U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-254/OL-89-04

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Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Quad Cities Nuclear Power Station

Examination Administered At: Quad Cities Nuclear Power Station
Cordova, Illinois

Examination Conducted: November 13-17, 1989

Examiners: Michael E. Bielby Sr. 1/4/90
M. E. Bielby, Chief Examiner Date

for Michael E. Bielby Sr. 1/4/90
J. Muth Date

for Michael E. Bielby Sr. 1/4/90
D. Draper Date

Approved By: M J Jordan 1/4/90
Michael Jordan, Operator Date
Licensing, Section No. 1

Examination Summary

Examination administered on November 13-17, 1989 Report No. 50-254/OL-89-04: Written and Operating Examinations were administered to six Reactor Operator (RO) candidates and one Senior Reactor Operator (SRO) candidate.
Results: All candidates successfully passed the operating examinations. One SRO and five ROs passed the written examination. Overall, one RO failed the examination.

REPORT DETAILS

1. **Examiners**

   M. Bielby, Chief Examiner, RIII NRC
   J. Muth, Battelle Pacific Northwest Laboratories (PNL)
   D. Draper, PNL
   J. Hammer (under instruction), RIII NRC

2. **Exit Meeting**

   An exit meeting was conducted on November 17, 1989. The following personnel attended this exit meeting:

   Facility Representatives

   R. Bax, Station Manager, Quad Cities
   J. Sirvoy, Services Director
   J. Wethington, Quality Assurance Superintendent
   J. Swales, Operations Assistant Superintendent
   J. Neal, Training Supervisor
   T. Barber, Regulatory Assurance
   T. Schares, Training Instructor

   NRC Representative

   R. Higgins, Senior Resident Inspector
   M. Bielby, Chief Examiner
   J. Hammer, Examiner

   The following items were discussed during the exit meeting:

   a. Security, Radiation Protection and Operations Personnel were cooperative in assuring there were no delays associated with badging, dosimetry and accessing the station during administration of the examinations.

   b. The following training strengths were identified during the examinations:

      (1) Candidates immediately referred to appropriate procedures to confirm Immediate Actions and review Subsequent Actions.

      (2) Candidates recognized entry conditions for Emergency Procedures (QGAs) and were familiar with procedural steps of the flowcharts.

ATTACHMENT I

NRC RESPONSE TO FACILITY COMMENTS
ON THE RO/SRO WRITTEN EXAMINATIONS
ADMINISTERED NOVEMBER 13, 1989

QUESTION 2.12 WHICH ONE (1) of the following equipment will be affected by a loss of Instrument Air?

a. Feedwater regulating low flow control valve
b. Reactor Water Cleanup filter demineralizer
c. Offgas system pressure control valves
d. Standby Liquid Control system

ANSWER: C.

COMMENT: This question does not give enough information in order to make a selection. A loss of Instrument Air will affect all of the systems or components listed (all of the answers are correct). The most direct effect will be seen in the Feedwater Regulating low flow control valve and the Offgas system pressure control valves. Therefore, both answers a. and c. are equally the most correct answers for this question.

Reference: QOA 600-1, Rev. 8
QOA 4700-6, Rev. 1
LIC-600, Rev. 4

RESPONSE: Comment accepted. Question deleted.

QUESTIONS 2.14
5.16a. Unit I is operating at 100% core power. A failure of the master recirculation flow controller causes both recirculation pumps to runback to minimum speed (less than 44 million lb/hr). No reactor protection trip occurs and all attempts to return the recirculation system to normal are ineffective. With respect to QOA-400-2, Rev. 2, "Core Instabilities." WHAT TWO (2) conditions would require the operator to scram the plant IMMEDIATELY?

ANSWER:
1. APRM or LPRM peak to Peak oscillation > 10%
2. Periodic LPRM upscale or downscale alarms.

COMMENT: The two conditions stated as the answer to this question actually constitute four conditions. These conditions are stated in one sentence in QOA 400-2, Rev. 2, step C.2, and consist of the following:

1. APRM peak-to-peak oscillations of greater than 10%

2. LPRM peak-to-peak oscillations of greater than 10%

3. Periodic LPRM upscale alarms

4. Periodic LPRM downscale alarms

Any one of these four would require the operator to manually scram the reactor.

Any two of these conditions stated should be counted as full credit.

RESPONSE: Comment accepted. Answer Key modified.

QUESTION 2.20 During a startup with reactor pressure at 550 psig and increasing, the operating control rod drive pump trips. WHICH ONE (1) of the following is an immediate action per QOA-300-1, "Control Rod Drive Pump Failure?"

a. verify correct valve lineup for the standby pump
b. start the standby CRD pump
c. verify recirculation system in individual manual control
d. scram the reactor

ANSWER: d.

COMMENT: A new procedure revision has come out for QOA 300-1, which may affect this question.

Reference: QOA 300-1, Rev. 9

RESPONSE: Comment not accepted. Major emphasis is still the SCRAM requirement. In addition Rev. 9 came out in April, 1989 and the pre-exam review accepted question as written.

QUESTION 3.17b.,c. MATCH the RHR System valves listed in Column B to the interlock restrictions described in Column A. Each valve may be used more than once or not all. Each interlock in Column A may have more than one valve associated with it. A drawing of the "B" RHR loop is attached for reference.

Column A (Interlocks)	Column B (Valves)
a. Interlocked closed if reactor pressure is above 100 psig _______	1. MO-1001-1, Suppression Pool Suction
b. Interlocked closed on a Group 2 isolation in any mode _______	2. MO-1001-43, Shutdown Cooling Suction
c. Interlocked closed on a LPCI initiation but can be opened anytime the Containment Cooling Permissive Switch is "ON" _______	3. MO-1001-16, Hx Bypass
d. Interlocked open on a LPCI initiation but can be throttled after a 30 second TD _______	4. MO-1001-18, Minimum Flow
e. Interlocked open on a LPCI initiation but can be throttled after a five minute TD _______	5. MO-1001-19, RHR Loop
	6. MO-1001-23, Drywell Spray
	7. MO-1001-28, LPCI Injection Out
	8. MO-1001-29, LPCI Injection
	9. MO-1001-37, Suppression Pool Cooling
	10. MO-1001-37, Suppression Pool Spray
	11. MO-1001-58, Head Spray FCV
	12. MO-1001-60, Head Spray Isolation

ANSWER:

a. 12
b. 12
c. 9
d. 3
e. 7

COMMENT:

Part b. of this question asks for RHR valves that will close on a Group 2 isolation in any mode. This can be interpreted two different ways. It may be interpreted as asking for valves that would close in any of a number of conditions, with the actual valves that do close varying from condition to condition. It could also be interpreted as those valves that will always go closed on a Group 2 isolation, regardless of conditions. Based on this ambiguity, item No. 8 should not be counted as incorrect, since the MO-1001-29 valve will close on a Group 2 isolation, if the RHR system is in the Shutdown Cooling mode of operation.

Part c. of this question suffers from the same ambiguity as part b. by the use of the work anytime. Based on this, items No. 6 and No. 10 should not be counted as incorrect, as the use of the Containment Cooling Permissive switch in the "ON" position will enable the use of these valves with a LPCI initiation signal present.

Reference: LIC 1000, Rev. 3, p. 16-20

RESPONSE: Comment accepted. No pre-exam comment. Answer Key modified.

QUESTION 3.18 Concerning the Rod Worth Minimizer System:

a. WHICH ONE (1) of the following conditions describes the MINIMUM flowrate at which the Rod Worth Minimizer System could by BYPASSED?

1. steam flow OR feed flow greater than 20%
2. steam flow AND feed flow greater than 20%
3. steam flow OR feed flow greater than 30%
4. steam flow AND feed flow greater than 30%

b. WHICH ONE (1) of the following responses will NOT occur if the RWM fails?

1. rod blocks will be applied regardless of reactor power
2. rod blocks will be applied if the system is UNBYPASSED
3. the system will fail to apply needed rod blocks
4. the system will auto transfer to the backup computer

ANSWER:

a. 2
b. 4

COMMENT: Part b. of this question has some very confusing distractors. In looking at the choices presented, and trying to determine what will NOT occur if the RWM fails, item 1 or 2 cannot be true if item 3 is true. The reverse also holds - if item 1 or item 2 is true, then item 3 must be false. Item 4 is independent of items 1, 2, or 3. By process of elimination, this would mean that there are at least 2 correct answers to this question. This question should be deleted.

Reference: None

RESPONSE: Comment not accepted. Using the True/False logic could also indicate that two of the distractors were false. In addition, the selections are to be considered independently. There were no references provided and the question was previously reworded per pre-exam comment.

QUESTION 3.20b. MATCH the power supplies listed in Column B with the loads in Column A for which they are the primary feed. Each bus may be used more than once or not at all.

Column A	Column B
a. Core Spray Pump 1B _______	1. Bus 11
b. U-1 Diesel Generator Cooling Water Pump _______	2. Bus 12
	3. Bus 13
c. Reactor Feed Pump 1A _______	4. Bus 13-1
d. Recirc MG Set 1B _______	5. Bus 14
e. RHR Pump 1D _______	6. Bus 14-1
f. RHR Service Water Pump 1D _______	7. Bus 15
	8. Bus 16
	9. Bus 17
	10. Bus 18
	11. Bus 19

ANSWER:

a. 6
b. 10
c. 1
d. 2
e. 6
f. 5

COMMENT: The answer for this item should be 11 (vs. 10). The power supply to the U-1 Diesel Generator Cooling Water Pump is Bus 19.

Reference: QOA 6700-5, Rev. 6

RESPONSE: Comment accepted. No pre-exam comment. Answer Key modified.

QUESTION 3.24a and 6.01a

MATCH the correct refueling interlock from Column B with the situation in Column A to which it applies. Items in Column A may have more than one answer. Interlocks in Column B may be used more than once or not at all.

Column A (Situation)	Column B (Refueling Interlock)
a. the refuel platform is over the reactor and a control rod is withdrawn and a load is on the grapple ______	1. rod block
	2. prevent movement of bridge towards reactor
b. a control rod is withdrawn and the platform is on switch refuel No. 1 and a fuel assembly is on the hoist ______	3. stop operation of fuel hoist
	4. stops upward movement of the overhead crane only
c. a radiation monitor reading of 16 mR/hr (high rad alarm) on the refuel floor ______	
d. the Bridge is located outside of the zone computer limits	

ANSWER:

a. 1, 3
b. 2
c. 4

COMMENT: Part a. of this question specifies that items No. 1 and No. 3 are the correct answers for this situation. Item No. 2 should not be counted as incorrect. The circuitry for this interlock would actuate in this situation, even though its effects would not be seen under the conditions given.

Reference: Technical Specifications
3.10.A.2.b

RESPONSE: Comment accepted. No pre-exam comment.
Answer Key modified.

QUESTION 3.25 During a core trasverse by the TIP system with the TIP in the core conditions indicating a Loss of Coolant Accident (LOCA) occur. WHICH ONE (1) of the following statements describes the response of the TIP system?

a. It continues its sequence for the present core position and then transfers to manual, reverses, and withdraws into the shield.

b. The ball valve closes regardless of the position of the probe, shearing the probe and isolating the TIP system.

c. The TIP system transfer to manual, reverse, and withdraws into the shield.

d. The TIP system transfers to manual, reverses to fast speed, and withdraws into the shield.

ANSWER: c.

COMMENT: None of the available selections for this questions is correct, per the reference indicated (Lesson Plan LIC 0700-6, Rev. 2). None of the available choices reflect actual plant operation. The TIPs do not automatically switch to MANUAL operation on a Group 2 isolation signal. This question should be deleted.

Reference: LIC 0700-6, Rev. 2, P. 46-48

RESPONSE: Comment accepted, question deleted. No pre-exam comment.
Answer Key modified.

QUESTION 3.34 FILL IN THE BLANKS to identify the MINIMUM shift staffing requirements per Technical Specifications for each condition below.

Unit 1 at Cold Shutdown, Unit 2 at Hot Shutdown

Operator License (a) _______
Non-Licensed (b) _______

Both Unit 1 and Unit 2 at Cold Shutdown

Operator License (c) _______
Non-Licensed (d) _______

ANSWER:

(a) 3
(b) 3
(c) 2
(d) 3

KA 294001A103

COMMENT:

This question, or variations thereof, has been used a number of times in the past. The K/A reference for this question is 294001A103, which states:

A1.03 Ability to locate and use procedures and station directives related to shift staffing and activities. (Emphasis added)

This is rated at 2.7 for ROs and 3.7 for SROs.

This indicates that this should be an open reference question. As the reference (Tech Spec 6.1) was not provided to the candidates, this question should be deleted.

Reference: NUREG 1123, P. 2-2

RESPONSE:

Comment accepted, question deleted. Answer Key modified.

QUESTION 5.08

During the course of a startup with Rx pressure at 300 psia, the RO reports to you as SRO that HPCI surveillance has caused the suppression pool temperature to reach 110 F. STATE the TWO (2) immediate actions in accordance with QOA-1600-3, "High Suppression Pool Temperature?"

ANSWER:

1. Initiate suppression pool cooling
2. Enter OGA-200-1, "Suppression Pool Temp Control"

COMMENT:

This procedure would be entered upon a TORUS WATER HIGH TEMP alarm (90X-4-G-17), which occurs at a torus temperature of 90°F. That the conditions state that the torus temperature is 110°F would indicate that the steps in this procedure would have been executed long ago.

Technical Specification 3.7.A.1.c.3) requires that the reactor be scrammed from any operating condition if the temperature of the torus reaches 110°F. This is also one of the steps in QGA 200-1, which is specified as one of the immediate actions (this is also one of the Subsequent Actions of QOA 1600-3). An answer of "scram the reactor", or words to that effect, should be accepted for 0.75 points of credit.

Reference: QOA 900-4-G, Rev. 11, P. 6
QOA 1600-3, Rev. 4
QGA 200-1, Rev. 3
Technical Specifications 3.7.A.1.c.3

RESPONSE: Comment accepted. The pre-exam comments wanted "scram the reactor" deleted because it was a subsequent action.

QUESTION 5.10c FILL IN THE BLANKS FROM THE LISTED CHOICES. Unit II is at 100% power. The Feedwater Level Control System has "A" controller in manual, "B" controller in automatic, Master controller in automatic set at 30 inches and Low flow controller in automatic at 25 inches. If the feedwater master controller loses its signal, the feedwater regulator valves will (a) ______. If the reactor level decreases to +25 inches, the low flow control valve will (b) ______. If air is lost to the low flow control valve it will (c) ______.

1. FAIL FULL OPEN
2. FAIL FULL CLOSED
3. FAIL AS IS
4. BEGIN TO OPEN

ANSWER: (a) 3.
(b) 4.
(c) 1.

COMMENT: The lesson plan LIC 0600 states that the low flow control valve will fail "as-is" on a loss of air pressure. This is also supported by recent revisions to QOA 600-1 and QOA 4700. For part c., an answer of "3." is the correct answer.

Reference: QOA 600-1, Rev. 8
QOA 4700-6, Rev.1
LIC 600, Rev. 4, p. 8-10, fig. 3

RESPONSE: Comment accepted, however, QOA 600-1, Rev. 8 is dated March 1989, and QOA 4700-6 Rev. 1 is dated March 1989. No pre-exam comment. Answer Key modified.

QUESTION 5.14a

MATCH the equipment/systems in Column B which would be affected by a loss of the systems in Column A. Items in Column A may have more than one correct answer. Items in Column B may be used more than once or not at all. Assume all systems are in their normal line up.

Column A	Column B
a. Instrument Air System	1. Standby liquid control system
b. Service Air System	2. CRDH flow control valves
	3. Breathing Air
	4. Scram Valves
	5. Outboard MSIVs
	6. Target Rock valves

ANSWER:

a. 1, 2, 4, 5, 6
b. 1, 3

COMMENT:

The Target Rock Valve is located in the drywell, and as such is supplied by the Drywell Pneumatic System. Under operating conditions, a normal lineup would have the Drywell pneumatic System being backed up by the station nitrogen supply system. Therefore, item No. 6 would be an incorrect answer for part a., and the answer for part a. should not require item No. 6 in order to get full credit.

Reference: LIC 0250, Rev. 2, p. 14-18
LIC 4600/4700, Rev. 2, p. 32 and fig. 11

RESPONSE:

Comment accepted, item 6 deleted. The pre-exam review requested "Target Rock Valve" vice "safety relief valves" as a selection. Answer Key modified.

QUESTION 5.15c

WHICH ONE (1) of the following items are entry conditions for QGA-300, "Secondary Containment Control?"

a. Rx building floor drain Sump "A" and "B" above the high level alarm for 10 minutes.

b. Steam tunnel area temperature reading 150 F.

c. Unit I CRD Hydraulic Control Units (South) area radiation reading 15 mR/hr.

d. Rx building Differential pressure reading 1.2 psid.

ANSWER: d

COMMENT: Item c. should also be considered a correct answer. 15 m4/hr is the Maximum Normal Operating Value for the CRD hydraulic Control Units area. The entry condition for QGA 300 regarding radiation levels states "An area radiation level ABOVE the Max Normal Operating Radiation Level (QGA should not be required. However, the entry conditions of the QGAs supplied to the candidates for the exam were blanked out. If the entry conditions were provided, then this distinction could be made; without the entry conditions supplied, the QGAs would be entered AT the Max Normal Operating Radiation Level. Also, if this radiation level were reached at the station, thereby giving an Area Radiation Monitor (ARM) alarm, QGA 300 would be entered.

Reference: QGA 300-1, Rev. 3
QGA 300-T2, Rev. 3
QOP 1800 T2, Rev. 16, p. 1

RESPONSE: Comment not accepted. QGA 300-1, Rev. 3 clearly states " . . . ABOVE the Max Normal . . ." and operators are required to know QGA entry conditions. The pre-exam review accepted the question as long as Max Normal tables were provided.

QUESTION 5.16b. Unit I is operating at 100% core power. A failure of the master recirculation flow controller causes both recirculation pumps to runback to minimum speed (less than 44 million lb/hr). No reactor protection trip occurs and all attempts to return the recirculation system to normal are ineffective.

b. WHY is the (APRM) Average Power Range Monitor Flow biased SCRAM ineffective in mitigating the core instability?

ANSWER: b. (Time delay in the APRM flow based setpoint has a time delay to account for fuel time constant.) If flux oscillations are less than time constant, the flow biased APRM trip would not see them.

COMMENT: This question should be deleted, since Quad Cities does not (and never has) use(d) a time delay circuit in the APRM flow-biased scram circuitry.

Reference: NEDO-31708, p. 6-4-15

RESPONSE: Comment accepted. This was a pre-exam comment. Answer Key modified.

QUESTION 5.18b CLASSIFY the following events using QEP 200-T1, "Classification of GSEP Condition."

a. A liquid discharge of insoluble iron-55 with a radionuclide concentration of 2.1 x 10**-2 uCi/ml.

b. A gaseous release of argon-41 with an instantaneous release concentration of 4 x 10**-6 uCi/ml.

c. Primary containment activity of 560 rem/hr.

d. Sustained winds of 112 mph with both units in Cold Shutdown.

e. A fire in the protected area which releases chloride in unbreathable concentrations in the protected area.

ANSWER:

a. alert
b. unusual event
c. site emergency
d. alert
e. alert

COMMENT: The answer to part b. of this questions should be a GSEP classification of "alert" instead of "unusual event". For the level of Argon-41 release specified, this comprises 2 times the level specified in 10 CFR 20 App. B Table I. Per EAL 17 of QEP 200-T1, this would be an Unusual Event. This level per EAL 17 of QEP 200-T1, this would be an Alert. 10 CFR 20.105 is the reference stated in EAL 17 of QEP 200-TI. 10 CFR 20.106 continues with specifics concerning allowable gaseous activity release rates to unrestricted areas, specifying the use of App. B, Table II. Based upon this, the answer to part 6. is "Alert".

Reference: 10 CFR 20.105, Appendix B QEP 200-T1, Rev. 15, p. 8

RESPONSE: Comment accepted, however, recommend that QEP 200 T1, EAL-17 wording for UNUSUAL EVENT and ALERT be clarified with respect to referencing the proper 10 CFR 20 paragraph and Appendix B table to use. Not a pre-exam comment. Answer Key modified.

QUESTION 6.04c MATCH the system response in Column B with the systems in Column A under the assumption that ONE safety relief valve (SRV) fails open during 100% power operation.

Column A	Column B
a. MWE ______	1. Increases Constantly
b. Indicated turbine steam flow ______	2. Decreases Constantly
c. Reactor water level ______	3. Increases and then Stabilizes
d. Feedwater temperature ______	4. Decreases and then Stabilizes
	5. No Change

ANSWER:

a. 4
b. 4
c. 4
d. 4

COMMENT: At Quad Cities, the Feedwater Regulating Valves (FWRVs) are operated only in the Single Element mode. Under the conditions given in this questions this would cause level to decrease, and then return to it original value, since the FWRVs would open to restore le.el to the setpoint. The correct answer for this part should be item No. 5, "No Change."

Reference: LIC 0600, Rev. 4, p. 2, 18, 20

RESPONSE: Comment accepted. No pre-exam comment. Answer Key modified.