REQUALIFICATION PROGRAM

FOR

REACTOR OPERATORS/SENIOR REACTOR OPERATORS

GEORGIA TECH RESEARCH REACTOR

January 2, 1991

Docket No. 50-160

License No. R-97

GTRR OPERATOR/SENIOR OPERATOR REQUALIFICATION PROGRAM

1.0 PURPOSE

To establish the procedures and criteria to be used in the conduct of operator/senior operator training and requalification for the Georgia Tech Research Reactor (GTRR).

2.0 SCOPE

2.1 Extent of Training

2.1.1 Training to be provided shall include classroom lectures and on-the-job training which shall be sufficiently thorough and detailed to ensure the maintenance of a high level of competence by the Reactor Operators (ROs)/Senior Reactor Operators (SROs).

2.1.2 Topics that will be covered in formal classroom training are presented in Section 4 and the listing of reactor control manipulations that shall be required of each RO/SRO in the Requalification program are specified in Section 5.

2.1.3 The activities described in the Requalification Program shall also constitute the requirements for the initial training of an unlicensed individual. Successful completion of the requalification program should enable a candidate to successfully complete the Reactor Operator examination given by the U. S. Nuclear Regulatory Commission.

2.2 Testing and Evaluation

Evaluation of the adequacy of the Requalification Training program shall be ensured through the mechanism of formal, written tests as well as evaluation of hands-on performance of the ROs/SROs.

2.3 Documentation

Each aspect of the requalification training for ROs/SROs shall be documented through the creation of records which shall be maintained at the Neely Nuclear Research Center. Examples of the forms that shall be utilized in the

documentation are attached to the Requalification Program.

3.0 GENERAL REQUIREMENTS

3.1 Licensing of ROs/SROs for the GTRR is performed by the United States Nuclear Regulatory Commission (USNRC). Each license is issued for a period of six years.

.2 The Requalification Program for ROs/SROs shall be conducted by Georgia Tech or its designee, after approval of the program by the USNRC.

3.2.1 The frequency of the requalification shall be a two year cycle, i. e., at the end of two years, each RO or SRO shall have successfully completed each portion of the Requalification Program as evidenced by successful completion of a comprehensive, written examination and required on-the-job performance evaluation.

3.2.2 Successful completion of the Requalification Program shall be demonstrated by a passing grade of 70.

3.2.3 The requalification examination shall be comprehensive in that it shall include the major topics identified in Section 4.

3.2.4 During the conduct of the Requalification Program, an examination shall be given at the completion of each series of lectures.

3.2.5 As part of the Requalification Program, ROs and SROs shall be required to successfully complete a reactor controls manipulation evaluation. Certification of completion shall be provided by the Manager of Operations or his/her designee.

4.0 CLASSROOM TRAINING

4.1 A series of lectures covering seven subjects shall be provided for the Requalification applicant during each requalification interval of two years. A listing of the seven subjects is provided below.

4.1.1 Reactor Theory and Principles of Operation

4.1.1.1 Material covered will include elementary nuclear reactor theory, technical terminology, basic heat transfer and the processes that occur in a nuclear reactor. These process include controlled and variable parameters of the

reactor, primary and secondary coolant systems and auxiliary systems. Reactor transients, both normal and off-normal will also be included.

4.1.1.2 A successful candidate must possess mathematical skills that allow him/her to determine exponential and logarithmic functions.

4.1.1.3 The duration of the classroom lectures and examination for this subject will be approximately 15 hours.

4.1.2 **General and Specific Plant Operating Characteristics**

4.1.2.1 The process variables and physical properties of the reactor during normal operating conditions describe the specific operating characteristics of a reactor. These shall be covered for the GTRR and shall be drawn primarily from the Safety Analysis Report (SAR), Technical Specifications (TS), completed experiment irradiations, the console log book, operating procedures and the operating experience of the reactor staff.

4.1.2.2 The duration of the classroom lectures and examination for this subject will be approximately 3 hours.

4 1.3 **Reactor Instrumentation and Control Systems, Reactor Protection Systems and Engineered Safety Systems**

4.1.3.1 Lectures will include the material listed below. Generally, the primary sources of material for these lectures will be drawn from the SAR, TS and GTRR drawings.

4.1.3.1.1 Radiation Detectors

4.1.3.1.2 Nuclear Instrumentation

4.1.3.1.3 Process Instrumentation

4.1.3.1.4 Reactor Control Circuits

4.1.3.1.5 Reactor Safety Circuits

4.1.3.1.6 Scram Parameters and Set Points

4.1.3.1.7 Emergency Core Coolant System

4.1.3.1.8 Annunciator Parameters

4.1.3.1.9 Interlocks and Permissives

4.1.3.2 The duration of the classroom lectures and examination for this subject will be approximately 5 hours.

4.1.4 **Normal, Off-Normal and Emergency Operating Procedures**

4.1.4.1 Written, approved procedures shall be used for reactor operations.

4.1.4.2 Each RO, SRO or candidate for an operator position shall be provided with an up-to-date copy of the Procedures Manual.

4.1.4.2.1 Normal Operations shall be covered in the series of procedures numbering 2xxx.

4.1.4.2.2 Auxiliary Systems procedures shall be covered in the series of procedures numbering 3xxx.

4.1.4.2.3 Site Emergency Procedures shall be covered in the series of procedures numbering 6xxx.

4.1.4.3 The duration of the classroom lectures and examination for this subject will be approximately 5 hours.

4.1.5 **Technical Specifications**

4.1.5.1 The GTRR Technical Specifications, which have been approved by the USNRC, will be the primary source of material for this subject area.

4.1.5.2 The duration of the classroom lectures and examination for this subject will be approximately 5 hours.

4.1.6 **Radiation Control and Safety**

4.1.6.1 The source of material for instruction in radiation control and safety shall come from the TS, 10 CFR 19, 10 CFR 20, the Georgia Tech Radiation Safety Manual and the written, approved Radiation Protection procedures (series 9000).

4.1.6.2 The duration of the classroom lectures and examination for this subject area will be approximately 3 hours.

4.1.7 **10 CFR Part 1**

4.1.7.1 Creation and Authority of the USNRC

4.1.7.2 The Commission - Headquarters

4.1.7.3 The Commission - Regional Offices

5.0 ON-THE-JOB TRAINING/REACTOR CONTROL MANIPULATIONS

5.1 Requirements for Annual Reactor Controls Manipulation

5.1.1 Each requalification candidate shall be evaluated annually on reactor control manipulation. The annual reactor control manipulations shall include the sequence of activities listed below.

5.1.1.1 Reactor startup

5.1.1.2 Increase of reactor power to 1000 kW

5.1.1.3 Switch reactor to auto control

5.1.1.4 Allow reactor to reach temperature equilibrium

5.1.1.5 Perform power calibration

5.1.1.6 Switch reactor to manual control

5.1.1.7 Decrease reactor power to 250 kW

5.1.1.8 Switch reactor to auto control

5.1.1.9 Discussion of reactor safety systems actions between the requalification applicant and the trainer shall include:

5.1.1.9.1 Loss of Primary Coolant

5.1.1.9.2 Loss of Secondary Coolant

5.1.1.9.3 Loss of Instrument Air

5.1.1.9.4 Loss of Electrical Power

5.1.1.10 Resumption of reactor controls manipulation at this point shall include reactor shutdown.

5.1.2 The trainer for the reactor controls manipulation portion of the training shall, at a minimum, be a Senior Reactor Operator.

5.2 Requirements for Biennel Reactor Controls Manipulation

5.2.1 In addition to the annual evaluation of the requalification candidates, each candidate shall be evaluated biennially (once/2 years) on other reactor controls manipulation. The biennial reactor control manipulations shall include the sequence of activities listed below.

5.2.1.1 All of the activities listed above in Step 5.1.

5.2.1.2 An elaboration of Step 5.1.1.9 above to include the response of the requalification candidate to the activities listed below.

5.2.1.2.1 Loss of shutdown cooling

5.2.1.2.2 Loss of a protective system channel

5.2.1.2.3 Misposition shim safety blade

5.2.1.2.4 Inability to drive a shim safety blade

5.2.1.2.5 Fuel cladding failure or radioactivity in the reactor coolant

5.2.1.2.6 Malfunction of the automatic control system

5.2.1.2.7 Malfunction of reactor coolant flow

5.2.1.2.8 Reactor trip

5.2.1.2.9 A nuclear instrument failure

6.0 BIENNIAL REQUALIFICATION EXAMINATION

6.1 Each requalification applicant shall successfully complete a comprehensive, written requalification examination every two years.

6.2 A passing score for this comprehensive examination shall be 70%.

6.3 Each requalification applicant shall have successfully completed the on-the-job training as discussed in Step 5.0 during the requalification interval.

6.4 Documentation shall be maintained showing the status of each requalification candidate in the requalification program.

7.0 REQUALIFICATION EVALUATION

7.1 The Manager, Reactor Operations or his/her designee, shall perform the overall evaluation of the requalification applicant.

7.2 Records of the evaluations shall be maintained.

7.3 A successful requalification candidate shall have completed the following activities.

7.3.1 Attend (or make up) all training lectures.

7.3.2 Receive a test score of at least 70% on each subject of the training lectures.

7.3.3 Receive a satisfactory evaluation on each annual reactor controls manipulations evaluation.

7.3.4 Receive a satisfactory evaluation on the biennial reactor controls manipulations evaluation.

7.3.5 Receive a score of at least 70% on the comprehensive, written biennial, requalification examination.

7.4 **Requalification Applicant Deficiency**

7.4.1 Additional training and retesting shall be given to an applicant who is found deficient in the requirements for requalification.

7.4.2 The standard for successful completion of the requalification program shall be the same as that described in Step 7.3.

EVALUATION OF REACTOR CONTROL MANIPULATION

Candidate _____ Date _____

Check One: Annual _____ Biennial _____

Control Manipulation or Discussion	Sat	Unsat
Reactor Startup	_____	_____
Increase reactor power to 1000 kW	_____	_____
Switch reactor to auto control	_____	_____
Allow reactor to reach temp. equil.....	_____	_____
Perform Power Calibration	_____	_____
Switch reactor to manual control	_____	_____
Decrease reactor power to 250 kW	_____	_____
Switch reactor to auto control	_____	_____
Loss of primary coolant	_____	_____
Loss of secondary coolant	_____	_____
Loss of instrument air	_____	_____
Loss of electrical power	_____	_____
Loss of shutdown coolant	_____	_____
Loss of a protective system channel ...	_____	_____
Mispositioned shim safety blade	_____	_____
Inability to drive a shim blade	_____	_____
Fuel cladding failure or Act. cool. ...	_____	_____
Malfunction of auto controller	_____	_____
Reactor trip	_____	_____
A nuclear instrument failure	_____	_____
Reactor Shutdown	_____	_____

COMMENTS: _____

_____

_____

_____

Candidate: (Circle One) Pass Fail

_____ _____

(Evaluator's Signature) (Date)

BIENNIAL EVALUATION OF TRAINING AND TEST SCORES

Candidate _____ Date _____

Lecture Subject:

1. Reactor theory and principles of operation
   Date(s) attended _____ thru _____
   Test score(s) _____ _____ _____

2. General and specific plant operating characteristics
   Date(s) attended _____ thru _____
   Test Score(s) _____ _____ _____

3. Reactor instrumentation and control systems, reactor protection systems and engineered safety systems.
   Date(s) attended _____ thru _____
   Test Score(s) _____ _____ _____

4. Normal, abnormal and emergency operating procedures
   Date(s) attended _____ thru _____
   Test Score(s) _____ _____

5. Technical Specifications
   Date(s) attended _____ thru _____
   Test Score(s) _____ _____

6. Radiation Control and Safety
   Date(s) attended _____ thru _____
   Test Scores (s) _____ _____

7.0 10 CFR I
   Date Attended _____ thru _____
   Test Scores _____ _____

Requalification Examination (Comprehensive):
Date of Exam _____ Exam Score _____

Requalification of Candidate: (Circle One) Complete Incomplete

Comments: _____

_____

_____

_____

_____ _____
(Manager, Reactor Operations) (Date)