



H. B. ROBINSON
SEG PLANT

TITLE

TRAINING INSTRUCTION NO. 201A

TRAINING OF REPLACEMENT REACTOR OPERATORS FOR NRC EXAMINATIONWITHOUT REACTOR STARTUP DEMONSTRATION

REV.	APPROVED BY	DATE	REV.	APPROVED BY	DATE	REV.	APPROVED BY	DATE
1	<i>W. Thayer</i>	2/8/79						
2	<i>W. Thayer</i>	3/5/80						
3	<i>W. Thayer</i>	5/19/80						
4	<i>D. J. Zimmerman for F.S. Stankovich</i>	6/27/80						

Recommend By: *W. Thayer*

1/25/79
DATE

Approved By: *W. Thayer*

2/8/79
DATE

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1.0 PURPOSE

The purpose of this instruction is to ensure that the requirements of Appendix F of NRC Operator Licensing Guide (NUREG-0094) "Eligibility for Examination with No Reactor Startup Demonstration", ANSI Standard N18.1 - 1971, "Selection and Training of Nuclear Power Plant Personnel" and 10 CFR 55, "Operators Licenses" are met or exceeded.

2.0 EDUCATIONAL BACKGROUND OF CANDIDATES

Reactor Operator candidates should hold a high school diploma or equivalent and have two years of power plant experience of which a minimum of one year shall be nuclear power plant experience.

3.0 PROCEDURE

The formal training program for the candidates covered by this instruction consists of four phases:

- a. On-the-job training
- b. Lectures
- c. Training at an NRC approved simulator
- d. Review and evaluation

Following is a description of each phase of training.

3.1 Phase 1 On-the-Job Training

Candidates will spend at least three months on shift as an extra person in the control room on on-the-job training involving manipulation of the plant controls during day-to-day operation prior to application.

- a. The candidates will manipulate the controls of the plant during at least five significant reactivity changes. Examples of significant reactivity changes are as follows:

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3.0 PROCEDURE (Continued)

1. Reactor trip
2. Power level change of greater than 10% with rod control in manual.
3. Reactor startup to the point of adding heat
4. Boration or dilution to significantly affect reactivity
5. Operation of the manipulator crane during refueling
6. Operation of steam generator controls during startup
7. Cooldown
8. Heatup
9. Operation of E-H System in manual during startup

Efforts should be made to have a diversification of reactivity changes for each applicant within the limitations of plant operational needs.

- b. During this phase, the candidate will perform periodic tests in accordance with Training Instruction No. 202.
- c. Prior to submittal of an application for a license, the candidate will complete Attachment 3, "H. B. Robinson Control Operator Qualification Check List".
- d. The candidate will complete Attachment 4, "On-the-Job Training Check-Off" during this phase.

3.2 Phase 2 Lectures

This phase will consist of approximately eight weeks of formal classroom training and two weeks of reactor experiments at North Carolina State University. Candidates will be removed from shift rotation and placed in a full-time training status.

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3.0 PROCEDURE (Continued)

Instruction during this phase will include but not be limited to the following topics:

- a. Reactor Theory and Principles of Reactor Operation
 1. Atomic and Nuclear Physics
 2. Fission process
 3. Neutron multiplication
 4. Reactivity
 5. Reactivity coefficients
 6. Reactor control
 7. Rod worth
 8. Xenon, Samarium and control poison effects
 9. Shutdown margin
- b. Design Features
 1. Nuclear Steam Supply System
 - a. Reactor vessel and internals
 - b. Fuel
 - c. CVCS
 2. Steam, condensate, feedwater, and related systems
 3. Turbine-Generator and supporting systems
 4. Safety Systems
 - a. Safety Injection
 - b. RHR
 - c. Containment Spray
 - d. Diesel Generator Emergency Power

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3.0 PROCEDURE (Continued)

5. Electrical Distribution

- a. 230 KV
- b. 4160 V
- c. 480 V
- d. Instrument Busses
- e. D.C. Distribution

c. Operating Characteristics

1. Reactor Control

- a. Control Rod Manipulations
- b. Xenon Transients and Oscillations
- c. Step load changes, auto or manual

2. Safety Analyses

- a. Review of minor accidents
- b. Review of major accidents

d. Instrumentation and Control

- 1. Nuclear Instrumentation
- 2. Rod Control
- 3. Rod Position Indication
- 4. Reactor Protection System
- 5. Containment Isolation
- 6. Steam Break Protection
- 7. SI Initiation and Logic

e. Standard and Emergency Operating Procedures

- 1. Precaution and Limitations
- 2. Emergency Immediate Actions
- 3. General Plant Operating Procedures
- 4. Emergency Plan and Procedures

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3.0 PROCEDURE (Continued)

f. Radiation Control and Protection

1. Radiation and Contamination
2. Biological Effects
3. Time/Distance/Shielding
4. 10 CFR 20
5. Monitoring Systems and Instruments
6. Radiation Procedures

g. Chemistry

1. Chemistry Control and Limits

h. Technical Specifications

1. Organization and Format
2. Safety Limits and Limiting Safety System Settings
3. Discharge Limits
4. Limiting Conditions for Operation

i. Heat Transfer, Fluid Flow, Thermodynamics

1. Basic properties of fluid and matter
2. Fluid statics
3. Fluid dynamics
4. Heat transfer by conduction, convection, radiation
5. Change of Phase - Boiling
6. Burnout and Flow Instability
7. Reactor Heat Transfer Limits

j. Mitigating Core Damage

1. Incore instrumentation

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3.0 PROCEDURE (Continued)

2. Excore Nuclear Instrumentation
3. Vital Instrumentation
4. Primary Chemistry
5. Radiation Monitoring
6. Gas Generation

3.3 Phase 3 Simulator Training

This phase will consist of an NRC approved program of at least one week's duration at a nuclear plant simulator. The simulator training center will provide certification attesting to the candidates:

- a. Ability to manipulate controls and keep the reactor under control during reactor startup.
- b. Ability to predict instrument response and use the instrumentation during a reactor startup.
- c. Ability to follow the facility startup procedures.
- d. Ability to explain alarms and annunciators that may occur during this operation.

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3.0 PROCEDURE (Continued)

3.4 Phase 4 Review and Evaluation

This phase consists of a minimum of 40 hours of review, a simulated NRC type exam and evaluation. This period is in addition to the lectures in Phase 2 of the program.

4.0 RESPONSIBILITY:

4.1 Plant Manager:

The selection of candidates and the method(s) used for the selection of candidates will be the responsibility of the Plant Manager and Operating Supervisor, Unit 2.

4.2 Operating Supervisor, Unit 2:

The selection of candidates and the method(s) used for the selection of candidates will be the responsibility of the Manager - Operations & Maintenance and Operating Supervisor, Unit 2.

4.3 Training Supervisor:

The Training Supervisor will be responsible for:

- a. Prescribing the duration and content of training for each candidate.
- b. The execution and over-all conduct of the Operator Replacement Program as delineated in this instruction.
- c. Timely initiation of requests to the NRC for hot license examinations.

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4.0 RESPONSIBILITY (Continued)

d. The proper maintenance of records pertaining to this program including:

1. Copies of examinations administered and the answers provided by the candidates.
2. Copies of lesson plans and instructional aids.
3. Lecture Attendance and Grade Sheet (Attachment 1).
4. Yearly Summary of Experience and Training (Attachment 8 of TI-200).
5. H. B. Robinson System Qualification Check-Off (Attachment 3).
6. On-the-Job Check-Off Sheet (Attachment 4).
7. Reactor Operators Periodic Test Completion Check-Off Sheet (Attachment 1 to TI-202).

4.4 License Candidate:

The license candidate under this program will be responsible for completion of Attachments 2, 3, and 4 of this instruction and Attachment 1 of TI-202.

4.5 Shift Foreman:

The Shift Foreman will be responsible for monitoring the on-the-job training.

Lecture Attendance and Grade Sheet

From _____ To _____

Trainee

[illegible]

G = Examination grade

CAROLINA POWER AND LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT

Replacement Candidate Weekly/Monthly
Report

Period From _____ to _____

1. Name: _____
2. Time on RTGB _____ hours
3. Evolutions performed (PT's, casualties, etc. - include brief description if needed)
 - A. _____
 - B. _____
 - C. _____
 - D. _____

Use separate sheet for any additional.

4. Number of power level changes $>10\%$ with rods in manual. _____
5. Number of startups to point of adding heat _____
6. Number of orderly shutdowns _____
7. Manual control of S/G's during plant loading _____
8. Manual control of EH system during plant loading _____
9. Boration _____
10. Dilution _____
11. Operation of manipulator during refueling _____ hrs.
12. List any additional training received (courses, lectures, etc.)
 - A. _____
 - B. _____
 - C. _____

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT

CONTROL OPERATOR QUALIFICATION
CHECK LIST

NAME _____

- | | <u>DATE</u> |
|---|-------------|
| 1. CVCS | _____ |
| 2. Reactor Coolant | _____ |
| 3. Reactor Internals and Core | _____ |
| 4. Safety Injection | _____ |
| 5. Residual Heat Removal | _____ |
| 6. Component Cooling | _____ |
| 7. Containment Vessel and Shielding | _____ |
| 8. Penetration Pressurization and IVSW | _____ |
| 9. Heating and Ventilation and Containment Air Handling | _____ |
| 10. Service Water | _____ |
| 11. Emergency Power Systems | _____ |
| 12. Sampling System | _____ |
| 13. Primary and Secondary Chemistry | _____ |

- | | <u>DATE</u> |
|-------------------------------|-------------|
| 14. Rod Control | _____ |
| 15. Reactor Protection | _____ |
| 16. Nuclear Instrumentation | _____ |
| 17. Main Steam | _____ |
| 18. In-Core Instrumentation | _____ |
| 19. Feedwater and Condensate | _____ |
| 20. Generator and Control | _____ |
| 21. Fuel Handling | _____ |
| 22. Auxiliary Feedwater | _____ |
| 23. Circulating Water | _____ |
| 24. Steam Generator Blow-down | _____ |
| 25. Heater Vents and Drains | _____ |

WHEN THIS FORM IS COMPLETED, ROUTE TO TRAINING SUPERVISOR.

CAROLINA POWER AND LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT

ON-THE-JOB TRAINING
CHECK-OFF

NAME: _____

Date Started: _____

A. Control Operator's Logs

Demonstrate the ability to maintain all logs normally maintained by Control Operator and be able to discuss reasons for recording each reading.

SRO/RO

Date

B. Operating Procedures

Demonstrate the ability to perform the following operating procedures (this should be done at RTGB locating all switches, instruments, and alarms associated with the operating procedure):

	<u>SRO/RO</u>	<u>DATE</u>
1. OP-14	_____	_____
2. OP-15	_____	_____
3. OP-16	_____	_____
4. OP-16-1	_____	_____
5. OP-21	_____	_____
6. OP-28	_____	_____
7. OP-28-1	_____	_____
8. OP-29	_____	_____
9. OP-30	_____	_____
10. OP-37	_____	_____
11. OP-38	_____	_____
12. OP-42	_____	_____
13. OP-43	_____	_____
14. OP-45	_____	_____

ON-THE-JOB CHECK-OFF SHEET (Continued)

NAME: _____

C. Overall Operating Procedure

Discuss the following in detail and demonstrate the ability to perform the evolutions.

	<u>SRO/RO</u>	<u>DATE</u>
1. GP-1	_____	_____
2. GP-2	_____	_____
3. GP-3A	_____	_____
4. GP-3B	_____	_____
5. GP-4	_____	_____
6. GP-5	_____	_____
7. GP-5A	_____	_____
8. GP-6	_____	_____
9. GP-7	_____	_____
10. GP-8	_____	_____

D. Technical Specifications

1. Section 1	_____	_____
2. Section 2	_____	_____
3. Section 3	_____	_____
4. Section 4	_____	_____
5. Section 5	_____	_____

E. Abnormal Procedures

1. Abnormal Procedure No. 1	_____	_____
2. Abnormal Procedure No. 2	_____	_____
3. Abnormal Procedure No. 3	_____	_____

ON-THE-JOB CHECK-OFF SHEET (Continued)

NAME: _____

E. Abnormal Procedures (Continued)

SRO/RO

DATE

- | | | |
|--|-------|-------|
| 4. Abnormal Procedure No. 4 | _____ | _____ |
| 5. Abnormal Procedure No. 5 | _____ | _____ |
| 6. Abnormal Procedure No. 6 | _____ | _____ |
| 7. Abnormal Procedure No. 6.1 | _____ | _____ |
| 8. Abnormal Procedure No. 8 | _____ | _____ |
| 9. Abnormal Procedure No. 9 | _____ | _____ |
| 10. Abnormal Procedure No. 10 | _____ | _____ |
| 11. Abnormal Procedure No. 11 | _____ | _____ |
| 12. Abnormal Procedure No. 12 | _____ | _____ |
| 13. Abnormal Procedure No. 14 | _____ | _____ |
| 14. Abnormal Procedure No. 15 | _____ | _____ |
| 15. Abnormal Procedure No. 16 | _____ | _____ |
| 16. Abnormal Procedure No. 17 | _____ | _____ |
| 17. Abnormal Procedure No. 18 | _____ | _____ |
| 18. Abnormal Procedure No. 19 | _____ | _____ |
| 19. Abnormal Procedure No. 20 | _____ | _____ |
| 20. Abnormal Procedure No. 21 | _____ | _____ |
| 21. Abnormal Procedure No. 22 | _____ | _____ |
| 22. Abnormal Procedure No. 23
Loss of Containment Integrity | _____ | _____ |
| 23. Abnormal Procedure No. 24
Loss of Instrument Buss | _____ | _____ |

F. Emergency Instructions

- | | | |
|---------|-------|-------|
| 1. EI-1 | _____ | _____ |
| 2. EI-4 | _____ | _____ |

ON-THE-JOB CHECK-OFF SHEET (Continued)

NAME: _____

F. Emergency Instructions (Continued)

SRO/RO

DATE

3. EI-6	_____	_____
4. EI-7	_____	_____
5. EI-8	_____	_____
6. EI-9	_____	_____
7. EI-10	_____	_____
8. EI-14	_____	_____
9. EI-15	_____	_____
10. EI-16	_____	_____
11. EI-17	_____	_____

DATE COMPLETED: _____

ROUTE TO TRAINING SUPERVISOR.