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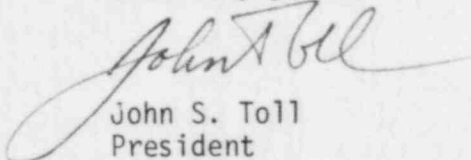
September 30, 1983

Mr. Cecil Thomas, Chief
Standardization and Special
Projects Branch
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Thomas.

Enclosed are 12 copies of the "Reactor Operator Requalification Program for Maryland University Training Reactor." This revision supersedes all previous submittals.

Sincerely yours,


John S. Toll
President

JST:jf

cc: Dr. David S. Sparks
Dr. John B. Slaughter
Dr. Ralph Belcher
Dr. Samuel Price

Enclosures

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REACTOR OPERATOR REQUALIFICATION PROGRAM

FOR

MARYLAND UNIVERSITY TRAINING REACTOR

Department of Chemical and Nuclear Engineering

University of Maryland

College Park, Maryland 20742

Revision 3, June 1, 1983

I. PURPOSE

This document sets forth the requirements for the Reactor Operator (R.O.) and Senior Reactor Operator Regualification Program for the Maryland University Training Reactor in accordance with the Code of Federal Regulations, Title 10, Part 50.54, Condition of licenses.

II. Schedule

The Operator Regualification Program cycle will last a period of two years, beginning on the first quarter of the bi-annual year. The licensed operator will enter the regualification program on the date the USNRC issues a license and will continue in the Program until either the expiration date of the current license or the date at which the current license is terminated. If the operator should receive his or her operating license no greater than six months prior to the completion of the two year cycle, the operator will be exempt in completing the requirements of the current program, but will be required to enter the following Regualification cycle. If the operator should receive his or her operating license greater than six months prior to the completion of the cycle, the operator will not be required to complete those program requirements required prior to the issuance of the license.

III. Reactor Operation

The operator will be required to perform, as either a reactor operator or senior operator, a minimum of ten reactor startups during the two year requalification cycle.

IV. REQUALIFICATION LECTURE SERIES

As part of the requalification program, licensed personnel will participate in the Requalification Lecture Series or equivalent as determined by the Reactor Director as either a student or an instructor. The lectures will be on a continuing basis throughout the Requalification cycle in those areas where annual operator and senior operator written examinations indicate that emphasis in scope and depth of coverage is needed in the following subjects:

- a) Theory and principles of operation
- b) General and specific plant operating characteristics
- c) Reactor instrument and control systems
- d) Reactor protection systems
- e) Engineered safety systems
- f) Normal, abnormal, and emergency operating procedures
- g) Radiation safety and control
- h) Technical Specifications
- i) Applicable portions of Title 10, Chapter I, CFR

As a substitute for the above, the licensed operator may either participate in ENNU 320, Nuclear Reactor Operations, as a student or an instructor or participate in the instruction of the training of students for the NRC license.

V. EVALUATION

The evaluation of the licensee's knowledge and performance of the requirements set forth in the requalification program will be accomplished by written and oral examinations, including a demonstration at the reactor console. These will be administered annually to each licensed operator. The written examination for the reactor operator will be prepared in accordance with the modified requirements of USNRC Generic letter 81-40, dated 12/16/81, Qualifications of Reactor Operators - License examinations. See Attachment 2 for specific requirements. The oral examination and console performance will be in accordance with 10CFR-55.23. The examination will be administered and graded by either the Reactor Director or his designee.

If a license holder scores less than 70% on any section of the annual written examination, the licensee will attend a makeup session on that section topic and will be administered a quiz. An overall grade of 80% will be required as a passing score.

If an individual receives a grade of less than 80% overall, it will be mandatory that he be relieved of his licensed duties and enter an accelerated requalification program. Upon successfully passing a second written examination and certification of satisfactory rating by the Reactor Director, the individual may return to his licensed duties.

An unsatisfactory evaluation on the annual oral examination will require that discussions of deficiencies take place between the licensee and Reactor Director or other suitable qualified person designated by the Director. A second oral evaluation will be administered. If performance is again unsatisfactory, the licensee will be relieved of responsibilities and placed into an accelerated requalification program.

VI. ACCELERATED REQUALIFICATION PROGRAM

The additional training that a licensee may require (as indicated by his examination) will consist of additional written exams, console performance or oral facility examinations. The additional training and the examination that the licensee receives will depend upon the weak area exhibited on previous examinations. The number of lectures and examinations that a licensee will receive will be determined by either the Reactor Director or his designee. The licensee must obtain a rating of at least 80% on the re-evaluation in order to be reassigned to his licensed duties.

VII. DOCUMENT REVIEW

The licensee will review during each Requalification cycle the following documents and instructions that are pertinent to the operations of the Reactor Facility.

1. Reactor License (R-70)
2. Technical Specifications

3. MUTR operating and emergency procedures
4. 10CFR-19, 20, 55, and sections 50.54 and 50.59 of Part 50

VIII. RECORDS

The following records will be maintained for each licensed operator and retained for the period until the license of the individual has expired or terminated:

- *Current Copy of either the licensee's reactor operator or senior reactor operator license.
- *Copies of the graded requalification examinations administered.
- *The operator's Requalification Program Progress Checklist, Attachment I, or similar.
- *The summary of training received by the licensee in the accelerated Requalification program documented in a memorandum for record and any additional documentation that is pertinent to additional training received by the licensee.

IX. ADMINISTRATION

The Reactor Director or his designee is responsible for the development, administration and execution of the Reactor Operator Requalification Program. The Reactor Director will be exempt from taking the annual written, console performance, and oral facility examinations, but will be required to perform the operations set forth in Section III and the review of the documents set forth in Section VI.

ATTACHMENTS

- 1 - Operator Requalification Program Progress Checklist
- 2A - Operator Written Examination Categories
- 2B - Senior Operator Written Examination Categories

Attachment I

Operator Requalification Program Progress Checklist

Name: _____ License # _____

Type: RO or SRO

Requal.cycle: _____ - _____ Effective: _____
year begun end

Date started: _____ Expiration: _____

I. Reactor Operations

*Completed 10 Reactor startups

Operators signature dateII. Document ReviewOperator's signature date

1. Facility License

2. Tech Specs

3. 10CFR-19

4. 10CFR-20

5. 10CFR-50.54 & 50.59

6. 10CFR-55

8. Procedures

III. Annual Written Exams

| <u>Category</u> (Reactor Operator) | <u>% of Category Score</u> | | <u>Notes</u> |
|---------------------------------------|----------------------------|-----------------|--------------|
| | <u>1st year</u> | <u>2nd year</u> | |
| I | _____ | _____ | |
| II | _____ | _____ | |
| III | _____ | _____ | |
| IV | _____ | _____ | |
| Total % | _____ | _____ | |
| | | | |
| (SRO) | | | |
| V | _____ | _____ | |
| VI | _____ | _____ | |
| VII | _____ | _____ | |
| VIII | _____ | _____ | |
| Total % | _____ | _____ | |

VI. Annual Oral Exams

| | | | |
|----------|-------------|-----------------------|-------|
| 1st year | Pass-Failed | _____ | _____ |
| | | Evaluator's signature | date |
| 2nd year | Pass-Failed | _____ | _____ |
| | | Evaluator's signature | date |

Attachment 2A - Operator Written Examination Categories

| Category | Points | Title |
|----------|--------|---|
| I | 25 | Principles of Nuclear Power Plant Operation |

This category contains questions to basic nuclear reactor behavior, elementary nuclear reactor theory, technical terminology and an appreciation of the processes taking place in a nuclear power plant. These processes include controlled and variable parameters of the reactor, primary and secondary coolant and auxiliary systems. Values which are expressed as normal or operating parameters or values which are measured as resultant characteristics are asked for in this category.

Further included are questions related to the traces that one would see on recorders during normal and abnormal transients, with the emphasis on facility behavior rather than instrument characteristics. Secondary system transients that induce reactor transients are also subject for questions in this category. Answering these questions requires mathematical ability including algebra and details and fundamental knowledge in reactor physics. Questions in this category are about reactors in general.

| Category | Points | Title |
|----------|--------|---|
| II | 25 | Plant Design, including Safety and Emergency Systems |

This category contains questions about the design features of the particular facility, with emphasis on those systems that are designed to maintain and protect against the uncontrolled release of radioactive materials. The applicant should be able to reproduce, from memory, fairly detailed sketches or descriptions of various hydraulic, pneumatic or electrical distribution systems and mechanical components. Questions are asked about design intent, construction, operation and interrelationships of those systems most directly associated with normal nuclear power plant operation and reactor safety. The applicant should be familiar with the conditions which require the use of safety and emergency systems and why such protection is required.

| Category | Points | Title |
|----------|--------|--------------------------|
| III | 25 | Instruments and Controls |

This category contains questions on the characteristics and interrelationship of the nuclear process and radiological instrumentation and facility control systems. The applicant should have sufficient knowledge of the nuclear instruments, the process instruments (temperature, pressure, level, flow, etc.), and radiological instruments (ionization, G-M, scintillation, etc.) to answer questions concerning principles of detector operations, location and setpoints of instruments and diagrammatic representation of instrumentation systems. Questions on control systems (control rod drive, level, pressure, integrated control, etc.), will include function, operation, interlocks and interrelationship with other plant systems.

An applicant is not expected to have the knowledge of an instrument technician but answers should indicate the ability to recognize the indications and consequences of improper instrument performance (e.g. over-compensation, power failure, signal failure) including the traces that recorders would show. He should also be able to make use of all available instrumentation to provide checks or verification of observed readings.

| Category | Points | Title |
|----------|--------|--|
| IV | 25 | Procedures - Normal, Abnormal Emergency and Radiological Control |

This category contains questions on the knowledge and use of the facility procedure including normal, abnormal, emergency, administrative, and radiological control procedures. The applicant is not expected to have normal procedures committed to memory but should be able to explain reasons, cautions, and limitations of normal operating procedures. In general, the applicant must demonstrate knowledge and understanding of the symptoms, automatic actions, and immediate action steps specified by abnormal and emergency procedures. Questions concerning radiological control procedures will be asked to the extent that the operator is responsible for personnel protection from the hazards of radiation and for controlling, discharging and monitoring radiological releases. Administrative procedures including operating restrictions, limitations in the facility license and technical specifications, may be included, to the extent they are directly applicable to an operator.

Attachment 2B - Senior Operator Written Examination Categories

| Category | Points | Title |
|----------|--------|---|
| V | 25 | Theory of Nuclear Power Plant Operation |

This category contains questions on principles of reactor theory including details of the fission process, neutron multiplication, source and control rod effects and criticality indications. It also contains questions on specific operating characteristics of the reactor and auxiliary systems, including nuclear, hydraulic, thermal, pneumatic, electrical and coolant chemistry. Further, it contains questions relating to fuel element characteristics and ruptured detection.

This category includes questions on the understanding and use of curves depicting reactor behavior which may be beyond the scope of knowledge needed by operators for routine operation. These may include, as applicable, differential and integral control rod worth curves, period, reactivity curves, temperature and power coefficient curves. The applicant should be able to determine the reactivity status of the reactor based on the facility's parameters and coefficients. Any curves needed will be given with the examination questions. Whenever possible, actual curves of the facility will be utilized; otherwise, applicable sample illustrative curves will be prepared.

The applicant should be able to demonstrate quantitative as well as mathematical expressions regarding reactor behavior; however, these expressions (or formulation) and nuclear constants (fission factors, half lives, etc,) usually need not be committed to memory and will be supplied in the examination when questions requiring the facility, concerning some aspects of basic reactor core and vessel design limits.

The primary emphasis throughout will be on understanding and practical application of the theory rather than mere memorization of technical facts.

| Category | Points | Title |
|----------|--------|--|
| VI | 25 | Plant Systems Design, Control and Instrumenta- tion |

This category contains questions about the design features of the particular facility with emphasis on these systems which are designed to maintain and protect against the uncontrolled release of radioactive materials. Questions are asked about design intent, construction, operation, and interrelationships of these systems most direct associated with normal nuclear reactor operation and reactor safety.

Further, this category contains questions on the characteristics and interrelationship of the nuclear, process, and radiological instrumentation and control systems. These questions will include into the principles of operations of detectors, location and set-points of instruments, diagrammatic representation of instrument and control systems. An applicant is not expected to have the knowledge of an instrument technician, but his answers should indicate the ability to recognize the indications and consequences of improper performance (e.g. over-compensation, power failure, signal failure) including the traces that recorders would show. He should also be able to use of all available instrumentation to provide checks or verifications of observed readings.

| Category | Points | Title |
|----------|--------|---|
| VII | 25 | Procedures - Normal, Abnormal, Emergency and Radiological Control |

This category contains questions on the procedures for the operation of the reactor and auxiliary systems, including administrative controls and technical specifications. In general, an applicant must demonstrate complete knowledge and understanding of the symptoms, automatic actions and immediate action steps specified by off-normal or emergency operating procedures. The applicant should be able to describe generally the objectives and methods used in the normal, off-normal and emergency operating procedures including how to perform the manipulations or verifications. Operating restrictions and limitations in the facility license, including technical specifications, may be included, to the extent they are directly applicable to a senior operator.

This category also contains questions on radiation hazards which may arise during operation or maintenance activities. Close familiarity with the provision of 10 CFR Part 20 and supplementary facility regulations is required as well as a good common sense approach to radiological safety situations. Questions may include calculations of effluent discharge limits, and conversion of measured radiation intensities to rem. The applicant should be able to set up and clean up maintenance areas so that he, his crew and the general public are protected. He should be familiar with the concept of ALARA and be able to demonstrate his knowledge regarding same. Also included are questions relating to procedures and equipment (processing and monitoring) available for handling and disposal systems of the facility and the hazards associated therewith.

This category also contains questions regarding fuel, fuel handling and core loading, including procedures and limitations concerning core loading and alteration, fuel transfer and storage, and detection and prevention of criticality.

| Category | Points | Title |
|----------|--------|---|
| VIII | 25 | Administrative Procedures, Conditions, and Limitations |

This category contains questions on administrative, procedural, and regulatory items which effect operation of the facility. Included are questions on limitations as specified in the facility license, including technical specifications. Questions concerning the technical specifications will require a thorough knowledge of what items are addressed in the specifications, including how to comply with the requirements understood. The exact details, numbers and surveillance requirements contained therein are not expected to be memorized. Questions may also covering the requirements for certain personnel to be present at certain times, the types of records that must be maintained, knowledge of the facility emergency plan, applicable provisions of 10 CFR Part 50 and Part 55.