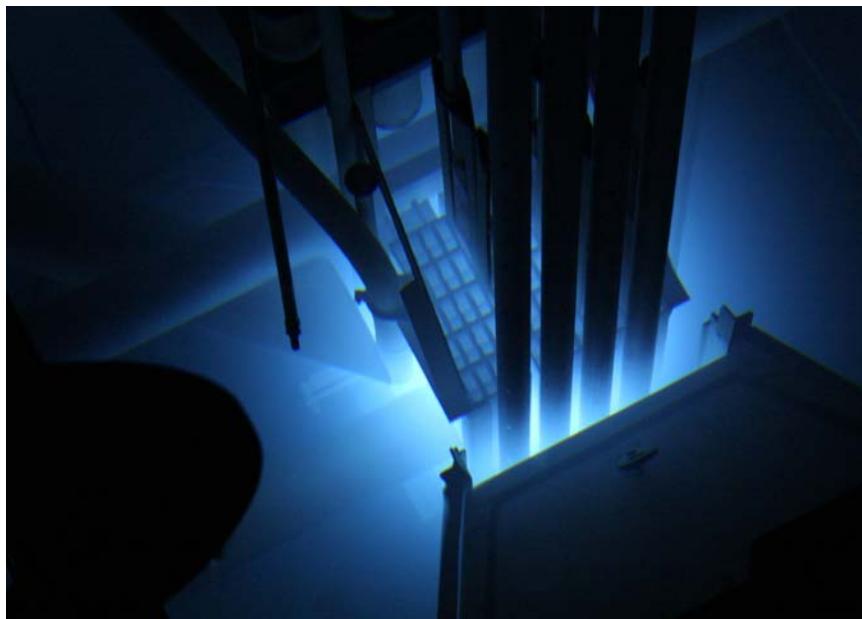


PULSTAR REACTOR

REACTOR OPERATOR TRAINING AND REQUALIFICATION PROGRAM

**NORTH CAROLINA STATE UNIVERSITY
RALEIGH, NORTH CAROLINA 27695**



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1. PURPOSE

The PULSTAR Reactor Operator Training and Requalification program is designed to satisfy the requirements of the contained in 10 CFR Part 55.59, NUREG 1537 Section 12.10 *Operator training and Requalification* and ANSI/ANS 15.4, *Selection and Training of Personnel for Research Reactors*.

The objectives of the program are to refresh knowledge in areas of infrequent operation, to review facility and procedural changes, to address subject matter not reinforced by direct use, and to improve in areas of performance weakness. The program is designed to evaluate the reactor operator's knowledge and proficiency to perform his or her duties and retrain where necessary. Emphasis is on those subjects necessary for continued proficiency. The program takes into consideration the specialized nature and mode of operation of the PULSTAR Reactor and the background, skill, degree of responsibility, and participation of reactor operations personnel in related activities. The program content reflects facility modifications and changes in procedures. Successful completion of the program is required in order for the individual to continue to perform licensed activities.

2. RESPONSIBILITY

The responsibility for this program rests with the Manager of Engineering and Operations (or a duly authorized representative). This responsibility shall cover the following items:

- a. Selection of knowledgeable individuals to give classroom lectures and to supervise retraining operations.
- b. Certification to the NRP Director that each individual has successfully completed the requalification program.
- c. Granting of exemptions to the requalification program as provided for in this plan.

3. SCHEDULE

The requalification program shall be conducted over a period not to exceed 24 months, to be followed by successive 24 month programs. During the 24-month period, the following shall be provided or accomplished:

- a. Lectures
- b. Written examination
- c. Medical evaluation
- d. Reactivity manipulations

The interval between any two successive written examinations shall be biennially not exceed 30 months. The interval between any two successive medical evaluations shall not exceed 24 months.

For the first 12 month interval and for the second 12 month interval of the 24 month period, the licensed

individual shall

- e. Complete an operating test or evaluation;
- f. Complete a review of documents, including abnormal and emergency procedures.

The interval between any two successive operating tests or evaluations shall not exceed 15 months.

4. CONTENT

The requalification program shall consist of lectures, document reviews, a written examination, operating examinations, routine reactor operations and a medical examination.

4.1. *Lectures*

The requalification program must include preplanned lectures on a regular and continuing basis throughout the 24 month requalification period in those areas where operator and senior operator written examinations and facility operating experience indicate that emphasis in scope and depth of coverage is needed. Lectures will cover the following subjects:

- a. Nuclear theory and principles of operation.
- b. Facility design and general and specific reactor operating characteristics.
- c. Instrumentation and control systems.
- d. Reactor protection systems.
- e. Engineered safety features.
- f. Normal, abnormal, and emergency operating procedures.
- g. Radiation control and safety.
- h. Technical specifications and applicable portions of Title 10 of the Code of Federal Regulations.
- i. Other facility specific information

All regularly scheduled lectures should be attended by all licensed operators. Written quizzes may be given following any lecture. The results of these quizzes will be used to evaluate the effectiveness of the given lectures, and to ascertain whether additional training is needed. Personnel missing lectures who were not excused shall be briefed on the topics, given a copy of the lesson plan, and be required to take any written quizzes that may have been given prior to the next scheduled requalification lecture.

Individual study may also substitute as a lecture; however, no more than two such study periods should be credited during the 24 month requalification period.

4.2. Document Review

For the first 12-month interval and for the second 12-month interval of the 24-month period, each licensed RO shall review the contents of all abnormal, emergency, and operating procedures.

All significant facility license, technical specifications, design and procedural changes shall be routed to all licensed operators in a timely manner. All licensed operators shall be required to sign all forms relating to the facility changes signifying understanding and notification of the specified change.

4.3. Written Examination

A written examination shall be taken biennially not to exceed 30 months. The examination should be similar in content to the initial licensing exam and shall cover the following categories:

- a. Reactor Theory, Thermodynamics and Facility Operating Characteristics
- b. Normal and Emergency Operating Procedures and Radiological Procedures
- c. Plant and Radiation Monitoring

Personnel holding Reactor Operator licenses and personnel holding Senior Reactor Operator licenses shall be examined on the same categories. In addition, the SRO test shall contain questions covering the following areas:

- d. Radioactive Materials Handling Disposal and Hazards
- e. Fuel Handling and Core Parameters, Administrative Procedures
- f. Limiting Conditions for Operation.

The acceptance criterion for all graded examinations is 70 percent and all operators are required to complete each examination satisfactorily.

A score on the written examination equal to or greater than 80 percent may require no additional training. Nevertheless, the results of all examinations including missed questions should be reviewed with the operator to ensure proper understanding.

A score on the written examination less than 80 percent may require additional training on those areas or topics where weaknesses or deficiencies are indicated. This retraining and retesting must be completed within 60 days from the date the examination was administered and before the candidate is considered requalified. In this case the candidate need not be removed from licensed duties subject to the evaluation of the Manager of Engineering and Operations or a duly authorized representative.

A score on the written or other examination of less than 70 percent requires that an evaluation be performed by the Manager of Engineering and Operations (or a duly authorized representative) within 1 month. The evaluation is to determine if the deficiencies require that the individual be removed from licensed duties pending completion of any accelerated retraining. In any case the licensed operator is removed from licensed duties if within 4 months he or she does not achieve a passing grade after reexamination.

Regardless of the score, if the individual's test indicates a deficiency in a critical area that affects safety, training is promptly administered to correct the deficiency or the operator is removed from licensed duties in the affected area until the deficiency is corrected.

4.4. Operating Examinations

To maintain a current license, each calendar year each reactor operator or senior reactor operator shall successfully complete an annual operating exam to be administered by the Manager of Engineering and Operations or a duly authorized representative. The annual operating exam for the Manager of Engineering and Operations shall be administered by a duly authorized representative.

The operating test will require the reactor operator or senior reactor operator to demonstrate an understanding of and the ability to perform a comprehensive sample of the applicable tasks required in 10 CFR Part 55.59(a)(2)(ii) and 10 CFR 55.45(a)(2) through (13).

Applicable tasks include:

- a. Perform startup procedures for the facility, including operating of those controls associated with plant equipment that could affect reactivity.
- b. Manipulate the console controls as required to operate the facility between shutdown and designated power levels.
- c. Identify annunciators and condition indicating signals and perform appropriate remedial actions where appropriate.
- d. Identify the instrumentation systems and the significance of facility instrument readings.
- e. Observe and safely control the operating behavior characteristics of the facility.
- f. Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.
- g. Safely operate the primary and secondary coolant system, and identify the relationship of the proper operation of these systems to the operation of the facility.
- h. Safely operate the auxiliary and emergency systems, including operation of those controls associated with plant equipment that could affect reactivity or the release of radioactive materials to the environment.
- i. Demonstrate or describe the use and function of the radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.
- j. Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure.
- k. Demonstrate knowledge of the emergency plan and, based upon license held, to decide

whether the plan should be executed and the duties under the plan assigned.

- I. Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility.
- m. Demonstrate the ability to safely operate the PULSTAR Reactor and work within the organization structure to insure that license limits are not exceeded.

The operating test will include an actual or simulated response to an abnormal emergency situation. This aspect of the test is deemed appropriate to fully meet the requirements of 10 CFR 55.5(4)(iii) and (iv). Annually at intervals not to exceed 15 months, each operator shall control the facility during the following:

- (i) Changes in power levels greater than 10 percent.
- *(ii) Dropped rod.
- *(iii) Rx SCRAM.
- *(iv) Loss of primary coolant.
- *(v) Loss of Rx Air.
- *(vi) Loss of primary coolant flow.
- *(vii) Loss of a SCRAM logic channel.
- *(viii) Stuck Rod.
- *(ix) Fuel cladding failure or high coolant activity.
- *(x) Malfunction of the Auto channel.
- *(xi) Loss of a Nuclear Instrumentation channel.
- *(xii) Loss of electrical power.

* Since the primary means of protection for the PULSTAR is to either shutdown or SCRAM, it is important for the operator to understand and recognize when either is required. These items will be performed as walkthroughs facilitated by a qualified knowledgeable individual and will concentrate on indications and actions taken. No operator action will actually be performed on the reactor console during a walkthrough.

The manipulations required during the annual operating test will be such that they will also meet the requirements of the applicable parts of the on-the-job training specified in 10 CFR 55.59(c)(3)(i)(A) through (AA), and the evaluation of the reactor manipulations stated in 10 CFR 55.59(c)(3)(ii).

4.5. Reactor Operation and Reactivity Manipulations

To maintain proficiency, each reactor operator shall be required to perform a minimum of four hours per

calendar quarter on shift as the reactor operator.

To maintain proficiency, each senior reactor operator shall be required to perform a minimum of four hours per calendar quarter on shift as the Designated Senior Reactor Operator.

To maintain proficiency, each reactor operator and senior reactor operator shall be required to annually perform at least ten reactivity manipulations in any combination of reactor startups, shutdowns, and/or power changes greater than or equal to 10% as a reactor operator. Direct supervision of the reactivity manipulations as the Designated Senior Reactor Operator shall be considered equivalent to actual performance.

If a licensed reactor operator or senior reactor operator has not met the quarterly operating requirements, then before resumption of licensed duties, the operator or senior operator shall be required to demonstrate that their knowledge and understanding of the operation and administration of the facility is satisfactory and operate the reactor for a minimum of six (6) hours under the direction of a reactor operator or senior reactor operator as appropriate in the position to which the individual will be assigned.

5. EVALUATION

5.1. Written Examinations

A grade equal to or greater than 70% will constitute a passing grade for the biennial written examination discussed in Section 4.3. Failure to achieve a passing grade will result in an accelerated retraining program in the subject area failed. This accelerated retraining program will be left at the discretion of the Manager of Engineering and Operations or a duly authorized representative.

An operator may be required to participate in an accelerated requalification program when it is deemed necessary by virtue of examination results.

5.2. Annual Operating Exam

The annual operations test and the annual walkthrough examination are key factors in evaluating the continued competence of the licensed operator. Each licensed operator shall demonstrate satisfactory understanding of the operation of the facility, procedures and license.

An operator may be required to participate in an accelerated requalification program when it is deemed necessary by virtue of examination results.

5.3. Medical Examination

All reactor operators and senior reactor operators shall undergo a medical examination by a physician biennially, not to exceed 24 months. The medical examination should be consistent with ANSI/ANS 15.4, *Selection and Training of Personnel for Research Reactors*.

6. ABSENCE FROM LICENSED ACTIVITIES

Before resumption of licensed activities, an individual who has not been actively performing licensed functions for a minimum of four hours per calendar quarter shall be required to demonstrate that their knowledge and understanding of the operation and administration of the facility is satisfactory. This may be accomplished through written, oral, or operational evaluations or a suitable combination.

In addition, a minimum of six hours under the direction of a licensed operator or senior operator as appropriate in the position to which the individual will be assigned must be completed prior to returning to active status. Any deficiencies revealed must be corrected before the individual resumes licensed functions. This demonstration will be documented and maintained in the requalification records.

7. RECORDS

Documents and records pertaining to the requalification program for a reactor operator or senior reactor operator shall be maintained for the duration of the currently valid license.