



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

GEORGIA INSTITUTE OF TECHNOLOGY

DOCKET NO. 50-160

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 9  
License No. R-97

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to Facility Operating License No. R-97 filed by the Georgia Institute of Technology (the licensee), dated June 5, 1990 and supplemented on July 31, September 20, and October 23, 1990, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations as set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the regulations of the Commission;
  - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public;
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied; and
  - F. Prior notice of this amendment was not required by 10 CFR 2.105(a)(4) and publication of notice for this amendment is not required by 10 CFR 2.106(a)(2).

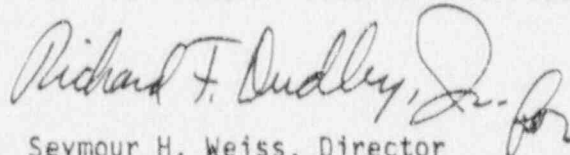
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the enclosure to this license amendment, and paragraph 2.C.(2) of License No. R-97 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 9, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Seymour H. Weiss, Director  
Non-Power Reactor, Decommissioning and  
Environmental Project Directorate  
Division of Reactor Projects - III,  
IV, V and Special Projects  
Office of Nuclear Reactor Regulation

Enclosure:  
Appendix A Technical  
Specifications Changes

Date of Issuance: December 12, 1990

ENCLOSURE TO LICENSE AMENDMENT NO. 9

FACILITY OPERATING LICENSE NO. R-97

DOCKET NO. 50-160

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

<u>Remove</u>	<u>Insert</u>
17	17
18	18
19	19
	19a
	27a
	27b

### 3.4 LIMITATIONS OF EXPERIMENTS

#### APPLICABILITY

These specifications apply to experiments performed at the GTRR. For the Fast Shutdown System (FSS) Experiments only, the reactivity worth limitations in specifications 3.4.a., 3.4.b., 3.4.c., 3.4.d., are governed by specification 3.9.

#### OBJECTIVE

To prevent damage to the reactor and to limit radiation dose to facility personnel and the public in the event of experiment failure.

#### SPECIFICATIONS

- a. The potential reactivity worth of each secured removable experiment shall be limited to 0.015 delta-k/k, except as indicated for FSS experiments in Specification 3.9.
- b. The magnitude of the potential reactivity of each unsecured experiment shall be limited to 0.004 delta-k/k, except as indicated for FSS experiments in Specification 3.9.
- c. The rate of change of reactivity of any unsecured experiment, any movable experiment, or any combination of such experiments having a total reactivity worth in excess of 0.0025 delta-k/k introduced by intentionally setting the experiment(s) in motion relative to the reactor shall not exceed 0.0025 delta-k/k-sec, except as indicated for FSS experiments in Specification 3.9.
- d. The sum of the magnitudes of the static reactivity worths of all unsecured experiments which coexist shall not exceed 0.015 delta-k/k, except as indicated for FSS experiments in Specification 3.9.
- e. The surface temperature of the material which bounds or supports any experiment shall not exceed the lowest of the following, where applicable:
  - (1) The saturation temperature of liquid reactor coolant at any point of mutual contact.
  - (2) A temperature conservatively below that at which the corrosion rate of the boundary material at any surface would lead to its failure, or,
  - (3) A temperature conservatively below that at which the strength of the boundary material would be reduced to a point predictably leading to failure.

- f. Materials of construction and fabrication and assembly techniques utilized in experiments shall be so specified and used that assurance is provided that no stress failure can occur at stresses twice those anticipated in the manipulation and conduct of the experiment or twice those which could occur as a result of unintended but credible changes of, or within, the experiment.
- g. The radioactive material content, including fission products, of any singly encapsulated experiment shall be limited so that the complete release of all gaseous, particulate, or volatile components from the encapsulation will not result in doses in excess of 10% of the equivalent annual doses stated in 10 CFR Part 20. This dose limit applies to persons occupying (1) unrestricted areas continuously for two hours starting at the time of the release or (2) restricted areas during the length of time required to evacuate the restricted area.
- h. The radioactive material content, including fission products, of any doubly encapsulated or vented experiment shall be limited so that the complete release of all gaseous, particulate, or volatile components from the encapsulation or confining boundary of the experiment could not result in (1) a dose to any person occupying an unrestricted area continuously for a period of two hours starting at the time of release in excess of 0.5 rem to the whole-body or 1.5 rem to the thyroid or (2) a dose to any person occupying a restricted area during the length of time required to evacuate the restricted area in excess of five rem to the whole-body or 30 rem to the thyroid.
- i. Explosive materials in excess of 25 milligrams TNT equivalent shall not be irradiated in the GTRR.
- j. Explosive materials in amounts up to 25 milligrams TNT equivalent may be irradiated and stored within the containment only if they are encapsulated in such a manner to assure compliance with Specification 3.4.f. in the event of detonation of the explosive material.
- k. Explosive materials in excess of 25 milligrams, but not to exceed 300 milligrams TNT equivalent, may be stored within the reactor containment building provided that the explosive is encapsulated in such a manner as to assure compliance with Specification 3.4.f.
- l. Experiments which could increase reactivity by flooding, shall not remain in or adjacent to the core unless measurements are made to assure that the shutdown margin requirements in Specification 3.1.a. would be satisfied after flooding.

## BASIS

Limiting the potential reactivity worth of secured removable experiments to 0.015 delta-k/k assures that any transient arising from the instantaneous removal of such experiments will not result in cladding failure and concomitant release of radioactive material which could lead to doses in excess of the limits set forth in 10 CFR Part 20.

A positive step change caused by the ejection or insertion of unsecured experiments worth less than 0.004 delta-k/k would not result in a transient behavior exceeding the Safety Limits established in Section 2.1 of these Specifications.

Manipulations of movable experiments within the limits established in Specification 3.4.c. will result in asymptotic periods longer than 20 seconds. Periods of this magnitude are easily accommodated by automatic response of the reactor safety system or by operator action. Prior to the manipulation of movable experiments the reactor power level will be reduced as required to accommodate the calculated prompt jump associated with the step insertion of the potential reactivity worth of the experiment.

Conformance with Specification 3.4.d. assures that common mode failures resulting in the insertion of the total reactivity worth of all unsecured experiments will not result in accident consequences more severe than those evaluated for the failure of a single secured experiment.

Specifications 3.4.e. and 3.4.f. provide assurance that experiments will not fail due to the pressure or temperature effects of operation under anticipated operating conditions. For the purposes of this specification the reactor shall be assumed to be operating at the Limiting Safety System Settings established in Section 2 of these Technical Specifications.

Specifications 3.4.g. and 3.4.h. will assure that the quantities of radioactive materials contained in experiments will be limited such that their failure will not result in restricted or unrestricted area doses which exceed the maximum annual exposures stated in 10 CFR 20.

Adherence to Specifications 3.4.i., 3.4.j., and 3.4.k. will prevent large quantities of explosives from being present within the reactor containment building and thereby preclude damage to the safety system and safety related equipment. Small quantities of explosive material may be safely used and stored as long as the encapsulation used has been shown to withstand the detonation of twice the quantity of explosive to be used.

Specification 3.4.1. assures that the shutdown margin required by Specification 3.1.a. will be met in the event of a positive reactivity insertion caused by flooding of an experiment. /

### 3.9 FAST SHUTDOWN SYSTEM EXPERIMENTS

#### APPLICABILITY

This specification applies to the conduct of the Fast Shutdown System Experiments to be performed in the GTRR.

#### OBJECTIVE

To define the limits and conditions for the performance of the Fast Shutdown System Experiments in the GTRR. These specifications are pertinent to the performance of the Fast Shutdown System Experiments only and do not supersede any other specifications except as noted in those specifications.

#### SPECIFICATIONS

- a. The potential reactivity worth of the experiment shall be limited to 1.75% delta-k/k.
- b. The rate of change of potential reactivity worth for the experiment shall not exceed 50% delta-k/k-sec.
- c. The gas shall not be removed from the experimental facility unless all shim-safety blades are fully inserted.
- d. The negative period scram time delay circuit shall be activated only when the Fast Shutdown System Experiments are in progress.
- e. The negative period scram time delay circuit shall be tested before each use with calibrated instruments whose calibrations are traceable to National Institute of Standards and Technology standards. The delay time shall be one second +/- 5%.
- f. During the conduct of these experiments, no other experiments will be conducted.

#### BASIS

Specification 3.9.a. and 3.9.b. restrict the conduct of the experiments to reactivity quantities and insertion rates consistent with the safety analyses for these experiments.

Specification 3.9.c. assures that the reactor will remain shutdown when the gas is released.

Specification 3.9.d. restricts the use of the negative period scram time delay circuit to only when the Fast Shutdown System Experiments are in progress, for which credible accident scenarios are considered in the safety analyses for these experiments.



Specification 3.9.e. limits the negative period scram delay time to one second, thereby limiting the amount of positive reactivity addition due to reactor cooling following the FSS experiment. This will limit the amount of power overshoot to a small percentage of the initial power in the event of a release of the gas during the one second delay time, as described in the FSS experiments safety analyses.