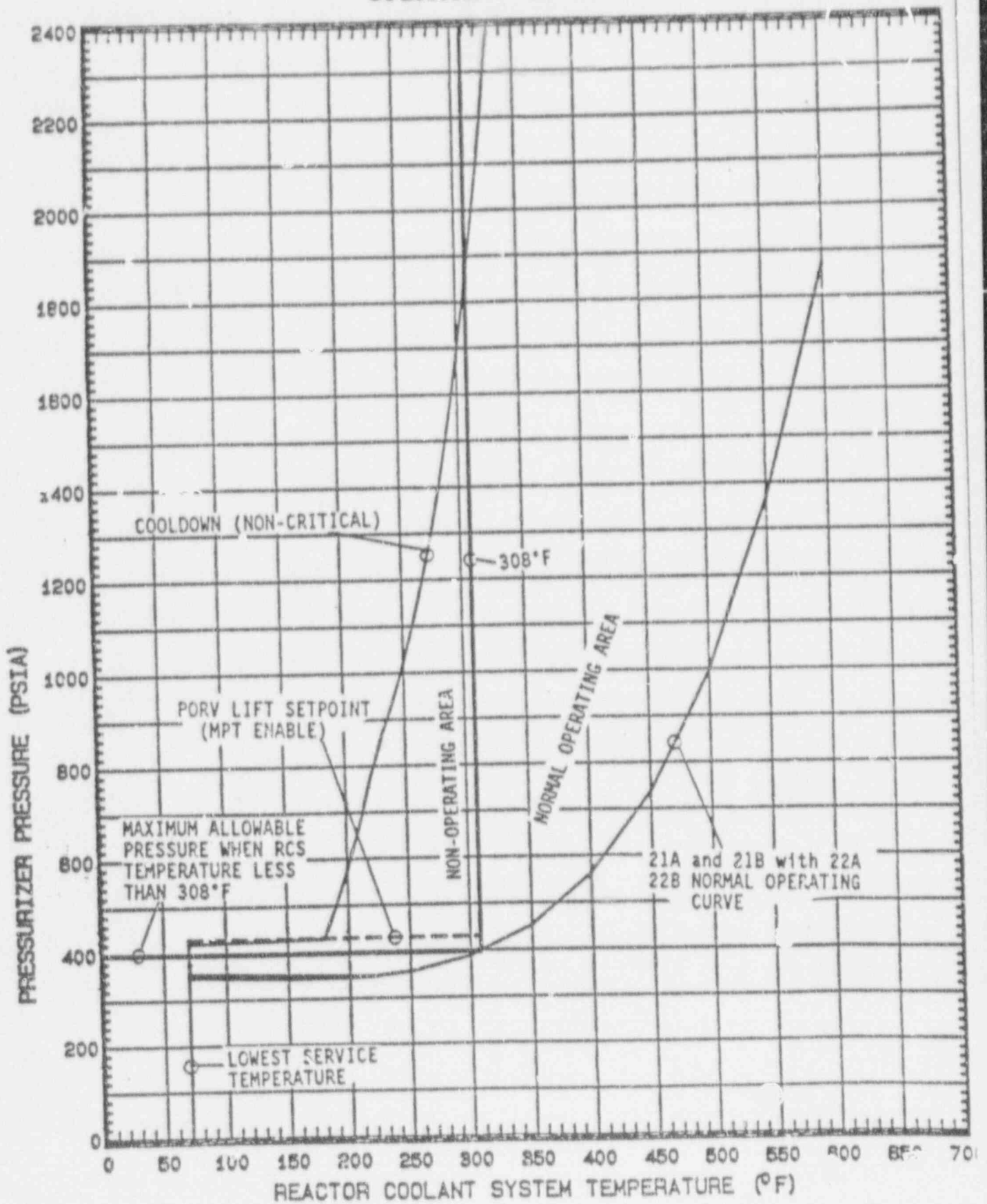


ATTACHMENT (1)  
22A AND 22B RCS  
OPERATING LIMITS

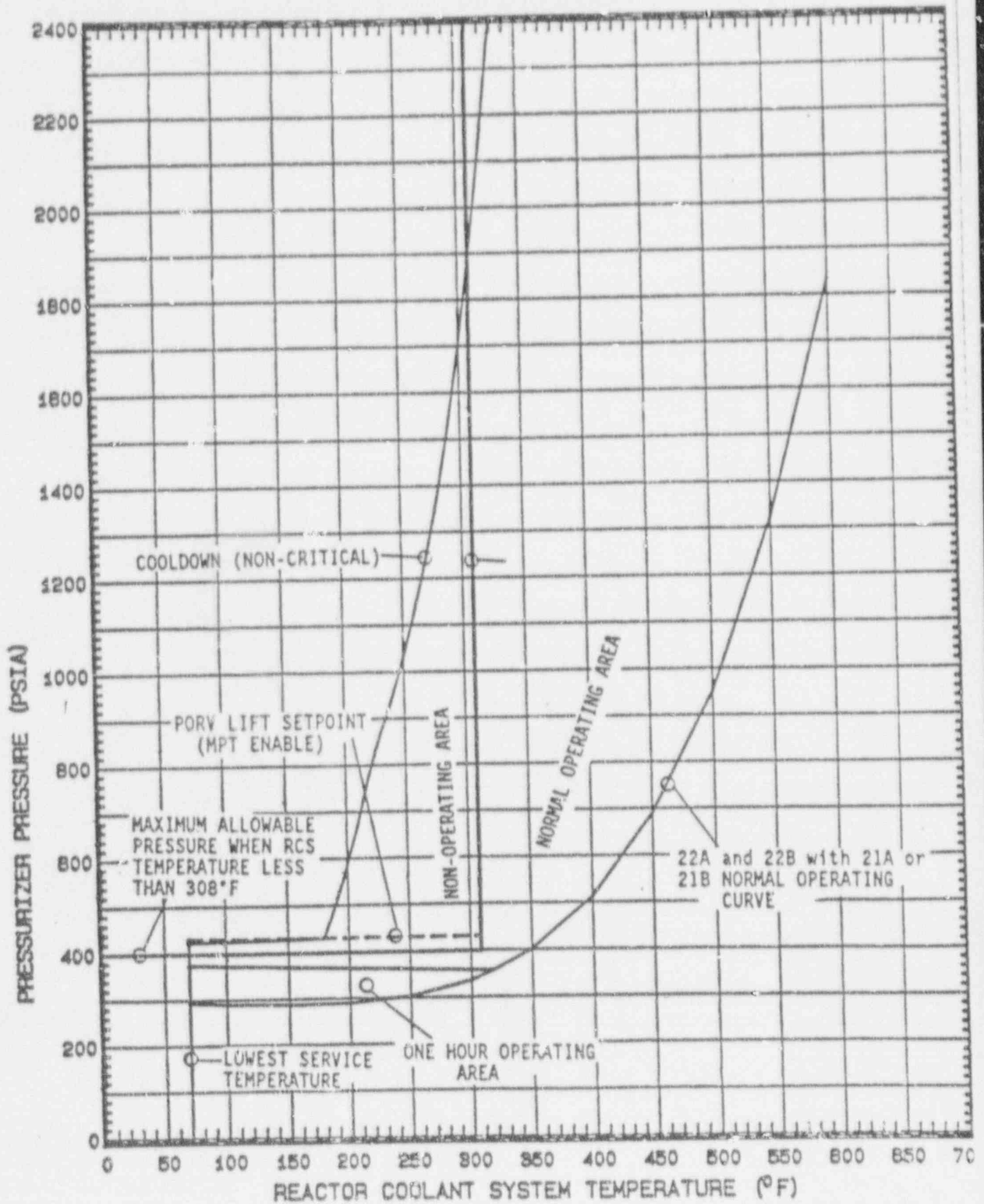


21A AND 21B WITH 22A OR 22B RCPs

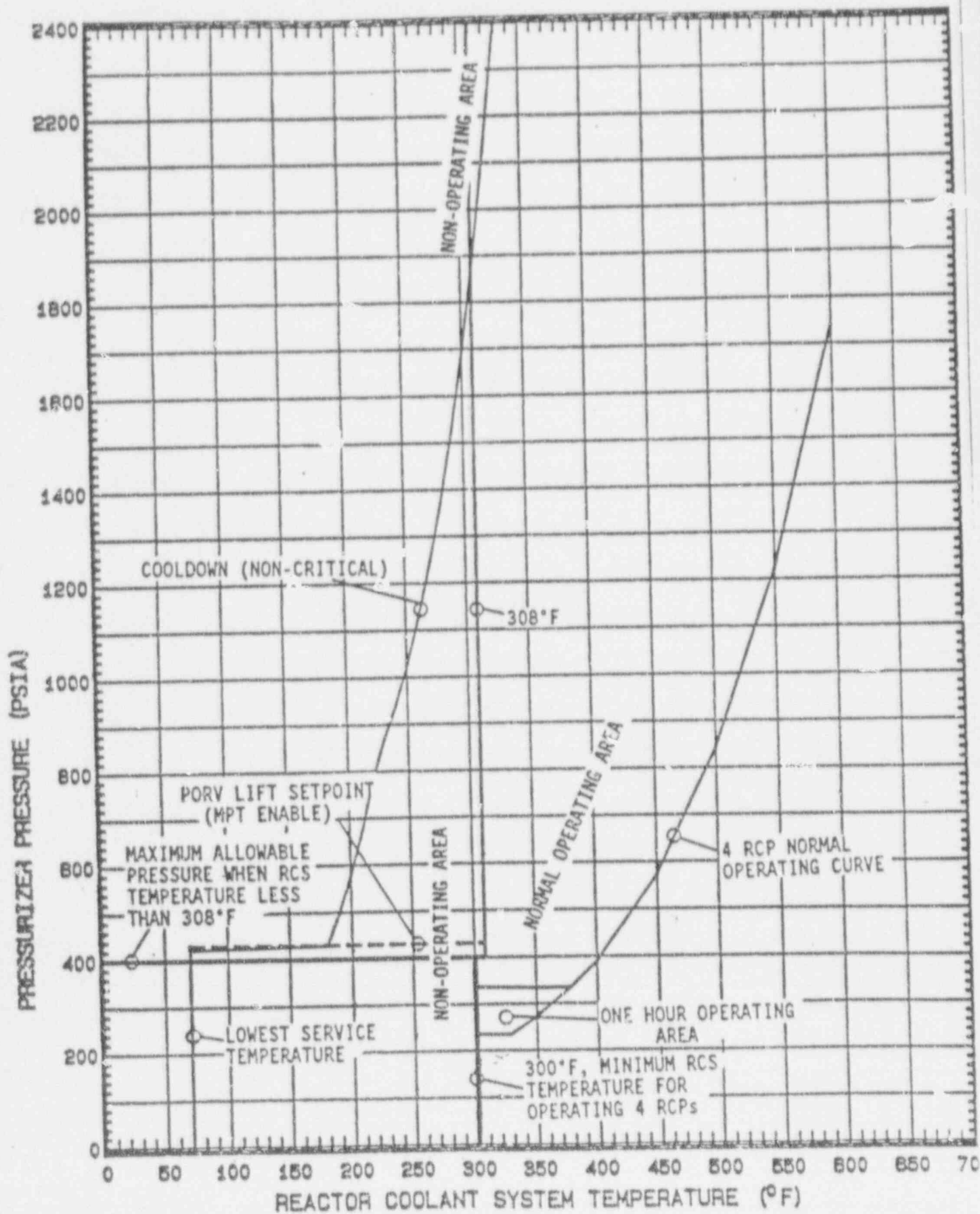
OPERATING LIMITS



OPERATING LIMITS



### 4 RCPs OPERATING LIMITS



## QUESTION 009 (1.00)

Units 1 and 2 are operating at 100% power when an electrical fault causes a complete and sustained loss of power to 11 DC bus. Select the statement which describes the effect on the Unit 1 and Unit 2 turbine operation.

- a. Unit 1 turbine will trip; Unit 2 turbine can be tripped manually from the control room or the turbine front standard
- b. Unit 1 turbine will trip; Unit 2 turbine can be tripped manually from the turbine front standard, but not the control room
- c. Unit 2 turbine will trip; Unit 1 turbine can be tripped manually from the control room or the turbine front standard
- d. Unit 2 turbine will trip; Unit 1 turbine can be tripped manually from the turbine front standard, but not the control room

QUESTION: 010 (2.00)

For EACH of the valves listed in column A, select the resultant effect from column B for a rupture of the containment instrument air header inside containment, downstream of the containment instrument air control valve (IA-2085). (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only one number may occupy each answer space.)

Column A (VALVE)	Column B (EFFECT)
_____ a. Pressurizer normal spray valves (RC-100 E/F)	1. Fail open/flow goes to maximum
_____ b. RCS loop charging control valves (CVC-518/19)	2. Fail closed/flow is stopped
_____ c. Auxiliary pressurizer spray valve (CVC-517)	3. Fail as is/flow cannot change
_____ d. RCP constant bleedoff relief isolation valve (CVC-507)	4. Does not fail/valve operation not immediately affected

QUESTION: 011 (1.00)

Unit 1 is operating at rated load when a shutdown group CEA drops into the core (fully inserted). Assuming the reactor does not trip, what color status light(s) will be illuminated for the dropped CEA on the CEA mimic display?

- a. Amber only
- b. Amber and green only
- c. Amber, green, and blue only
- d. Amber, green, blue, and red

QUESTION: 012 (2.00)

For each automatic action in column A, select the main condenser vacuum setpoint at which the action should occur from column B. (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only a single number may occupy each answer space.)

Column A (AUTOMATIC ACTIONS)	Column B (VACUUM SETPOINTS)
_____ a. Unit 1 Main Turbine Trip	1. 25 inches Hg
_____ b. Unit 1 Turbine bypass valves disabled	2. 22.5 inches Hg
_____ c. Unit 1 SGFP trip	3. 20 inches Hg
_____ d. Unit 2 SGFP trip	4. 17.5 inches Hg
	5. 10 inches Hg
	6. 6 inches Hg

QUESTION: 013 (1.00)

In accordance with CCI-300L (Calvert Cliffs Operating Manual), which one of the following evolutions may be performed WITHOUT the applicable procedure present?

- a. The RO is going to shift the in-service letdown flow control valve (CVC-110P/Q)
- b. The CRO is going to transfer between control modes of the feedwater regulating valves
- c. The CRO is going to energize Channel A of the reactor protection system
- d. The RO is going to isolate steam generator blowdown



QUESTION: 014 (1.00)

After a reactor trip and safety injection, SPDS indicates that the CORE & RCS HEAT REMOVAL safety function block is yellow, but there is a small magenta square by the yellow safety function block. What condition is indicated by the small magenta square?

- a. Safety function status is inaccurate due to missing data
- b. Safety function is being assessed with invalid data
- c. Safety function status is being assessed with reduced logic
- d. Safety function status is yellow due to invalid data

QUESTION: 015 (1.00)

CCI-112 (Safety Tagging) requires a second qualified individual to verify the proper hanging/clearing of safety tags but lists several cases in which verification may be waived. For which one of the following cases is the CRS NOT PERMITTED to waive the independent verification requirement?

- a. The affected component was not altered from its normal position/condition
- b. Verification would delay recovery actions during a plant emergency
- c. Entry into a High Radiation area is required
- d. An operational test can be used to verify operability and the component is not a locked valve

QUESTION: 016 (1.00)

When 120 vac vital bus 11 or 12 is powered from its backup bus, the associated EDG must be declared inoperable. What is the reason for this declaration?

- a. Vital diesel auxiliaries are deenergized when the 120 vac vital bus is on backup power
- b. Associated starting logic channels will not function to start the diesel automatically on a loss of offsite power
- c. Associated starting logic channels will not function to start the diesel automatically on a SIAS
- d. On a loss of offsite power with a LOCA, the diesel will start, but the LOCI sequencer will be deenergized

QUESTION: 017 (2.00)

For each function/signal in column A, select the source of the function/signal from column B. (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only a single number may occupy each answer space.)

Column A (FUNCTIONS/SIGNALS)	Column B (SOURCES)
_____ a. CEA Withdrawal Prohibit (CWP)	1. CEDS control panel
_____ b. CEA Motion Inhibit bypass signal	2. Reactor Protection System
_____ c. Reactor power (Qmet) input to metrascope	3. Reactor Regulating System
_____ d. Digital CEA Group position indication	4. Metrascope
	5. Plant Computer
	6. CEDS Logic Cabinet C

QUESTION: 018 (2.00)

Select the Volume Control Tank (VCT) level from Column B that initiates each automatic control function in Column A.

(0.5 each)

(Numbers in Column B may be used once, more than once or not at all, but only a single number may occupy each answer space.)

Column A (AUTOMATIC CONTROL FUNCTIONS)	Column B (VCT LEVELS)
_____ a. Automatic makeup starts	1. 116.0 inches
_____ b. Automatic makeup stops	2. 112.5 inches
_____ c. Charging suction valves swap to RWT	3. 110.0 inches
_____ d. Letdown diverts to Waste Processing System	4. 107.5 inches
	5. 90.0 inches
	6. 87.5 inches
	7. 8.7 inches
	8. 3.0 inches

QUESTION: 019 (1.00)

Refer to the attached Technical Specifications figures, 3.2-2 and 3.2-4.

Reactor power is 70% when a continuous CEA withdrawal occurs. When the withdrawal is stopped, indicated Axial Shape Index (ASI) is -0.29 and reactor power peaks at 79%.

Which, if any, axial flux offset control limit(s) is(are) being exceeded?

- a. Linear Heat Rate only
- b. DNB only
- c. Both Linear Heat Rate and DNB
- d. Neither Linear Heat Rate nor DNB

QUESTION: 020 (1.00)

A 22 year-old licensed male reactor operator has the following exposure history:

- Current quarterly whole body dose: 250 mrem
- Current yearly whole body dose: 4.5 rem
- Current lifetime whole body dose (including current quarter): 19.25 rem

Assuming his exposure is properly documented, what is the MAXIMUM ADDITIONAL whole body exposure this operator can receive THIS QUARTER and still comply with 10 CFR 20?

- a. 500 mrem
- b. 750 mrem
- c. 1000 mrem
- d. 1250 mrem

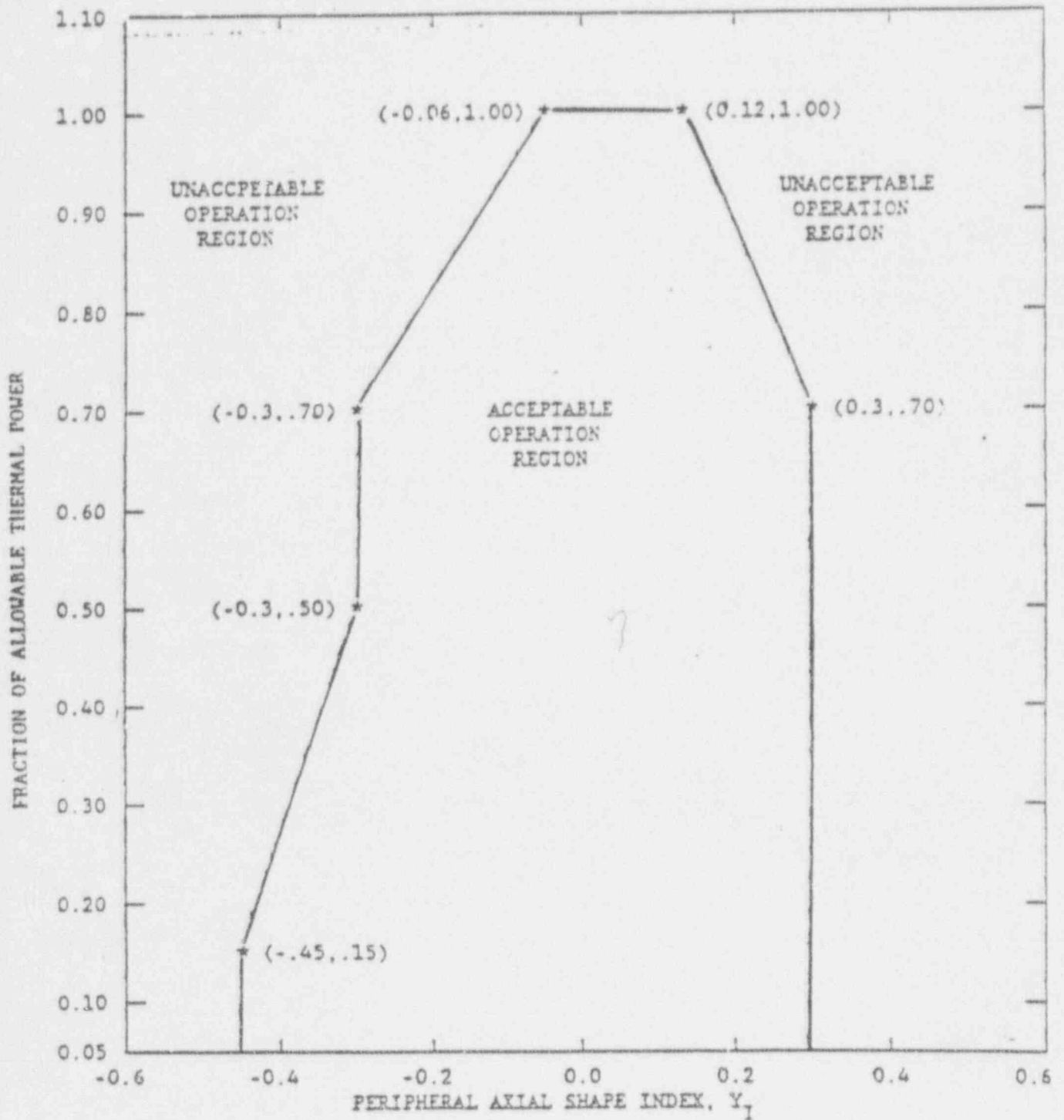


Figure 3.2-2  
 Linear Heat Rate Axial Flux Offset Control Limits

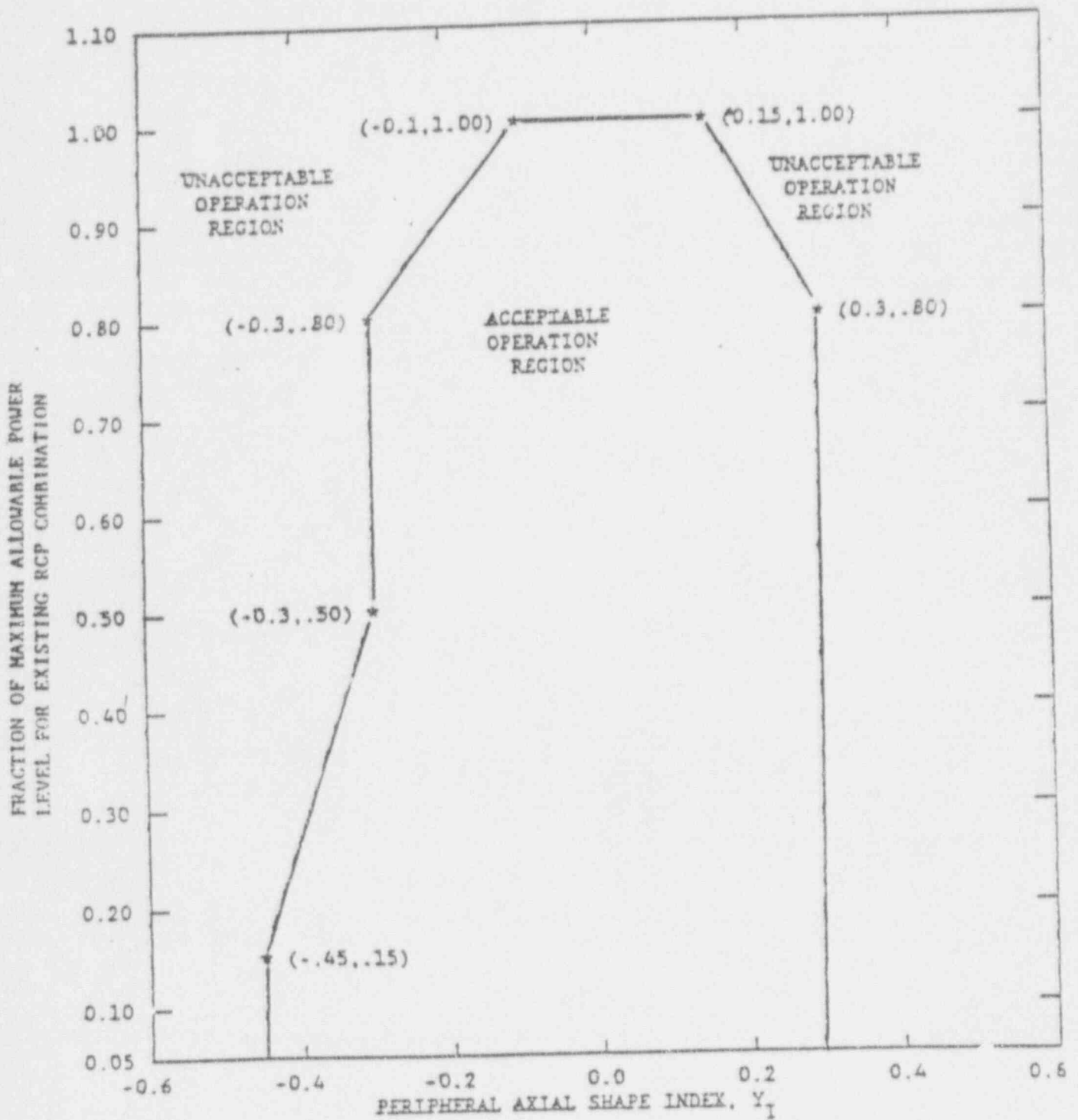


Figure 3.2-4  
DNB Axial Flux Offset Control Limits

QUESTION: 021 (1.00)

During a plant calorimetric calculation CVCS letdown and charging were inadvertently reported as being in service while they were actually isolated. How will this error affect the CALCULATED core thermal power?

- a. LESS THAN actual power since the CVCS heat loss constant is a negative term in the calculation
- b. EQUAL TO actual power since CVCS heat loss is not considered in the calorimetric calculation
- c. EQUAL TO actual power since there is essentially no net heat loss in the CVCS
- d. GREATER THAN actual power since the CVCS heat loss constant is a positive term in the calculation

QUESTION: 022 (1.00)

Which one of the following combinations states the dose rate limits above which the associated area must be posted as an Exclusion High Radiation Area or a Locked High Radiation Area?

- |    | EXCLUSION HIGH<br>RADIATION AREA | LOCKED HIGH<br>RADIATION AREA |
|----|----------------------------------|-------------------------------|
| a. | > 100 mr/hr                      | > 1 R/hr                      |
| b. | > 100 mr/hr                      | > 100 R/hr                    |
| c. | > 10 R/hr                        | > 1 R/hr                      |
| d. | > 10 R/hr                        | > 100 R/hr                    |

QUESTION: 023 (1.00)

Units 1 and 2 have experienced a loss of offsite power. The levels in the condensate storage tanks are as follows:

- 11 CST - 9.7 feet
- 12 CST - 29.6 feet
- 21 CST - 6.4 feet

How much time is left until cooldown is required to be commenced on both units? (Attachment 11 is provided for your use.)

- a. 6 hours
- b. 8 hours
- c. 10 hours
- d. 12 hours

*Question deleted LEB*

QUESTION: 024 (1.00)

A Unit 2 reactor trip has occurred. EOP-0 (Post-Trip Immediate Actions) is in progress. The Turbine Trip button has been depressed, but the 21 generator bus breaker (552-61) has remained closed and the turbine throttle valves are still open.

Which one of the following actions should be performed IMMEDIATELY per EOP-0?

- a. Locally trip the turbine
- b. Open 21 generator bus breaker, 552-61
- c. Stop EHC pump(s)
- d. Shut both MSIIVs

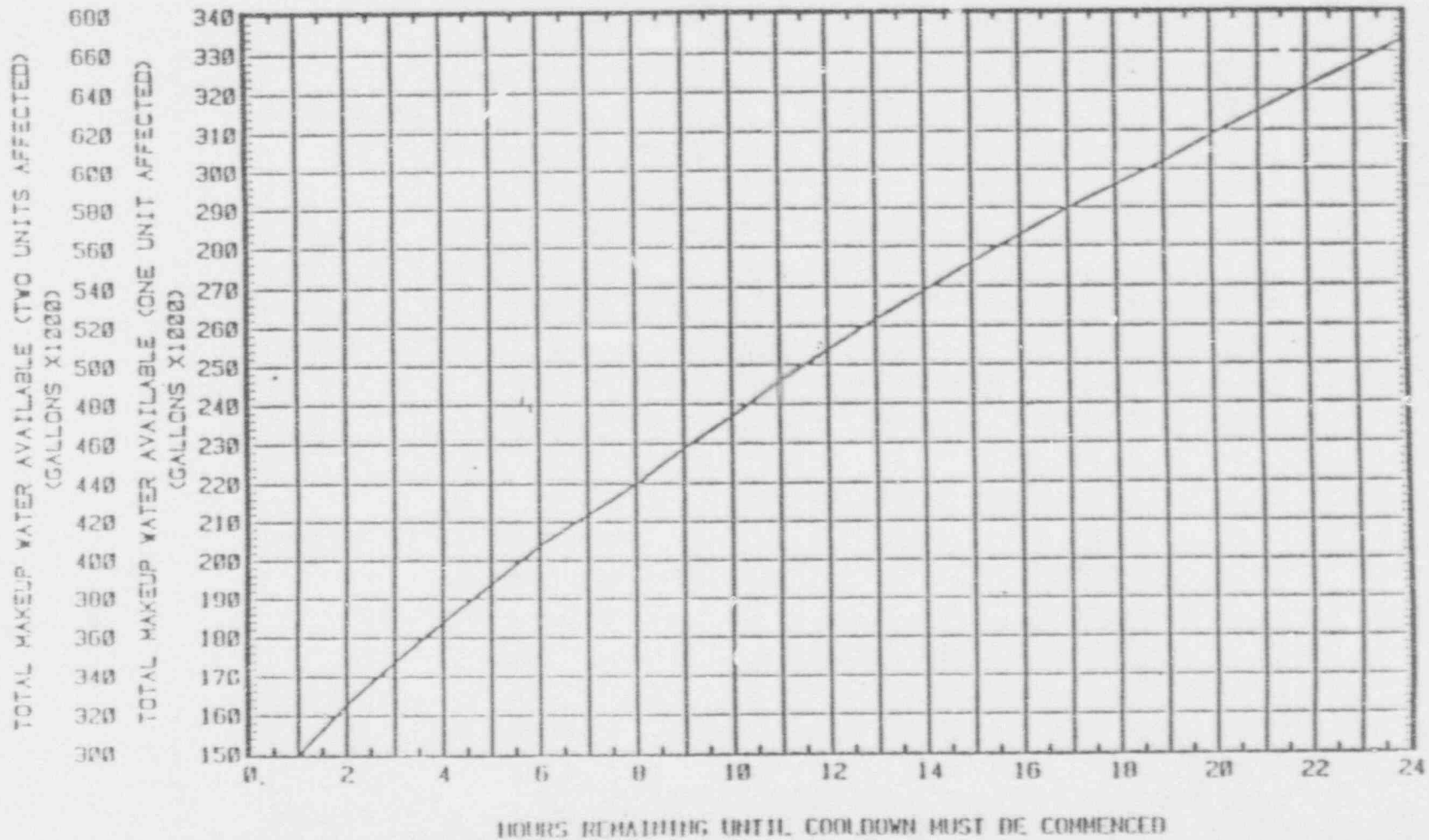


# MAKEUP WATER REQUIRED FOR RCS COOLDOWN

## MAKEUP REQUIRED VS. TIME UNTIL RCS COOLDOWN IS COMMENCED

( 1 FT. = 9636.78 GAL. )

CCOM CR  
88-1137



QUESTION: 025 (1.00)

Which of the following emergency diesel generator (EDG) shutdowns are BYPASSED when the EDG is automatically started by a SIAS?

- a. Jacket coolant high temperature and generator underfrequency
- b. Generator underfrequency and crankcase high pressure
- c. Crankcase high pressure and jacket coolant low pressure
- d. Jacket coolant low pressure and jacket coolant high temperature

QUESTION: 026 (1.00)

The following indications on the Power Range Nuclear Instrumentation for Channel A are observed:

Upper Detector - 33%  
Lower Detector - 27%

Which one of the following should be the indicated Channel A ASI?

- a. -0.10
- b. 01
- c. +. 01
- d. +0.10

QUESTION: 027 (1.50)

Match the Unit 1 nuclear instrumentation channels in column A to the appropriate type of detector from column B. (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only a single number may occupy each answer space.)

Column A (NIS CHANNEL)	Column B (DETECTOR)
_____ a. Wide Range Logarithmic	1. Self-powered neutron detector
_____ b. Power Range Control	2. Compensated ion chamber
_____ c. Power Range Safety	3. Uncompensated ion chamber
	4. Fission chamber
	5. Proportional detector

QUESTION: 028 (1.00)

After a loss of MCC-114, which one of the following boration flow paths would be AVAILABLE?

- RWT outlet valve and a charging pump
- 12 BA pump, BA direct M/U valve, and a charging pump
- 11 BA pump, BA flow control valve, VCT M/U valve, VCT outlet valve, and a charging pump
- 11 and 12 BAST gravity drain valves, and a charging pump

QUESTION: 029 (1.00)

When responding to a major leak that is NOT caused by a steam generator tube leak, which parameter below would be a reactor trip requirement per ACP-2A (Excessive RCS Leakage)?

- a. Pressurizer level at 99 inches
- b. Tavg at 547 degrees F
- c. Pressurizer pressure at TM/LP pre-trip value
- d. Leak rate greater than the capacity of 2 charging pumps

QUESTION: 030 (1.50)

List the 3 RMS alarms checked in the EOP-0 immediate actions, when monitoring for normal radiation levels external to containment. [0.5 each]

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

QUESTION: 031 (1.00)

Why are the CEDM cooling fans maintained in operation when the RCS is in a natural circulation cooldown with RCS temperature below 300 degrees F following a LOCA?

- a. Maintains a supply of air to the cavity cooling system
- b. Prevents condensation from building up on CEDM motor windings
- c. Keeps CEDM motor windings from overheating due to higher than normal containment air temperatures
- d. Aids in cooling reactor vessel head to help collapse any head voids which may have developed

QUESTION: 032 (1.00)

Which condition(s) is/are required to isolate the individual room supply and exhaust dampers to the control room and cable spreading rooms?

- a. Containment Radiation Signal (CRS)
- b. Hi Smoke alarm
- c. CRS and High Radiation signal from a local monitor
- d. Hi smoke alarm and High Radiation signal from a local monitor

QUESTION: 033 (1.00)

Under which one of the following conditions would BASSS be operable?

- a. Group 5 CEAs average height below 55% insertion and PA912 greater than zero
- b. All detectors at one level in a symmetric group have failed
- c. Reactor trip breakers open
- d. Reactor power at 48%

QUESTION: 034 (1.00)

What are the oxygen and curie content Technical Specification limits for the waste gas decay tanks?

	OXYGEN (Less Than Or Equal To)	NOBLE GAS (Less Than Or Equal To)
a.	4% by volume	58,500 curies
b.	4% by weight	53,500 curies
c.	6% by volume	58,500 curies
d.	6% by weight	53,500 curies

QUESTION: 035 (1.00)

The setpoint for the normal liquid effluent monitor is based on assumptions in the Offsite Dose Calculation Manual (ODCM).

Which one of the following would require the monitor setpoint to be decreased?

- a. Decrease in actual release rate from 120 gpm to 90 gpm
- b. Decrease in operating circ water pumps from 6 to 5
- c. Decrease in monitor background radiation level
- d. Decrease in Bay level

QUESTION: 036 (1.00)

Why is it important to secure a waste gas discharge promptly whenever the discharge CVs have shut on an effluent high radiation alarm?

- a. To prevent damage to the waste gas compressor
- b. To prevent damage to the effluent radiation monitor
- c. To prevent the header relief valve from lifting and discharging to the main vent
- d. To prevent the header relief valve from lifting and discharging to the surge tank

QUESTION: 037 (1.00)

When using the Auxiliary Spray valve, CV-517, what temperature input is used with Pressurizer temperature to determine the temperature differential per Technical Specifications?

- a. Loop charging inlet temperature
- b. RCS cold leg temperature
- c. Regenerative HX charging outlet temperature
- d. Volume control tank temperature

QUESTION: 038 (2.00)

Match the type of RCS leakage in column A with the TECH SPEC limit in column B. [0.5 each]  
 (The numbers in column B may be used once, more than once, or not all and only one number may occupy each answer space.)

COLUMN A (RCS LEAKAGE)	COLUMN B (TECH SPEC LIMIT)
_____ a. Pressurizer heater weld leak	1. 0 gpm
_____ b. PORV seat leakage	2. 0.5 gpm
_____ c. S/G tube leak	3. 1 gpm
_____ d. CV-516, L/D Isolation valve, body to bonnet leak	4. 5 gpm
	5. 10 gpm
	6. 50 gpm



QUESTION: 039 (1.00)

Given the following Quench Tank conditions and OI-1B, Quench Tank Operations (attached):

1. Pressure 9 psig
2. Temperature 140 degrees F
3. Level 32 inches

What action below should be taken to restore normal operating conditions in the quench tank?

- a. Drain the Quench Tank
- b. Fill the Quench Tank
- c. Raise Nitrogen pressure
- d. Bleed and Feed the Quench Tank

QUESTION: 040 (1.00)

RAS should occur upon a decreasing indicated RWT level of:

- a. 2.5 feet to 2.0 feet
- b. 2.0 feet to 1.5 feet
- c. 1.5 feet to 1.0 feet
- d. 1.0 feet to 0.5 feet

COMPLIANCE MANDATORY  
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CALVERT CLIFFS NUCLEAR POWER PLANT

OI-1B QUENCH TANK OPERATIONS

REVISION 7

	Signature	Date
ORIGINATOR:	<u><i>R. B. [unclear]</i></u>	<u>1 8/19/86</u>
REVIEWER:	<u><i>Richard L. Dasein</i></u>	<u>1 8/19/86</u>
POSRC:	MTG. NO. <u>86-59</u>	<u>1 8/27/86</u>
APPROVED:	<u><i>Shuil</i></u>	<u>1 8/27/86</u>

Manager-Nuclear Operations or General  
Supervisor-Operations if POSRC review is not required

LIST OF EFFECTIVE PAGES

<u>PAGE NUMBER</u>	<u>REVISION</u>
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<u>ATTACHMENTS</u>	<u>REVISION</u>
1A	7
1B, Pages 1-2	7

LIST OF EFFECTIVE CHANGES

<u>PAGE NUMBER</u>	<u>CHANGE NUMBER</u>
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7	90-1375, 88-1168
8	90-192
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ATTACHMENT (1A)	
1	87-185, 88-88, 88-1025
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2	87-185, 88-1025

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## QUENCH TANK OPERATIONS

### I. GENERAL PRECAUTIONS

- A. Do not exceed 50 PSIG Quench Tank pressure. Pressure in excess of 50 PSIG may distort the tank Rupture Disk.
- B. Quench Tank must be filled and read for operation before the Reactor Coolant System is heated above 210°F.
- C. Except for Bleed and Feed operation to cool Quench Tank, maintain Quench Tank level between the high and low level alarm setpoints and at approximately 28.5 inches.

### II. QUENCH TANK LINEUP FOR PLANT STARTUP

#### A. Initial Conditions

1. The Nitrogen System is lined up per OI-4.
2. The Demineralized Water System is lined up per OI-23B.
3. The Waste Gas System is lined up per OI-17B.
4. Reactor Coolant Drain Tank is capable of accepting liquid discharges from the Quench Tank.

#### B. Procedure

1. IF level is below the low level alarm point,  
THEN fill the Quench Tank to a desired level between the high and low level alarm per Section III.
2. IF level is above the high level alarm point,  
THEN drain the Quench Tank to a desired level between the high and low level alarm per Section IV.

88-1168

3. Open the Quench Tank Vent, RC-400-CV, and Containment Vent Isolations, WGS-2180-CV and WGS-2181-CV.
4. Open the Containment Nitrogen Supply Valve, N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2.
5. Purge the Quench Tank for 15 minutes.
6. Have Chemistry sample the Quench Tank to insure Oxygen concentration is less than 4%.
7. IF Oxygen concentration is greater than 4%,  
THEN continue purging.
8. WHEN Oxygen concentration is less than 4%,  
THEN shut RC-400-CV and WGS-2180-CV and 2181-CV.
9. WHEN Quench Tank pressure is approximately 3 PSIG,  
THEN shut the Containment Nitrogen Supply Valve, N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2.

### III. FILLING THE QUENCH TANK

#### A. Initial Conditions

1. The Waste Gas System is lined up per OI-17B.
2. The Demineralized Water System is lined up per OI-23B.

#### B. Procedure

1. Check shut the Containment Nitrogen Supply Valve, N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2.
2. Check shut the Quench Tank Drain Valve, RC-401-CV.

- NOTE -

- 90-1375 | DW-5460-CV shall be administratively controlled per Tech. Spec. 3.6.4.1, and CCI-114.
- 88-1168 |
3. Open the Quench Tank Demineralized Water Supply Valve, DW-5460-CV, and fill Quench Tank to a level between the high and low level alarm.
  4. Limit the Quench Tank pressure to less than 10 PSIG by venting to the Waste Gas header through RC-400-CV.
  5. WHEN level in the Quench Tank is at the desired level, THEN shut the Demineralized Water Supply Valve, DW-5460-CV.

IV. DRAINING THE QUENCH TANK

A. Initial Conditions

1. The Reactor Coolant Drain Tank is capable of accepting the Quench Tank discharge.
2. The Nitrogen System is lined up per OI-4.

B. Procedure

- CAUTION -

The Quench Tank may be drained below the low level alarm point only after the Reactor Coolant System has been cooled down below 210°F.

1. Open the Quench Tank Drain Valve, RC-401-CV.



2. IF a negative pressure is developed and the water does not flow out of the Quench Tank,  
THEN open the Containment Nitrogen Supply Valve, N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2, until a sufficient pressure, but no more than 10 PSIG, is built up in the Quench Tank to force out the water.
3. WHEN the desired level is attained,  
THEN shut the Quench Tank Drain Valve, RC-401-CV.
4. Shut N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2 if opened.

V. BLEED AND FEED OPERATION TO COOL THE QUENCH TANK

A. Initial Conditions

90-192

1. Quench Tank temperature is higher than normal due to leakage or discharge from any of the following:
  - Pressurizer Power Operated Relief Valve
  - Pressurizer Safety Valve
  - Safety Injection System Relief Valve
  - Pressurizer Vents
  - Reactor Vessel Head Vents
2. The Nitrogen System is lined up per OI-4.
3. The Demineralized Water System is lined up per OI-23B.
4. The Waste Gas System is lined up per OI-17B.
5. The RC Drain Tank is capable of accepting liquid discharges from the Quench Tank.

B. Procedure

- CAUTION -

Do not attempt to adjust the Quench Tank Parameters until after the relief or safety valve discharge has stopped.

88-1168

- CAUTION -

The Quench Tank may experience a rapid increase in pressure. Minimize the time that the Sparger Nozzles will be uncovered.

1. Open the Quench Tank Drain Valve, RC-401-CV, and drain the Quench Tank to not less than 15", then shut the drain valve.

- NOTE -

90-1375

DW-5460-CV shall be administratively controlled per Tech. Spec. 3 5.4.1, and CCI-114.

88-1168

2. Open the Quench Tank Demineralized Water Supply Valve, DW-5460-CV and fill the tank, to not greater than 35", then shut the Demineralized Water Supply Valve.
3. Repeat Steps 1 and 2 until Quench Tank temperature is less than 120°F and the Quench Tank High Temperature Alarm is clear.

88-1168

4. Drain Quench Tank to a level between the high and low level alarm.
5. Reduce the Quench Tank Pressure by opening the Quench Tank Vent Valve, RC-400-CV. Close the Vent Valve when the Quench Tank pressure approaches 3 PSIG to prevent bleeding excess Nitrogen to the Waste Gas header.

ATTACHMENT (1A)  
QUENCH TANK (UNIT 1)

VALVE NUMBER	NORMAL OP. POS	DESCRIPTION	LOCATION	INIT/ DATE	COMMENTS
87-185   1-N <sub>2</sub> -238	SHUT	CNTMT N <sub>2</sub> SUPPLY VLV	27' E PEN		
N <sub>2</sub> -246	LOCKED OPEN	11 QUENCH TK N <sub>2</sub> INLET VLV	ABOVE QT		
N <sub>2</sub> -247	----	11 QUENCH TK N <sub>2</sub> INLET CHK VLV	ABOVE QT		
1-DW-250	LOCKED OPEN	11 QUENCH TK DEMIN WTR SUPP HDR ISO VLV	ABOVE QT		
1-DW-251	----	DI H <sub>2</sub> O TO 11 QUENCH TK CHK VLV	ABOVE QT		
1-DW-280	LOCKED SHUT	HEAD WASH DOWN AREA DI H <sub>2</sub> O SUPPLY	69' HEAD LAYDOWN AREA		
87-185   1-DW-381	LOCKED SHUT	DI H <sub>2</sub> O TO RCP BAYS	N OF QT		
88-88   1-DW-382	SHUT	DI H <sub>2</sub> O TO 11A & 11B RCP'S	11 RCP PUMP BAY		
1-DW-383	SHUT	DI H <sub>2</sub> O TO 12A & 12B RCP'S	12 RCP PUMP BAY		
1-DW-5460-CV	SHUT	DEMIN WATER CNTMT ISO	27' E PEN		

- NOTE -

88-1025

ALL 'DW' VALVES APPEAR IN OI-23B DEMINERALIZED WATER.  
 ALL 'N<sub>2</sub>' VALVES APPEAR IN OI-4 NITROGEN GAS SYSTEM.

ATTACHMENT (1B)  
QUENCH TANK (UNIT 2)

87-185

VALVE NUMBER	NORMAL OP. POS	DESCRIPTION	LOCATION	INIT/ DATE	COMMENTS
N <sub>2</sub> -268	LOCKED OPEN	21 QUENCH TK N <sub>2</sub> INLET VLV	U-2 CNTMT		
N <sub>2</sub> -269	----	21 QUENCH TK N <sub>2</sub> INLET CHK VLV	U-2 CNTMT		
N <sub>2</sub> -272	SHUT	21&22 SG & PZR & QT N <sub>2</sub> SUPP	ON WEST WALL OF CNTMT 27' E PEN RM		
N <sub>2</sub> -348	----	21 RC DRN TK SUPP CKV	27' E PEN		
N <sub>2</sub> -349	----	21 & 22SG 21 PZR, QT TK, SUPP CKV	W WALL U-2 27' E PEN RM		
N <sub>2</sub> -398	----	QT & SG N <sub>2</sub> CKV	U-2 CNTMT PEN #20C		
N <sub>2</sub> -399	SHUT	QT & SG TEST CONN	U-2 CNTMT PEN #20C		
N <sub>2</sub> -400	OPEN	STM GEN & QUENCH TK N <sub>2</sub> ISO (INSIDE)	U-2 CNTMT PEN #20C		
2-DW-384	LOCKED SHUT	DI H <sub>2</sub> O TO RCP BAYS			
2-DW-385	SHUT	DI H <sub>2</sub> O TO 21A & 21B RCP'S	@ 21A RCP BAY		

- NOTE -

88-1025

ALL 'DW' VALVES APPEAR IN OI-23B DEMINERALIZED WATER.  
 ALL 'N<sub>2</sub>' VALVES APPEAR IN OI-4 NITROGEN GAS SYSTEM.

ATTACHMENT (1B)  
QUENCH TANK (UNIT 2)

87-185

VALVE NUMBER	NORMAL OP. POS	DESCRIPTION	LOCATION	INIT/DATE	COMMENTS
2-DW-386	SHUT	DI H <sub>2</sub> O TO 22A & 22B RCP'S	@ 22A RCP BAY		
2-DW-387	SHUT	21 QUENCH TK DI H <sub>2</sub> O SUPP HDR VENT VLV			
2-DW-388	LOCKED SHUT	HEAD WASH-DOWN AREA DI H <sub>2</sub> O SUPP			
2-DW-389	LOCKED OPEN	21 QUENCH TK DI H <sub>2</sub> O SUPP HDR ISO VLV			
2-DW-390	-----	21 QUENCH TK DI H <sub>2</sub> O SUPP HDR CHK VLV			
2-DW-391	SHUT	21 QT DW HDR VENT B/U	@ QUENCH TANK		
2-DW-5460-CV	SHUT	DEMIN WTR CONTMT ISOL OUTSIDE CONTMT	OUTSIDE U-2 CONTMT		

- NOTE -

88-1025

ALL 'DW' VALVES APPEAR IN OI-23B DEMINERALIZED WATER.  
 ALL 'N<sub>2</sub>' VALVES APPEAR IN OI-4 NITROGEN GAS SYSTEM.

QUESTION: 041 (2.00)

*Unit 1*

Match each component listed in Column A to the ESFAS signal in Column B that will operate it. [0.5 each]

(The numbers in Column B may be used once, more than once, or not at all and only one number may occupy each answer space.)

COLUMN A (COMPONENT)	COLUMN B (ESFAS SIGNAL)
_____ a. Containment Iodine Filter	1. CSAS
_____ b. Main Steam Isolation Valves	2. CIS
_____ c. Hydrogen Purge Containment Isolation Valves	3. SIAS
_____ d. Containment Waste Gas Header Vent (CV-2181)	4. CRS
	5. RAS

QUESTION: 042 (1.00)

Unit 1 is at rated power with 11 AFW pump aligned for auto initiation. The following sequence of conditions occurs in the S/Gs, commencing with an automatic reactor trip at TIME=0.

TIME	CONDITIONS
+10 seconds	SGIS
+20 seconds	11 S/G: 800 psia, -130 inches 12 S/G: 625 psia, -140 inches
+30 seconds	11 S/G: 750 psia, -140 inches 12 S/G: 525 psia, -200 inches

At +30 seconds, which AFW pumps should be running? (Assume NO operator action is taken.)

- a. None
- b. 13 only
- c. 11 & 13 only
- d. 11, 13, and 23

QUESTION: 043 (1.00)

Given the following conditions:

- 1) Unit 1 reactor tripped
- 2) S/G 11 pressure is 890 psia
- 3) S/G 12 pressure is 750 psia
- 4) S/G 11 level is -180 inches
- 5) S/G 12 level is -210 inches

Which action below is expected to have occurred?

- a. AFW Blocking valves to #11 S/G should have closed
- b. AFW Blocking valves to #12 S/G should have closed
- c. 11 AFW pump should have tripped
- d. 11 and 13 AFW pumps should have tripped

QUESTION: 044 (1.00)

The local keyswitch for 11 AFW pump has been placed in the disable position. What effect does this have on the 11 AFW pump?

- a. Turbine cannot be tripped locally
- b. Turbine overspeed protection is defeated
- c. Control room trip function is defeated
- d. Turbine control is transferred to 1C43



QUESTION: 045 (1.00)

Which NI indication is lost on a loss of 120 VAC bus 2Y02?

- a. 1C15 channel A wide range
- b. 1C15 channel B linear range
- c. 2C43 channel B aux excore wide range
- d. 1C43 channel B aux excore wide range

QUESTION: 046 (1.00)

Which one of the following is an output of the Reactor Regulating System power ratio calculator?

- a. Secondary Calorimetric Power Calculation
- b. Axial Shape Index
- c. Axial Flux Offset
- d. Azimuthal Power Tilt

QUESTION: 047 (1.00)

While operating at 100% power, T-hot RTD TE-111X fails LOW. How will the following respond with no operator action?

- |    | LETDOWN FLOW | B/U HEATERS | B/U CHARGING PUMP |
|----|--------------|-------------|-------------------|
| a. | Increases    | Deenergize  | Starts            |
| b. | Increases    | Energize    | Stops             |
| c. | Decreases    | Deenergize  | Starts            |
| d. | Decreases    | Energize    | Stops             |

QUESTION: 048 (1.00)

Which one of the following describes how the VOPT setpoint is maintained during a reactor power decrease?

- a. Automatically, by the level 1 bistable
- b. Manually, until power is less than 10E-4%
- c. Automatically, at a value 10% higher than Qpower
- d. Manually until power is less than 30%

QUESTION: 049 (1.00)

Which one of the following parameters is sensed to provide the Loss-of-Load input signal to the RPS Loss-of-Load trip units on Unit 2?

- a. Low pressure on turbine auto-stop oil header
- b. Low pressure on turbine emergency trip system header
- c. Voltage on turbine master trip bus
- d. Voltage in turbine power-load unbalance circuit

QUESTION: 050 (1.00)

Which statement describes the response of the variable pressure signal (Pvar) input to TM/LP setpoint as ASI changes?

- a. Pvar increases as ASI changes from -0.5 to -0.2
- b. Pvar decreases as ASI approaches optimum ASI (+0.2)
- c. Pvar remains constant as ASI approaches optimum ASI (+0.2)
- d. Pvar remains constant as ASI changes from +0.2 to +0.5

QUESTION: 051 (1.00)

Which one of the following conditions would cause a STOP MOTION signal to be supplied to the CEA group programmer modules?

- a. During withdrawal, highest CEA in group reaches 130.5 inches
- b. During withdrawal, lowest CEA in group reaches 129 inches
- c. During insertion, highest CEA in group reaches 6 inches
- d. During insertion, lowest CEA in group reaches 3 inches

QUESTION: 052 (1.00)

When a manual reactor trip is attempted the reactor does NOT trip after depressing the manual trip pushbuttons. FOP-0 alternate actions require feeder breakers to 480 VAC busses supplying the CEDM MG sets to be tripped. Which action below will accomplish this?

- a. Trip CEDM MG set feeder breakers on 11A & 12A 480V busses and open tie breakers
- b. Trip CEDM MG set feeder breakers on 12A & 13A 480V busses and open tie breakers
- c. Trip CEDM MG set feeder breakers on 13A & 14A 480V busses and open tie breakers
- d. Trip CEDM MG set feeder breakers on 11A & 14A 480V busses and open tie breakers

QUESTION: 053 (1.00)

Which one of the following will cause a GROUP OUT OF SEQUENCE signal?

- a. More than one group between UCS and LCS or 2 adjacent groups within 86 inches of each other and not at the LSP or USP
- b. More than one group between LSP and USP or 2 adjacent groups within 86 inches of each other and not at the LCS or UCS
- c. More than one group between UCS and LCS or 2 adjacent groups within 93 inches of each other and not at the LSP or USP
- d. More than one group between LSP and USP or 2 adjacent groups within 93 inches of each other and not at the LCS or UCS

QUESTION: 054 (1.00)

During an extended loss of the Unit 1 plant computer, it becomes necessary to insert the group 5 CEAs from the fully withdrawn position. The counter readings were taken before and after CEA insertion. If the counter reading increases by 10, what is the new group 5 CEA height?

- a. 132.5 inches
- b. 130.0 inches
- c. 127.5 inches
- d. 125.0 inches

QUESTION: 055 (1.00)

What is the minimum level requirement for pressurizer operability while operating in MODE 1?

- a. 101 inches
- b. 133 inches
- c. 145 inches
- d. 160 inches

QUESTION: 056 (1.00)

Given the following conditions for the Pressurizer level controller:

- Controlling setpoint is generated by the RRS
- Local setpoint is indicated by the setpoint index
- Remote setpoint light is on
- Process indicator indicates the remote setpoint

In what position is the pressurizer level controller Local Remote Selector Switch?

- a. Local Process
- b. Local-Remote Compare
- c. Remote-Remote Compare
- d. Remote Process

QUESTION: 057 (1.00)

Unit 2 is in MODE 6 with all CEAs inserted following a normal plant shutdown, when an invalid SIAS occurs. What set of procedures should be referenced to determine the validity of the signal?

- a. Emergency procedures
- b. Abnormal operating procedures
- c. Normal operating procedures
- d. Alarm response procedures

QUESTION: 058 (1.00)

Which one of the following events requires 1 hour prompt notification of the NRC?

- a. Spurious CVCIS caused by a voltage spike
- b. Automatic reactor trip due to RCP trip
- c. Main turbine trip on overspeed while paralleling the generator
- d. Inadvertent SIAS with HPSI injection

QUESTION: 059 (1.00)

Which condition indicates the expected relationship between core exit thermocouple (CET) temperature and T-hot while operating in Mode 2?

- a. CET values are equal to T-hot
- b. CET values are approximately 5 degrees F less than T-hot
- c. CET values are approximately 15 degrees F greater than T-hot
- d. CET values are approximately 15 degrees F less than T-hot

QUESTION: 060 (1.00)

What is the purpose of the power load unbalance circuit in the Unit 1 EHC system?

- a. Quickly shuts the control valves (only) to prevent an overload condition
- b. Quickly shuts the control and intercept valves to prevent an overload condition
- c. Quickly shuts the control and intercept valves to prevent an overspeed condition
- d. Quickly shuts the control valves (only) to prevent an overspeed condition

QUESTION: 061 (1.00)

Why is steady state reactive load on the U-1 main generator limited to 85 MVAR in the lead direction?

- a. To prevent a generator overcurrent trip
- b. To prevent the generator from slipping a pole
- c. To prevent overheating the main transformer
- d. To prevent overheating the stator windings

QUESTION: 062 (1.00)

When an alarm annunciator is removed from service, a \_\_\_\_\_ sticker is placed on the alarm annunciator window.

- a. red
- b. yellow
- c. white
- d. blue



QUESTION: 063 (1.00)

Locked valve MS-109, 21 AFW Pump Main Steam Supply, was closed and tagged for repairs on 21 AFW pump. When repairs were completed, MS-109 was opened and locked by a licensed operator. Does another LICENSED operator have to verify the status of MS-109? Select the correct answer and reason from the following choices.

- a. Yes, because the second verifier of restored locked valves must be a licensed operator
- b. Yes, because two licensed operators are required to verify the position of restored locked valves
- c. No, because only one licensed operator is required to participate in the verification process for locked valves
- d. No, because any person qualified to operate this valve may perform the second verification

QUESTION: 064 (1.00)

EOP-1 directs the operator to, "Verify heaters or sprays restoring pressurizer pressure to between 2225 and 2275 psia."

When used in the above example, what does the term "VERIFY" mean?

- a. To observe an expected condition or characteristic; to determine; to ascertain
- b. To watch or monitor; to visually take note of; to pay attention to
- c. To attend to displays to determine equipment operating conditions
- d. To make sure by taking necessary or appropriate actions

QUESTION: 065 (1.00)

During verification of a FULLY OPEN manually operated valve, the operator should:

- a. fully close the valve, then reopen the valve to the fully open position
- b. operate the valve handwheel in the open direction, if the handwheel does not move, the valve is fully open
- c. operate the valve handwheel in the open direction until the valve is backseated one-half turn
- d. operate the valve handwheel in the close direction, then reopen the valve to the fully open position

QUESTION: 066 (1.00)

A reactor trip has occurred on Unit 2 and AFW pumps 21 and 23 are operating and feeding both steam generators. If a loss of instrument air pressure occurs, AFW flow rate to the steam generators will initially: (Assume no operator action.)

- a. increase, because the 21 AFW pump turbine will increase speed
- b. increase, because all AFW flow control valves associated with AFW pump 23 will fail open
- c. decrease, because the 21 AFW pump turbine will decrease speed
- d. decrease, because all AFW flow control valves associated with AFW pump 23 will fail closed

QUESTION: 067 (1.00)

Unit 2 has experienced a loss of all feedwater event with T-ave at 550 degrees F and increasing. A caution in (EOP-3) Total Loss of All Feedwater, states:

"After S/G becomes ineffective for heat removal, Once Through Core Cooling must be initiated prior to CET temperature reaching 560 degrees F to ensure adequate heat removal."

What is the basis for the 560 degrees F CET limit?

- a. It corresponds to a saturation pressure low enough to allow adequate HPSI flow
- b. It corresponds to a saturation pressure high enough to prevent reactor vessel head voiding
- c. It ensures a minimum RCS subcooling of 30 degrees F at the pressurizer PORV lift setpoint
- d. It ensures an adequate shutdown margin exists prior to commencing the cooldown

QUESTION: 068 (1.00)

Unit 2 has experienced a tube rupture in 21 S/G and a loss of offsite power. An RCS cooldown is in progress by steaming 22 S/G to atmosphere. During the cooldown the CRO observes that loop 21 T-hot is 500 degrees F and loop 21 T-cold is 525 degrees F. The CRO is required to:

- a. Continue the RCS cooldown expecting to see loop 21 T-cold decrease and T-hot increase
- b. Stop the RCS cooldown until normal natural circulation is established in loop 21
- c. Stop the RCS cooldown because the wrong S/G is being steamed
- d. Continue the RCS cooldown because the temperature indications are expected

QUESTION: 069 (1.00)

How will core voiding affect the indication of the source range nuclear instrumentation in a shutdown reactor?

- a. Indication decreases because decreased coolant density results in less neutron leakage
- b. Indication increases because decreased coolant density results in more neutron leakage
- c. Indication decreases because decreased coolant density causes a greater time delay between power changes and neutron leakage reaching the detectors
- d. Indication increases because decreased coolant density causes a positive reactivity effect in a partially voided core

QUESTION: 070 (1.00)

Which one of the following explains the cause of iodine spiking following power transients?

- a. Iodine is normally contained within the fuel pins but escapes via pinhole leaks during a power change
- b. Iodine is released from burnable poison pins as the rate of neutron absorption changes during a power transient
- c. Iodine is a daughter of xenon which always increases during a power change
- d. Iodine is a major source of RCS activity and is released from the crud during a power transient

QUESTION: 071 (1.00)

Unit 2 is operating at 100% power when CCW to RCP 22B is isolated. What operator action is required?

- a. Trip RCP 22B immediately
- b. Trip RCP 22B within 10 minutes
- c. Trip RCP 22B after conducting an expeditious shutdown
- d. RCP 22B may operate with no restrictions as long as controlled bleedoff flow is maintained

QUESTION: 072 (1.00)

Unit 1 is performing a reactor startup. During CEA withdrawal, criticality is observed with group 3 CEAs at 40 inches. What operator action is required by Technical Specifications?

- a. Immediately trip the reactor
- b. Immediately commence a normal reactor shutdown
- c. Immediately commence insertion of group 3 control rods to 0 inches
- d. Immediately commence borating at greater than 40 gpm of 2300 ppm boric acid until shutdown margin is restored

QUESTION: 073 (1.00)

During the restoration of a tagout, which one of the following is responsible for establishing the sequence for restoration of tagged components?

- a. Safety Tagging Supervisor
- b. Shift Supervisor
- c. Plant Watch Supervisor
- d. Control Room Supervisor

QUESTION: 074 (1.00)

While completing the daily operating log, the Control Room Operator discovers regenerative heat exchanger outlet temperature indication that is outside the allowable range listed on the log sheet. How should the operator log this abnormal condition?

- a. Enter the abnormal reading and circle the entry. Document the cause and/or corrective action being taken in the comments section. No further documentation is required.
- b. Return regenerative heat exchanger outlet temperature to the normal range and enter the new value for the indication in the logs. No further documentation is required.
- c. Enter the abnormal reading and place an asterisk next to the entry. Document the cause and/or corrective action being taken at the bottom of the log on the same page as the abnormal reading. No further documentation is required.
- d. Notify the Control Room Supervisor of the abnormal condition. Restore regenerative heat exchanger outlet temperature to the normal range and ensure the Shift Supervisor's log is updated. No further documentation is required.

QUESTION: 075 (1.00)

With the exception of the fire brigade leader, the Fire Brigade shall consist of at least \_\_\_\_\_ individual(s) from the Operation Watch Section and no more than \_\_\_\_\_ individual(s) from any other plant section.

- a. 2; 2
- b. 2; 1
- c. 3; 2
- d. 3; 1

QUESTION: 076 (1.00)

A Reactor Operator has worked the following hours on the dates indicated:

DATE	HOURS WORKED
3/12/92	- 0800 through 2000
3/13/92	- 0800 through 1800
3/14/92	- 0800 through 2200
3/15/92	- 0800 through 2000
3/16/92	- 0800 through 1600
3/17/92	- 0800 through 2000
3/18/92	- 0800 through 2200

On which of the above dates did this operator FIRST violate the overtime requirements? (CCI-159, Use of Overtime, pages 2 and 3 are attached for your reference.)

- a. 3/13/92
- b. 3/15/92
- c. 3/17/92
- d. 3/18/92

- NOTE -

Key Maintenance Personnel are those personnel who are responsible for the correct performance of maintenance, repair, modification, or calibration of Plant structures, systems or components, and who are personnel performing or immediately supervising the performance of such activities. The term applies to all personnel performing these functions, regardless of whether or not they are assigned to the Shift Staff.

- E. Other personnel directly involved with operating, maintenance, and testing. (See Attachment 3)

II. CANCELLATION

This Instruction cancels and supersedes Section XIV of CCI-140F.

III. WORK HOURS

- A. Whenever possible, supervisors should endeavor to develop work schedules such that overtime is avoided. However, when circumstances require overtime, the following guidelines shall be used.
1. An individual should not be permitted to work more than:
    - a. Sixteen (16) hours straight.
    - b. Sixteen (16) hours in any twenty-four (24) hour period.
    - c. Twenty-four (24) hours in any forty-eight (48) hour period.



- d. Seventy-two (72) hours in any seven (7) day period.

- NOTE -

For a, b, c, and d above turnover time and travel time between home and Calvert Cliffs for call in situations are not to be included.

2. There should be a break of at least eight (8) hours between work periods (including shift turnover and travel time).
  3. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.
- B. Deviations from the above guidelines, when necessitated by extraordinary circumstances, shall be preapproved in writing by the Plant General Manager or the individual's Superintendent or General Supervisor by use of Attachment (1). This authorization shall include a brief description of the extenuating circumstances. During periods when the above mentioned personnel are not on site, the individual shall initiate Attachment (1) and present it to the Shift Supervisor for approval. The Shift Supervisor will forward the approved Attachment (1) to the individual's General Supervisor, who shall review and initial the form.
- C. It is the responsibility of the individual to notify his Supervision of any deviations to this Instruction and initiate Attachment (1).

QUESTION: 077 (1.00)

A plant accident has resulted in the declaration of a Site Emergency. Which one of the following describes the normal transfer of responsibility for the Site Emergency Coordinator?

- a. Shift Supervisor to Recovery Officer to Plant General Manager
- b. Shift Supervisor to Plant General Manager to Recovery Officer
- c. Shift Supervisor to TSC Director to EOF Director
- d. Shift Supervisor to TSC Director to OSC Director

QUESTION: 078 (1.50)

Match the emergency organizations in column A to the appropriate reporting location from column B. (0.5 for each)

(Numbers in column B may be used once, more than once, or not at all and only one number may occupy each answer space.)

COLUMN (ORGANIZATION)	COLUMN B (LOCATION)
___ a. Emergency Operations Facility	1. Interim Office Building
___ b. Technical Support Center	2. Auxiliary Building
___ c. Operational Support Center	3. Control Room
	4. Calvert Industrial Park

QUESTION: 079 (1.00)

Which one of the following is the LOWEST emergency classification that will require the activation of the Emergency Operations Facility, Technical Support Facility, AND the Operational Support Facility?

- a. Site Emergency
- b. Alert
- c. General Emergency
- d. Unusual Event

QUESTION: 080 (1.00)

Which one of the following should be commenced only AFTER the on-coming shift has assumed the watch?

- a. Formal shift briefing of the shift
- b. Filling out the appropriate Shift Turnover Checklists
- c. Control board walkdown by the on-coming CRO
- d. Face-to-face turnover of items affecting plant operation by on-coming and off-going RO

QUESTION: 081 (1.00)

A normal plant shutdown is in progress with the following conditions:

- Pressurizer pressure at 415 psig and slowly decreasing
- Pressurizer level at 160 inches and slowly decreasing

A leaking pressurizer PORV is suspected. Which one of the following is the expected PORV tailpipe temperature if the PORV is partially open? (Assume downstream pressure is atmospheric and 100% steam quality in the pressurizer.)

- a. 652 degrees F
- b. 450 degrees F
- c. 330 degrees F
- d. 212 degrees F

QUESTION: 082 (1.00)

Unit 2 is operating at 90% power when a Steam Generator Low Level reactor trip is received. What actions are required by the crew to satisfy the reactivity control requirements of EOP-0, Post-Trip Immediate Actions?

- a. Depress one set of manual trip pushbuttons at 2C05 or 2C15 only if the reactor did not initially trip
- b. Depress one set of manual trip pushbuttons at 2C05 or 2C15 whether or not the reactor initially tripped
- c. Depress both sets of manual trip pushbuttons at 2C05 and 2C15 only if the reactor did not initially trip
- d. Depress both sets of manual trip pushbuttons at 2C05 and 2C15 whether or not the reactor initially tripped

QUESTION: 083 (1.00)

During refueling of Unit 2, with a spent fuel assembly raised to the hoist-up limit (above the reactor vessel flange), the maximum credible failure of the refueling pool seal occurs. Select the approximate time required for the radiation dose rate at the Fuel Handling Machine Platform to reach 1R/hr with no operator action. (Assume the Transfer Tube Gate valve is open.)

- a. 3 minutes
- b. 30 minutes
- c. 3 hours
- d. 30 hours

QUESTION: 084 (1.00)

Unit 2 is in Mode 1 with the following conditions for the RWT:

- 410,000 gallons
- 2350 ppm boron
- 85 degrees F

What is the operability status of the RWT?

- a. Operable
- b. Inoperable due to water volume
- c. Inoperable due to boron concentration
- d. Inoperable due to temperature

QUESTION: 085 (1.00)

Which one of the following lists the 480 volt bus power supplies for the Unit 2 hydrogen recombiners?

- |    | 21 RECOMBINER | 22 RECOMBINER |
|----|---------------|---------------|
| a. | Bus 21B       | Bus 22B       |
| b. | Bus 23B       | Bus 22B       |
| c. | Bus 21B       | Bus 24B       |
| d. | Bus 23B       | Bus 24B       |

QUESTION: 086 (1.00)

Which one of the following conditions will satisfy an interlock to allow travel of the fuel transfer carriage from the refueling pool to the spent fuel pool?

- Both the Spent Fuel Handling Machine and the Refueling Machine must be out of the upender area
- Either the Spent Fuel Handling Machine or the Refueling Machine must be out of the upender area
- Both upenders must be in the horizontal position
- Dillon load cell indicates that a fuel assembly is loaded in the fuel transfer carriage

QUESTION: 087

Which one of the following contains actions that are specifically identified in AOP-9A (Control Room Evacuation) to be performed within the first hour after the control room has been evacuated due to a fire?

- Stop all RCPs and isolate letdown
- Stop all RCPs and establish charging flow
- Establish AFW flow and charging flow
- Establish AFW flow and isolate letdown

(\*\*\*\*\* END OF EXAMINATION \*\*\*\*\*)

## ANSWER KEY

## MULTIPLE CHOICE

001 a  
002 a  
003 d  
004 a  
005 a

006 a

007 MATCHING

a 1 (or 5)  
b 1 (or 5)  
c 7  
d 2

008 MATCHING

a 4  
b 2  
c 4  
d 2

## MULTIPLE CHOICE

009 b

010 MATCHING

a 2  
b 4  
c 4  
d 1

## MULTIPLE CHOICE

011 c

012 MATCHING

a 2  
b 2  
c 3  
d 6

## MULTIPLE CHOICE

013 b

014 c

015 a

016 b

017 MATCHING

a 2  
b 1  
c 2  
d 5

A N S W E R   K E Y

018    MATCHING

- a    5
- b    4
- c    8
- d    3

MULTIPLE CHOICE

- 019    a
- 020    b
- 021    d
- 022    c
- ~~023~~   ~~⊗~~ - *question deleted JRB*
- 024    d
- 025    d
- 026    a

027    MATCHING

- a    4
- b    3
- c    3

MULTIPLE CHOICE

- 028    b
- 029    c

030    COMPLETION

- 1    Main Vent Gaseous (RM-5415)
- 2    Condenser Offgas (RM-1732)
- 3    S/G Blowdown (RM-4010/4095)

MULTIPLE CHOICE

- 031    d
- 032    b
- 033    d
- 034    a
- 035    c
- 036    d
- 037    c

038    MATCHING

- a    1
- b    5
- c    3
- d    5

MULTIPLE CHOICE

- 039    d
- 040    d



## ANSWER KEY

## 041 MATCHING

a 2

b 1

*grb* c 4 (OR) 3

d 3

## MULTIPLE CHOICE

042 a

043 b

044 c

045 d

*grb* 046 c (OR) B

047 b

048 c

049 a

050 b

051 c

052 b

053 b

054 c

055 b

056 c

057 d

058 d

059 a

060 c

061 b

062 d

063 a

064 d

065 d

066 a

067 a

068 d

069 b

070 a

071 b

072 d

073 d

074 a

075 d

076 b

077 b

078 MATCHING

a 4

b 2

c 1

A N S W E R   K E Y

M U L T I P L E   C H O I C E

- 079   b
- 080   a
- 081   c
- 082   b
- 083   b
- 084   a
- 085   c
- 086   c
- 087   c

(\*\*\*\*\* END OF EXAMINATION \*\*\*\*\*)

ATTACHMENT 2

RO WRITTEN EXAMINATION AND ANSWER KEY

# MASTER

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

CANDIDATE'S NAME: \_\_\_\_\_  
FACILITY: Calvert Cliffs 1 & 2  
REACTOR TYPE: PWR-CE  
DATE ADMINISTERED: 92/04/27

INSTRUCTIONS TO CANDIDATE:

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires a final grade of at least 80%. Examination papers will be picked up four (4) hours after the examination starts.

<u>TEST VALUE</u>	<u>CANDIDATE'S SCORE</u>	<u>%</u>	
95.5 *			
<u>96.50</u>			
	<u>FINAL GRADE</u>	<u>%</u>	TOTALS

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

\_\_\_\_\_  
Candidate's Signature

Question 17 deleted  
XFB

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

MULTIPLE CHOICE

001 a b c d \_\_\_\_

002 a b c d \_\_\_\_

003 MATCHING

a \_\_\_\_

b \_\_\_\_

c \_\_\_\_

d \_\_\_\_

004 MATCHING

a \_\_\_\_

b \_\_\_\_

c \_\_\_\_

d \_\_\_\_

MULTIPLE CHOICE

005 a b c d \_\_\_\_

006 MATCHING

a \_\_\_\_

b \_\_\_\_

c \_\_\_\_

d \_\_\_\_

MULTIPLE CHOICE

007 a b c d \_\_\_\_

008 a b c d \_\_\_\_

009 a b c d \_\_\_\_

010 MATCHING

a \_\_\_\_

b \_\_\_\_

c \_\_\_\_

d \_\_\_\_

011 COMPLETION

a \_\_\_\_

b \_\_\_\_

012 MATCHING

a \_\_\_\_

b \_\_\_\_

c \_\_\_\_

d \_\_\_\_

MULTIPLE CHOICE

013 a b c d \_\_\_\_

014 a b c d \_\_\_\_

015 a b c d \_\_\_\_

016 a b c d \_\_\_\_

017 a b c d \_\_\_\_

018 a b c d \_\_\_\_

019 a b c d \_\_\_\_

020 a b c d \_\_\_\_

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

021 a b c d \_\_\_

022 a b c d \_\_\_

023 a b c d \_\_\_

024 a b c d \_\_\_

025 MATCHING

a \_\_\_

b \_\_\_

c \_\_\_

MULTIPLE CHOICE

026 a b c d \_\_\_

027 a b c d \_\_\_

028 a b c d \_\_\_

029 a b c d \_\_\_

030 a b c d \_\_\_

031 a b c d \_\_\_

032 a b c d \_\_\_

033 COMPLETION

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

MULTIPLE CHOICE

034 a b c d \_\_\_

035 a b c d \_\_\_

036 a b c d \_\_\_

037 a b c d \_\_\_

038 MATCHING

a \_\_\_

b \_\_\_

c \_\_\_

d \_\_\_

MULTIPLE CHOICE

039 a b c d \_\_\_

040 a b c d \_\_\_

041 MATCHING

a \_\_\_

b \_\_\_

c \_\_\_

d \_\_\_

MULTIPLE CHOICE

042 a b c d \_\_\_

043 a b c d \_\_\_

044 a b c d \_\_\_

045 a b c d \_\_\_

046 a b c d \_\_\_

047 a b c d \_\_\_

048 a b c d \_\_\_

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

049 a b c d \_\_\_

050 a b c d \_\_\_

051 a b c d \_\_\_

052 a b c d \_\_\_

053 a b c d \_\_\_

054 a b c d \_\_\_

055 a b c d \_\_\_

056 a b c d \_\_\_

057 a b c d \_\_\_

058 a b c d \_\_\_

059 a b c d \_\_\_

060 a b c d \_\_\_

061 a b c d \_\_\_

062 a b c d \_\_\_

063 a b c d \_\_\_

064 a b c d \_\_\_

065 a b c d \_\_\_

066 a b c d \_\_\_

067 a b c d \_\_\_

068 MATCHING

a \_\_\_

b \_\_\_

c \_\_\_

d \_\_\_

MULTIPLE CHOICE

069 a b c d \_\_\_

070 a b c d \_\_\_

071 a b c d \_\_\_

072 a b c d \_\_\_

073 a b c d \_\_\_

074 a b c d \_\_\_

075 MATCHING

a \_\_\_

b \_\_\_

c \_\_\_

MULTIPLE CHOICE

076 a b c d \_\_\_

077 a b c d \_\_\_

078 a b c d \_\_\_

079 a b c d \_\_\_

080 a b c d \_\_\_

081 a b c d \_\_\_

## A N S W E R   S H E E T

Multiple Choice    (Circle or X your choice)

If you change your answer, write your selection in the blank.

082    a    b    c    d    \_\_\_\_

083    a    b    c    d    \_\_\_\_

084    a    b    c    d    \_\_\_\_

085    a    b    c    d    \_\_\_\_

086    a    b    c    d    \_\_\_\_

087    a    b    c    d    \_\_\_\_



## 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. After the examination has been completed, you must sign the statement on the cover sheet indicating that the work is your own and you have not received or given assistance in completing the examination. This must be done after you complete the examination.
3. Restroom trips are to be limited and only one applicant 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.
4. Use black ink or dark pencil ONLY to facilitate legible reproductions.
5. Print your name in the blank provided in the upper right-hand corner of the examination cover sheet and each answer sheet.
6. Mark your answers on the answer sheet provided. USE ONLY THE PAPER PROVIDED AND DO NOT WRITE ON THE BACK SIDE OF THE PAGE.
7. Before you turn in your examination, consecutively number each answer sheet, including any additional pages inserted when writing your answers on the examination question page.
8. Use abbreviations only if they are commonly used in facility literature. Avoid using symbols such as < or > signs to avoid a simple transposition error resulting in an incorrect answer. Write it out.
9. The point value for each question is indicated in parentheses after the question.
10. Show all calculations, methods, or assumptions used to obtain an answer to any short answer questions.
11. Partial credit may be given except on multiple choice questions. Therefore, ANSWER ALL PARTS OF THE QUESTION AND DO NOT LEAVE ANY ANSWER BLANK.
12. Proportional grading will be applied. Any additional wrong information that is provided may count against you. For example, if a question is worth one point and asks for four responses, each of which is worth 0.25 points, and you give five responses, each of your responses will be worth 0.20 points. If one of your five responses is incorrect, 0.20 will be deducted and your total credit for that question will be 0.80 instead of 1.00 even though you got the four correct answers.
13. If the intent of a question is unclear, ask questions of the examiner only.

14. When turning in your examination, assemble the completed examination with examination questions, examination aids and answer sheets. In addition, turn in all scrap paper.
15. Ensure all information you wish to have evaluated as part of your answer is on your answer sheet. Scrap paper will be disposed of immediately following the examination.
16. To pass the examination, you must achieve a grade of 80% or greater.
17. There is a time limit of four (4) hours for completion of the examination.
18. When you are done and have turned in your examination, leave the examination area (EXAMINER WILL DEFINE THE AREA). If you are found in this area while the examination is still in progress, your license may be denied or revoked.

QUESTION: 001 (1.00)

Unit 2 is operating at rated load with RCS boron concentration at 800 ppm when a reactor trip (no SIAS) occurs. The RO determines that ONE CEA failed to fully insert and begins emergency boration.

In accordance with EOP-O (Post-Trip Immediate Actions), emergency boration must continue until RCS boron concentration is at least which one of the following?

- a. 1000 ppm
- b. 1200 ppm
- c. 1700 ppm
- d. 2300 ppm

QUESTION: 002 (1.00)

OI-16 (Component Cooling System) Section III, Shifting Operating Pumps, contains the following Note:

"Two component cooling water pumps should not be run for extended periods with only one CC HX in service."

Which of the following is the reason for this Note?

- a. Minimize possibility of accelerated tube erosion in the on-service CCW heat exchanger
- b. Minimize possibility of one pump being at shutoff head if pump discharge pressures are not equal
- c. Provide greater CCW system reliability since Technical Specifications require both CCW loops to be operable
- d. Minimize possibility of pump with higher discharge pressure reaching near-runout conditions

QUESTION: 003 (2.00)

For each of the post-trip situations in column A, match the number of Unit 2 RCPs to be stopped from column B per EOP-0 (Post-Trip Immediate Actions). (0.5 each)

Assume all RCPs are initially operating and RCS cold leg temperature is 540 degrees F for each situation. EOP-0, Attachment 1 is attached for your reference if needed.

(Number in column B may be used once, more than once, or not at all, but only one number may occupy each answer space.)

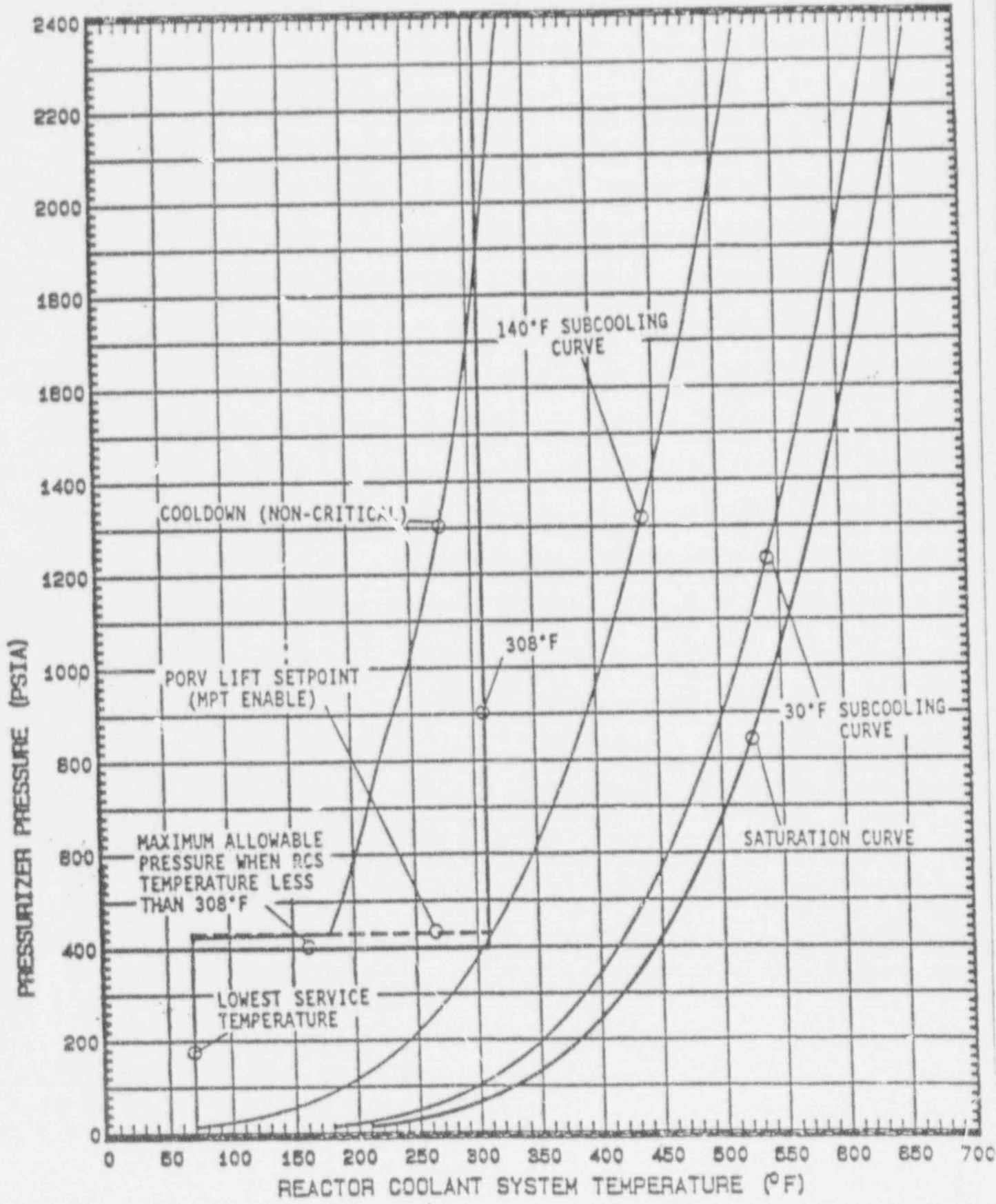
Column A (SITUATIONS)	Column B (RCPs TO BE STOPPED)
_____ a. LOCA with RCS pressure decreasing through 1650 psia and CIS actuated	1. One
_____ b. LOCA with RCS pressure decreasing through 1625 psia	2. Two
_____ c. Stuck open pressurizer PORV with RCS pressure decreasing through 1250 psia	3. Three
_____ d. SGTR with RCS pressure decreasing through 1400 psia	4. Four

91-1003

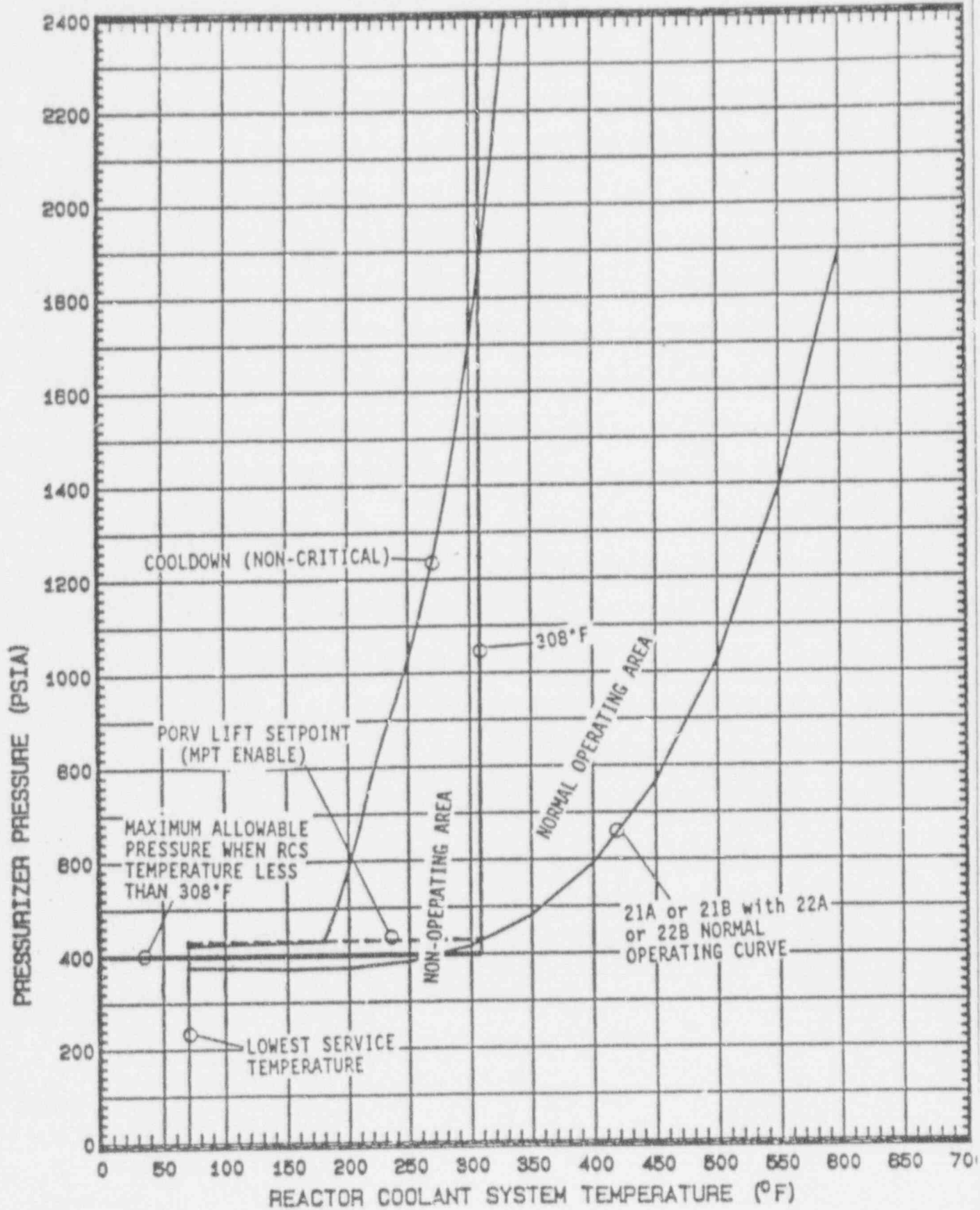
ATTACHMENT (1)

ATTACHMENTS  
Rev. 1/Unit 2  
Page 1 of 7

RCS PRESSURE TEMPERATURE LIMITS  
12 EPFY

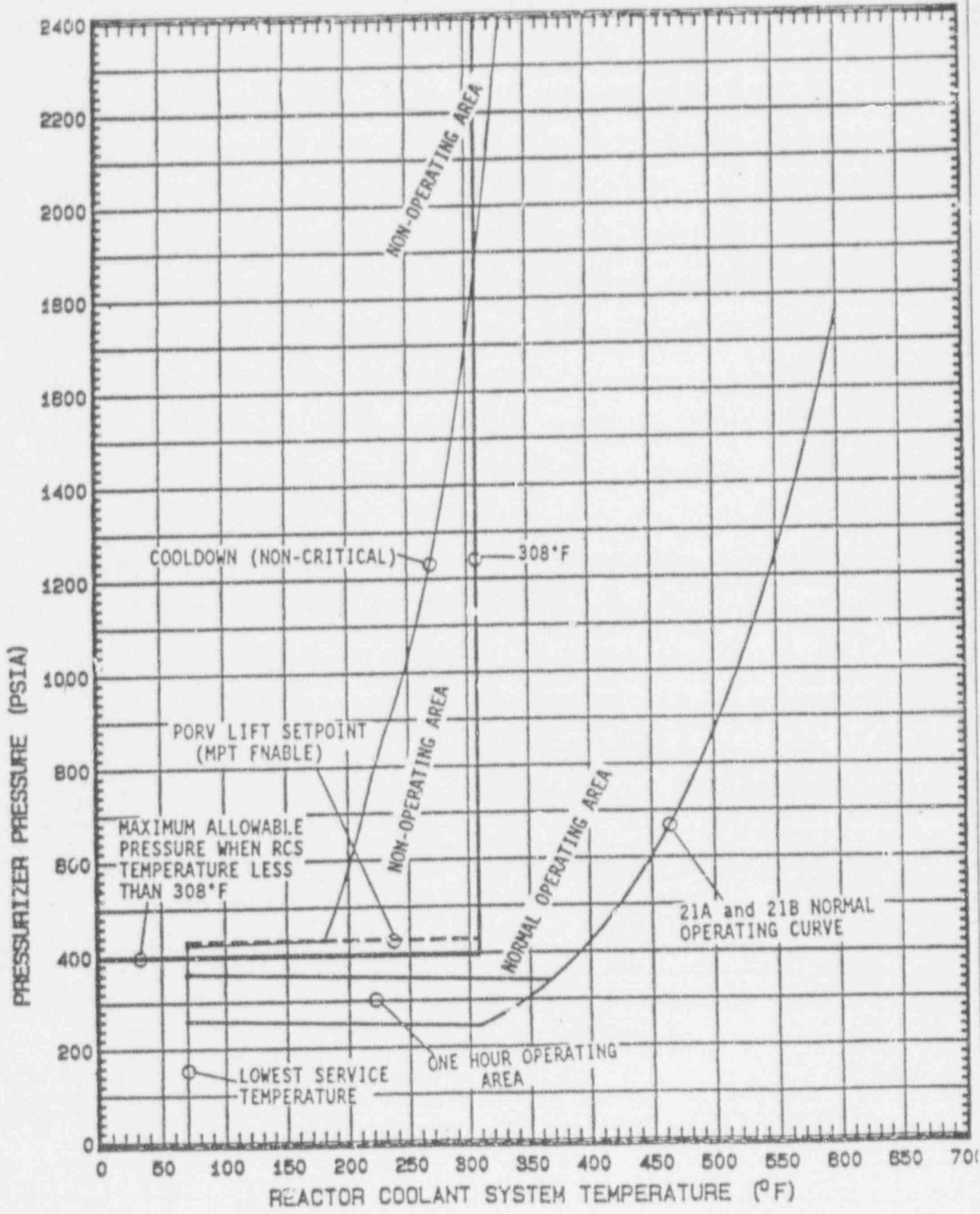


ONE RCP EACH LOOP  
OPERATING LIMITS



1-1003

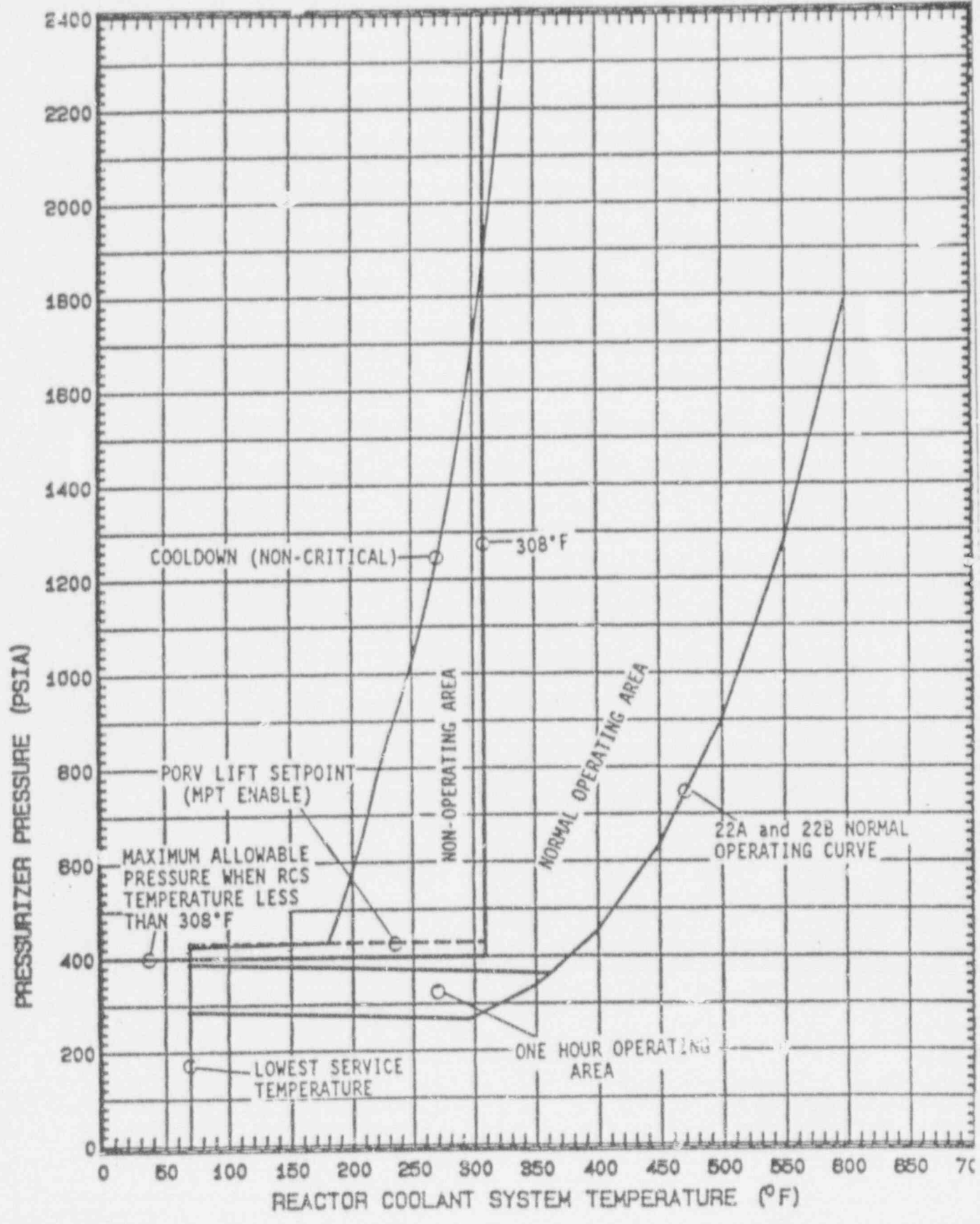
# ATTACHMENT (1) 21A AND 21B RCPs OPERATING LIMITS



1003

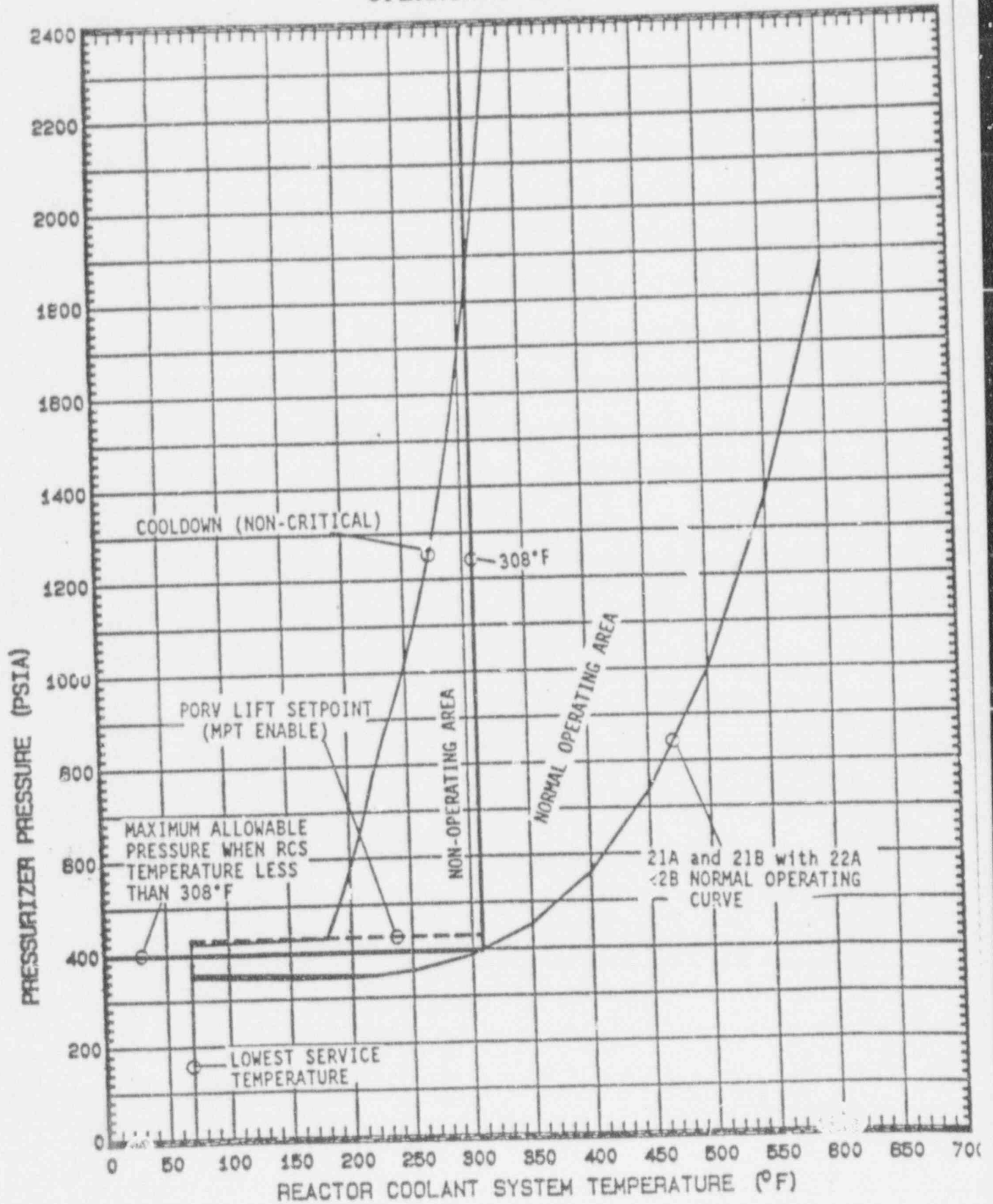
# ATTACHMENT (1) 22A AND 22B RCPs OPERATING LIMITS

ATTACHMENTS  
Rev. 1/Unit 2  
Page 4 of 7

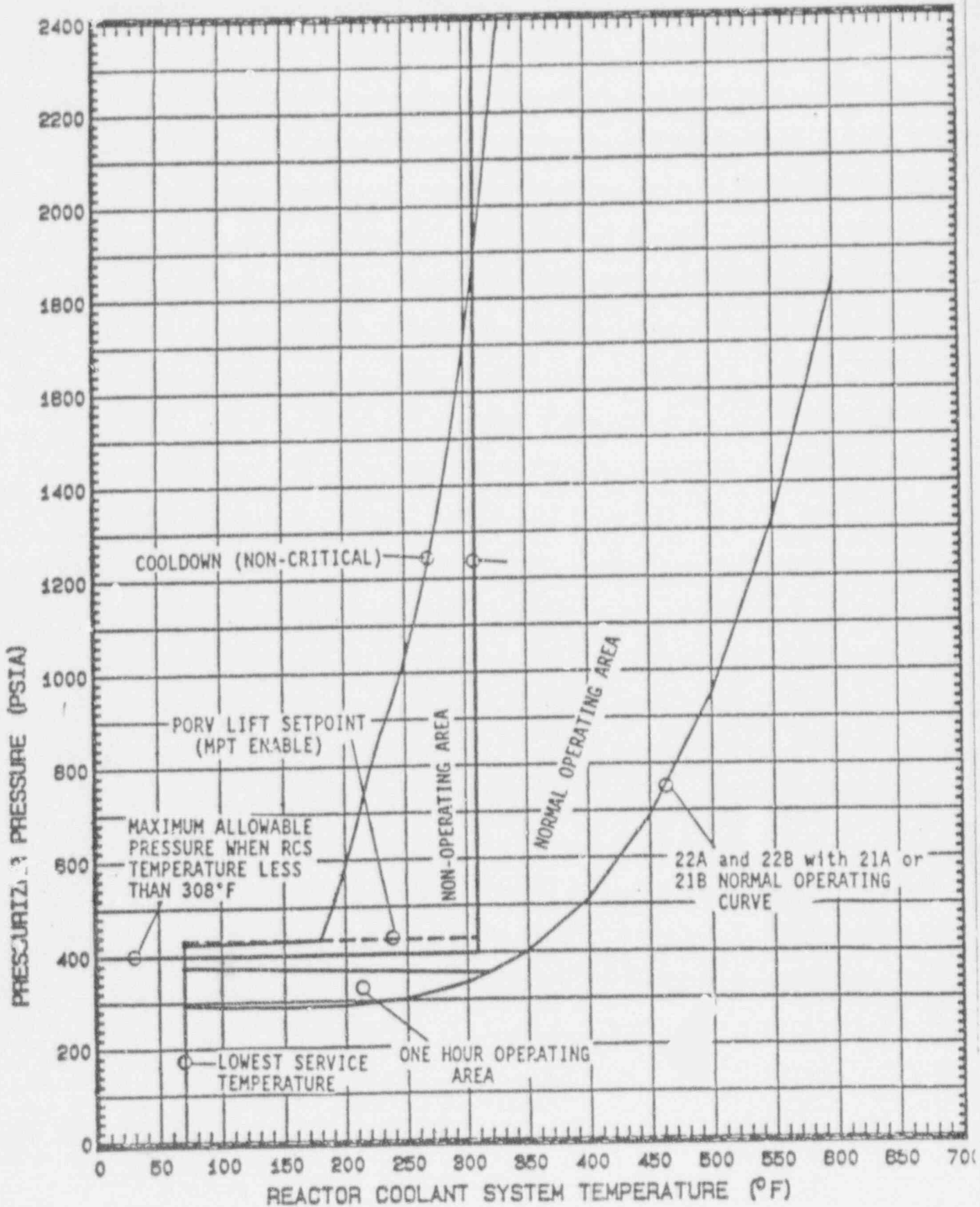




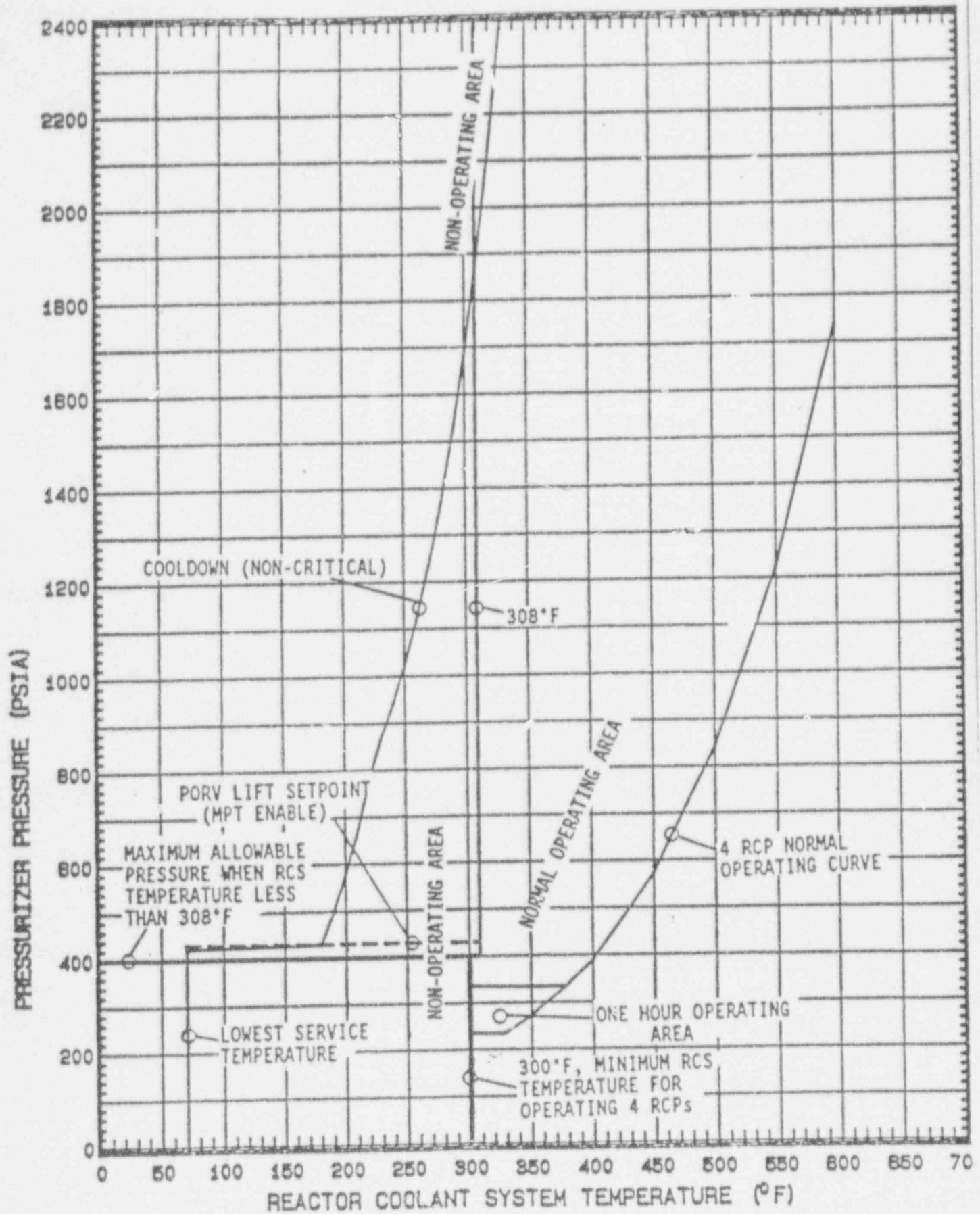
### 21A AND 21B WITH 22A OR 22B RCPs OPERATING LIMITS



### OPERATING LIMITS



4 RCPs OPERATING LIMITS



41-1003

QUESTION: 004 (2.00)

For EACH of the valves listed in column A, select the resultant effect from column B for a rupture of the containment instrument air header inside containment, downstream of the containment instrument air control valve (IA-2085). (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only one number may occupy each answer space.)

Column A (VALVE)	Column B (EFFECT)
_____ a. Pressurizer normal spray valves (RC-100 E/F)	1. Fail open/flow goes to maximum
_____ b. RCS loop charging control valves (CVC-518/19)	2. Fail closed/flow is stopped
_____ c. Auxiliary pressurizer spray valve (CVC-517)	3. Fail as is/flow cannot change
_____ d. RCP constant bleedoff relief isolation valve (CVC-507)	4. Does not fail/valve operation not immediately affected

QUESTION: 005 (1.00)

Unit 1 is operating at rated load when a shutdown group CEA drops into the core (fully inserted). Assuming the reactor does not trip, what color status light(s) will be illuminated for the dropped CEA on the CEA mimic display?

- a. Amber only
- b. Amber and green only
- c. Amber, green, and blue only
- d. Amber, green, blue, and red

QUESTION: 006 (2.00)

For each automatic action in column A, select the main condenser vacuum setpoint at which the action should occur from column B. (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only a single number may occupy each answer space.)

Column A (AUTOMATIC ACTIONS)	Column B (VACUUM SETPOINTS)
___ a. Unit 1 Main Turbine Trip	1. 25 inches Hg
___ b. Unit 1 Turbine bypass valves disabled	2. 22.5 inches Hg
___ c. Unit 1 SGFP trip	3. 20 inches Hg
___ d. Unit 2 SGFP trip	4. 17. inches Hg
	5. 10 inches Hg
	6. 6 inches Hg

QUESTION: 007 (1.00)

In accordance with CCI-300L (Calvert Cliffs Operating Manual), which one of the following evolutions may be performed WITHOUT the applicable procedure present?

- The RO is going to shift the in-service letdown flow control valve (CVC-110P/Q)
- The CRO is going to transfer between control modes of the feedwater regulating valves
- The CRO is going to energize Channel A of the reactor protection system
- The RO is going to isolate steam generator blowdown

QUESTION: 008 (1.00)

A LOCA results in a reactor trip and SIAS; the pressurizer empties and RCS pressure decreases to 1200 psia. All pressurizer heaters automatically deenergize. Safety injection flow then restores pressurizer level to 120 inches and increases RCS pressure to 1300 psia.

Which pressurizer heaters will automatically reenergize during this pressurizer pressure/level increase? (Assume no operator action.)

- a. All Backup and Proportional heaters
- b. Only the Proportional heaters (all banks)
- c. Only the Backup heaters (all banks)
- d. Only 2 banks of Backup heaters

QUESTION: 009 (1.00)

When 120 vac vital bus 11 or 12 is powered from its backup bus, the associated EDG must be declared inoperable. What is the reason for this declaration?

- a. Vital diesel auxiliaries are deenergized when the 120 vac vital bus is on backup power
- b. Associated starting logic channels will not function to start the diesel automatically on a loss of offsite power
- c. Associated starting logic channels will not function to start the diesel automatically on a SIAS
- d. On a loss of offsite power with a LOCA, the diesel will start, but the LOCI sequencer will be deenergized

QUESTION: 010 (2.00)

For each function/signal in column A, select the source of the function/signal from column B. (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only a single number may occupy each answer space.)

Column A (FUNCTIONS/SIGNALS)	Column B (SOURCES)
___ a. CEA Withdrawal Prohibit (CWP)	1. CEDS control panel
___ b. CEA Motion Inhibit bypass signal	2. Reactor Protection System
___ c. Reactor power (Qmet) input to metrascope	3. Reactor Regulating System
___ d. Digital CEA Group position indication	4. Metrascope
	5. Plant Computer
	6. CEDS Logic Cabinet C

QUESTION: 011 (1.00)

Fill in the blanks to complete the following statement of a control element drive system interlock:

Regulating rods cannot be withdrawn above (a) \_\_\_\_\_ inches unless all shutdown rods have been withdrawn above (b) \_\_\_\_\_ inches. (0.5 each)

QUESTION: 012 (2.00)

Select the Volume Control Tank (VCT) level from Column B that initiates each automatic control function in Column A.  
(0.5 each)

(Numbers in Column B may be used once, more than once or not at all, but only a single number may occupy each answer space.)

Column A (AUTOMATIC CONTROL FUNCTIONS)	Column B (VCT LEVELS)
_____ a. Automatic makeup starts	1. 116.0 inches
_____ b. Automatic makeup stops	2. 112.5 inches
_____ c. Injection valves	3. 110.0 inches
	4. 107.5 inches
_____ d. Diverts to Waste Processing System	5. 90.0 inches
	6. 87.5 inches
	7. 8.7 inches
	8. 3.0 inches



QUESTION: 013 (1.00)

If the saltwater valve handswitches are NOT manipulated during a large-break loss of coolant accident, which one of the following describes the saltwater flow conditions through the SERVICE WATER heat exchangers during the accident?

- a. Full flow during SI injection phase; throttled flow during recirculation phase
- b. No flow during SI injection phase; throttled flow during recirculation phase
- c. Throttled flow during SI injection phase; full flow during recirculation phase
- d. Throttled flow during SI injection phase; no flow during recirculation phase

QUESTION: 014 (1.00)

Refer to the attached Technical Specifications figures, 3.2-2 and 3.2-4.

Reactor power is 70% when a continuous CEA withdrawal occurs. When the withdrawal is stopped, indicated Axial Shape Index (ASI) is -0.29 and reactor power peaks at 79%.

Which, if any, axial flux offset control limit(s) is(are) being exceeded?

- a. Linear Heat Rate only
- b. DNB only
- c. Both Linear Heat Rate and DNB
- d. Neither Linear Heat Rate nor DNB

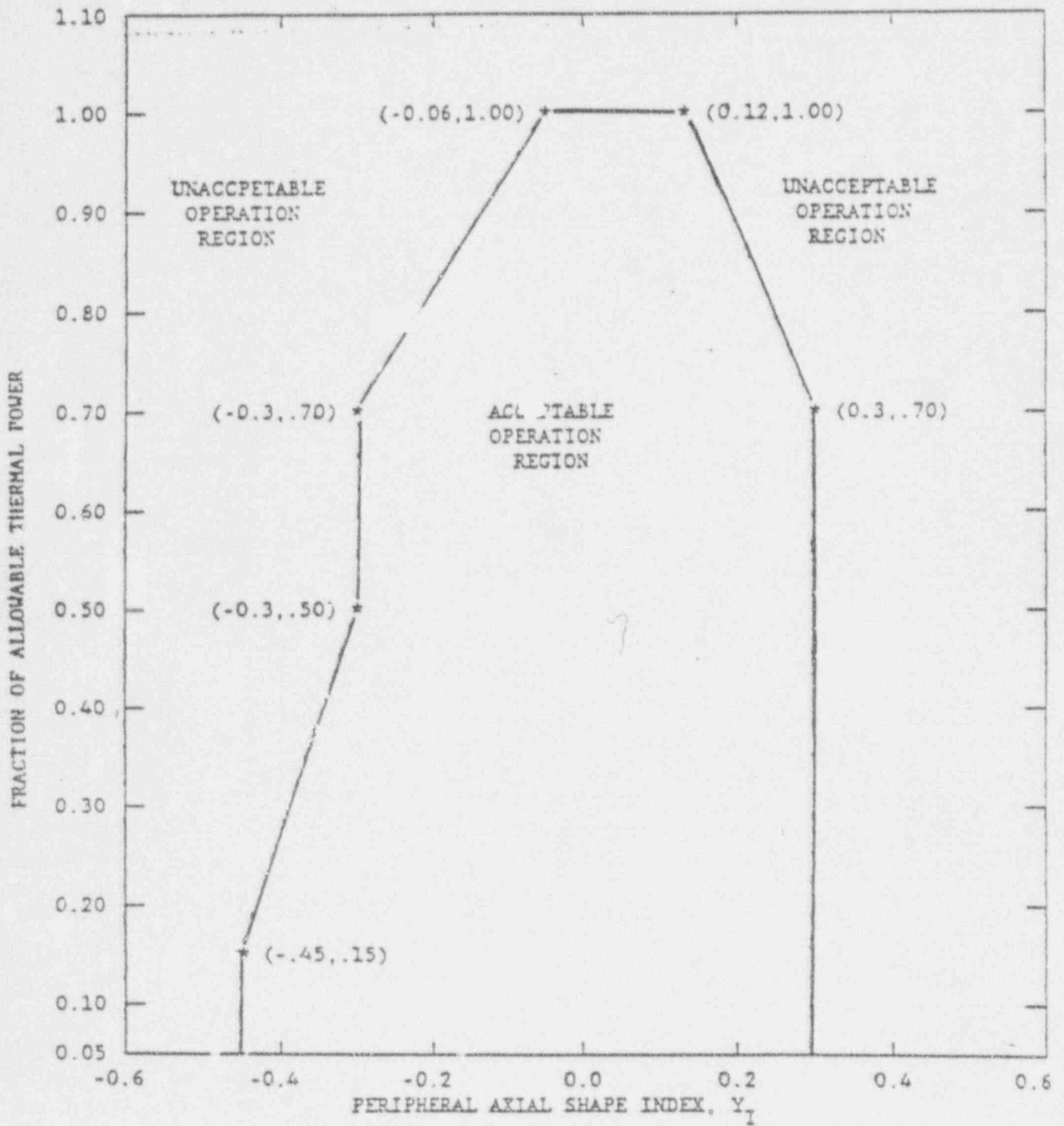


Figure 3.2-2  
Linear Heat Rate Axial Flux Offset Control Limits

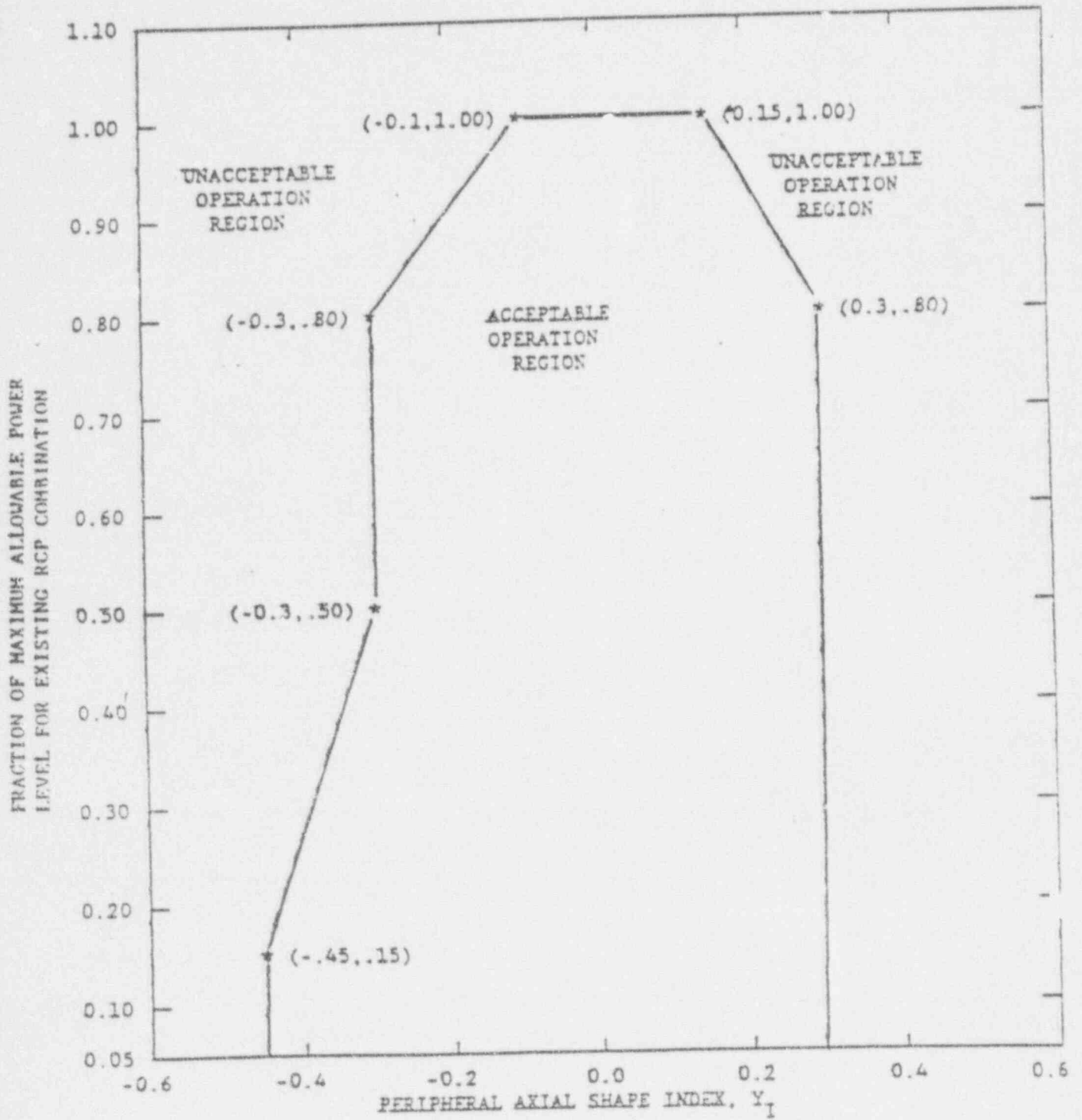


Figure 3.2-4  
DNB Axial Flux Offset Control Limits

QUESTION: 015 (1.00)

A 22 year-old licensed male reactor operator has the following exposure history:

- Current quarterly whole body dose: 250 mrem
- Current yearly whole body dose: 4.5 rem
- Current lifetime whole body dose (including current quarter): 19.25 rem

Assuming his exposure is properly documented, what is the MAXIMUM ADDITIONAL whole body exposure this operator can receive THIS QUARTER and still comply with 10 CFR 20?

- a. 500 mrem
- b. 750 mrem
- c. 1000 mrem
- d. 1250 mrem

QUESTION: 016 (1.00)

During a plant calorimetric calculation CVCS letdown and charging were inadvertently reported as being in service while they were actually isolated. How will this error affect the CALCULATED core thermal power?

- a. LESS THAN actual power since the CVCS heat loss constant is a negative term in the calculation
- b. EQUAL TO actual power since CVCS heat loss is not considered in the calorimetric calculation
- c. EQUAL TO actual power since there is essentially no net heat loss in the CVCS
- d. GREATER THAN actual power since the CVCS heat loss constant is a positive term in the calculation

QUESTION: 017 (1.00)

Units 1 and 2 have experienced a loss of offsite power. The levels in the condensate storage tanks are as follows:

11 CST - 9.7 feet  
12 T - 29.6 feet  
21 CST - 6.4 feet

How much time is left until cooldown is required to be commenced on both units? (Attachment 11 is provided for your use.)

- a. 6 hours
- b. 8 hours
- c. 10 hours
- d. 12 hours

*Question deleted 270*

QUESTION: 018 (1.00)

A Unit 2 reactor trip has occurred. EOP-0 (Post-Trip Immediate Actions) is in progress. The Turbine Trip button has been depressed, but the 21 generator bus breaker (552-61) has remained closed and the turbine throttle valves are still open.

Which one of the following actions should be performed IMMEDIATELY per EOP-0?

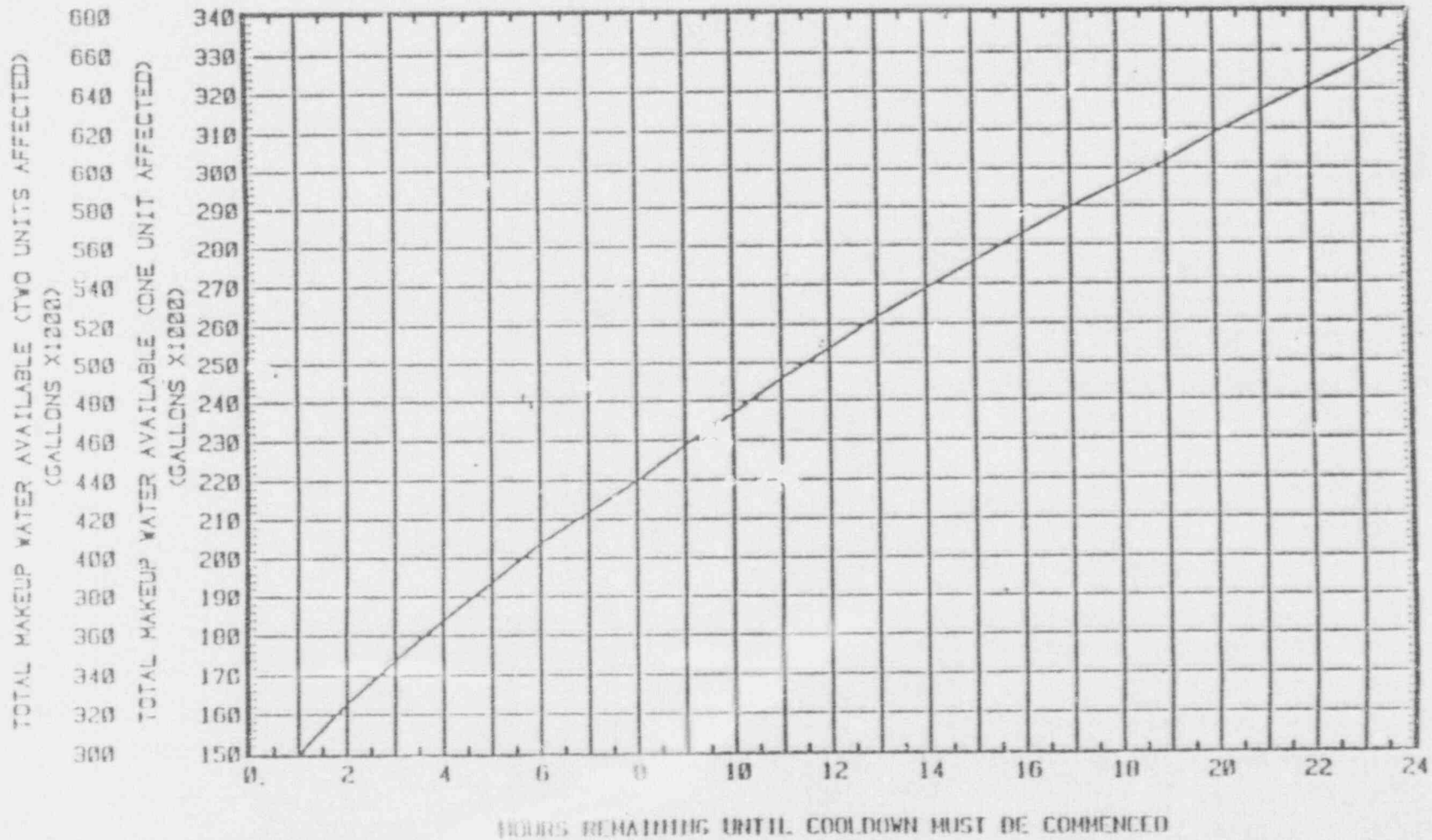
- a. Locally trip the turbine
- b. Open 21 generator bus breaker, 552-61
- c. Stop ~~MSIV~~ pump(s)
- d. Shut both MSIVs

# MAKEUP WATER REQUIRED FOR RCS COOLDOWN

## MAKEUP REQUIRED VS. TIME UNTIL RCS COOLDOWN IS COMMENCED

( 1 FT. = 9636.78 GAL. )

CCOH CR  
88-1137



QUESTION: 019 (1.00)

The control room has been evacuated because of a fire in 1C02. Why is it necessary to remove the CLOSE fuses for a RCP breaker prior to locally opening the breaker?

- a. To ensure the charging spring discharges
- b. To ensure the operability of the breaker "customer" trips
- c. To prevent breaker closing on a fault
- d. To prevent an electrical shock hazard to the operator assigned to open the breaker

QUESTION: 020 (1.00)

Unit 2 is operating at rated power when a valid "11/12 SERV WATER HEADER PRESS LO" alarm is received. AOP-7B (Loss of Service Water) is implemented. AOP-7B directs the operator to reduce heat load on the service water system by reducing main generator MVARs to zero.

How does reducing MVARs reduce the heat load on service water?

- a. Generator current is reduced which reduces generator heat generation
- b. Generator terminal voltage is reduced which reduces generator real load
- c. Hydrogen pressure increases which improves heat transfer
- d. Rotor windage heat generation is reduced

QUESTION: 021 (1.00)

Why is trisodium phosphate dodecahydrate (TSP) dissolved in the containment sump water during a LOCA?

- a. Minimize the possibility of corrosion cracking of containment components during operation of ECCS
- b. Minimize the possibility of cavitation at the suction of the ECCS pumps
- c. Minimize the amount of hydrogen generated by radiation-induced decomposition of the containment sump water
- d. Minimize the amount of boric acid required to be added to the RWT

QUESTION: 022 (1.00)

Unit 2 is operating at rated power when a switchyard fault occurs resulting in a loss of offsite power and a reactor trip. EOP-0 has been completed but natural circulation has not yet been verified.

Which one of the following conditions would indicate that natural circulation flow has NOT been established? (Consider each condition separately.)

- a. Pressurizer level at 110 inches and decreasing slowly
- b. Steam generator pressures at 920 psig and increasing slowly
- c. RCS subcooling at 18 degrees F and increasing slowly
- d. Core differential temperature at 22 degrees F and decreasing slowly



QUESTION: 023 (1.00)

Unit 2 had been operating at rated power for one month when a reactor trip occurred. An ECC calculation was performed for a reactor startup with criticality estimated at 24 hours after the trip. Complications delayed restart another 12 hours and a second ECC calculation was performed. The desired critical CEA position was kept the same for both ECCs.

Which one of the following statements describes the relationship between the two ECC calculations?

- a. The second ECC requires a lower critical boron concentration due to the change in xenon reactivity
- b. The second ECC requires a higher critical boron concentration due to the change in xenon reactivity
- c. The second ECC requires a lower critical boron concentration due to the change in source neutron level
- d. The second ECC requires a higher critical boron concentration due to the change in source neutron level

QUESTION: 024 (1.00)

Which of the following emergency diesel generator (EDG) shutdowns are BYPASSED when the EDG is automatically started by a SIAS?

- a. Jacket coolant high temperature and generator underfrequency
- b. Generator underfrequency and crankcase high pressure
- c. Crankcase high pressure and jacket coolant low pressure
- d. Jacket coolant low pressure and jacket coolant high temperature

QUESTION: 025 (1.50)

Match the Unit 1 nuclear instrumentation channels in column A to the appropriate type of detector from column B. (0.5 each)

(Numbers in column B may be used once, more than once, or not at all, but only a single number may occupy each answer space.)

Column A (NIS CHANNEL)	Column B (DETECTOR)
_____ a. Wide Range Logarithmic	1. Self-powered neutron detector
_____ b. Power Range Control	2. Compensated ion chamber
_____ c. Power Range Safety	3. Uncompensated ion chamber
	4. Fission chamber
	5. Proportional detector

QUESTION: 026 (1.00)

Unit 1 is operating at rated power when a reactor trip occurs. The atmospheric steam dump valves quick-open and then modulate fully closed as T-avg decreases below 535 degrees F. If T-avg begins to increase above 535 degrees F again, how will the atmospheric steam dump valves respond?

- a. The dump valves will immediately begin to modulate open until T-avg reaches 540 degrees F, at which time they will quick-open
- b. The dump valves will remain closed until T-avg reaches 540 degrees F, at which time they will begin to modulate open
- c. The dump valves will immediately begin to modulate open until T-avg reaches 557 degrees F, at which time they will be fully open
- d. The dump valves will remain closed until T-avg reaches 540 degrees F, at which time they will quick-open

QUESTION: 027 (1.00)

A large break LOCA has occurred; the crew has implemented EOP-5 (Loss of Coolant Accident) and is now responding to an RAS actuation. What is the reason total HPSI flow must be limited to 1000 gpm when two HPSI pumps are operated after an RAS?

- a. Minimizes the amount of coolant flowing out the break onto nearby equipment
- b. Minimizes the possibility of HPSI pump runout
- c. Minimizes the possibility of HPSI pump cavitation
- d. Minimizes the rate of level decrease in the containment sump

QUESTION: 028 (1.00)

Which one of the following indicates that one electrical interlock requirement is satisfied for starting 11A RCP?

- a. "11A RCP SEAL TEMP HI PRESS" alarm clear
- b. 12A or 12B RCP operating
- c. 11A RCP "COMPONENT COOLING FLOW LO" alarm clear
- d. 11A RCP oil lift pump OFF

QUESTION: 029 (1.00)

Which one of the following signals controls SGFP speed for the Unit 2 Lovejoy Control system?

- a. The higher signal from the startup station handswitch or the HIC
- b. The lower signal from the startup station handswitch or the HIC
- c. The higher signal from the FRV PDIC or the manual speed changer handswitch
- d. The lower signal from the FRV PDIC or the manual speed changer handswitch

QUESTION: 030 (1.00)

Which one of the following statements describes the purpose of the SGFP controller track and hold circuit?

- a. Allows for a bumpless transfer between auto and manual
- b. Provides electrical high speed stop
- c. Decreases SGFP speed to minimum upon a prompt failure of the HIC controller
- d. Prevents a SGFP overspeed trip due to a prompt failure of the HIC controller

QUESTION: 031 (1.00)

After a loss of MCC-114, which one of the following boration flow paths would be AVAILABLE?

- a. RWT outlet valve and a charging pump
- b. 12 BA pump, BA direct M/U valve, and a charging pump
- c. 11 BA pump, BA flow control valve, VCT M/U valve, VCT outlet valve, and a charging pump
- d. 11 and 12 BAST gravity drain valves, and a charging pump

QUESTION: 032 (1.00)

When responding to a major leak that is NOT caused by a steam generator tube leak, which parameter below would be a reactor trip requirement per AOP-2A (Excessive RCS Leakage)?

- a. Pressurizer level at 99 inches
- b. Tavg at 547 degrees F
- c. Pressurizer pressure at TM/LP pre-trip value
- d. Leak rate greater than the capacity of 2 charging pumps

QUESTION: 033 (1.50)

List the 3 RMS alarms checked in the EOP-0 immediate actions, when monitoring for normal radiation levels external to containment. [0.5 each]

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

QUESTION: 034 (1.00)

Why are the CEDM cooling fans maintained in operation when the RCS is in a natural circulation cooldown with RCS temperature below 300 degrees F following a LOCA?

- a. Maintains a supply of air to the cavity cooling system
- b. Prevents condensation from building up on CEDM motor windings
- c. Keeps CEDM motor windings from overheating due to higher than normal containment air temperatures
- d. Aids in cooling reactor vessel head to help collapse any head voids which may have developed

QUESTION: 035 (1.00)

Which condition(s) is/are required to isolate the individual room supply and exhaust dampers to the control room and cable spreading rooms?

- a. Containment Radiation Signal (CRS)
- b. Hi Smoke alarm
- c. CRS and High Radiation signal from a local monitor
- d. Hi smoke alarm and High Radiation signal from a local monitor

QUESTION: 036 (1.00)

Under which one of the following conditions would BASSS be operable?

- a. Group 5 CEAs average height below 55% insertion and PA912 greater than zero
- b. All detectors at one level in a symmetric group have failed
- c. Reactor trip breakers open
- d. Reactor power at 48%

QUESTION: 037 (1.00)

Why is it important to secure a waste gas discharge promptly whenever the discharge CVs have shut on an effluent high radiation alarm?

- a. To prevent damage to the waste gas compressor
- b. To prevent damage to the effluent radiation monitor
- c. To prevent the header relief valve from lifting and discharging to the main vent
- d. To prevent the header relief valve from lifting and discharging to the surge tank



QUESTION: 038 (2.00)

Match the type of RCS leakage in column A with the TECH SPEC limit in column B. [0.5 each]  
 (The numbers in column B may be used once, more than once, or not at all and only one number may occupy each answer space.)

COLUMN A (RCS LEAKAGE)	COLUMN B (TECH SPEC LIMIT)
_____ a. Pressurizer heater weld leak	1. 0 gpm
_____ b. PORV seat leakage	2. 0.5 gpm
_____ c. S/G tube leak	3. 1 gpm
_____ d. CV-516, L/D Isolation valve, body to bonnet leak	4. 5 gpm
	5. 10 gpm
	6. 50 gpm

QUESTION: 039 (1.00)

Given the following Quench Tank conditions and OI-1B, Quench Tank Operations (attached):

1. Pressure 9 psig
2. Temperature 140 degrees F
3. Level 32 inches

What action below should be taken to restore normal operating conditions in the quench tank?

- a. Drain the Quench Tank
- b. Fill the Quench Tank
- c. Raise Nitrogen pressure
- d. Bleed and Feed the Quench Tank.

COMPLIANCE MANDATORY  
CONTROLLED COPY

CALVERT CLIFFS NUCLEAR POWER PLANT

01-1B QUENCH TANK OPERATIONS

REVISION 7

	Signature	Date
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## QUENCH TANK OPERATIONS

### I. GENERAL PRECAUTIONS

- A. Do not exceed 50 PSIG Quench Tank pressure. Pressure in excess of 50 PSIG may distort the tank Rupture Disk.
- B. Quench Tank must be filled and ready for operation before the Reactor Coolant System is heated above 210°F.
- C. Except for Bleed and Feed operation to cool Quench Tank, maintain Quench Tank level between the high and low level alarm setpoints and at approximately 28.5 inches.

### II. QUENCH TANK LINEUP FOR PLANT STARTUP

#### A. Initial Conditions

- 1. The Nitrogen System is lined up per OI-4.
- 2. The Demineralized Water System is lined up per OI-23B.
- 3. The Waste Gas System is lined up per OI-17B.
- 4. Reactor Coolant Drain Tank is capable of accepting liquid discharges from the Quench Tank.

#### B. Procedure

- 1. IF level is below the low level alarm point,  
THEN fill the Quench Tank to a desired level between the high and low level alarm per Section III.
- 2. IF level is above the high level alarm point,  
THEN drain the Quench Tank to a desired level between the high and low level alarm per Section IV.

3. Open the Quench Tank Vent, RC-400-CV, and Containment Vent Isolations, WGS-2180-CV and WGS-2181-CV.
4. Open the Containment Nitrogen Supply Valve, N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2.
5. Purge the Quench Tank for 15 minutes.
6. Have Chemistry sample the Quench Tank to ensure Oxygen concentration is less than 4%.
7. IF Oxygen concentration is greater than 4%,  
THEN continue purging.
8. WHEN Oxygen concentration is less than 4%,  
THEN shut RC-400-CV and WGS-2180-CV and 2181-CV.
9. WHEN Quench Tank pressure is approximately 3 PSIG,  
THEN shut the Containment Nitrogen Supply Valve, N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2.

### III. FILLING THE QUENCH TANK

#### A. Initial Conditions

1. The Waste Gas System is lined up per OI-17B.
2. The Demineralized Water System is lined up per OI-23B.

#### B. Procedure

1. Check shut the Containment Nitrogen Supply Valve, N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2.
2. Check shut the Quench Tank Drain Valve, RC-401-CV.

- NOTE -

90-1375 | DW-5460-CV shall be administratively controlled  
per Tech. Spec. 3.6.4.1, and CCI-114.

3. Open the Quench Tank Demineralized Water Supply Valve, DW-5460-CV, and fill Quench Tank to a level between the high and low level alarm.
- 88-1168 | 4. Limit the Quench Tank pressure to less than 10 PSIG by venting to the Waste Gas header through RC-400-CV.
5. WHEN level in the Quench Tank is at the desired level, THEN shut the Demineralized Water Supply Valve, DW-5460-CV.

IV. DRAINING THE QUENCH TANK

A. Initial Conditions

1. The Reactor Coolant Drain Tank is capable of accepting the Quench Tank discharge.
2. The Nitrogen System is lined up per OI-4.

B. Procedure

- CAUTION -

The Quench Tank may be drained below the low level alarm point only after the Reactor Coolant System has been cooled down below 210°F.

1. Open the Quench Tank Drain Valve, RC-401-CV.



2. IF a negative pressure is developed and the water does not flow out of the Quench Tank,  
THEN open the Containment Nitrogen Supply Valve, N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2, until a sufficient pressure, but no more than 10 PSIG, is built up in the Quench Tank to force out the water.
3. WHEN the desired level is attained,  
THEN shut the Quench Tank Drain Valve, RC-401-CV.
4. Shut N<sub>2</sub>-238 for Unit 1 or N<sub>2</sub>-272 for Unit 2 if opened.

V. BLEED AND FEED OPERATION TO COOL THE QUENCH TANK

A. Initial Conditions

90-192

1. Quench Tank temperature is higher than normal due to leakage or discharge from any of the following:
  - Pressurizer Power Operated Relief Valve
  - Pressurizer Safety Valve
  - Safety Injection System Relief Valve
  - Pressurizer Vents
  - Reactor Vessel Head Vents
2. The Nitrogen System is lined up per OI-4.
3. The Demineralized Water System is lined up per OI-238.
4. The Waste Gas System is lined up per OI-178.
5. The RC Drain Tank is capable of accepting liquid discharges from the Quench Tank.

B. Procedure

- CAUTION -

Do not attempt to adjust the Quench Tank Parameters until after the relief or safety valve discharge has stopped.

88-1168

- CAUTION -

The Quench Tank may experience a rapid increase in pressure. Minimize the time that the Sparger Nozzles will be uncovered.

1. Open the Quench Tank Drain Valve, RC-401-CV, and drain the Quench Tank to not less than 15", then shut the drain valve.

- NOTE -

90-1375

DW-5460-CV shall be administratively controlled per Tech. Spec. 3.6.4.1, and CCI-114.

88-1168

2. Open the Quench Tank Demineralized Water Supply Valve, DW-5460-CV and fill the tank, to not greater than 35", then shut the Demineralized Water Supply Valve.
3. Repeat Steps 1 and 2 until Quench Tank Temperature is less than 120°F and the Quench Tank High Temperature Alarm is clear.

88-1168

4. Drain Quench Tank to a level between the high and low level alarm.
5. Reduce the Quench Tank Pressure by opening the Quench Tank Vent Valve, RC-400-CV. Close the Vent Valve when the Quench Tank pressure approaches 3 PSIG to prevent bleeding excess Nitrogen to the Waste Gas header.

ATTACHMENT (1A)  
QUENCH TANK (UNIT 1)

87-185

VALVE NUMBER	NORMAL OP. POS	DESCRIPTION	LOCATION	INIT/ DATE	COMMENTS
1-N <sub>2</sub> -238	SHUT	CNTMT N <sub>2</sub> SUPPLY VLV	27' E PEN		
N <sub>2</sub> -246	LOCKED OPEN	11 QUENCH TK N <sub>2</sub> INLET VLV	ABOVE QT		
N <sub>2</sub> -247	----	11 QUENCH TK N <sub>2</sub> INLET CHK VLV	ABOVE QT		
1-DW-250	LOCKED OPEN	11 QUENCH TK DEMIN WTR SUPP HDR ISO VLV	ABOVE QT		
1-DW-251	----	DI H <sub>2</sub> O TO 11 QUENCH TK CHK VLV	ABOVE QT		
1-DW-280	LOCKED SHUT	HEAD WASH DOWN AREA DI H <sub>2</sub> O SUPPLY	69' HEAD LAYERS AREA		
87-185 88-88	1-DW-381	LOCKED SHUT	DI H <sub>2</sub> O TO RCP BAYS	ABOVE QT	
	1-DW-382	SHUT	DI H <sub>2</sub> O TO 11A & 11B RCP'S	11 RCP PUMP BAY	
	1-DW-383	SHUT	DI H <sub>2</sub> O TO 12A & 12B RCP'S	12 RCP PUMP BAY	
	1-DW-5460-CV	SHUT	DEMIN WATER CNTMT ISO	27' E PEN	

- NOTE -

88-1025

ALL 'DW' VALVES APPEAR IN OI-238 DEMINERALIZED WATER.  
 ALL 'N<sub>2</sub>' VALVES APPEAR IN OI-4 NITROGEN GAS SYSTEM.

ATTACHMENT (1B)  
QUENCH TANK (UNIT 2)

87-185

VALVE NUMBER	NORMAL OP. POS	DESCRIPTION	LOCATION	INIT/DATE	COMMENTS
N <sub>2</sub> -268	LOCKED OPEN	21 QUENCH TK N <sub>2</sub> INLET VLV <sup>2</sup>	U-2 CNTMT		
N <sub>2</sub> -269	----	21 QUENCH TK N <sub>2</sub> INLET CHK VLV	U-2 CNTMT		
N <sub>2</sub> -272	SHUT	21&22 SG & PZR & QT N <sub>2</sub> SUPP	ON WEST WALL OF CNTMT 27' E PEN RM		
N <sub>2</sub> -348	----	21 RC DRN TK SUPP CKV	27' E PEN		
N <sub>2</sub> -349	----	21 & 22SG 21 PZR, QT TK, SUPP CKV	W WALL U-2 27' E PEN RM		
N <sub>2</sub> -398	----	QT & SG N <sub>2</sub> CKV	U-2 CNTMT PEN #20C		
N <sub>2</sub> -399	SHUT	QT & SG TEST CONN	U-2 CNTMT PEN #20C		
N <sub>2</sub> -400	OPEN	STM GEN & QUENCH TK N <sub>2</sub> ISO (INSIDE)	U-2 CNTMT PEN #20C		
2-DW-384	LOCKED SHUT	DI H <sub>2</sub> O TO RCP BAYS			
2-DW-385	SHUT	DI H <sub>2</sub> O TO 21A & 21B RCP'S	@ 21A RCP BAY		

- NOTE -

88-1025

ALL 'DW' VALVES APPEAR IN OI-23B DEMINERALIZED WATER.  
 ALL 'N<sub>2</sub>' VALVES APPEAR IN OI-4 NITROGEN GAS SYSTEM.

ATTACHMENT (1B)  
QUENCH TANK (UNIT 2)

87-185

VALVE NUMBER	NORMAL OP. POS	DESCRIPTION	LOCATION	INIT/DATE	COMMENTS
2-DW-386	SHUT	DI H <sub>2</sub> O TO 22A & 22B RCP'S	@ 22A RCP BAY		
2-DW-387	SHUT	21 QUENCH TK DI H <sub>2</sub> O SUPP HDR VENT VLV			
2-DW-388	LOCKED SHUT	HEAD WASH-DOWN AREA DI H <sub>2</sub> O SUPP			
2-DW-389	LOCKED OPEN	21 QUENCH TK DI H <sub>2</sub> O SUPP HDR ISO VLV			
2-DW-390	----	21 QUENCH TK DI H <sub>2</sub> O SUPP HDR CHK VLV			
2-DW-391	SHUT	21 T DW HDR VENT B/U	@ QUENCH TANK		
2-DW-5460-CV	SHUT	DEMIN WTR CONTMT ISOL OUTSIDE CONTMT	OUTSIDE U-2 CONTMT		

- NOTE -

88-1025

ALL 'DW' VALVES APPEAR IN OI-23B DEMINERALIZED WATER.  
 ALL 'N<sub>2</sub>' VALVES APPEAR IN OI-4 NITROGEN GAS SYSTEM.

QUESTION: 040 (1.00)

RAS should occur upon a decreasing indicated RWT level of:

- a. 2.5 feet to 2.0 feet
- b. 2.0 feet to 1.5 feet
- c. 1.5 feet to 1.0 feet
- d. 1.0 feet to 0.5 feet

QUESTION: 041 (2.00)

*Unit 1*

Match each component listed in Column A to the <sup>Unit 1</sup>ESFAS signal in Column B that will operate it. [0.5 each]

(The numbers in Column B may be used once, more than once, or not at all and only one number may occupy each answer space.)

COLUMN A (COMPONENT)	COLUMN B (ESFAS SIGNAL)
_____ a. Containment Iodine Filter	1. CSAS
_____ b. Main Steam Isolation Valves	2. CIS
_____ c. Hydrogen Purge Containment Isolation Valves	3. SIAS
_____ d. Containment Waste Gas Header Vent (CV-2181)	4. CRS
	5. RAS

QUESTION: 042 (1.00)

Unit 1 is at rated power with 11 AFW pump aligned for auto initiation. The following sequence of conditions occurs in the S/Gs, commencing with an automatic reactor trip at TIME=0.

TIME	CONDITIONS
+10 seconds	SGIS
+20 seconds	11 S/G: 800 psia, -130 inches 12 S/G: 625 psia, -140 inches
+30 seconds	11 S/G: 750 psia, -140 inches 12 S/G: 525 psia, -200 inches

At +30 seconds, which AFW pumps should be running? (Assume NO operator action is taken.)

- a. None
- b. 13 only
- c. 11 & 13 only
- d. 11, 13, and 23

QUESTION: 043 (1.00)

Given the following conditions:

- 1) Unit 1 reactor tripped
- 2) S/G 11 pressure is 890 psia
- 3) S/G 12 pressure is 750 psia
- 4) S/G 11 level is -180 inches
- 5) S/G 12 level is -210 inches

Which action below is expected to have occurred?

- a. AFW Blocking valves to #11 S/G should have closed
- b. AFW Blocking valves to #12 S/G should have closed
- c. 11 AFW pump should have tripped
- d. 11 and 12 AFW pumps should have tripped

QUESTION: 044 (1.00)

The local keyswitch for 11 AFW pump has been placed in the disable position. What effect does this have on the 11 AFW pump?

- a. Turbine cannot be tripped locally
- b. Turbine overspeed protection is defeated
- c. Control room trip function is defeated
- d. Turbine control is transferred to 1C43



QUESTION: 045 (1.00)

Which NI indication is lost on a loss of 120 VAC bus 2Y02?

- a. 1C15 channel A wide range
- b. 1C15 channel B linear range
- c. 2C43 channel B aux excore wide range
- d. 1C43 channel B aux excore wide range

QUESTION: 046 (1.00)

Unit 2 is at 9% power, preparing to synchronize with the grid, when channel A Linear Range NI loses its high voltage power supply. Which trip unit(s) in channel A RPS will trip?

- a. High power only
- b. High power and TM/LP only
- c. High power, TM/LP, and APD only
- d. High power, TM/LP, APD, and High SUR

QUESTION: 047 (1.00)

Which one of the following is an output of the Reactor Regulating System power ratio calculator?

- a. Secondary Calorimetric Power Calculation
- b. Axial Shape Index
- c. Axial Flux Offset
- d. Azimuthal Power Tilt

QUESTION: 048 (1.00)

While operating at 100% power, T-hot RTD TE-111X fails LOW. How will the following respond with no operator action?

	LETDOWN FLOW	B/U HEATERS	B/U CHARGING PUMP
a.	Increases	Deenergize	Starts
b.	Increases	Energize	Stops
c.	Decreases	Deenergize	Starts
d.	Decreases	Energize	Stops

QUESTION: 049 (1.00)

Which one of the following parameters is sensed to provide the Loss-of-Load input signal to the RPS Loss-of-Load trip units on Unit 2?

- Low pressure on turbine auto-stop oil header
- Low pressure on turbine emergency trip system header
- Voltage on turbine master trip bus
- Voltage in turbine power-load unbalance circuit

QUESTION: 050 (1.00)

Which statement describes the response of the variable pressure signal (Pvar) input to TM/LP setpoint as ASI changes?

- a. Pvar increases as ASI changes from -0.5 to -0.2
- b. Pvar decreases as ASI approaches optimum ASI (+0.1)
- c. Pvar remains constant as ASI approaches optimum ASI (+0.2)
- d. Pvar remains constant as ASI changes from +0.2 to +0.5

QUESTION: 051 (1.00)

During a power increase Linear Range NI and Delta-T power indications begin to diverge. Why does this occur?

- a. Neutron leakage from the core is affected by RCS temperature changes
- b. Delta-T instrument has a relatively slow response time during power changes
- c. At higher power levels, delta-T is no longer proportional to reactor power
- d. NI detectors are affected by the higher gamma flux levels at increased power levels

QUESTION: 052 (1.00)

Which one of the following conditions would cause a STOP MOTION signal to be supplied to the CEA group programmer modules?

- a. During withdrawal, highest CEA in group reaches 130.5 inches
- b. During withdrawal, lowest CEA in group reaches 129 inches
- c. During insertion, highest CEA in group reaches 6 inches
- d. During insertion, lowest CEA in group reaches 3 inches

QUESTION: 053 (1.00)

When a manual reactor trip is attempted the reactor does NOT trip after depressing the manual trip pushbuttons. EOP-0 alternate actions require feeder breakers to 480 VAC busses supplying the CEDM MG sets to be tripped. Which action below will accomplish this?

- a. Trip CEDM MG set feeder breakers on 11A & 12A 480V busses and open tie breakers
- b. Trip CEDM MG set feeder breakers on 12A & 13A 480V busses and open tie breakers
- c. Trip CEDM MG set feeder breakers on 13A & 14A 480V busses and open tie breakers
- d. Trip CEDM MG set feeder breakers on 11A & 14A 480V busses and open tie breakers

QUESTION: 054 (1.00)

Which one of the following will cause a GROUP OUT OF SEQUENCE signal?

- a. More than one group between UCS and LCS or 2 adjacent groups within 86 inches of each other and not at the LSP or USP
- b. More than one group between LSP and USP or 2 adjacent groups within 86 inches of each other and not at the LCS or UCS
- c. More than one group between UCS and LCS or 2 adjacent groups within 93 inches of each other and not at the LSP or USP
- d. More than one group between LSP and USP or 2 adjacent groups within 93 inches of each other and not at the LCS or UCS

QUESTION: 055 (1.00)

During an extended loss of the Unit 1 plant computer, it becomes necessary to insert the group 5 CEAs from the fully withdrawn position. The counter readings were taken before and after CEA insertion. If the counter reading increases by 10, what is the new group 5 CEA height?

- a. 132.5 inches
- b. 130.0 inches
- c. 127.5 inches
- d. 125.0 inches

QUESTION: 056 (1.00)

What is the minimum level requirement for pressurizer operability while operating in MODE 1?

- a. 101 inches
- b. 133 inches
- c. 145 inches
- d. 160 inches

QUESTION: 057 (1.00)

Given the following conditions for the Pressurizer level controller:

- Controlling setpoint is generated by the RRS
- Local setpoint is indicated by the setpoint index
- Remote setpoint light is on
- Process indicator indicates the remote setpoint

In what position is the pressurizer level controller Local Remote Selector Switch?

- a. Local Process
- b. Local-Remote Compare
- c. Remote-Remote Compare
- d. Remote Process

QUESTION: 058 (1.00)

Given the following conditions:

- OP-2 Reactor startup in progress
- HS-100 selected to PIC-100-X
- Pressure setpoint is set to 2200 psia
- Equalizing RCS and Pressurizer boron within 10 ppm
- VS-100-8 selected to BOTH

At what pressurizer pressure should spray valves 100E & 100F start to open?

- a. 2300 psia
- b. 2275 psia
- c. 2250 psia
- d. 2225 psia

QUESTION: 059 (1.00)

Deenergizing an ESFAS sensor cabinet affects the operability of the associated RPS channel. Which RPS trip is affected?

- a. High containment pressure
- b. TM/LP
- c. VOPT
- d. APD

QUESTION: 060 (1.00)

Unit 2 is in MODE 6 with all CEAs inserted following a normal plant shutdown, when an invalid SIAS occurs. What set of procedures should be referenced to determine the validity of the signal?

- a. Emergency procedures
- b. Abnormal operating procedures
- c. Normal operating procedures
- d. Alarm response procedures

QUESTION: 061 (1.00)

Which condition indicates the expected relationship between core exit thermocouple (CET) temperature and T-hot while operating in Mode 2?

- a. CET values are equal to T-hot
- b. CET values are approximately 5 degrees F less than T-hot
- c. CET values are approximately 15 degrees F greater than T-hot
- d. CET values are approximately 15 degrees F less than T-hot



QUESTION: 062 (1.00)

What is the purpose of the power load unbalance circuit in the Unit 1 EHC system?

- a. Quickly shuts the control valves (only) to prevent an overload condition
- b. Quickly shuts the control and intercept valves to prevent an overload condition
- c. Quickly shuts the control and intercept valves to prevent an overspeed condition
- d. Quickly shuts the control valves (only) to prevent an overspeed condition

QUESTION: 063 (1.00)

Why is steady state reactive load on the U-1 main generator limited to 85 MVAR in the lead direction?

- a. To prevent a generator overcurrent trip
- b. To prevent the generator from slipping a pole
- c. To prevent overheating the main transformer
- d. To prevent overheating the stator windings

QUESTION: 064 (1.00)

When an alarm annunciator is removed from service, a \_\_\_\_\_ sticker is placed on the alarm annunciator window.

- a. red
- b. yellow
- c. white
- d. blue

QUESTION: 065 (1.00)

EOP-1 directs the operator to, "Verify heaters or sprays restoring pressurizer pressure to between 2245 and 2275 psia."

When used in the above example, what does the term "VERIFY" mean?

- a. To observe an expected condition or characteristic; to determine; to ascertain
- b. To watch or monitor; to visually take note of; to pay attention to
- c. To attend to displays to determine equipment operating conditions
- d. To make sure by taking necessary or appropriate actions

QUESTION: 066 (1.00)

During verification of a FULLY OPEN manually operated valve, the operator should:

- a. fully close the valve, then reopen the valve to the fully open position
- b. operate the valve handwheel in the open direction, if the handwheel does not move, the valve is fully open
- c. operate the valve handwheel in the open direction until the valve is backseated one-half turn
- d. operate the valve handwheel in the close direction, then reopen the valve to the fully open position

QUESTION: 067 (1.00)

A reactor trip has occurred on Unit 2 and AFW pumps 21 and 23 are operating and feeding both steam generators. If a loss of instrument air pressure occurs, AFW flow rate to the steam generators will initially: (Assume no operator action.)

- a. increase, because the 21 AFW pump turbine will increase speed
- b. increase, because all AFW flow control valves associated with AFW pump 23 will fail open
- c. decrease, because the 2<sup>nd</sup> AFW pump turbine will decrease speed
- d. decrease, because all AFW flow control valves associated with AFW pump 23 will fail closed

QUESTION: 068 (2.00)

Match each action in column A to the setpoint pressure (RCS or pressurizer) that will cause the action from column B.  
(0.5 each)

(Numbers in column B may be used once, more than once, or not at all but only one number may occupy each answer space.)

	COLUMN A (ACTIONS)	COLUMN B (PRESSURE)
_____	a. Open SI-634/644 (isolation valves for safety injection tanks)	1. 280 psia
_____	b. Shut SI-652 (shutdown cooling return valve)	2. 300 psia
_____	c. PORV setpoint with MPT enabled on Unit 1	3. 363 psia
_____	d. PORV setpoint with MPT enabled on Unit 2	4. 384 psia
		5. 410 psia
		6. 430 psia

QUESTION: 069 (1.00)

Unit 2 has experienced a loss of all feedwater event with T-ave at 550 degrees F and increasing. A caution in (EOP-3) Total Loss of All Feedwater, states:

"After S/G becomes ineffective for heat removal, Once Through Core Cooling must be initiated prior to CET temperature reaching 560 degrees F to ensure adequate heat removal."

What is the basis for the 560 degrees F CET limit?

- a. It corresponds to a saturation pressure low enough to allow adequate HPSI flow
- b. It corresponds to a saturation pressure high enough to prevent reactor vessel head voiding
- c. It ensures a minimum RCS subcooling of 30 degrees F at the pressurizer PORV lift setpoint
- d. It ensures an adequate shutdown margin exists prior to commencing the cooldown

QUESTION: 070 (1.00)

Unit 2 has experienced a tube rupture in 21 S/G and a loss of offsite power. An RCS cooldown is in progress by steaming 22 S/G to atmosphere. During the cooldown the CRO observes that loop 21 T-hot is 500 degrees F and loop 21 T-cold is 525 degrees F. The CRO is required to:

- a. Continue the RCS cooldown expecting to see loop 21 T-cold decrease and T-hot increase
- b. Stop the RCS cooldown until normal natural circulation is established in loop 21
- c. Stop the RCS cooldown because the wrong S/G is being steamed
- d. Continue the RCS cooldown because the temperature indications are expected

QUESTION: 071 (1.00)

How will core voiding affect the indication of the source range nuclear instrumentation in a shutdown reactor?

- a. Indication decreases because decreased coolant density results in less neutron leakage
- b. Indication increases because decreased coolant density results in more neutron leakage
- c. Indication decreases because decreased coolant density causes a greater time delay between power changes and neutron leakage reaching the detectors
- d. Indication increases because decreased coolant density causes a positive reactivity effect in a partially voided core

QUESTION: 072 (1.00)

Unit 2 is operating at 100% power when CCW to RCP 22B is isolated. What operator action is required?

- a. Trip RCP 22B immediately
- b. Trip RCP 22B within 10 minutes
- c. Trip RCP 22B after conducting an expeditious shutdown
- d. RCP 22B may operate with no restrictions as long as controlled bleedoff flow is maintained

QUESTION: 073 (1.00)

While completing the daily operating log, the Control Room Operator discovers regenerative heat exchanger outlet temperature indication that is outside the allowable range listed on the log sheet. How should the operator log this abnormal condition?

- a. Enter the abnormal reading and circle the entry. Document the cause and/or corrective action being taken in the comments section. No further documentation is required.
- b. Return regenerative heat exchanger outlet temperature to the normal range and enter the new value for the indication in the logs. No further documentation is required.
- c. Enter the abnormal reading and place an asterisk next to the entry. Document the cause and/or corrective action being taken at the bottom of the log on the same page as the abnormal reading. No further documentation is required.
- d. Notify the Control Room Supervisor of the abnormal condition. Restore regenerative heat exchanger outlet temperature to the normal range and ensure the Shift Supervisor's log is updated. No further documentation is required.

QUESTION: 074 (1.00)

A Reactor Operator has worked the following hours on the dates indicated:

DATE	HOURS WORKED
3/12/92	- 0800 through 2000
3/13/92	- 0800 through 1800
3/14/92	- 0800 through 2200
3/15/92	- 0800 through 2000
3/16/92	- 0800 through 1600
3/17/92	- 0800 through 2000
3/18/92	- 0800 through 2200

On which of the above dates did this operator FIRST violate the overtime requirements? (CCI-159, Use of Overtime, pages 2 and 3 are attached for your reference.)

- a. 3/13/92
- b. 3/15/92
- c. 3/17/92
- d. 3/18/92



- NOTE -

Key Maintenance Personnel are those personnel who are responsible for the correct performance of maintenance, repair, maintenance, or calibration of Plant structures, systems or components, and who are personnel performing or immediately supervising the performance of such activities. The term applies to all personnel performing these functions, regardless of whether or not they are assigned to the Shift Staff.

- E. Other personnel directly involved with operating, maintenance, and testing. (See Attachment 3)

II. CANCELLATION

This Instruction cancels and supersedes Section XIV of CCI-140F.

III. WORK HOURS

- A. Whenever possible, supervisors should endeavor to develop work schedules such that overtime is avoided. However, when circumstances require overtime, the following guidelines shall be used.
1. An individual should not be permitted to work more than:
    - a. Sixteen (16) hours straight.
    - b. Sixteen (16) hours in any twenty-four (24) hour period.
    - c. Twenty-four (24) hours in any forty-eight (48) hour period.

d. Seventy-two (72) hours in any seven (7) day period.

- NOTE -

For a, b, c, and d above turnover time and travel time between home and Calvert Cliffs for call in situations are not to be included.

2. There should be a break of at least eight (8) hours between work periods (including shift turnover and travel time).
3. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.

B. Deviations from the above guidelines, when necessitated by extraordinary circumstances, shall be preapproved in writing by the Plant General Manager or the individual's Superintendent or General Supervisor by use of Attachment (1). This authorization shall include a brief description of the extenuating circumstances.

During periods when the above mentioned personnel are not on site, the individual shall initiate Attachment (1) and present it to the Shift Supervisor for approval. The Shift Supervisor will forward the approved Attachment (1) to the individual's General Supervisor, who shall review and initial the form.

C. It is the responsibility of the individual to notify his Supervision of any deviations to this Instruction and initiate Attachment (1).

QUESTION: 075 (1.50)

Match the emergency organizations in column A to the appropriate reporting location from column B. (0.5 for each)

(Numbers in column B may be used once, more than once, or not at all and only one number may occupy each answer space.)

COLUMN A (ORGANIZATION)		COLUMN B (LOCATION)	
_____ a.	Emergency Operations Facility	1.	Interim Office Building
_____ b.	Technical Support Center	2.	Auxiliary Building
_____ c.	Operational Support Center	3.	Control Room
		4.	Calvert Industrial Park

QUESTION: 076 (1.00)

Which one of the following is the LOWEST emergency classification that will require the activation of the Emergency Operations Facility, Technical Support Facility, AND the Operational Support Facility?

- a. Site Emergency
- b. Alert
- c. General Emergency
- d. Unusual Event

QUESTION: 077 (1.00)

Which one of the following should be commenced only AFTER the on-coming shift has assumed the watch?

- a. Formal shift briefing of the shift
- b. Filling out the appropriate Shift Turnover Checklists
- c. Control board walkdown by the on-coming CRO
- d. Face-to-face turnover of items affecting plant operation by on-coming and off-going RO

QUESTION: 078 (1.00)

A normal plant shutdown is in progress with the following conditions:

- Pressurizer pressure at 415 psig and slowly decreasing
- Pressurizer level at 160 inches and slowly decreasing

A leaking pressurizer PORV is suspected. Which one of the following is the expected PORV tailpipe temperature if the PORV is partially open? (Assume downstream pressure is atmospheric and 100% steam quality in the pressurizer.)

- a. 652 degrees F
- b. 450 degrees F
- c. 330 degrees F
- d. 212 degrees F

QUESTION: 079 (1.00)

Unit 2 is operating at 90% power when a Steam Generator Low Level reactor trip is received. What actions are required by the crew to satisfy the reactivity control requirements of EOP-0, Post-Trip Immediate Actions?

- a. Depress one set of manual trip pushbuttons at 2C05 or 2C15 only if the reactor did not initially trip
- b. Depress one set of manual trip pushbuttons at 2C05 or 2C15 whether or not the reactor initially tripped  
  
Depress both sets of manual trip pushbuttons at 2C05 and 2C15 only if the reactor did not initially trip
- d. Depress both sets of manual trip pushbuttons at 2C05 and 2C15 whether or not the reactor initially tripped

QUESTION: 080 (1.00)

Unit 2 is in Mode 1 with the following conditions for the RWT:

- 410,000 gallons
- 2350 ppm boron
- 85 degrees F

What is the operability status of the RWT?

- a. Operable
- b. Inoperable due to water volume
- c. Inoperable due to boron concentration
- d. Inoperable due to temperature

QUESTION: 081 (1.00)

Which one of the following lists the 480 volt bus power supplies for the Unit 2 hydrogen recombiners?

	21 RECOMBINER	22 RECOMBINER
a.	Bus 21B	Bus 22B
b.	Bus 23B	Bus 22B
c.	Bus 21B	Bus 24B
d.	Bus 23B	Bus 24B

QUESTION: 082 (1.00)

Which one of the following conditions will satisfy an interlock to allow travel of the fuel transfer carriage from the refueling pool to the spent fuel pool?

- Both the Spent Fuel Handling Machine and the Refueling Machine must be out of the upender area
- Either the Spent Fuel Handling Machine or the Refueling Machine must be out of the upender area
- Both upenders must be in the horizontal position
- Dillon load cell indicates that a fuel assembly is loaded in the fuel transfer carriage

QUESTION: 083 (1.00)

Which one of the following contains actions that are specifically identified in AGP-9A (Control Room Evacuation) to be performed within the first hour after the control room has been evacuated due to a fire?

- Stop all RCPs and isolate letdown
- Stop all RCPs and establish charging flow
- Establish AFW flow and charging flow
- Establish AFW flow and isolate letdown

QUESTION: 084 (1.00)

Unit 2 was operating at 100 percent power when the Main Turbine tripped due to loss of vacuum. How should the atmospheric dump valves (ADVs) and turbine bypass valves (TBVs) respond immediately after the trip?

- a. ADVs go full open, TBVs remain shut
- b. ADVs go full open, TBVs go full open
- c. ADVs go shut, TBVs go full open
- d. ADVs go shut, TBVs remain shut

QUESTION: 085 (1.00)

What is the maximum allowable liquid discharge flow rate for a RCWMT?

- a. 50 gpm
- b. 70 gpm
- c. 100 gpm
- d. 120 gpm

QUESTION: 086 (1.00)

Pressurizer level is 30 inches below setpoint due to a transient. If all systems are in automatic, what letdown flow rate should exist?

- a. 0 gpm
- b. 19 gpm
- c. 29 gpm
- d. 39 gpm

QUESTION: 087 (1.00)

High temperature in the ECCS pump room actuates a pressure switch starting the fan cooling unit on \_\_\_\_\_/\_\_\_\_\_ and secures the unit at \_\_\_\_\_/\_\_\_\_\_.

STARTS

SECURES

- |                                |                            |
|--------------------------------|----------------------------|
| a. Low pressure/104 degrees F  | High pressure/95 degrees F |
| b. High pressure/104 degrees F | Low pressure/95 degrees F  |
| c. Low pressure/120 degrees F  | High pressure/95 degrees F |
| d. High pressure/120 degrees F | Low pressure/95 degrees F  |

(\*\*\*\*\* END OF EXAMINATION \*\*\*\*\*)



A N S W E R   K E Y

MULTIPLE CHOICE

- 001 a
- 002 a
- 003 MATCHING
  - a 4
  - b 2
  - c 4
  - d 2
- 004 MATCHING
  - a 2
  - b 4
  - c 4
  - d 1

MULTIPLE CHOICE

- 005 c
- 006 MATCHING
  - a 2
  - b 2
  - c 3
  - d 6

MULTIPLE CHOICE

- 007 b
- 008 d

- 009 b
- 010 MATCHING
  - a 2
  - b 1
  - c 2
  - d 5

011 COMPLETION

- a 10
- b 129

012 MATCHING

- a 5
- b 4
- c 8
- d 3

MULTIPLE CHOICE

- 013 a
- 014 a
- 015 b
- 016 d
- ~~017~~ ~~a~~ *deleted*
- 018 d
- 019 c
- 020 a

A N S W E R   K E Y

021 a  
 022 b  
 023 b  
 024 d  
 025 MATCHING  
     a 4  
     b 3  
     c 3

MULTIPLE CHOICE

026 b  
 027 c  
 028 c  
 029 b  
 030 d  
 031 b  
 032 c

033 COMPLETION

- 1 Main Vent Gaseous (RM-5415)
- 2 Condenser Offgas (RM-1752)
- 3 S/G Blowdown (RM-4010/4095)

MULTIPLE CHOICE

034 d  
 035 b

036 d  
 037 d  
 038 MATCHING  
     a 1  
     b 5  
     c 3  
     d 5

MULTIPLE CHOICE

039 d  
 040 d  
 041 MATCHING  
     a 2  
     b 1  
     c 4 (OR) 3  
     d 3

MULTIPLE CHOICE

042 a  
 043 b  
 044 c  
 045 d  
 046 b  
 047 c (OR) b  
 048 b

A N S W E R   K E Y

- 049 a
- 050 b
- 051 a
- 052 c
- 053 b
- 054 b
- 055 c
- 056 b
- 057 c
- 058 c
- 059 a
- 060 d
- 061 a
- 062 c
- 063 b
- 064 d
- 065 d
- 066 d
- 067 a

068 MATCHING

- a 2
- b 2
- c 6
- d 6

MULTIPLE CHOICE

- 069 a
- 070 d
- 071 b
- 072 b
- 073 a
- 074 b

075 MATCHING

- a 4
- b 2
- c 1

MULTIPLE CHOICE

- 076 b
- 077 a
- 078 c
- 079 b
- 080 a
- 081 c

A N S W E R   K E Y

082    c

083    c

084    a

085    d

086    c

087    a

(\*\*\*\*\* END OF EXAMINATION \*\*\*\*\*)

**ATTACHMENT 3**

**FACILITY COMMENTS AND RESOLUTION OF COMMENTS**

## Facility Comments and Resolution of Comments

### COMMENT (SRO-23/RO-17)

The facility states that current procedures do not provide guidance for using EOP Attachment 11 in the manner required by the question. The question required the examinee to determine the time required for both units to commence a cooldown. EOP Attachment 11 has 2 scales for CST water inventory (single unit affected and both units affected), however, one of the curves is no longer used (both units affected). This question requires the examinee to make assumptions that may not be valid. Based on the examinees assumptions, answers a., b., or c. could be correct.

### RESOLUTION

Concur with the facility's comment. The question was deleted from the examination.

### COMMENT (SRO-41/RO-41)

The facility states that 2 ESFAS signals will actuate the Hydrogen Purge Containment Isolation Valves. Therefore, either answer 3 or 4 to part c is correct.

### RESOLUTION

Concur with the facility's comment. The answer keys have been changed to accept either 3 or 4 as the correct answer for part c of this question. This question was revised based on facility comments made during the facility review of the written examination concerning recent changes in plant ESFAS operation. The facility review apparently missed the second correct answer.

### COMMENT (SRO-46)

The facility states that 2 outputs are provided by the Reactor Regulating System Power Ratio Calculator, therefore, answers b. and c. are both correct.

### RESOLUTION

Concur with the facility's comment. Although not noted in the above comment, RO-47 is also affected. The answer keys have been changed to accept either b. or c. as the correct answer. This question was also revised to address facility comments during the written examination review. The facility review apparently missed the second correct answer. In addition, this question came from the facility closed reference question examination bank, which indicated c. to be the correct answer. Post-examination review indicates that b. is the most correct answer.