UNIVERSITY OF FLORIDA

Nuclear Facilities
Department of Nuclear and Radiological Engineering

202 Nuclear Sciences Center
P.O. Box 118300
Gainesville, Florida 32611-8300
Tel: (352) 392-1408
Fax: (352) 392-3380
Email: vernet@ufl.edu

October 28, 2005

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Amendment 25
UFTR Technical Specifications

UNIVERSITY OF FLORIDA TRAINING REACTOR
FACILITY LICENSE: R-56, DOCKET NO. 50-83
REQUEST FOR CHANGE IN TECHNICAL SPECIFICATIONS

A proposed amendment to the UFTR Technical Specifications (R-56 License) affecting pages 5 and 26 of the approved Tech Specs is attached. The proposed change will constitute Amendment 25 to the UFTR R-56 License as noted on the text pages. The changes are marked with the usual vertical line(s) in the right-hand margin indicating all amendments to date on these two Tech Spec pages.

This change is requested to allow UFTR operation with up to two thermocouples (temperature sensors) failed at the outlet lines of two fuel boxes. The existing system is instrumented with thermocouples in the outlet lines of all six fuel box outlet lines (Points 1 through 6) as well as the bulk core coolant temperature on the inlet line (Point 7) and the outlet line (Point 8) in the equipment pit where the primary coolant pump is located. Thermocouples are also located on the secondary coolant system (Points 9 and 10). All of these temperature measuring channels currently provide trips at 155° F and a warning alarm at 150° F.

UFTR Tech Specs as approved already indicate in Section 3.2.3, Reactor Control and Safety Systems Measuring Channels, that the minimum number of operable temperature indicators on the primary coolant side is 6 and on the secondary side is 1. Similarly, in Table 3.2, Safety System Operability Tests, the only requirement is that the scram function be tested with the daily checkout (prior to operation) for "high average primary coolant outlet temperature." This measurement would properly be made on Point 7 as the core outlet average temperature. Nevertheless, all points (1 through 10) are currently checked for the trip on the daily check so no change is needed for these sections.

A020

However, the Limiting Safety System Settings specifications delineated in Tech Spec Section 2.2 on page 5 indicates:

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

In addition, the description in Tech Spec Section 5.6.1, Primary Cooling System, on page 26 indicates the primary cooling 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.

Based on these descriptions, two changes to the Tech Specs are requested as follows:

On page 5, in Section 2.2, specification (3) becomes:

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

Similarly, on page 26, in Section 5.6.1, item (1) becomes:

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

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 (causing a trip after less than 30 minutes at full power). With the change noted, the necessity for periodic core area entries and large dose commitments could be reduced. With the core inlet and outlet plus at least 4 individual outlets monitored, there is more than enough temperature monitoring input to assure that temperature transients are adequately monitored.

Moreover, Tech Spec 2.1, Safety Limits, Specification (3), "The primary coolant outlet temperature from any fuel box shall not exceed 200°F," is easily assured to be satisfied. Any transient in an unmonitored box would be indicated in adjacent temperature transients to easily assure the safety limit is not reached. The coolant flow is also monitored.

By making the requested change to allow operation with up to 2 failed thermocouples in the core area, maintenance to replace the thermocouples will be delayed until a core entry will be needed for a fuel change from HEU to LEU fuel. There will also be a large benefit by reducing dose commitment and reducing the number of times the core region needs to be entered. Therefore, this change is well considered to reduce the time when the incore fuel is less well protected, and to minimize dose commitment for ALARA considerations—all while optimizing facility utilization and availability.

As a final note, a similar modified Argonaut reactor referenced in the existing UFTR Safety Analysis Report (reference 4 on page R-1 and description on page 1-16) shows thermocouples monitoring only at the core inlet and outlet points.

Since the UFTR facility is in line for Department of Energy supported conversion from high enriched uranium (HEU) to low enriched uranium (LEU) fuel, we have gone to a 10-year inspection interval for the incore fuel and mechanical integrity check on the reactor control and safety system. In effect, this current interval will permit the thermocouple repair to be delayed until the fuel conversion is made. At that point, the existing HEU fuel will be removed and fresh LEU fuel added. With removal of all fuel for conversion, maintenance will be performed on all core temperature sensing channels to assure they will last until the next core entry.

This change as requested is considered to have minor safety significance but large significance for core protection and for ALARA considerations. This change has been reviewed by UFTR management and by the Reactor Safety Review Subcommittee both of whom concur on this evaluation.

This entire submittal consists of one signed original letter of transmittal with the two pages (5 and 26) containing the proposed changes comprising the requested Amendment 25 to the UFTR Technical Specifications plus thirteen additional photocopied sets.

We appreciate your consideration of this amendment. Please let us know if you need further information.

Sincerely,

William G. Vernetson
Director of Nuclear Facilities

WGV/dms
Enclosures (13 sets)

cc: Al Adams, NRC Project Manager
Craig Bassett, NRC Inspector
Reactor Safety Review Subcommittee
UFTR Reactor Manager

Sworn and subscribed this 28 day of October 2005.

Diana Dampier
Notary Public

Diana L. Dampier
Commission ... 2982
Expires July 20, 2009
Bonded Troy Fain Insurance Inc ...5-7019

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