

EXAMINATION REPORT

Docket No: 50-368

License No: NPF-6

Licensee: Arkansas Power & Light Company  
P.O. Box 551  
Little Rock, Arkansas 72203

Examinations administered at Arkansas Nuclear One, Unit 2 (ANO 2)

Chief Examiner: *Stephen L. McCrory* 7/31/84  
Stephen L. McCrory, Examiner Date

Approved by: *R. A. Cooley* 8/1/84  
R. A. Cooley, Section Chief Date

Summary

Examinations conducted on June 14-15, 1984.

An oral examination (retake) was administered to one SRO candidate. Partial written and complete oral requalification examinations were administered to two (2) ROs, and four (4) SROs with one of the SROs taking the written examination only. All candidates passed these examinations.

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Report Details

1. Examination Results

SRO Candidates				RO Candidates			
Total	Pass	Fail	%	Total	Pass	Fail	%
5	5	0	100	2	2	0	100

2. Examiners

S. L. McCrory, Chief Examiner, NRC  
G. Streier, EG&G

3. Examination Report

This Examination Report is composed of the sections listed below.

- A. Examination Review Meeting Comment Resolution
- B. Exit Meeting Minutes
- C. Generic Comments
- D. Examination Master Copy (SRO/RO Questions and Answers)

Performance results for individual candidates are not included in this report because, as noted in the transmittal letter attached, examination reports are placed in NRC's Public Document Room as a matter of course.

A. Examination Review Meeting Comment Resolution

Sections 4 and 7 were prepared by NRC for the RO and SRO requalification examinations respectively.

In general, 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:

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NRC

S. L. McCrory

UTILITY

J. Vandergrift  
J. Constantin  
R. Wewers

COMMENTS

Prior to the examination administration, the facility training personnel provided the NRC examiner with corrections to the facility requalification examination bank questions. These corrections were entered into the NRC prepared sections 4 and 7 as necessary. There were no further comments concerning these sections.

B. Exit Meeting Summary

At the conclusion of the exam period, the NRC examiner met with representatives of the plant staff to discuss the results of the examinations. The following personnel were present for the exit interview:

NRC

S. McCrory

UTILITY

J. M. Levine  
J. D. Vandergrift  
J. Constantin  
R. Hargrove  
L. Humphrey

The NRC examiner reported that all oral examinations were clear passes and that no significant generic weaknesses were noticed. He further committed to having the results of the NRC prepared portions of the written requalification examination available the following week.

The NRC examiner inquired concerning the status of the facility response to the Region IV Administrator's letter of May 24, 1984 concerning the facility's performance on the March 1984 replacement examinations. Facility staff personnel stated that the matter was still under investigation and no definitive response had been formulated. They had not set a target response date at the time of this exit interview.

## ANO 2 EXAMINATION REPORT

As a result of a B&W owners' meeting attended earlier this year by AP&L personnel, a question was raised concerning issuing a Reactor Operator License concurrent with a Senior Reactor Operator Instructor Certification based on successful completion of the SRO Instructor Certification examination. This being applicable to candidates meeting the experience and training requirements for RO, but lacking the experience requirements for SRO (Instant). The NRC examiner agreed to get a definitive statement of current Operator Licensing Branch (OLB) policy concerning this matter upon return to the region office.

This issue should be addressed in the August 1984 meeting on operator training and licensing.

### C. Generic Comments

During the grading of the exams, areas of generic weakness are identified based on the responses of the candidates to individual questions. The following generic weaknesses were identified as a result of the grading of the ANO 2 exams.

1. Most of the candidates had trouble of one sort or another with question 4.3/7.1. Five of six were unable to accurately use attachment C to obtain the RCS mass by interpolation between the values given. Two of six did not realize that the conversion factor (0.1227) in the equation on attachment A.2 is the product of (0.0164 ft<sup>3</sup>/lb) and (7.48 gal/ft<sup>3</sup>) in the preceding equation. Two of the six did not realize that the flow rate of the boric acid makeup pumps, discharging to the suction of the charging pumps, is greater than the combined flow rate of all the charging pumps such that charging pump capacity becomes limiting when injecting boric acid as stated in the question.
2. Four of four SRO candidates were unable to give the three reactor restart conditions requested in question 7.9. Three of these four did not realize that restart after a reactor trip for training had been deleted from the procedure.

These areas should be regarded as potential areas for emphasis in the ANO 2 training program particularly the understanding and use of various "fill in the blank" type forms found in the operating procedures. Because of the small sample size and the specificity of the remarks, this analysis does not necessarily indicate a problem with the training program as a whole.

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D. Examination Master Copy

Date Administered: June 15, 1984

Exam Type: Reactor Operator and Senior Reactor Operator  
requalification

Comments:

Only sections four (4) and seven (7) were prepared by the NRC to be substituted into the RO and SRO requalification examinations for the week of 10 June 1984.

During the administration of the examination, the SRO candidates were instructed to change question 7.9 to read "... lists 3 conditions ..." vice 4.

ANO 2 EXAMINATION KEY

4.1 List 5 controls available to the operator at the remote shutdown panel. (Redundant controls will be considered as one.) (1.0)

Ans: (any 5)

1. Pressurizer spray control valves. (2HIC-4651A, 2HIC-4652A)
2. Letdown flow control valves. (2HIC-4817A, 2HIC-4817B)
3. Steam dump and bypass system. Emerg. off.
4. Auxiliary spray control valve. (2HIS-4824-2A)
5. Shutdown cooling flow control valves. (2HIC-5091A, 2HIC-5093A)
6. Letdown diversion control valve. (2HS- 4826A)
7. Letdown backpressure control valve. (2HIC-4812)
8. RPS/ESFAS pressurizer pressure trip setpoint reset (four channels).
9. RPS/ESFAS pressurizer pressure trip bypass (four channels).
10. Low steam generator pressure trip setpoint reset (four channels).

Ref: ANO II FSAR 7.4

Question value is 1 pt , 0.2 each.



ANO 2 EXAMINATION KEY

- 4.2 Concerning the RCS:
- A. Why is a leak rate performed? (.25)
  - B. What are ANO II maximum leak rates? (1.5)
  - C. How often is a leak rate required? (.25)

Ans:

- A. A leak rate is performed in order to identify potential problems of leakage from the primary system.
- B. Leakage shall be limited to:
  - 1. No pressure boundary leakage.
  - 2. 1 gpm unidentified leakage.
  - 3. 1 gpm total primary to secondary leakage through both steam generators or 0.5 gpm through a steam generator.
  - 4. 10 gpm identified leakage from the RCS and
  - 5. Leakage specified (in Table 3.4.6-1) for RCS pressure isolation valves (specified in Table 3.4.6-1)
- C. Leak rates are required every 72 hours during steady state operation except when in the shutdown cooling mode.

Ref: ANO II T.S. 3.4.6

Question value is 2 pts , Part A 0.25, part B 0.3 ea, part C 0.25.

ANO 2 EXAMINATION KEY

- 4.3/ 7.1 Reactor power is being increased from 60-100% power. A final boron concentration has been computed and it will be necessary to increase the boron concentration 20ppm. Determine the amount of boric acid to be added and how long it would take to inject this amount all at one time using one charging pump (at maximum flow). Initial conditions are given below. Work sheets and tables from OP 2103.04 have been provided to assist calculations. (2.0)

Initial conditions:

RCS  $T_{avg}$  = 566<sup>o</sup>F  
Pressurizer level = 52%  
VCT level = 40%  
Initial RCS boron conc. = 430ppm  
Boric acid feed conc. = 12000ppm

Ans:

100 gal of boric acid are required and it will take 2.27 min to inject it using one charging pump.  
See the answer key work sheet for gal calculation.  
charging pump capacity is 44 gal/min  
injection time =  $100\text{gal}/44\text{gal/min} = 2.27\text{min}$

Ref:

OP 2103.04 and OP 2104.02

Question value is 2 pts, 0.5 for RCS volume developed from table, 0.5 for correct use of form, 0.5 for final ans (100 gal), and 0.5 for time to inject (2.27  $\pm$  .1 min)



ANO 2 EXAMINATION KEY

4.4/  
7.2 Refer to figure 4.1 for this question.

- A. What are the required immediate actions if the H<sub>2</sub>/O<sub>2</sub> analyzer reading for the Waste Gas Surge Tank is at point 1? (1.0)
- B. What FURTHER immediate actions are required if the situation degrades to the indication at point 2? (1.0)
- C. Why is the mixture at point 3 impossible? (1.0)

Ans:

- A.
  - 1. Change H<sub>2</sub>/O<sub>2</sub> analyzer lineup to monitor the waste gas decay tank in service.
  - 2. Have Radchem Dept perform H<sub>2</sub>/O<sub>2</sub> samples on all affected components.
  - 3. Take action to reduce concentrations to be within Region A within 24 hours.
- B.
  - 1. Secure all vent, purge and vacuum degas operations.
  - 2. Place Waste Gas Compressors in "Pull to Lock".
  - 3. Continue H<sub>2</sub>/O<sub>2</sub> sampling by Radchem.
  - 4. Take (further) action to reduce concentrations
- C. The mixture is impossible because the only O<sub>2</sub> source for the systems monitored by the H<sub>2</sub>/O<sub>2</sub> is air which is 79% N<sub>2</sub>. Therefore, a mixture of 80% H<sub>2</sub> will have about 4% O<sub>2</sub> and 16% N<sub>2</sub>.

Ref: AOP 2203.10 pgs 1& 6

Question value is 3 pts, 0.33 ea in part A, 0.25 ea in part B, and 1 pt for part C.

ANO 2 EXAMINATION KEY

4.5/ List the immediate actions for "degraded power". (2.0)

Ans:

1. Verify reactor and turbine trips.
2. Verify that both DG's have started and buses 2A3 and 2A4 are energized.
3. Verify that the service water pumps have restarted and are supplying cooling water to Loops 1 and 2.
4. Verify greater than 50°F margin to saturation temp.

Ref: ANO II OP 2202.05

Question value is 2 pts, 0.5 each.

ANO 2 EXAMINATION KEY

4.6/ List 3 conditions which would require the operator to trip the  
7.4 reactor or initiate plant shutdown to Hot-Standby according to OP  
2202.18, Emergency Shutdown "Symptoms" (1.5)

Ans:

1. Pressurizer level greater than 82% for more than 5 minutes.
2. Systems degraded beyond the most degraded condition allowed by T.S.
3. Failure of the RPS to function upon reaching reactor trip setpoints.

Ref: ANO II OP 2202.18

Question value is 1.5 pts, 0.5 each.

ANO 2 EXAMINATION KEY

- 4.7/ 7.5 A. Upon exiting a contaminated area, you find that your hands and shirt sleeves appear to be contaminated. Describe in moderate detail the survey and decontamination procedures you expect HP personnel to perform on you. (1.5)
- B. Radiation Protection Procedure 1622.010 gives five (5) SPECIFIC precautions to help prevent radioactive material from entering the body while being decontaminated. List three (3) of them. (1.0)
- C. List three (3) ways that radioactive contaminants may enter the body and become an INTERNAL radiological health hazard. (1.0)

Answer:

- A.
1. Detailed whole body frisk
  2. Check skin for cuts, abrasions, etc.
  3. Remove clothing
  4. Second frisk after clothing removed
  5. Dress in clean anti-c or surgical greens and proceed to decon area
  6. Wash affected areas with soap and water  
(Look to see that about 5 of these areas are covered in a common sense manner.)
- B. (any 3)
1. Cover skin cuts or abrasions not contaminated with water proof dressing
  2. Do not use stiff brushes or other items which may abrade the skin
  3. use anti-cs and respirators as needed to reduce contamination spread
  4. Water should be about body temperature
  5. Do not use industrial or waterless hand cleaners.  
(Give 1/2 credit for "good sense" actions which do not fit these.)
- C. (any 3)
1. Inhalation (breathing in)
  2. Oral ingestion (swallowing)
  3. Open wounds or skin abrasions
  4. Through the skin pores
  5. Skin absorption (cellular osmosis)  
(Will accept "through the skin" as a single correct answer)

Reference: RPP 1622.010 pgs 3-5, Std Rad Con Information

Question value is 3.5 pts, part A 0.3 ea (5 minimum), part B 0.33 ea, and part C. 0.33 ea.

ANO 2 EXAMINATION KEY

4.8/ List 5 of the 7 possible indications of RCS at saturation. (2.0)  
7.6

Ans: (any 5)

1. High RCS pump vibration alarm
2. Oscillations in RCP current indications
3.  $T_{sat}$  margin indication(s) =  $0^{\circ}$ , margin to saturation alarms in.
4. The combination of RCS temp and p2r pressure to the right of the saturation line of Figure 1.
5.  $T_h$  increasing (greater than  $570^{\circ}$ ) and diverging from  $T_c$  and  $T_h - T_c$  greater than or equal to  $50^{\circ}$  if on natural circulation.
6. Incore instrument temp greater than  $T_{sat}$  for the existing pressurizer pressure.
7. Oscillations in excore power channels due to steam formation.

Ref: ANO II OP 2202.06

Question value is 2 pts, 0.4 each.

ANO 2 EXAMINATION KEY

4.9 In regard to regulatory documents, match the description in Column B with the document in Column A. (1.0)

<u>COLUMN A</u>	<u>COLUMN B</u>
A. Code of Federal Regulations	___ 1. Describe a method acceptable to the NRC, for conducting activities.
B. NUREG's	___ 2. Information about possible problems, corrective actions for generic problems
C. NRC Reg. Guides	___ 3. Federal Law
D. NRC Bulletins & Circulars	___ 4. NRC position paper which give either a proposed position or comment.

Ans:

A. 3	1. C
B. 4 - OR -	2. D
C. 1	3. A
D. 2	4. B

Ref: ANO II lesson plan AA-52001-008

Question value is 1 pt, 0.25 each.



ANO 2 EXAMINATION KEY

7.3 Answer true or false for each of the following: (2.0)

1. Power operation in mode 1 may continue with one diesel generator and one offsite electrical power source inoperable as long as either one is restored to operable status within 24 hours and the other is restored within 72 hours.
2. A DC bus train consists of a 125-volt DC bus, a 125-volt DC battery bank, and a full capacity charger.
3. If only one offsite AC power source is operable while in mode 6, a second AC source must be made operable within 72 hours or containment integrity must be restored.
4. Any one of the following busses may be inoperable for up to 8 hours while in mode 1 without having to shut down.  
2A3, 2A4, 2B5, 2B6  
2RS1, 2RS2, 2RS3, 2RS4

Ans:

1. FALSE
2. TRUE
3. FALSE
4. TRUE

Reference: ANO II T.S.

1. 3.8.1.1
2. 3.8.2.3
3. 3.8.1.2
4. 3.8.2.1

Question value is 2 pts, 0.5 each.

ANO 2 EXAMINATION KEY

7.7 "Immediate notification" requires the NRC be notified within one/four hours. List, in order of preference, the three means of communication to be used for this notification. (1.5)

Ans:

1. ENS, Emergency notification System, Red phone, NRC Hotline.
2. Commercial phone.
3. HPN, HP Net, or Radio (OES Relay).

Ref: ANO II OP 1000.08

Question value is 1.5 pts, 0.3 for arrangement, and 0.4 each.

ANO 2 EXAMINATION KEY

7.8 Answer TRUE or FALSE for each of the following: (1.5)

- A. Any notice of violation involving radiological working conditions must be posted.
- B. Persons reporting violations will receive a percentage of the fines imposed.
- C. Any worker may request an annual record of his radiation exposure on record.
- D. All individuals frequenting a restricted area are responsible to report promptly to management any unnecessary exposure to radiation.
- E. All complaints must be directed through the applicable union steward.
- F. A workers' representative may accompany the NRC inspector during the inspection of physical working conditions.

Ans:

- A. TRUE
- B. FALSE
- C. TRUE
- D. TRUE
- E. FALSE
- F. TRUE

Ref: 10 CFR Part 19

Question value is 1.5 pts, 0.25 each.

ANO 2 EXAMINATION KEY

7.9 OP 2102.06 (Reactor Trip Recovery) lists 3 conditions allowing use of the Reactor Trip Recovery procedure. List all 3. (1.5)

Ans: (any 3)

1. Cause of the trip is known and is/or shall be corrected.
2. The trip did not result from failure of any safety-related system.
3. A cooldown is not required.

Ref: ANO II OP 2102.06

Question value is 1.5 pts, 0.5 each.

ANO II REQUALIFICATION AUDIT REPORT

Facility: Arkansas Nuclear One Unit 2  
Examiner: S.L. McCrory, G. Streier  
Dates of Evaluation: June 14-15, 1984  
Areas Evaluated: XX Written XX Oral        Simulator

Written Examination

1. Evaluation of Examination: Satisfactory
2. Evaluation of Facility Examination Administration: Satisfactory
3. If NRC examination was substituted for facility examination (or sections thereof), attach examination summary sheet to this form. Summary sheet attached XX.
4. Evaluation of examination grading: Satisfactory

Oral Examination

1. Overall Evaluation: Satisfactory
2. Number Observed: NONE Number Conducted: Five

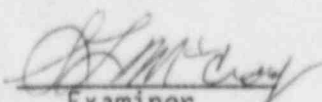
Simulator Evaluation

1. Overall Evaluation: Not Applicable
2. Number Observed:        Number conducted:

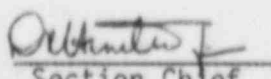
Overall Program Evaluation

Satisfactory: XX Marginal:        Unsatisfactory:         
Pass ratio for NRC written examinations above 80%.  
Pass ratio for facility written examinations above 80%.

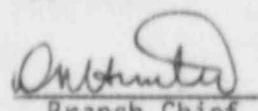
Submitted:

  
Examiner

Forwarded:

  
Section Chief

Approved:

  
Branch Chief