

50-182

PURDUE UNIVERSITY



SCHOOL OF NUCLEAR ENGINEERING

February 12, 1988

Alexander Adams, Jr., Project Manager
U S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

Dear Mr. Adams:

The enclosed revised operator requalification program is submitted in response to your request for additional information dated January 14, 1988. It has been rewritten to comply with both ANSI/ANS 15.4 and 10 CFR 55.59 as these documents apply to the Purdue University Reactor Facility.

If any additional information is required, we remain ready to supply it.

Sincerely,

F. M. Clikeman
F. M. Clikeman
Professor and Acting Head

Enclosure: As Stated

FMC/jlb

*Beulah Jean Brant
copies June 11, 1990*

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OPERATOR REQUALIFICATION PROGRAM
for the
PUR-1 REACTOR FACILITY

This program is designed to comply with the intent of 10 CFR 55, Appendix A, concerning the continued training and requalification of operators for the PUR-1 reactor. It will be mandatory for all operators licensed on the PUR-1 reactor to participate in the program.

The requalification program will consist of the following parts:

A. INSTRUCTION

A series of eight meetings will be held over a two year period, during which all topics listed below in part A.1.b. will be covered.

1. Each meeting will consist of:
 - a. A review of reactor operations and modifications, if any.
 - b. A lecture of one or more of the following topics:
 - i. Theory and principles of operation.
 - ii. General and specific plant operating characteristics.
 - iii. Plant instrumentation and control systems.
 - iv. Plant protection systems.
 - v. Engineered safety systems.
 - vi. Normal, abnormal, and emergency operating procedures.
 - vii. Radiation control and safety.
 - viii. Technical specifications.
 - ix. Applicable portions of Title 10, Chapter I, Code of Federal Regulations.
2. The lectures will be given by the reactor operators, senior operators, university radiation control officers, or faculty members of the School of Nuclear Engineering.

B. PROGRAM EVALUATION

Completion of the biennial operator requalification program will consist of a written examination and a demonstration of operator proficiency in reactor operation.

1. Written examination:
 - a. One of the senior operators will be exempt from taking the examination. This senior operator will make up and administer the examination to all other operators and

senior operators. The senior operator may receive assistance for making up questions on the topics in part A.1.b. from the instructor for each topic. The senior operator exemption will rotate through the entire senior operator roster.

- b. The written examination for requalifying licensees will contain representative questions measuring the knowledge, skills, and abilities needed to perform licensed duties. These will be identified from the licensed operator's duties performed, information in the Safety Analysis Report, operating procedures, facility license and amendments, License Event Reports, and any other information requested from the facility licensee by the NRC.
- c. The representative questions for the operators examination will sample the following topics:
 - i. Fundamentals of reactor theory including the fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects.
 - ii. General design features of the core, fuel assemblies, control rods, core instrumentation, and coolant flow.
 - iii. Mechanical components and design features of the reactor coolant system.
 - iv. Auxiliary systems that affect the facility.
 - v. Facility operating characteristics during steady state and transient conditions.
 - vi. Design, components, and functions of reactivity control mechanisms and instrumentation.
 - vii. Design, components, and functions of control and safety systems including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
 - viii. Components, capability, and functions of emergency systems.
 - ix. Shielding, isolation, and containment design features, including access limitations.
 - x. Administrative, normal, abnormal, and emergency operating procedures.
 - xi. Purpose and operation of radiation monitoring systems, including alarms and survey equipment.
 - xii. Radiological safety principles and procedures.
 - xiii. Procedures and equipment available for handling and disposal of radioactive materials.
- d. Representative questions for the senior operators examination will sample the topics in the operators list and in addition will sample the following list:

- i. Conditions and limitations in the facility license.
 - ii. Facility operating limitations in the technical specifications and their bases.
 - iii. Licensee procedures required to obtain authority for design and operating changes.
 - iv. Radiation hazards that may arise during normal and abnormal situations including maintenance activities and various contamination conditions.
 - v. Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
 - vi. Procedures and limitations involved in initial core loading, alterations in core configuration, and determination of various internal and external effects on core reactivity.
 - vii. Fuel handling facilities and procedures.
- e. Any person who scores less than 70%, overall, on the examination will be relieved from his licensed duties and enrolled in an accelerated program until such time as he can satisfactorily pass an examination covering the material. The course content and duration will depend upon the individual's deficiencies.

2. Operator proficiency:

- a. The exempt senior operator will also administer an operator proficiency examination to all other operators and senior operators.
- b. The content of the operating test will be identified from duties of the licensed operator/senior operator and reference documents listed in Part B.1.b.
- c. The operations test for the requalifying licensee will demonstrate an understanding of and the ability to accomplish a representative sample of the following items:
 - i. Perform the prestartup procedures.
 - ii. Manipulate the console controls as required to operate the facility between shutdown and designed power levels.
 - iii. Identify annunciators and condition-indicating signals and perform appropriate remedial actions where appropriate.
 - iv. Identify the instrumentation systems and the significance of facility instrument readings.
 - v. Observe and safely control the operating behavior characteristics of the facility.
 - vi. Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.

- vii. Safely operate the facilities auxiliary and emergency systems.
 - viii. Demonstrate or describe the use and function of the facilities radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personal monitoring equipment.
 - ix. Demonstrate knowledge of significant radiation hazards and the ability to perform procedures to reduce excessive levels of radiation and to guard against personal exposure.
 - x. Demonstrate knowledge of the emergency plan, including, as appropriate, the operator's or senior operator's responsibility to decide whether the plan should be executed and the duties assigned under the plan.
 - xi. Demonstrate the knowledge and ability, as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility.
 - xii. Demonstrate the ability to act as a member of the operations crew so that all procedures, the limits to the license and its amendments are not violated.
- d. Any person who can not demonstrate proficient operation of the reactor will be relieved of his licensed duties until such time as proficient operation could be demonstrated.

C. ON THE JOB TRAINING

1. Each licensed operator in the requalification program will be required to make a minimum of 10 reactor startups or power level changes during the two year period covered by the program.
2. Each licensed operator at the facility will manipulate the plant controls, and each licensed senior operator will either manipulate the plant controls or direct the activities of individuals during plant control manipulations during the term of the operators/senior operators license. Manipulations by operators/senior operators must consist of the following activities:
 - a. Completed annually.
 - i. Plant shutdown.
 - ii. Significant power changes (>10%).
 - iii. Loss of coolant.
 - iv. Loss of electrical power.
 - v. Loss of coolant flow.

- b. Completed on a two-year cycle.
 - i. Loss of protective system channel.
 - ii. Mispositioned control rod or rods.
 - iii. Inability to drive control rods.
 - iv. Conditions requiring use of emergency boration.
 - v. Fuel cladding failure or high activity in reactor coolant.
 - vi. Failure of servo system.
 - vii. Reactor trip.
 - viii. Failure of nuclear instrumentation.

D. LITERATURE REVIEW

Each reactor operator and senior operator will annually review the contents of the operating manual, technical specifications, and the emergency procedures. A signed statement to this fact will be kept in the requalification file for a period of four years.

E. RECORDS

Records will be maintained to document each instructor, each topic discussed, each licensed operator's and senior operator's participation in the requalification program. The records will contain copies of each written exam, answer sheets, results of evaluation, and the biennial operator proficiency demonstration. Documentation of additional training and test required for individuals exhibiting deficiencies will also be included in the files. All records of the requalification program will be retained by the training coordinator until the licenses of the participants are renewed.

F. EXEMPTIONS

During intervals when the licensed operations crew consists only of senior operators who are instructors for topics in part A.1.b., the requalification program will be modified to exempt those senior operators from parts A and B.1. Parts B.2, C, D, and E will remain in effect. When the licensed operations crew increases to include those who do not instruct in the program, the program will revert to its initial content.