

PENN STATE BREAZEAL REACTOR
ADMINISTRATIVE POLICY

OPERATOR AND SENIOR OPERATOR
REQUALIFICATION

AP-3, Revision 1

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Effective Date: _____

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A. PURPOSE

To assure that all operators and senior operators maintain competence.

B. ADMINISTRATION

1. The operations manager, or a designate appointed by the Director, shall be responsible for:
 - a. Conducting the requalification program.
 - b. Assuring that the examinations are not compromised.
 - c. Maintaining records required by the program.
2. The requalification program shall be conducted over a period of 24 consecutive months.
3. A licensee conducting an exam shall be exempt from that exam.
4. During each one-year period, no licensee shall conduct and be exempt from more than one of the three exams (comprehensive written, oral procedure, and operating test).
5. No licensee shall conduct and be exempt from the same exam twice during the 24-month requalification program.
6. A licensee conducting and exempt from the comprehensive written exam during one 24-month requalification program shall not conduct and be exempt from this exam during the next 24-month requalification program.

C. LECTURE SERIES

1. Each of the following subjects shall be covered during the two year requalification cycle.
 - a. Reactor Theory and Principles of Operation
 - b. General and Specific Plant Operating Characteristics
 - c. Plant Instrumentation and Control Systems
 - 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

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2. As appropriate, table-top exercises, drills or other forms of training may substitute for a formal lecture.

D. WRITTEN EXAMINATION

1. During each requalification program, a comprehensive written exam shall be given to all licensees in the subject areas listed. The written exam will not discriminate between RO and SRO knowledge level. There will be twenty questions per subject area and the questions are expected to be objective (multiple choice or matching). The exam shall sample the items listed in each subject area.
 - a. Reactor Theory , Thermodynamics and Facility Operating Characteristics
Fundamentals of reactor theory including fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects. Causes and effects of temperature, reactivity changes due to temperature, and reactivity changes due to experiments and experimental facilities. Facility operating characteristics during steady state and transient conditions.
 - b. Normal and Emergency Operating Procedures and Radiological Controls
Radiological safety principles and procedures, procedures and equipment available for handling and disposal of radioactive materials and effluents. Shielding and access limitations. Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions. Administrative, normal, abnormal, and emergency operating procedures for the facility. Conditions and limitations in the facility license; facility operating limitations in the technical specifications and their bases; facility licensee procedures to obtain authority for design and operating changes in the facility; assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations; procedures and limitations involved in initial core loading, alterations in core configuration, and determination of various internal and external effects on core reactivity.
 - c. Facility and Radiation Monitoring Systems

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General design features of the core, including core structure, fuel elements, control rods, core instrumentation, and coolant flow; general design features and mechanical components of the pool recirculation system, pool cooling system, systems for adding water to the pool, and equipment that could affect release of radioactive materials to the environment. Fuel handling facilities and procedures. Design, components, and functions of reactivity control mechanisms and instrumentation. Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. Components, capacity, and functions of emergency systems. Purpose and operation of radiation monitoring system, including alarms, and survey equipment.

2. A licensee receiving a grade of less than 70% in one or more of the three subject areas shall be removed from licensed duties. He or she shall receive written notice of that licensee's removal.
3. Training following exam failure shall be lectures, tutoring, self-study, or on-the-job training as determined appropriate by the operations manager or a designate appointed by the Director. This training shall be documented.
4. If the licensee received less than a 70% grade in only one subject area, then the re-exam will cover only that subject area. If two or three subject areas were failed, then all three subject areas shall be retaken. A licensee may be returned to licensed duties upon the successful attainment of at least a 70% grade in each re-examined subject area. This return shall be documented.

E. ORAL EXAMINATIONS

1. During each calendar year, each licensee is expected to review PSBR abnormal and emergency procedures. Subsequent to this, an oral examination shall be given to ensure familiarity with these procedures.
2. A licensee receiving a grade of less than 70% shall be removed from licensed duties. He or she shall receive written notice of that licensee's removal.
3. Training following exam failure shall be lectures, tutoring, self-study, or on-the-job training as determined appropriate by the operations manager or a designate appointed by the Director. This training shall be documented.

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4. A licensee may be returned to licensed duties upon the successful attainment of at least a 70% grade on a re-exam. This return shall be documented.

F. ON-THE-JOB TRAINING

1. Each licensee shall perform at least one control manipulation from shutdown to critical each calendar quarter. Each licensee shall perform annually each of the following reactor control manipulations. Senior operator licensees shall be credited with these manipulations if they direct control manipulations as they are performed.
 - a. Reactor start-up to include a range where reactivity feedback from nuclear heat addition is noticeable.
 - b. Reactor shutdown.
 - c. Power change in manual rod control greater than 10%.
 - d. Power change in automatic rod control greater than 10%.
 - e. Power change using square wave mode.
 - f. Power change using pulse mode.
 - g. Reactor checkout.
2. Each licensee shall actively perform the functions of the licensed position for a minimum of four hours per calendar quarter. A licensee not meeting this requirement shall have an inactive license until the conditions of H3 are met.
3. Meetings shall be held as deemed necessary at which facility design, license, and procedure issues are discussed. Documentation shall be by meeting minutes that shall be distributed to those not in attendance.
4. Written material concerning facility design, license, and procedure changes shall be distributed, circulated, or made available by electronic media. Documentation that this material has been read by each licensee shall be by a sign-off or E-mail response. In the case of procedures, the sign-off or E-mail response will be required only for persons so indicated on the procedure distribution sign-off list.

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G. OPERATING TEST

1. A SRO shall administer an operating test to each licensee during each year, to ensure the licensee has the knowledge, competence, and dexterity to safely operate the reactor and respond to situations that may arise, and to ensure familiarity with features of facility design with special emphasis on design changes. The operating test shall be open reference. The operating test shall use a minimum of five tasks (with designated critical steps) with follow-up questions for a representative sample from among items a through n. A control console reactivity manipulation must be one of the tasks and one of tasks must take place out of the control room. Where appropriate, there may be a differentiation between RO and SRO tasks.
 - a. Perform pre-startup (reactor checkout) procedure.
 - 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 or describe appropriate remedial actions.
 - d. Identify the instrumentation systems and the significance of facility instrument readings.
 - e. Observe and safely control or describe how to safely control the operating behavior characteristics of the facility.
 - f. Describe or perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.
 - g. Demonstrate or describe the operation of the pool recirculation system, pool cooling system, and systems for adding water to the pool.
 - h. Demonstrate or describe the operation of the facility's equipment that could effect release of radioactive materials to the environment.
 - i. Demonstrate or describe the use and function of the facility's radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.

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- 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 for the facility, including, as appropriate, the operator's or senior operator's responsibility to decide whether the plan should be executed; demonstrate knowledge of the duties under the plan.
 - l. 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 function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.
 - n. Demonstrate knowledge of features of facility design, with special emphasis on design changes.
- 2. An operating test checklist shall be filled out by the evaluator for all licensees.
 - 3. A licensee satisfactorily completing less than 70% of the tasks and follow-up questions shall be removed from licensed duties. He or she shall receive written notice of that licensee's removal. Should an operator incorrectly perform or fail to perform a critical step, the task may be graded as unsatisfactory if the deficiency jeopardizes the safety of the facility or has significant safety impact on the public. Failure to perform, or incorrectly performing, two or more critical steps shall result in failure of the task.
 - 4. Training following exam failure shall be lectures, tutoring, self-study, or on-the-job training as determined appropriate by the operations manager or a designate appointed by the Director. This training shall be documented.
 - 5. A licensee may be returned to licensed duties upon the satisfactory completion of at least 70% of the tasks and follow-up questions on a re-exam. This return shall be documented.

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H. LICENSEE REQUALIFICATION REQUIREMENTS TO RETURN TO ACTIVE LICENSE STATUS FOLLOWING AN ABSENCE FROM DUTY DURING A CALENDAR QUARTER

1. The licensee shall meet any reactivity requirement deficiencies of Section F1.
2. The licensee shall pass the operating test as per Section G.
3. The licensee shall complete a minimum of six hours of shift functions under the direction of an operator or senior operator as appropriate.
4. The licensee shall pass any written or oral exams as per Sections D and E that were given during the absence from duty.
5. The licensee shall be informed of any facility design, license, or procedure changes during the absence.

I. MEDICAL CERTIFICATION

Medical certification shall be as described in chapter 7 of ANSI/ANS-15.4-1988 (or current version) - Selection and Training of Personnel for Research Reactors.

J. RECORDS

1. Records of the requalification program shall be maintained in each licensee file until the next license renewal.
2. The records shall contain copies of written exams administered including the answers given by the licensees.
3. Records of documentation and results of additional training and examinations in areas where licensee deficiencies were noted shall be retained.
4. Results of the oral examination shall be recorded.
5. Operating test checklists shall be maintained in each licensee's file.
6. Reactivity manipulation checklists shall be maintained in each licensee's file.
7. Duty hour requirements for each calendar quarter shall be documented.
8. Records shall be maintained for actions taken to return licensees to active license status as described in Section H.
9. Records documenting the completion of the lecture series.

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10. Records indicating fulfillment of the medical certification requirements of section I shall be maintained until the completion of the next physical exam.

K. REFERENCES

1. ANSI/ANS-15.4-1988 - Selection and Training of Personnel for Research Reactors.
2. 10 CFR 55, current as of date of submission of this plan to the NRC.
3. NUREG-1478, Non-Power Reactor Operator Licensing Examiner Standards, June 1994.

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