

EXAMINATION REPORT  
No. 50-289/OL-85-02

Licensee: Nebraska Public Power District  
P. O. Box 499  
Columbus, Nebraska 68601

Docket No.: 50-298

Operator examinations at Cooper Nuclear Station (CNS)

Chief Examiner: John L. Pellet 2-6-85  
John L. Pellet Date Signed

Approved by: R. A. Cooley 2-6-85  
R. A. Cooley, Section Chief Date Signed

Summary

One Senior Reactor Operator license examination written retake was administered at the CNS site by the NRC. The candidate passed the examination.

CNS EXAMINATION REPORT

1. Persons Examined

SRO Retake Candidates:

<u>PASS</u>	<u>FAIL</u>	<u>TOTAL</u>
<u>1</u>	<u>0</u>	<u>1</u>

2. Examiners

J. Pellet, NRC (Chief Examiner)  
D. DuBois, NRC (Senior Resident Inspector)

3. Examination Report

A. Examination Review Meeting Comment Resolution

Editorial comments or changes made during the exam, the exam review, or subsequent grading reviews are not addressed by this resolution section. This section reflects resolution of substantive comments made during the exam review. The modifications discussed below are included in the master exam key which is provided elsewhere in this report, as are all other changes mentioned above but not discussed herein. The following personnel were present for the exam review:

<u>NRC</u>	<u>UTILITY</u>
<u>D. DuBois</u>	<u>R. Jansky</u>

- (1) 6.03 Trip logic for feedwater level control is 2 out of 3 vessel level inputs.  
Resp.: ACCEPT. Key modified.
- (2) 6.04 All IRM Rod Blocks are bypassed with Mode Switch in RUN.  
Resp.: ACCEPT. Key modified.
- (3) 6.05 Procedure 2.2.8 states about 265 psid, 2.4.1.1.1 gives an operating pressure of 250-265 psid.  
Resp.: ACCEPT. Key modified.
- (4) 6.12.b W=core flow should not be required for full credit.  
Resp.: ACCEPT. Provided for info only - not required.

B. EXAMINATION MASTER COPY (SRO/RO QUESTIONS AND ANSWERS)

The SRO examination master key makes up the rest of this report.

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

FACILITY: COOPER  
 REACTOR TYPE: BWR-GE4  
 DATE ADMINISTERED: 85/01/16  
 EXAMINER: PELLET, J.  
 APPLICANT: \_\_\_\_\_

INSTRUCTIONS TO APPLICANT:

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

CATEGORY	% OF	APPLICANT'S	% OF	
VALUE	TOTAL	SCORE	VALUE	CATEGORY
25.50	100.00	_____	_____	6. PLANT SYSTEMS DESIGN, CONTROL, AND INSTRUMENTATION
25.50	100.00	_____	_____	TOTALS

FINAL GRADE \_\_\_\_\_%

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

\_\_\_\_\_  
APPLICANT'S SIGNATURE

## QUESTION 6.01 (2.50)

- a. List three (3) sources of power to the 1F and 1G 4160V buses. (1.5)
- b. State whether each system listed below has an automatic transfer to a backup power source. (1.0)
1. Recirculation MG sets.
  2. Vital Instrument AC Power System (RPS).
  3. 120/220 VAC Instrument Power System.
  4. No-Break Power System.

## QUESTION 6.02 (2.00)

Give the indication or reading for the #1 and #2 recirculation pump seal cavity pressures for each of the conditions below. Assume normal operating conditions at 100% power.

- a. Both seals good. (1.0)
- b. #1 seal failed. (0.5)
- c. #2 seal failed. (0.5)

## QUESTION 6.03 (2.00)

Explain how selecting channel B to level control in the Feedwater Control System ensures that reactor vessel overflow protection remains in effect.

## QUESTION 6.04 (2.50)

List four (4) rod blocks associated with the IRM's. Include setpoints and AUTOMATIC bypasses for each if they exist.

## QUESTION 6.05 (2.00)

- a. State the normal operating value or range of values for each of the parameters below. (1.0)
1. Control Rod Drive system flow.
  2. Drive water differential pressure.
  3. Cooling water differential pressure.
- b. Explain how the on-line flow control valve responds during a reactor scram and why. (1.0)

QUESTION 6.06 (1.50)

Explain the basic purpose for installing the Low-Low Set Safety/Relief Valve Control System.

QUESTION 6.07 (1.50)

Explain what is meant by RECIRCULATION RATIO and give its value at rated power and recirc flow.

QUESTION 6.08 (1.50)

Explain how failure of the inservice pressure controller "A" low will affect the actual steam pressure if the DEH is in MODE 4 at 100% steady-state steam pressure of 955 psig. State the new steady-state pressure.

QUESTION 6.09 (1.00)

Explain why the main portion of the Feedwater Control System is designed to use single element control when operated at low power levels.

QUESTION 6.10 (2.00)

Explain how and why each of the following would affect INDICATED reactor level. Assume in all cases a change occurs.

- a. Equalizing valve on the level transmitter leaks through.
- b. Drywell temperature INCREASES over an extended period of time.

QUESTION 6.11 (4.00)

State four (4) of the five (5) modes of operation for the Residual Heat Removal System and briefly explain the function of each.



## QUESTION 6.12 (3.00)

Give the setpoint per Technical Specifications for each of the RPS trip parameters listed below.

- a. High Reactor Power (IRM).
- b. High Reactor Power (APRM - FLOW BIASED).
- c. High Reactor Pressure.
- d. High Drywell Pressure.
- e. Low Reactor Water Level.
- f. Scram Discharge Volume High Water Level.
- g. Main Steam Line High Radiation.
- h. Turbine Stop Valve Closure.
- i. Turbine Control Valve Fast Closure.

ANSWERS -- COOPER

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ANSWER 6.01 (2.50)

- a. normal station service xformer, S/U xformer, D/G, emergency power xformer [any 3/4 @ 0.5 ea.]  
 b. 1-NO, 2-NO, 3-NO, 4-YES (4 ans. @ 0.25 ea.)

## REFERENCE

CNS TRNG MANUAL, Elect. Dist., p. 5, 10, 11

ANSWER 6.02 (2.00)

- a. 1-1000 psig, 2-500 psig (2 ans. @ 0.5 ea.)  
 b. 1-1000 psig, 2-1000 psig (2 ans. @ 0.25 ea.)  
 c. 1-1000 psig, 2-0 psig (2 ans. @ 0.25 ea.)

## REFERENCE

CNS TRNG MANUAL, Recirc System, p. 2, 3, Figure 1

ANSWER 6.03 (2.00)

Ch. A/C use 1 sensing tap. B uses diff. sens. tap. B does not cause a trip on high level but failure of A & C or A/C sensing line would (because trip logic is 2/3). Therefore selecting B to control assures that failure of a single sensing line does not cause RFPT speedup & loss of hi level trip. (Sensing tap concept 1.0, Logic concept 1.0)

## REFERENCE

CNS SOP 2.2.28, Section V.B.; TRNG MANUAL, RV Instr., p. 14, Figure 5

ANSWER 6.04 (2.50)

BLOCK	SETPOINT	BYPASS
Upscale	108/125	Mode switch in RUN
Downscale	2.5% scale	Downscale on range 1 (and MS in RUN)
Inop	N/A	N/A - Manual only (and MS in RUN)
Detector not full in	N/A	Mode switch in RUN
[4 BLOCKS @ 0.25 ea., 2 STPNTS @ 0.25 ea., 3 BYPASSES @ 0.333 ea.]		

## REFERENCE

CNS TRNG MANUAL, IRM, p. 6, 7

ANSWERS -- COOPER

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ANSWER 6.05 (2.00)

- a. 1-45/55 gpm, 2-~250/265 psid, 3-15/25 psid  
b. As accumulator pressure decreases, charging flow increases. Flow is sensed upstream of chg. tap so hi flow is sensed sending a minimum position signal to the FCV.  
(a. 3 ans. @ 0.333 ea., b. Sensed flow change concept 0.5, FCV change 0.5)

## REFERENCE

CNS SOP 2.2.8, p. 2, 3

ANSWER 6.06 (1.50)

To provide sufficient time between initial and subsequent lifting of any single relief valve for the water level in the discharge piping to drain down to normal level to prevent overpressure conditions during subsequent lifting of a relief valve.  
(3 concepts @ 0.5 ea.: drain time, level in dis. pipe, prevent overpress.)

## REFERENCE

CNS Low-Low Set L. P. , CNS REQUALIFICATION EXAMINATION on May 2, 1984

ANSWER 6.07 (1.50)

RATIO = Total Core Flow / Steam or Feedwater Flow; 7.5:1 @ CNS  
(ratio 1.0, value 0.5)

## REFERENCE

CNS TRNG MANUAL, Ch. 20, p. 9

ANSWER 6.08 (1.50)

"A" failing low causes "B" to be selected by the HVG and "B" is normally set 3 psi higher than "A". New steam pressure is 958 psig.  
(B sel. by HVG 0.6, B 3# higher 0.6, 958 psig 0.3)

## REFERENCE

CNS DEH System L. P.; CNS REQUALIFICATION EXAMINATION on May 2, 1984



ANSWERS -- COOPER

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ANSWER 6.09 (1.00)

At low power levels or feed/steam rates flow instruments are inaccurate and unstable so 3 element control is bypassed.  
[Concept unstable/inaccurate 1.0]

## REFERENCE

CNS TRNG MANUAL, Ch. 46, p. 4

ANSWER 6.10 (2.00)

- a. Indicated level would INCREASE. Reference leg - variable leg dp would go to zero.
  - b. Indicated level would INCREASE. Reference leg density would decrease due to temperature increase so reference leg pressure would decrease so reference leg - variable leg dp would decrease.
- [1.0 ea. ans.; level direction 0.5, dp direction/explanation 0.5]

## REFERENCE

CNS TRNG MANUAL, Ch. 27, p. 14 - 14a

ANSWER 6.11 (4.00)

1. LPCI - Restore or maintain RV level post-LOCA.
  2. Containment Spray - Limit temperature and pressure in the torus and drywell post-LOCA.
  3. Steam Condensing - Condense steam or remove heat while the RV is isolated from the condenser.
  4. Torus Cooling - Remove heat from the suppression pool water.
  5. Shutdown Cooling - Remove decay and residual heat from the RV to achieve and maintain cold shutdown.
- [any 4/5 ans. @ 1.0 concept - specific names or wording above not req'd.]

## REFERENCE

CNS TRNG MANUAL, Ch. 29, p. 2

ANSWERS -- COOPER

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ANSWER 6.12 (3.00)

- a.  $\leq 120/125$  of scale
  - b.  $\leq (0.66W + 54)\%$  (FRP / MFLPD; W = core flow)
  - c.  $\leq 1045$  psig
  - d.  $\leq 2$  psig
  - e.  $\geq 12.5$  inches
  - f.  $\leq 92$  inches
  - g.  $\leq 3\times$  normal full power background
  - h.  $\leq 10\%$  valve closure
  - i.  $\geq 1000$  psig turbine control fluid pressure
- (9 ans. @ 0.333 ea.)

## REFERENCE

CNS TRNG MANUAL, Ch. 45, p. 4, 5; CNS TECH. SPECS., Table 3.1.1