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

THE UNIVERSITY OF MICHIGAN

DOCKET NO. 50-2

FORD NUCLEAR REACTOR

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 26
License No. R-28

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

   A. The application for amendment by The University of Michigan (the licensee) dated June 27, 1978, as supplemented September 14 and 28, 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-28 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 26, 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: October 13, 1978

ATTACHMENT TO LICENSE AMENDMENT NO. 26

FACILITY OPERATING LICENSE NO. R-28

DOCKET NO. 50-2

Replace existing pages 10, 17, 37 and 38 of the Technical Specifications contained in Appendix A with the attached revised pages 10, 17, 37 and 38. The changed areas on the revised pages are shown by a marginal line.

height of water above the top of the core (H), and core exit temperature (T_e).

OBJECTIVE

To assure that automatic protective action is initiated to prevent a safety limit being exceeded.

SPECIFICATION

a. The limiting safety system settings for reactor thermal power (P), primary coolant flow through the core (W), height of water above the top of the core (H), and reactor coolant exit temperature (T_e) shall be as follows:

Variable	LSSS
P (Max.)	2.4 Mw or 1.2 Mw (See Spec. 5.2)
W (Min.)	900 gpm
H (Min.)	19 Feet
T_e (Max.)	129°F

BASES

The limiting safety system settings specified above have been chosen to assure that automatic protective action will correct the most severe abnormal situation anticipated before a safety limit is exceeded. The safety margin that is provided between the LSSS and the SL also allows for the most adverse combination of instrument uncertainties associated with measuring the above observable parameters. These instrument uncertainties include a power level variable of five percent, a pool water level variation of six inches, a flow variation of ten percent, and a core inlet temperature variation of two degrees Fahrenheit. These values were chosen to be conservative.

Figure 2.2 shows the basis for selection of these LSSS values. With a LSSS for reactor power of 2.4 Mw and a possible power measurement error of 5 percent, the true value of thermal power could be 2.52 Mw. With the maximum exit temperature Auto-Rundown function setpoint of 129°F, the true value of the maximum temperature could be 131°F. Figure 2.2 shows the combination of true value of inlet temperature and core flow rate at which the maximum fuel plate temperature of the "hot channel" reaches the boiling point temperature of the coolant. It also shows the true value of coolant inlet temperature

TABLE 3.1

REQUIRED SAFETY CHANNELS

Channel	Setpoint*	Minimum Number Required	Function
Log Count Rate	2 cps	1	Rod Withdrawal Interlock
Log N-Period		1	Wide range power level and input for period scram
Period Safety	5 sec	1	Scram
Level Safety	120% (2.4 Mw or 1.2 Mw)**	2	Scram
High Power/ No Water Flow	(a) 900 gpm (b) hold-up tank isolation valve not fully open (c) hold-up tank static pressure 1 psig below full power value	1	Scram ≥ 100 Kw
High Power/ Header Down		1	Scram ≥ 100 Kw
Header Up/ No Water Flow	900 gpm	1	Scram
Building Exhaust Radiation Level	1 mr/hr	1	Scram
Building Alarm Manual Switch		1	Scram
Manual Scram Switch		1	Scram
Magnet Power Keyswitch		1	Scram
Reactor Coolant Exit Temp.	129°F	1	Auto Rundown
Pool Level	1 foot below pool overflow	1	Auto Rundown
Bridge Not Clamped	When clamps released	1	Scram

*Values listed are limiting setpoints. For operational convenience, setpoints may be changed to more conservative values.

**See Specification 5.2 for setpoint depending on reactor fuel.

5.2 REACTOR FUEL

The fuel assemblies shall be of the MTR type, consisting of plates containing uranium-aluminium alloy, uranium aluminide (UAl_x), or uranium oxide (U_3O_8) fuel (uranium enriched in the isotope U_{235}), clad with aluminium. Partially loaded fuel assemblies in which some of the plates do not contain uranium may be used.

The authorized fuel assembly designs are:

No. Fuel Plates	Grams of Uranium-235
18	140 ± 2%
9	70 ± 2%
10	169 ± 2%

The 9-plate fuel assembly shall be used in all loadings for the control rods fuel assemblies. The reactor power level and scram setpoints for authorized core loadings shall be:

Fuel Loading	Power Level	LSSS
Normal 18 plate core	2 Mw	2.4 Mw
Fringe* 18 or 10-plate with center of 18-plate core	2 Mw	2.4 Mw
Intermixed (nonfringe*) 18 and 10 fuel plate core	1 Mw	1.2 Mw

* Fringe fuel assemblies are those in east, west and south locations L5, L6, L7, L8, L9, L10, L20, L30, L40, L50, L60, L70, L75, L76, L77, L78, L79 and L80.

5.3 REACTOR BUILDING

The reactor building is a windowless, four story, reinforced concrete building with 12 inch walls structurally integral with the footings and foundation mats. The building is approximately 69 feet wide x 68 feet long x 70 feet high with approximately 44 feet exposed above grade. The building has the following general features:

a. The reactor is housed in a closed room designed to restrict leakage.

b. The reactor room is equipped with a ventilation system designed to exhaust air or other gases present in the building atmosphere into the inlet air region for the building cooling tower which exhausts a minimum of 45 feet above ground level.

c. The ventilation system provides ventilation for certain storage and experimental facilities and exhaust these a minimum of 54 feet above ground level.

d. The openings into the reactor building are the equipment access door, the personnel doors, the equipment access hatch, the air intake and exhaust ducts, the room 3103 fume hood exhaust duct, the beam port ventilation duct, the north wall door, the door between the hot cave operating face and the beam hole floor, and the pneumatic system for sample transfer between the FNR and several laboratories in the Phoenix Memorial Laboratory.

5.4 FUEL STORAGE

a. Irradiated fuel elements and fueled devices shall be stored in an array which will permit sufficient natural convection cooling by water or air such that the fuel element or fueled device temperature will not exceed 100°C.

b. All reactor fuel elements and fueled devices shall be stored in a geometric array which assures subcriticality. The array spacings will be based on the experimental results reported in ORNL-CF-58-9-40 for storage array experiments performed with ORR and BSF fuel elements.