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

GEORGIA INSTITUTE OF TECHNOLOGY

DOCKET NO. 50-160

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 4
License No. R-97

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Georgia Institute of Technology (the licensee) dated September 13, 1978, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and 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;

   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. Publication of notice of this amendment is not required since it does not involve a significant hazards consideration nor amendment of a license of the type described in 10 CFR Section 2.106(a)(2).

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating 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. 4 , 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 the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 30, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 4

FACILITY OPERATING LICENSE NO. R-97

DOCKET NO. 50-160

Appendix A of the Technical Specifications is revised by removing the pages listed below and replacing with identically numbered pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change.

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Fig. II-1

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1.27 Surveillance Frequency - Unless otherwise stated in these specifications, periodic surveillance tests, checks, calibrations, and examinations shall be performed within the specified surveillance intervals. These intervals may be adjusted plus or minus 25%. In cases where the elapsed interval has exceeded 100% of the specified interval, the next surveillance interval shall commence at the end of the original specified interval.

1.28 Surveillance Interval - The surveillance interval is the calendar time between surveillance tests, checks, calibrations, and examinations to be performed upon an instrument or component when it is required to be operable. These tests may be waived when the instrument, component, or system is not required to be operable, but the instrument, component, or system shall be tested prior to being declared operable.

1.29 Mode 1 Operation - Mode 1 operation is deemed to be in effect whenever the reactor is operating at a thermal power level which is less than or equal to one megawatt.

1.30 Mode 2 Operation - Mode 2 operation is deemed to be in effect whenever the reactor is operating at a thermal power level which is greater than one megawatt but not to exceed five megawatts.

2.1.2 SAFETY LIMITS IN THE NATURAL CONVECTION MODE

APPLICABILITY

This specification applies to the interrelated variables associated with the core thermal and hydraulic performance in the natural convection mode of operation.

SPECIFICATION

The reactor thermal power shall not exceed two (2) kW.

BASIS

Experience with the GTRR has shown that no damage to the core and no boiling occurs without forced convection coolant flow at power levels up to two kW.

2.2 LIMITING SAFETY SYSTEM SETTINGS

2.2.1 LIMITING SAFETY SYSTEM SETTINGS IN THE FORCED CONVECTION MODE

APPLICABILITY

Applies to the settings of those instruments monitoring the safety limits.

OBJECTIVE

To assure automatic protective action is initiated before a safety limit is exceeded.

SPECIFICATION

The safety system trip settings for levels greater than one MW shall be as follows:

Thermal Power	5.5MW
Reactor Coolant Flow	1625 GPM
Reactor Outlet Temperature	139 F

The safety system trip settings for power levels less than or equal to one MW shall be as follows:

Thermal Power	1.25 MW
Reactor Coolant Flow	1000 GPM
Reactor Outlet Temperature	125 F

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BASIS

The trip settings are chosen so that the reactor is operated with no incipient boiling. An analysis was made showing that at 1800 gallons per minute total coolant flow, five MW thermal power an inlet reactor coolant temperature of 114 F and the application of all the engineering uncertainty factors, a maximum fuel surface temperature 8 F less than the local D_2O saturation temperature might occur.(1)

Operation during the period 1964 to 1973 has demonstrated that a 1000 GPM flow trip setting provides for safe operation of the reactor at power levels less than or equal to one MW. The 1.25 MW power trip setting has been chosen to ensure that no incipient boiling occurs with the reduced coolant flow.

REFERENCE

(1) Letter, R. S. Kirkland to USAEC, October 22, 1971, Response No. 10.

2.2.2 LIMITING SAFETY SYSTEM SETTINGS IN NATURAL CONVECTION MODE

APPLICABILITY

Applies to the values of safety system settings when operating in the natural convection mode.

OBJECTIVE

To assure the reactor is not operated at a power level sufficient to cause fuel damage.

SPECIFICATION

The reactor thermal power safety system setting shall not exceed 1.1 kW when operating in the natural convection mode.

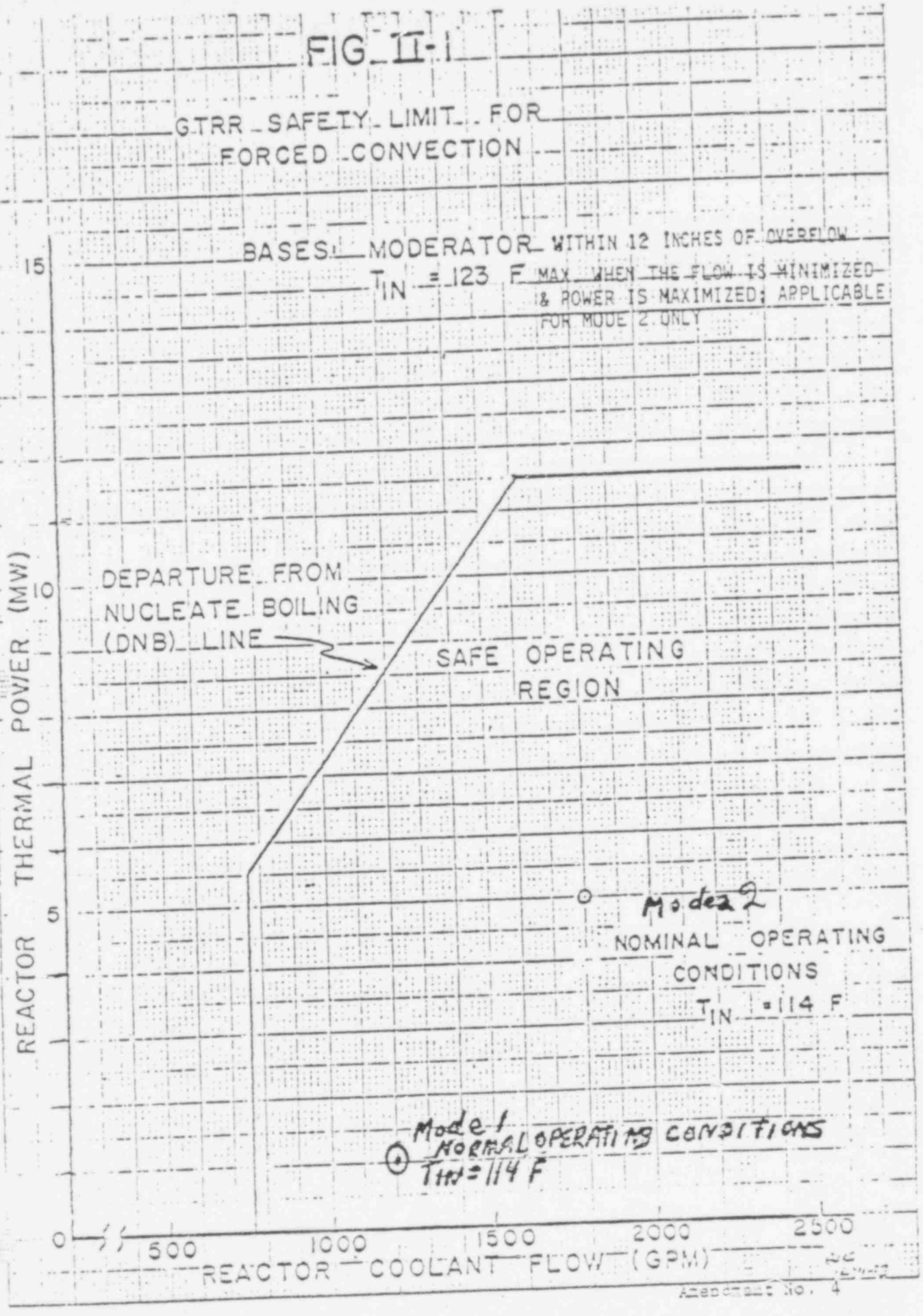
BASIS

In the natural convection mode of reactor operation the main coolant pumps are not operating. The reactor isolation valves may be closed so that only internal, natural convection is available for cooling. Experience with the GTRR has shown that the reactor can be operated at one kW indefinitely without exceeding a bulk reactor temperature of 123 F.

FIG II-1

GTRR SAFETY LIMIT FOR FORCED CONVECTION

BASES: MODERATOR WITHIN 12 INCHES OF OVERFLOW
T_{IN} = 123 F MAX WHEN THE FLOW IS MINIMIZED & POWER IS MAXIMIZED; APPLICABLE FOR MODE 2 ONLY



Amendment No. 4

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3.0 LIMITING CONDITIONS FOR OPERATION

3.1 REACTIVITY LIMITS

APPLICABILITY

This specification applies to the reactivity condition of the reactor and the reactivity worths of control blades and experiments.

OBJECTIVE

To assure that the reactor can be shut down at all times and that the safety limits will not be exceeded.

SPECIFICATION

a. The shutdown margin relative to the cold xenon free critical condition shall be at least 0.01 $\Delta k/k$ with the most reactive shim-safety blade and the regulating rod fully withdrawn.
b. The reactor shall be subcritical by more than 0.0275 $\Delta k/k$ during loading changes.
c. A shim-safety blade shall not be removed from the core if the shutdown margin is less than 0.01 $\Delta k/k$ with the most reactive remaining shim-safety rod fully withdrawn.
d. Prior to criticality each shim-safety blade which is withdrawn above full insertion shall be positioned so that a free fall of the blade towards its full inserted position will result in a reactor scram activated by a negative period scram.
e. The excess reactivity of the core shall be limited to 11.9% $\Delta k/k$.

BASIS

The shutdown margin required by Specification 3.1.a assures that the reactor can be shut down from any operating condition and will remain shutdown after cool down and xenon decay even if the control blade of the highest reactivity worth should be in the fully withdrawn position.

Specifications 3.1.b, 3.1.c, and 3.2.e provides assurance that the core will remain subcritical during loading changes and shim-safety blade maintenance or inspection.

The restriction on shim blade position for criticality assures that, in the event of a shim blade failure which results in the shim blade passing through its normal insertion limit to a position which results in a positive reactivity insertion, a negative period will be generated by the first 10° insertion that will cause the three remaining shim-safety blades to scram.

TABLE 3.1

REQUIRED SAFETY CHANNELS

Channel	Mode 1 Setpoint	Mode 2 Setpoint	Minimum No. Required	Function
Start up (cps)	2	2	1(a)	Minimum contrate permissive rod withdrawal interlock
Period trip (sec ±)	≤10	≤10	2(c)	Scram
Power trip (MW)	1.25	5.5	2(c)	Scram
Low D_2O flow (gpm)	1000	1625	2(b)(c)	Scram
High D_2O Temperature (°F)	125	139	2(c)	Scram
Low D_2O Level (inches below overflow)	≤12"	≤12		Isolate reactor vessel Scram Initiate ECCS
No D_2O Overflow	-	-	1	Scram
Manual scram	-		1	Scram
Reflector drain	-	-	1	Backup scram
Containment doors open	-	-	1 per airlock	Scram
Reactor isolation valves closed	-	-	2(c) per valve	Scram

(a) Required during startup and for operation with less than 1 decade overlap between the startup channel and the pico-ammeter channel.

(b) Not required for natural convection operation

(c) One of the twelve required safety channels may be bypassed for a period not to exceed 8 hours for test, repair, or calibration

TABLE 3.2

SAFETY RELATED INSTRUMENTATION REQUIRED FOR OPERATION

Instrumentation	Setpoint	Minimum No. Required Mode 1	Mode 2	Function
Pico ammeter channel	-	1	1	Linear power level measurement and input for the automatic control mode
High building radiation	≤10 mr/hr or 2x normal 5Mw Background	5 (a)	5 (a)	Alarm and prevents startup
Gas monitor		1 (b)	1 (b)	Init... containment isolation
Filter assembly monitor		1 (b)	1 (b)	Initiates containment isolation
Kanne chamber		1 (b)	1 (b)	Initiates containment isolation
D_2O Leak detection system	-	1 (b)	1 (b)	Initiates containment isolation
Particulate monitor		1 (b)	1 (b)	Initiates containment isolation
Emergency cooling tank level	<280 gal.	-	2 (b)	Alarm and prevents startup
No D_2O Overflow	No overflow	1	1	" " " "

(a) Area monitors shall be located on the experimental level, the reactor top, in the reactor basement, and in an area that will be allow changes in reactor coolant radioactivity to be detected.

(b) Either channel may be bypassed for a period not to exceed 8 hours for test, repair or calibration.

4.0 SURVEILLANCE REQUIREMENTS

4.1 REACTIVITY LIMITS

APPLICABILITY

This specification applies to the surveillance requirements for reactivity limits.

OBJECTIVE

To assure that the reactivity limits of Specification 3.1 are not exceeded.

SPECIFICATIONS

a. Shim-safety blade reactivity worths and the shutdown margin measured annually and whenever a core configuration is loaded for which shim-safety blade worths have not been measured. Prior to shim-safety blade calibration, the reactor shall be confirmed to be subcritical in the cold xenon free conditions with any single blade fully withdrawn and all other shim-safety blades fully inserted.

b. The reactivity worth of experiments inserted in the GTRR shall be measured during the first startup subsequent to the experiments insertion, and shall be verified if core configuration changes cause increases in experiment reactivity worth which may cause the experiment worth to exceed the values specified in Specification 3.4.

BASIS

Specification 4.1.a will assure that shim-safety rod reactivity worths are not degraded or changed by core manipulations which cause these rods to operate in regions where their effectiveness is reduced.

The specified surveillance relating to the reactivity worth of experiments will assure that the reactor is not operated for extended periods before determining the reactivity worth of experiments. This specification will also provide assurance that experiment reactivity worths do not increase beyond the established limits due to core configuration changes.