

PORTLAND GENERAL ELECTRIC COMPANY

TROJAN NUCLEAR PLANT

July 29, 1980

Revision 6

TRAINING PROCEDURE TP-2-1  
OPERATOR LICENSING

APPROVED BY

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DATE

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I. INTRODUCTION

This training program is designed to provide the necessary education, training, and experience to prepare a candidate, normally an auxiliary operator, to successfully take a NRC reactor operator's license examination. The program exercises the option of using a simulator training program in lieu of a reactor startup demonstration at the Trojan Plant.

The program consists of a combination of classroom instruction, on-the-job training, dedicated Control Room time, and simulator training. An operator seeking to take the license examination will normally begin this program by studying plant systems and completing systems checkouts. This self study may be supplemented by classroom lectures on plant systems. As the operator becomes familiar with plant systems, he should begin to participate in Control Room activities for training. The majority of classroom instruction will be normally scheduled after the operator has completed the required system checkouts and plant operations. Periodic quizzes and examinations will be given during the classroom phase of training in order to determine the student's progress. At the end of the classroom phase, the performance of each student will be reviewed to determine if the student will be recommended for a NRC licensing examination. The evaluation will be made by the Operations and Training Supervisors and will be based on the student's classroom performance, Control Room performance, and the results of his on-the-job training. Those students who are recommended will then participate in a simulator startup certification program followed by a prelicensing review series. A final written and oral examination will be given to ensure each applicant is adequately prepared to take the NRC operator's licensing examination.

The time allowed to complete this program may vary due to the applicant's experience and the plant's operational commitments. Twelve months is considered to be the normal length of time to complete this program. The maximum time period permitted is 18 months from the date the applicant assumed the position of Auxiliary Operator. All applicants should

participate in the program for at least 6 months prior to taking the license examination unless waived by the Training Supervisor.

## II. CURRICULUM OUTLINE

### A. On-The-Job Training

1. In order to ensure that the license candidate is familiar with plant systems, he will be required to be orally examined on selected plant systems. Either a Shift Supervisor or a member of the Training Staff will certify that the student has demonstrated satisfactory knowledge during the oral checkout. Training checkout forms are to be used in obtaining the required checkouts. Completed forms are to be returned to Training. Checkouts on the following systems are required for all candidates:

QC-I-01	Reactor Coolant System - Overall
QC-I-02	Reactor Vessel and Internals
QC-I-03	CVCS - Letdown and Charging
QC-I-04	Safety Injection
QC-I-05	Residual Heat Removal
QC-I-06	Containment Spray
QC-I-07	Service Water
QC-I-08	Component Cooling Water
QC-I-09	Auxiliary Feedwater
QC-I-10	Emergency Diesels
QC-I-11	Fuel Handling
QC-II-01	Safeguards and Containment Isolation
QC-II-02	Reactor Protection
QC-II-03	Pressurizer Pressure and Level
QC-II-04	Steam Generator Level and Feed Pump Speed
QC-II-05	Steam Dump
QC-II-08	Excore Instrumentation
QC-II-09	Incore Instrumentation
QC-II-10	Full Length Rods
QC-II-12	Digital Rod Position Indication
QC-II-13	Rod Insertion
QC-III-01	230 KV System
QC-III-02	480 Volt System
QC-III-03	120 VAC Preferred and Non-Preferred
QC-III-05	125 VDC System
QC-III-09	12 KV System
QC-III-10	4 KV System
QC-IV-08	Spent Fuel Pool Cooling and Purification
QC-IV-10	Spent and New Fuel Pits
QC-V-01	Main Steam
QC-V-04	Main Turbine and Supervisory

QC-V-05	EHC
QC-V-12	Feedwater and Condensate
QC-V-13	Main Feedwater Pump and Turbine
QC-V-18	Steam Generator Slowdown
QC-VI-01	Containment H&V
QC-VI-04	Control Room H&V
QC-VII-01	Clean Radioactive Waste
QC-VII-02	Dirty Radioactive Waste
QC-VII-03	Solid Radwaste
QC-VII-04	Gaseous Radioactive Waste
QC-VII-08	Vent Collection
QC-IX-01	Containment Building Design
QC-IX-02	Service and Instrument Air
QC-IX-04	Fire Protection
QC-IX-20	Diesel Fuel Oil
QC-X-05	Portable H.P. Instruments
QC-X-06	Radiation Monitoring

Attendance at classroom lectures and passing a written exam on the subject may be accepted in lieu of receiving a formal check-out. This option may be exercised with the approval of the Training Supervisor.

Bimonthly the Training Supervisor will forward to the Operations Supervisor a report on the checkout progress of each of the candidates.

2. All license candidates will receive practical training in the manipulation of power plant controls and general Control Room operations. Each applicant must manipulate the controls of the Trojan Nuclear Plant during at least five significant reactivity changes. Evolutions which are acceptable to fulfill this requirement are:
  - a. Reactor startup.
  - b. Reactor shutdown.
  - c. Manual control of steam generator.
  - d. Manual control of the turbine generator during a load change of greater than 10%.
  - e. Boration during power operation.
  - f. Dilution during power operation.
  - g. Operation of manipulator crane during refueling.

- h. Any significant changes in manual rod control (> 10% power).
- i. Manual rod control during generator synchronization.

In addition to reactivity manipulations the applicant shall participate in other Control Room activities. Three months of the applicant's training period shall be devoted to Control Room Operation. During this period, he shall perform all duties normally performed by licensed operators, under the direct supervision of a Reactor Operator. This dedicated Control Room period shall be supervised by the Shift Supervisor with guidance provided by the Training Department. Whenever a non-licensed individual actively participates in any plant evolutions in the Control Room, he should document his participation on Training Form RM. He should include the date, time spent, and a description of the activity performed. The Control Operator initials the form at the end of each shift. Some examples of the types of activities that should be documented are:

- a. Component Cooling Water or Service Water train rotation.
- b. Starting and loading of emergency diesel.
- c. Containment purge.
- d. Placing a feedwater pump in service.
- e. Rotation of charging pumps.
- f. Transferring auxiliary electrical buses.

Each individual is responsible for maintaining his own records of Control Room activities by the use of Control Room Participation Forms. At the end of the month, each license candidate will forward the completed forms for that month to the Training Supervisor.

#### B. CLASSROOM INSTRUCTION

A lecture series presented by qualified instructors from the plant staff or contractor personnel will be given. Instructors who teach systems, integrated responses, transient and simulator courses shall hold a Senior Reactor Operator license or shall have successfully completed a Senior Operator examination.

The amount of classroom instruction received by each applicant will be determined by his previous nuclear experience. In general, applicants with no previous nuclear experience will participate in ~ 475 hours of formal classroom instruction. The lecture series will cover the following topics:

- 1. Fuel Handling.
- 2. Radiation Protection.
- 3. Plant Mechanical and Electrical Systems.

4. Instrumentation and Control.
5. Security.
6. Radiological Emergency Response Plan.
7. Technical Specifications.
8. Administrative Orders/Operating Instructions.
9. Emergency Instructions/Off Normal Instructions.
10. Radioactive Waste System.
11. Trojan Plant Systems.
12. Plant Characteristics and Control.
13. Nuclear and Reactor Physics.
14. Plant Transients and Accident Analysis.
15. Chemistry.
16. Reactor Safeguards.
17. Heat Transfer, Thermodynamics, and Fluid Flows.
18. Mitigation of Accidents involving a degraded core.

Those applicants with previous nuclear experience at either commercial or naval nuclear power plants will be required to participate in a minimum of 250 hours of classroom lectures. The topics covered will be the same as those listed above; however, the amount of time spent covering plant systems will be greatly reduced. Knowledge of plant systems will be gained by self study. A written examination on plant systems will be given to each applicant during the classroom phase of training.

As a final preparation prior to taking the license examination, all license candidates will participate in a prelicense review series. The two-week course will consist of a combination of classroom instruction, subject review, written quizzes, oral examinations, and homework assignments.

C. Simulator Training

Each candidate will satisfactorily complete a NRC-approved training program of at least one week duration at a nuclear power plant simulator.

D. Evaluation

The performance of license candidates during the classroom phase will be routinely evaluated through periodic quizzes and examinations.

At the completion of the program, a written and oral exam, similar to the NRC exams in content and time allotment, shall be given. Quizzes and examinations will be prepared and administered by the Training Staff and graded by a member of the Training Staff. The Training Supervisor will approve all quizzes and examinations and will review them for grading techniques and consistency.

A grade of 70 percent or greater on the quizzes and 80 percent overall or 70 percent on a section for the simulated NRC exam is considered to be satisfactory. Any license candidate failing to meet this criterion will be assigned remedial study by the Training Supervisor and will be reexamined in the deficient area. The reexamination may consist of either another written quiz or examination, or an oral examination administered by an individual designated by the Training Supervisor. The oral examinations will be conducted by Senior Reactor Operator personnel as scheduled and assigned by the Training Supervisor.

E. Senior Operator License

Each Senior Operator candidate shall possess or have possessed, a operators license for at least one year prior to taking a NRC administered Senior Reactor Operator License examination. If the operator license is for a facility other than Trojan the applicant shall participate in Sections A through D of this procedure. Additionally, he shall have a minimum of 4 years responsible power plant experience, or 7 years power plant experience and 2 years of academic or technical training related to nuclear power. Two years must be nuclear power plant experience of which at least 6 months shall be at Trojan. After satisfying all criteria in A through D of this procedure, the applicant must have 3 months of shift training as an extra man on shift. Preferably this 3 months should be concurrent with the on-the-job training performed during the operator licensing phase of this procedure.

F. Administration

The following records will be maintained by the Training Supervisor:

1. copies of examinations and quizzes.
2. Examination and quiz grades.
3. Records of on-the-job training.
4. Records of simulator training.
5. Oral examination results.