Purpose:
To set forth a program by which holders and prospective holders of Nuclear Regulatory Commission Reactor Operator and Senior Reactor Operator licenses will be trained for initial and subsequent renewal licensing.

Discussion:
The DAEC Operator Training Program is divided into three separate sections. Section I is the Operator Initial License Training Program. This program is designed to give unlicensed personnel the knowledge and experience necessary to meet the standards set forth in Federal Regulations for license application.

Section II is the Licensed Operator Retraining Program. This program will be conducted in order to maintain operator proficiency at a high level. It is designed to meet or exceed the requirements of 10 CFR 55, Appendix A.

Section III is the Training Instructor Qualifications. This section specifies the qualification requirements for instructors conducting the Operator Initial License Training and Licensed Operator Retraining Programs. These requirements are designed to provide quality instruction in both programs.
I. Initial License Training Program

As the need for additional NRC licenses at DAEC arises, an Operator Initial License Training program will be initiated. The length and content of this program will be dependent on the individual's previous training and experience but will ensure that sufficient training and experience is obtained. The program will consist of the following:

References

NUREG - 0094

ANSI 18.1 - 1971

Program Index

A. Experience Requirements
B. Classroom Instruction
C. On-Shift Instruction
D. Simulator Instruction
E. Review and Evaluation
F. Documentation

A. Experience Requirements

1. Applicants for operator licenses

(a) Supervisors shall meet experience requirements of ANSI N18.1-1971, Section 4.3.1 and have a minimum time of six months on site.

(b) Operators shall meet the experience requirements of ANSI N18.1-1971, Section 4.5.1 and have a minimum time of six months on site.
2. Applicants for senior operator licenses
   (a) Applicants shall have held an operator's license for a minimum of one year.
   (b) Applicants shall have 4 years of responsible power plant experience. Responsible power plant experience should be that obtained as a control room operator (fossil or nuclear) or as a plant supervisor involved in the day-to-day activities of the facility. A maximum of 2 years power plant experience may be fulfilled by academic or related technical training, on a one-for-one time basis. Two years shall be nuclear power plant experience. At least 6 months of the nuclear power plant experience shall be at the Duane Arnold Energy Center.

B. Classroom Instruction

1. The Initial Reactor Operator License Training program will normally require 520 hours (13 weeks) of formal classroom training. However, credit for previous experience or education will be permitted on an individual basis. The classroom instruction will cover the following subject areas:

   Reactor Operator
   (a) Principles of reactor operation
   (b) Facility design features (including control, and mitigation of accidents involving a degraded core)
   (c) General operating characteristics
   (d) Instrumentation and control systems
   (e) Safety and emergency systems
   (f) Standard and emergency operating procedures
(g) Radiation control and safety provisions

(h) Principles of heat transfer and fluid mechanics

2. The Senior Reactor Operator Training program will normally require 160 hours (4 weeks) of formal classroom training. The classroom instruction will cover the following subject areas:

Senior Reactor Operator

(i) Reactor Theory

(j) Handling and disposal of and hazards associated with radioactive materials

(k) Specific operating characteristics

(l) Fuel handling and core parameters

(m) Administrative procedures, conditions and limitations

(n) Theory of fluids and thermodynamics

3. Periodic quizzes shall be administered throughout the classroom training and records maintained such that the candidate's progress may be evaluated and adjustments can be made to the programs as necessary.

C. On Shift Instruction

1. Applicants for Operator Licenses

Applicants shall be required to complete a minimum of three months on shift training as an extra person on shift. This training will be under the direction of a licensed control room operator.

(a) The on shift training will consist of performing (under instruction) the day-to-day operations required of the control room operator (i.e. log taking, equipment operations, directing the activities of non-licensed operators, surveillance testing, etc.).
(b) Applicants will be required to complete the control manipulations listed in Attachment 1. These manipulations may be performed during on shift training or during simulator training program. Normal control manipulations, such as plant or reactor startups, must be actually performed. Control manipulations during abnormal or emergency conditions must be walked through with, and evaluated by the Shift Supervisor or a training instructor at a minimum.

2. Applicants for Senior Operator Licenses
Applicants shall be required to complete a minimum of three months on shift training as an extra person on shift. This training will be under the direction of the Shift Supervising Engineer. The on shift training will consist of performing (under instruction) the day-to-day operations of the Shift Supervisor.

D. Simulator Instruction

1. A simulator training program approved by the NRC will consist of a minimum of one (1) week's training. This training program will ensure that the individuals attending the simulator demonstrate the following:
   (a) The ability to manipulate the controls and keep the reactor under control during a reactor startup.
   (b) The ability to predict instrument response and use the instrumentation during a reactor startup.
   (c) The ability to follow the facility startup procedures.
   (d) The ability to explain alarms and annunciators that may occur during the reactor startup.

The certification attesting to the satisfactory accomplishment of the above will be forwarded to NRC.
2. Additional simulator training will be utilized to complete any control manipulations (listed in Attachment 1) unable to be completed during on-shift training.

E. Review and Evaluation

A minimum of forty (40) hours for review, audit examinations and evaluation will be used to identify any problem areas that may exist for each individual. An attempt will be made to correct any problems that are identified during this time.

F. Documentation

1. The Training Coordinator will be responsible for maintaining the following documentation:
   (a) Lecture attendance records
   (b) Examinations and quizzes
   (c) On-shift training records
   (d) Record on Control Manipulations
   (e) Simulator certification
   (f) License evaluation

   The above documentation will be maintained in each individual's training record.

2. When personnel receive a license from NRC, a copy of that license and any report from NRC pertaining to the person's deficient areas on the examination will be placed in the individual's training record. The licensed individual will then be enrolled in the Licensed Operator Retraining Program.
II. Licensed Operator Retraining Program

The purpose of this program is to provide a comprehensive retraining program for all persons currently holding NRC operating licenses. This document has been prepared to present the scope and details of the retraining program and presents the material that will be included in the program as required by the Code of Federal Regulations, Part 55, Appendix A.

References

10 CFR, Part 55

Program Index

A. Annual Written Examination
B. Lecture Series
C. Document Review
D. On-shift Training
E. Performance Evaluations
F. Prolonged Absence from Licensed Duties
G. Records

A. Annual Written Examination

1. Annual Written Examination will be administered to each licensed operator or senior operator. This examination will be comparable in content and depth to NRC licensing examinations.

2. The Reactor Operator examination categories will be:
   (a) Principles of Reactor Operation
   (b) Features of Facility Design (including control and mitigation of accidents involving a degraded core).
(c) General Operating Characteristics  
(d) Instruments and Controls  
(e) Safety and Emergency Systems  
(f) Standard and Emergency Operating Procedures  
(g) Radiation Control and Safety  
(h) Principles of Heat Transfer and Fluid Mechanics  

3. The Senior Operator examination categories will be:  
(i) Reactor Theory  
(j) Radioactive Material Handling, Disposal and Hazards  
(k) Specific Operating Characteristics  
(l) Fuel Handling and Core Parameters  
(m) Administrative Procedures, Conditions and Limitations  
(n) Theory of Fluids and Thermodynamics  

4. Individuals failing to achieve a minimum of 80% overall and at least 70% in each category will be relieved of his licensed duties in a timely manner and will be required to participate in an accelerated retraining program. A judgement will be made by the Assistant Chief Engineer - Operations, Operations Supervisor, and Training Coordinator at the time of failure as to how the accelerated program may best be administered.  

5. The Training Coordinator shall not be required to take the Annual Written Examination as he is directly involved in the preparation and approval process.  

6. The Annual Written exam shall be approved by the Chief Engineer or either Assistant Chief Engineer. The individual approving the examination will also be exempt from taking it.
7. Each licensed individual's graded examination will become part of their training file.

B. Lecture Series

1. In order to maintain high operator proficiency and effective response to normal and abnormal plant conditions, an on-site lecture series will be conducted. The indicated weak areas on the examinations will become prime topics for coverage during the lecture series. The lecture series will consist of the following general sections with the approximate time per section noted.

   (a) Reactor Theory & Principles of Reactor Operation (8 hrs)
   (b) Facility Design, including control and mitigation of accidents involving a degrade core (8 hrs)
   (c) General and Specific Operating Characteristics (8 hrs)
   (d) Instrumentation & Control Systems (8 hrs)
   (e) Safety and Emergency Systems (8 hrs)
   (f) Standard and Emergency Operating Procedures (8 hrs)
   (g) Radiation Control and Safety (8 hrs)
   (h) Theory & Principles of Heat Transfer & Fluid Mechanics and Thermodynamics (8 hrs)
   (i) Handling and disposal of and Hazards Associated with radioactive Materials (4 hrs)
   (j) Fuel Handling and Core Parameters (4 hrs)
   (k) Administrative Procedures, Conditions & Limitations (8 hrs)

2. No more than 50% of the above lecture times will consist of films, video tapes, or training slides.
3. Only individuals achieving a grade of 80% or less on categories of the Annual Written Examination shall be required to attend the lectures on those associated categories. Periodic examinations will be administered throughout the lecture series, a grade of 80% or greater is considered passing.

C. Document Review

1. This section of the program is used to ensure that all licensed personnel are made aware of the following:
   (a) Revisions to the Operating Instructions
   (b) Revisions to the Integrated Plant Operating Instructions
      (Emergency and Annunciator Response Instructions part of IPOI)
   (c) Revisions to applicable Administrative Control Procedures
   (d) Revisions to the Technical Specifications
   (e) Revisions to the Facility Licenses
   (f) Changes in the Plant Design
   (g) Reportable Occurrence Reports for the facility

2. The Training Coordinator shall periodically schedule the documents to be reviewed. This shall ensure that an annual review of the Emergency Instructions is completed. These documents or reference to the documents will be contained in the Control Room Document Review Notebook and the Staff Document Review Notebook. All licensed personnel are required to complete the assigned document review. Upon completion of the review personnel shall initial and date the document review sheet. This verifies they have completed the review of the documents and understands the contents.

3. The Training Coordinator shall periodically review the status of the document review notebooks to ensure personnel are accomplishing the required document review. Completed document review sheets will be maintained in the training files.

-10-
4. The group discussion method is encouraged for personnel on-shift, especially in the review of Emergency and Annunciator Response Instructions.

D. On Shift Training

1. Each licensed operator will be required to complete all control manipulations and plant evolutions from Attachment 1. These manipulations shall be completed on a two year cycle, except for the starred items, which are required annually. However, each individual shall perform or participate in a combination of control manipulations based on the availability of plant equipment.

2. Senior operators may take credit for these items if they direct or evaluate control manipulations as they are performed, or walked through.

3. Normal control manipulations, such as plant or reactor startups, must be actually performed. Control manipulations during abnormal or emergency operations must be walked through with, and evaluated by the Shift Supervising Engineer or a training instructor at a minimum.

4. A simulator may be used to satisfy the performance of any control manipulations. The use of Technical Specifications and plant procedures should be maximized during the simulator control manipulations.
E. Performance Evaluation

Once per license period, each licensed individual will be systematically evaluated by the plant staff. This will be accomplished by the observation of licensed personnel's performance during routine operating conditions, emergency and abnormal operating conditions and any special operating conditions that may arise. This evaluation documentation will be placed in the individual's training file.

F. Prolonged Absence from Licensed Duties

1. A prolonged absence is defined as a period of four (4) months or longer without involvement in licensed duties. Any licensed individual absent from operating duties for a prolonged period will be given a written examination and/or an oral examination to determine any areas in which he needs accelerated training prior to his return to operating duties. In addition to the above mentioned examinations, he will be required to review any changes or reports on the following subjects:

   (a) Operating Instructions
   (b) Integrated Plant Operating Instructions
   (c) Administrative Control Procedures
   (d) Technical Specifications
   (e) Facility License's
   (f) Plant Design
   (g) Reportable Occurrences

2. The above when accomplished will be documented and placed in the individual's training file.

G. Record Retention

The Training Coordinator will be responsible for maintaining license
holder retraining records. Records of the Retraining Program shall be maintained to document each individual's participation in the Retraining Program. Copies of the following records shall be maintained:

(a) Written examinations administered

(b) Answers given by licensee on examinations

(c) Results of evaluations

(d) Documentation of any additional training administered in areas in which a licensed individual has exhibited deficiencies.

(e) Control Manipulation Record
III. Training Instructor Qualifications

In order to provide quality instruction in both Initial and Requalification Training Programs the instructors utilized in these programs will be experienced BWR Operations/Training personnel and meet the following additional requirements.

1. Instructors who teach systems, integrated responses, transient or simulator courses hold SRO licenses or shall have demonstrated their competence to the NRC by successful completion of a senior operator examination.

2. Instructors employed by Iowa Electric Light and Power Co. will be enrolled in the Licensed Operator Retraining Program and be required to participate in all areas, except those they are actively teaching.

3. Consultant instructors utilized by the Duane Arnold Energy Center must be able to provide the facility with documentation showing they are currently certified as qualified instructors under the current NRC standards.
Control Manipulation and Plant Evolution List

*(1) A plant or reactor startup to the point of adding heat and heatup rate is established.
(2) A plant shutdown.
*(3) Manual control of feedwater during startup or shutdown.
*(4) Any reactivity control manipulation which results in an actual reactor thermal power change of 10% or greater.
*(5) Loss of coolant accidents including the following:
   (a) Small line break inside primary containment
   (b) Large line break
   (c) Small line break outside primary containment
(6) Complete loss of instrument and service air
(7) Station Electrical System Failures:
   (a) Loss of off-site power sources
   (b) Loss of all power to an essential bus
   (c) Loss of all power to a nonessential bus
   (d) Loss of instrument AC distribution panel 1Y11 or 1Y21
   (e) Loss of uninterruptible AC distribution panel 1Y23
   (f) Reactor protection system AC distribution system failures
(8) Reactor Recirculation System Failures:
   *(a) Loss of one pump
   *(b) Loss of two pumps
   (c) Increasing flow
   (d) Decreasing flow
(9) Decreasing Main Condenser Vacuum
(10) Emergency Service Water System Failures
(a) Loss of all emergency service water flow
(b) Loss of one emergency service water loop
(c) Loss of flow to individual components from one emergency service water supply header.

(11) Residual Heat Removal and RHR Service Water Failures
(a) Loss of RHR pump(s) in shutdown cooling mode
(b) Loss of RHR heat exchanger in shutdown cooling mode. (Including loss of RHR service water)
(c) Loss of RHR pump(s) in suppression pool cooling mode
(d) Loss of RHR heat exchanger in suppression pool cooling mode. (Including loss of RHR service water)

(12) Feedwater System Failures
*(a) Total loss of feedwater flow
(b) Partial loss of feedwater flow
(c) Increasing reactor water level
(d) Feedwater or condensate system rupture
(e) Feedwater heater failure
(f) Feedwater regulating valve lockup (fail as is)

(13) Control Rod System Failures
(a) No control rod movement
(b) Complete loss of CRD water flow
(c) Loss of control rod position indication

(14) Failure of Control Rod Reactivity Control
(a) Continuous rod withdrawal or rod drop
(b) Loss of shutdown margin (SBLC initiation)
(15) High Off-Gas Radiation and Reactor Coolant Activity
(16) Turbine trips
(17) Failures in Main Steam Pressure Control System
   (a) Failure of one or both bypass valves (BPVs) to open when required
   (b) Closure of main stop valves or control valves
   (c) One or more control valves fail open
   (d) One or both bypass valves fail open
(18) Reactor Scram
(19) Steam Line Break Outside Drywell
   (a) Steam Line Break - Small Break
   (b) Steam Line Break - Large Break
(20) Flux (IRM & APRM) Instrument Failures