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Mgr. of Ops.

YANKEE ROWE OPERATOR TRAINING PROGRAM

SCOPE

To establish a program through which holders and prospective holders of Nuclear Regulatory Commission Reactor Operator and Senior Operator licenses will be trained for initial and renewal licensing.

ENCLOSURES

AP-0500 - Pgs. 1-10 - Rev. 6
AP-0500, Att. "A" - Pg. 1 - Rev. 6

REFERENCES

1. ANSI N18.1 - 1971, "Selection and Training of Nuclear Power Plant Personnel"

2. Title 10, Code of Federal Regulations Part 55 and Part 55, Appendix A.

3. Technicial Specifications, Section 6.4.1

4. Qualification of Reactor Operator Letter - March 28, 1980

DISCUSSION

The training program is divided into two separate phases. The first of these is the R.O. and S.O. operator licensing programs. This phase will be designed to give personnel the knowledge and experience necessary to meet the requirements of the Federal Regulations for license application.

The second phase of the training program will be licensed reactor operator and senior operator retraining. The program will be conducted to maintain licensed operators and senior operators at the highest level of competence and proficiency. The program is designed to meet or exceed the requirements set forth by the Nuclear Regulatory Commission in the Code of Federal Regulation, pertaining to operator retraining and license renewal. The program will consist of a combination of the following:

1. Evaluation Exams.

2. On-site lecture series supplemented at times by videotapes and other effective training aids.

3. Implementation and documentation of a review program in which all licensed personnel are kept current in their knowledge of:

   a. Operating and Emergency Procedures.

b. Applicable Administrative Procedures.

c. Plant Design Changes.

d. Abnormal Plant events, their cause and correction.

4. Actual control manipulation, or direct supervision thereof, for at least 10 reactor startups, shutdowns, or significant reactivity changes which demonstrate familiarity with the reactor control systems.

The following subject areas will be covered during the evaluation and lecture series of both phases of the program:

1. Reactor Theory and Principles of Operations.

2. Principles of Theory of Heat Transfer, Fluid Flow and Thermodynamcis.

3. General and Specific Plant Operating Characteristics.

4. Plant Instrumentation and Control System.

5. Plant Protection Systems.

6. Engineered Safety Systems.

7. Radiation Control and Safety.

8. Technical Specifications.

9. Standard and Emergency Operating Procedures.

10. Applicable portions of Title 10, Code of Federal Regulations.

11. Training in the use of installed systems to control or mitigate an accident in which the core is severely damaged.

Documentation of the initial training and retraining program will be maintained by the Training Supervisor.

The Training Supervisor has the responsibility of implementing all training. He will also be responsible for maintain adequate records of the training effort.

PROCEDURE

I. INITIAL REACTOR OPERATOR LICENSE PROGRAM

A. As the need arises for additional NRC Reactor Operators' licenses at Yankee Rowe, a training program will be instituted which will ensure each candidate receives sufficient training and experience to allow for license application submittal.

B. Applicants for a Reactor Operator license shall have passed the Alternate Control Room Operator examination to be eligible for the Reactor Operator initial license program.

C. Applicants for Reactor Operator licenses shall have received three (3) months of training as an extra person in the Control Room.

D. Classroom lectures for Reactor Operators will include the following subject materials:

1. Reactor Theory
2. Principles of Heat Transfer and Fluid Mechanics
3. Systems and Components
4. Instrumentation and Controls
5. Transient Analysis
6. Design Features
7. Health Physics
8. Technicial Specifications
9. Operating and Emergency Procedures
10. Training in the use of installed systems to control or mitigate an accident in which the core is severely damaged.

E. Classroom lecture attendance and evaluation examination results will be maintained by the Training Supervisor. These records will be maintained only for the purpose of license application. The application will become a part of the individual's training file.

F. Actual manipulation of the reactor controls by the individual to demonstrate his ability to operate the plant in a safe and compentent manner.

G. Upon completion of the above, each applicant will be required to pass a company examination similar in scope and depth to an NRC examination.

H. When an individual receives an NRC license, a copy of the license will be filed in the training record. The licensee will then be enrolled in the Retraining Program.

I. Applicants will grant permission to the NRC to inform Yankee management regarding the results of the examinations for purposes of enrollment in requalification programs.

II. APPLICANTS FOR SENIOR OPERATOR'S LICENSES SHALL MEET THE FOLLOWING REQUIREMENTS:

A. Applicants for Senior Operator's Licenses shall have a minimum of four (4) years responsible power plant experience. A maximum of two (2) years' power plant experience may be fulfilled by academic or related technical training, on a one-for-one basis. Two years shall be nuclear power plant experience.

B. At least six (6) months of nuclear power plant expeirence must be acquired at Yankee Rowe.

C. Applicants for Senior Operator's Licenses shall have held an Operator's License for one (1) year.

D. Applicants for Senior Operator's Licenses shall have at least three (3) months of shift training as an extra man on shift.

E. Classroom lectures for Senior Operators shall include the following subject material:

1. Reactor Theory

2. Radioactive Material Handling

3. Specific Operating Characteristics including Plant and Reactor Transients

4. Fuel Handling and Core Parameters

5. Administrative Procedures, Conditions and Limitations

6. Theory of Fluids and Thermodynamics

7. Training in the use of installed Plant systems to control or mitigate an accident in which the core is severely damaged.

F. Applicants will grant permission to the NRC to inform Yankee management regarding the results of the examinations for purposes of enrollment for requalifications.

G. Classroom lecture attendance and evaluation examination results will be maintained by the Training Supervisor. These records will be maintained only for the purpose of license application. The application will become a part of the individual's training file.

H. Upon completion of the above, each applicant will be required to pass a Company examination similar in scope and depth to an NRC examination.

I. When an individual receives an NRC License, a copy of the license will be filed in the training record. The licensee will then be enrolled in the Retraining Program.

III. LICENSED OPERATOR RETRAINING

A. Evaluation Examination

1. Examinations will be administered to each licensed operator and senior operator at least annually. (Not to exceed 15 months)

2. Reactor operator examination categories will consist of the following topics:

a. Prinicples of Reactor Operation

a'. Prinicples of Heat Transfer and Fluid Mechanics

b. Features of Facility Design

c. General Operating Characteristics including Transients and Accident mitigation with a degraded core.

d. Instrumentation and Control Systems

e. Safety and Emergency Systems

f. Standard and Emergency Operating Procedures

g. Radiation Control and Safety

3. Senior operator examination categories will consist of the following topics:

h. Reactor Theory

h'. Theory of Fluids and Thermodynamics

i. Radioactive Material Handling, Disposal and Hazards

j. Specific Operating Characteristics including transients and accident mitigation with a degraded core.

k. Fuel Handling and Core Parameters

l. Administrative Procedures, Conditions and Limitiations

4. If a licensed operator or senior operator fails to achieve an overall examination grade of 80% or fails to achieve 70% in any category he will be required to participate in an accelerated requalification program prior to resuming licensed activities. A judgment will be made by the Training Supervisor at the time of the failure as to how the accelerated program may best be administered.

5. The following information pertaining to evaluation examinations will become a part of the license holders training files:

   a. A copy of the licensee's answers.

   b. The grade the licensee achieved for each section and his overall percentage grade.

6. A copy of all examination questions will be maintained by the Training Supervisor.

7. The requalification records shall be maintained for the life of the plant.

8. All individuals shall be retrained and examinations administered at periods not to exceed 15 months.

B. On-Site Lecture Series

The on-site lecture series will consist of preplanned lectures to be given on a regular and continuing basis which will be interrupted by heavy plant workloads or outages and the traditional vacation periods of June, July and August. Where applicable, up to 50% of the lecture series may be supplemented by the use of films, video tapes and/or individual study.

1. The following general sections will comprise the lecture series:

   a. Theory and Principles of Operation

   a'. Heat Transfer, Fluid Flow, Thermodynamics and mitigation of accidents involving a degraded core.

   b. General and Specific Plant Operating Characteristics

   c. Plant Instrumentation and Controls

   d. Plant Protection Systems

   e. Engineered Safety Systems

   f. Normal, Abnormal and Emergency Operating Procedures

   g. Radiation Control and Safety

   h. Technical Specifications

   i. Applicable portions of Title 10, Chapter I, Code of Federal Regulations.

2. Each licensee who fails to achieve a grade of 80% in a grade section or sections shall be required to attend lectures given pertaining to the subject material in which he has shown the deficiency.

3. The normal lecture series will be scheduled so that each licensee will have the opportunity to attend each lecture in the normal course of his work schedule.

4. Training instructors will be enrolled in the annual requalification program.

5. Training instructors who teach systems, integrated responses and transients shall have demonstrated their competence to the NRC by successful completion of a senior operators license examination.

6. The Training Supervisor shall maintain the following records for the lecture series:

   a. Attendance Record

   b. Results of Examinations Administered

   c. Schedule and Curriculum Record

7. All applications for reactor operator, senior operator and renewals will be signed by the Vice-President of Operations or his designated alternate, the Manager of Operations.

C. Operator Review Program

1. All licensed operators and senior operators will review the facility design changes, applicable procedure changes and facility license changes.

2. The Training Supervisor will insure all licensed operators and senior operators review all abnormal and emergency procedures, at least annually. The completed forms will be returned to the Training Supervisor for file in the individual's file.

3. The performance of all licensed individuals will be evaluated during actual or simulated abnormal and emergency plant conditions. This will be done to meet the requirement for systematic observation and evaluation which appears in Paragraph 4.c of Appendix "A" of 10 CFR, Part 55. This will be accomplished by oral examination in the case of simulated experiences. These evaluations will be documented and placed in the individual's file.

D. Reactivity Control Manipulations

1. Each licensed operator and senior operator is required to perform or direct at least ten significant reactivity changes, which demonstrate familiarity with the control systems, during the two year duration of his license. Refer to Appendix "A" of this procedure for a listing of reactivity changes for which Yankee Rowe will take credit.

2. Reactivity manipulations will be documented by the Training Supervisor. This information will be incorporated into the individual's training records.

3. Each operator should make an effort to perform a variety of reactivity changes in lieu of the same reactivity change ten times.

4. Control Manipulations: The following control manipulations and plant evaluations where applicable to the plant design are acceptable for meeting the reactivity control manipulations required by Appendix "A", Paragraph 3.a of 10 CFR Part 55. The starred items shall be performed on an annual basis; all other items shall be performed on a two-year cycle. The requalification program requires that each individual perform or participate in a combination of reactivity control manipulations based on the availability of plant equipment and systems. Those control manipulations which are not performed at the plant may be performed on a simulator. The use of the Technical Specifications should be maximized during the simulator control manipulations. Personnel with senior licenses are credited with these activities if they direct or evaluate control manipulations as they are performed:

*a. Plant or reactor startups to include a range that reactivity feedback from nuclear heat addition is noticeable and heatup rate is established.

b. Plant shutdown.

*c. Manual control of steam generators and/or feedwater during startup and shutdown.

d. Boration and/or dilution during power operation.

*e. Any significant (>10%) power changes in manual rod control or manual feed control.

f. Any reactor power change of 10% or greater.

*g. Loss of coolant including:

1. Significant PWR steam generator leaks
2. Inside and outside primary containment
3. Large and small, including leak-rate determination.
4. Saturated Reactor Coolant response (PWR)

h. Loss of instrument air (if simulated plant specific).

i. Loss of electrical power (and/or degraded power sources).

*j. Loss of core coolant flow/natural circulation.

k. Loss of condenser vacuum.

l. Loss of service water if required for safety.

m. Loss of shutdown cooling.

n. Loss of component cooling system or cooling to an individual component.

o. Loss of normal feedwater or normal feedwater system failure.

*p. Loss of all feedwater (normal and emergency).

q. Loss of protective system channel.

r. Mispositioned control rod or rods (or rod drops).

s. Inability to drive control rods.

t. Conditions requiring use of emergency boration or standby liquid control system.

u. Fuel cladding failure or high activity in reactor coolant or offgas.

v. Turbine or generator trip.

w. Malfunction of automatic control system(s) which affect reactivity.

x. Malfunction of reactor coolant pressure/volume control system.

y. Reactor trip.

z. Main steam line break (inside or outside containment).

z(a). Nuclear instrumentation failure(s).

E. Operating Experience

1. 10 CFR 55.31 requires satisfactory demonstration of knowledge and understanding of plant operation for any persons who have not actively performed operator or senior operator duties for a period of four months or longer.

2. Any individual absent from operating duties for a period of four months or longer will be given a written and/or an oral examination to determine any areas in which the individual needs accelerated training before resuming his normal duties.

3. The Training Supervisor shall ensure that the individual who has been absent for four months or longer is made aware of procedure, design and license changes which have taken place in his absence.

F. Simulator Training

1. If plant operating history indicates a need for training under emergency or abnormal conditions a reactor simulator may be utilized.

2. This training, if used, will be used at least biennially for all licensed operators when the need for such training is indicated.

3. The Training Supervisor will be responsible for documentation of any individual's participation in simulator training

G. Special Training Assignments

1. The Training Supervisor shall document special training assignments executed by licensed operators or senior operators, such as:

a. In-Plant assignment to another department.

b. Off-Site seminars or classes.

YANKEE ROWE OPERATOR TRAINING PROGRAM

APPENDIX "A"

SIGNIFICANT REACTIVITY CHANGES

1. Reactor startup to the point of adding heat.
2. Controlled reactor shutdown.
3. Manual control of steam generator levels during startups and shutdowns when power is less than 10%.
4. Operation of the turbine governor controls in manual during startups and for power changes equal to or greater than 10%.
5. Boration or dilution which changes boron concentration by at least 10 ppm.
6. Operation of the manipulator crane in the core during refueling.
7. Any power changes of 10% or more in manual rod control.
8. Manual rod control prior to and during generator synchronization.