January 12, 2006

Dr. William G. Vernetson
Director of Nuclear Facilities
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Department of Nuclear and
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202 Nuclear Sciences Center
P.O. Box 118300
Gainesville, FL 32611-8300

SUBJECT: UNIVERSITY OF FLORIDA - ISSUANCE OF AMENDMENT RE: FUEL BOX THERMOCOUPLES (TAC NO. MC8801)

Dear Dr. Vernetson:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 25 to Amended Facility Operating License No. R-56 for the University of Florida Training Reactor. The amendment consists of changes to the technical specifications (TSs) in response to your application dated October 28, 2005.

The amendment reduces the number of thermocouples required to monitor primary coolant temperature at the fuel box inlets and outlets and clarifies where the primary coolant temperature measurement is to be taken.

A copy of the safety evaluation supporting Amendment No. 25 is also enclosed.

Sincerely,

/RA/

Carl F. Lyon, Project Manager
Research and Test Reactors Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-83

Enclosures: 1. Amendment No. 25
2. Safety Evaluation

cc w/enclosures: See next page

cc:

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UNIVERSITY OF FLORIDA

DOCKET NO. 50-83

AMENDMENT TO AMENDED FACILITY OPERATING LICENSE

Amendment No. 25
License No. R-56

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

    A. The application for an amendment to Amended Facility Operating License No. R-56 filed by the University of Florida (the licensee) on October 28, 2005, conforms to the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the regulations of the Commission as stated in Chapter I of Title 10 of the *Code of Federal Regulations* (10 CFR);

    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 that (i) the activities authorized by this amendment can be conducted without endangering the health and safety of the public and (ii) such activities will be conducted in compliance with the regulations of the Commission;

    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. This amendment is issued in accordance with the regulations of the Commission as stated in 10 CFR Part 51, and all applicable requirements have been satisfied; and

    F. Prior notice of this amendment was not required by 10 CFR 2.105 and publication of a notice for this amendment is not required by 10 CFR 2.106.

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 Amended Facility Operating License No. R-56 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 25, 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 and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Brian E. Thomas, Branch Chief
Research and Test Reactors Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Enclosure: Changes to the Technical
Specifications

Date of Issuance: January 12, 2006

ENCLOSURE TO LICENSE AMENDMENT NO. 25

AMENDED FACILITY OPERATING LICENSE NO. R-56

DOCKET NO. 50-83

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

Remove	Insert
5	5
26	26

Specifications: The limiting safety system settings shall be

(1) Power level at any flow rate shall not exceed 125 kW.

(2) The primary coolant flow rate shall be greater than 30 gpm at all power levels greater than 1 watt.

(3) The average primary coolant outlet temperature shall not exceed 155° F when measured at any monitored fuel box outlet.

(4) The reactor period shall not be faster than 3 sec.

(5) The high voltage applied to Safety Channels 1 and 2 neutron chambers shall be 90% or more of the established normal value.

(6) The primary coolant pump shall be energized during reactor operations.

(7) The primary coolant flow rate shall be monitored at the return line.

(8) The primary coolant core level shall be at least 2 in. above the fuel.

(9) The secondary coolant flow shall satisfy the following conditions when the reactor is being operated at power levels equal to or larger than 1 kW:

(a) Power shall be provided to the well pump and the well water flow rate shall be larger than 60 gpm when using the well system for secondary cooling.

or

(b) The water flow rate shall be larger than 8 gpm when using the city water system for secondary cooling.

(10) The reactor shall be shut down when the main alternating current (ac) power is not operating.

(11) The reactor vent system shall be operating during reactor operations.

(12) The water level in the shield tank shall not be reduced 6 in. below the established normal level.

Bases: The University of Florida Training Reactor (UFTR) limiting safety system settings (LSSS) are established from operating experience and safety considerations. The LSSS 2.2.3 (1) through (10) are established for the protection of the fuel, the fuel cladding, and the reactor core integrity. The primary and secondary bulk coolant temperatures, as well as the outlet temperatures for the six fuel boxes, are monitored and recorded in the control room. LSSS 2.2.3 (11) are established for the protection of reactor personnel in relation to accumulation of argon-41 in the reactor cell and for the control of radioactive gaseous effluents from the cell. LSSS 2.2.3 (12) are established to protect reactor personnel from potential external radiation hazards caused by loss of biological shielding.

multirange pico-ammeter. The pico-ammeter sends a signal to one channel of the two-pen recorder to display power level from source level to full power. It also sends a signal to the automatic flux controller which, in comparison with a signal from a percent of power setting control acts to establish and/or hold power level at a desired value. The rate of power increase is controlled by the action of a limiter in the linear channel/automatic control system which maintains the reactor period at or slower than 30 sec.

5.6 Cooling Systems

5.6.1 Primary Cooling System

The primary coolant is demineralized light water, which is normally circulated in a closed loop. The flow is from the 200-gal storage (dump) tank to the primary coolant pump; water is then pumped through the primary side of the heat exchanger and to the bottom of the fuel boxes, upward past the fuel plates to overflow pipes located about 6 in. above the fuel, and into a header for return to the storage tank. A purification loop is used to maintain primary water quality. The purification loop pump circulates about 1 gpm of primary water, drawn from the discharge side of the heat exchanger, through mixed-bed ion-exchange resins and a ceramic filter. The purification loop pump automatically shuts off when the primary coolant pump is operating, since flow through the purification system is maintained. Primary coolant may be dumped from the reactor fuel boxes by opening an electrically operated solenoid dump valve, which routes the water to the dump tank. A pressure surge of about 2 lb above normal in the system also will result in a water dump by breaking a graphite rupture disc in the dump line. This drains the water to the primary equipment pit floor actuating an alarm in the control room. The primary coolant system is instrumented as follows:

(1) thermocouples at ≥ 4 fuel box outlets and the main inlet and outlet (six total), alarming and recording in the control room

(2) a flow sensing device in main inlet line, alarming and displayed in the control room

(3) a flow sensing device (no flow condition) in the outlet line, alarming in the control room

(4) resistivity probes monitoring the inlet and outlet reactor coolant flow, alarming and displayed in the control room

(5) an equipment pit water level monitor, alarming in the control room

The reactor power is calibrated annually by the use of the coolant flow and temperature measuring channels.

5.6.2 Secondary Cooling System

Two secondary cooling systems are normally operable in the UFTR: a well secondary cooling system and a city water secondary cooling system. The well secondary cooling system is the main system used for removal of reactor

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 25 TO

AMENDED FACILITY OPERATING LICENSE NO. R-56

THE UNIVERSITY OF FLORIDA

DOCKET NO. 50-83

1.0 INTRODUCTION

By letter dated October 28, 2005, the University of Florida (UF or the licensee) submitted a request for amendment to Amended Facility Operating License No. R-56 for the UF Training Reactor. The request would change the Technical Specifications (TSs) to allow operation of the UF Training Reactor (UFTR) with up to two thermocouples failed at the outlet lines of two fuel boxes and clarify where the primary coolant temperature measurement is to be taken.

TS 2.2, "Limiting Safety System Settings," Specification (3) states that:

> The average primary coolant outlet temperature shall not exceed 155E F when measured at any fuel box outlet.

Specifically, the licensee proposes to change Specification (3) to read:

> The average primary coolant outlet temperature shall not exceed 155E F when measured at any monitored fuel box outlet.

In addition, TS 5.6.1, "Primary Cooling System," states, in part, that:

> The primary coolant system is instrumented as follows:
> (1) thermocouples at each fuel box and the main inlet and outlet (eight total), alarming and recording in the control room

Specifically, the licensee proposes to change the statement to read:

> The primary coolant system is instrumented as follows:
> (1) thermocouples at $ 4 fuel box outlets and the main inlet and outlet (six total), alarming and recording in the control room

2.0 BACKGROUND

The primary coolant system at the UFTR is described in the Final Safety Analysis Report (FSAR) for the UFTR, section 5.2, "Primary Coolant System." The system is a closed loop cooling system. Water from a storage tank is pumped by the primary coolant pump through the primary side of a heat exchanger to the bottom of six fuel boxes. The water flows upward into the boxes past the fuel plates to overflow pipes located above the fuel and then into a header for return to the storage tank.

Eight thermocouples provide primary coolant temperature information. A thermocouple (No. 7) measures the temperature of the primary coolant from the heat exchanger that is supplied to the fuel boxes. Each of the fuel box outlet lines contains a thermocouple (Nos. 1-6) which sends information to a data acquisition system in the control room. The coolant from the six fuel boxes flows together into a single return line which discharges to the primary coolant storage tank. Located in this return line is a thermocouple (No. 8) which monitors the combined coolant bulk temperature from the fuel boxes. The information from all thermocouples (Nos. 1-8) is supplied to the reactor protection system for alarm and trip functions.

3.0 EVALUATION

The licensee proposes to revise the TSs to allow operation of the UFTR with up to two thermocouples failed at the outlet lines of two fuel boxes. The TSs specify the minimum number of operable temperature indicators and the surveillance requirement for primary coolant temperature. TS 3.2.3, "Reactor Control and Safety Systems Measuring Channels," requires a minimum number of 6 operable primary coolant temperature indicators for reactor operation. TS Table 3.2, "Safety system operability tests," requires a daily check of high average primary coolant outlet temperature. In addition, TS 2.1, "Safety Limits," Specification (2) requires that "[t]he primary coolant outlet temperature from any fuel box shall not exceed 200E F." The licensee proposes no changes to TS 2.1, TS 3.2.3, or TS Table 3.2.

Because of the high radiation fields to which the core region thermocouples are subjected, one has failed on several occasions and one is currently failing. Since the UFTR is scheduled for conversion from high enriched uranium to low enriched uranium, the proposed changes will permit any repair of up to two failed fuel box thermocouples to be delayed until the fuel conversion is made. The licensee states that the proposed changes will reduce the necessity for periodic core area entries and the associated personnel exposure.

The licensee proposes to revise TS 5.6.1 to require thermocouples at $ 4 fuel box outlets and the main inlet and outlet (six total), alarming and recording in the control room. This is consistent with the requirement of TS 3.2.3 for a minimum number of 6 operable primary coolant temperature indicators. The proposed change is also consistent with the requirement of TS Table 3.2 for a daily check of high average primary coolant outlet temperature. The average primary coolant outlet temperature is properly made at thermocouple No. 8, the main outlet. The licensee does not propose to change the requirement for the main inlet and outlet thermocouples. The licensee states that any transient in an unmonitored box would be indicated in adjacent temperature transients to easily assure the safety limit is not reached. In addition, coolant flow, which would also indicate any developing problem in the fuel boxes, is a monitored TS parameter. Therefore, the proposed changes will not result in difficulty in complying with TS 2.1. Since the proposed changes to TS 5.6.1 are consistent with the existing requirements of TS 3.2.3, TS 2.1, and TS Table 3.2, the changes are acceptable to the staff.

The licensee proposes to change TS 2.2, Specification (3) to require that the average primary coolant outlet temperature shall not exceed 155E F when measured at any *monitored* fuel box outlet. The proposed change simply clarifies the requirement of where the temperature measurement is taken and is consistent with the proposed change to TS 5.6.1 and the existing requirements of TS 3.2.3, TS 2.1, and TS Table 3.2. Therefore, the proposed change to TS 2.2 is acceptable to the staff.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment changes the requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes the inspection and surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The NRC staff has concluded, based on the considerations discussed above, that the proposed amendment does not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) result in a significant reduction in a margin of safety. Therefore, the amendment does not involve a significant hazards consideration.

The NRC staff has also concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: C. Lyon

Date: January 12, 2006