

REPLACEMENT OPERATOR TRAINING

(PROGRAM 11)

CLASS DURATION: 10 weeks (Part I - 4 weeks, Part II - 6 weeks)

TRAINING LOCATION: B&W Nuclear Training Center, Lynchburg, Virginia

DESCRIPTION: The purpose of this program is to supplement a utility training program with a concentrated classroom program of nuclear supply system instruction and operational experience gained from operating the B&W nuclear power plant simulator. This program will provide instruction for nuclear plant auxiliary operators so that they will be adequately prepared for the AEC Reactor Operator examination. The prerequisites for this program include:

1. Completion of a Comprehensive Basic Nuclear Theory Course (B&W Program 4 or the equivalent).
2. Completion of a program to develop experience as a Reactor Operator Under Instruction which will include a number of significant reactor power changes.

PROGRAM: The replacement operator program is divided into two parts which are conducted separately but are mutually dependent. Part 1 is a classroom presentation of the systems and components which makeup the nuclear steam supply and its instrumentation and control equipment. Part 2 is the practical application of knowledge of the nuclear steam supply systems to operation of the B&W nuclear steam supply simulator.

PART I - Nuclear Steam Supply Systems (4 weeks - maximum of 12 students per group)

This part provides a series of lectures covering design and operation of the particular plant the trainees will operate.

Operating personnel study the detailed designs of the major components of the nuclear system and their various characteristics. All facets of the instrumentation and control systems are studied to give each student an operational knowledge of these systems. Water chemistry, radiochemistry, and health physics are studied in relationship to their application to the operation of a plant.

The subjects covered during Part 1 are shown below:

<u>Subject Matter</u>	<u>Estimated time, hr.</u>
Reactor Vessel and Internals	7
1. Reactor vessel design, materials, NDTT.	
2. Reactor internals description, assembly, and purposes.	
3. Design, component parts, and control rods.	

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Primary Loop Components.	6
1. Simplified two-loop heat transport system.	
2. Description of piping, pumps, and pressurizer.	
Steam Generators.	4
Description, peculiarities, heat transfer characteristics, mechanical design.	
Reactor Auxiliary Systems.	28
1. Functional requirements (normal and emergency).	
2. Design objectives and criteria.	
3. System-by-system description, equipment description, arrangement, parameters.	
Control Rod Drives	6
1. Description of drives.	
2. Description of controls.	
Instrumentation and Control	28
1. Functional requirements and description.	
2. Integrated plant control system.	
3. Nuclear instrumentation and reactor protection system.	
4. Primary loop non-nuclear instrumentation.	
5. Reactor auxiliaries non-nuclear instrumentation.	
6. Incore monitoring system description and function.	
7. Automatic data logging and on-line computer.	
Chemistry	4
1. Water chemistry expected primary and secondary values.	
2. Changes in radiochemistry with life and malfunctions.	
3. Chemistry casualty conditions and necessary actions.	
Health Physics	6
1. Radiation monitoring systems.	
2. Decontamination methods and precautions.	
3. Administrative procedures and controls.	
Station Electric Power	4
1. Distribution System.	
2. System Interlocks.	

Safety Analysis 19

1. Review of applicable reactor theory, heat transfer, and fluid flow.
2. Potential plant accidents and hazards.
3. Administrative safeguards.
4. Accident analysis (MHA, MCA, reactivity accidents, equipment failures such as loss of coolant flow).

Examination and Review 8

Supervised Study 40

PART II - PWR Operation (6 weeks)

This part of the total program provides the operational experience on the B&W simulator which will allow the trainees to become proficient reactor operators. This part of the program is dependent upon the trainees completing Part I of the program where the detailed knowledge of plant systems is presented. Instruction will be entirely involved with plant operation in normal plant modes (manual, partial automatic and full automatic control), abnormal equipment configuration operation, and casualty control. The students will be given an audit (mock), written and performance exam to prepare them for their license examination. The last week of the program is set aside for preparation and conduct of Reactor Operator examinations which the purchaser should schedule with the USAEC Operator Licensing Branch.

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Subject Matter	Estimated time, hr.
Simulator Operation.	100

The trainees are broken into groups of three for duty in the control room with each trainee operating the simulator at the each of the three operating positions. Approximately one-third of each trainee's time will be spent working as Shift Supervisor, one-third as Control Operator, and the final third as Assistant Control Operator.

During these six weeks, the emphasis is on operational orientation with the trainee concentrating on learning the basic operations of the plant, including casualty procedures.

Subject Matter

Classroom Instruction	86
Plant operating procedures are presented as a planned sequence coinciding with actual operations on the simulator. Operations included in this sequence include startup, reactivity control, power operations, transient control, loss of load, reactor trip, and casualty procedures.	
Study Time	30
AEC-Examination and Review	24

