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

Amendment 26
(previously Amendment 25)
UFTR Technical Specifications
Correcting Addendum

University of Florida Training Reactor, Facility License: R-56, Docket No. 50-83
Request for Change in Technical Specifications Approving HEU to LEU Conversion
With Responses to Requests for Additional Information

A proposed amendment to the UFTR Technical Specifications (R-56 License) for conversion from high enriched uranium (HEU) fuel to low enriched uranium (LEU) fuel affecting pages 4, 5, 6, 7, 8, 9, 13, 15, 16, 21, 23, 24, 26 and 38 of the approved Tech Specs was submitted by letter dated June 19, 2006. These proposed changes, updated with this submittal, will constitute Amendment 26 to the UFTR R-56 License as noted on the text pages.

First, submitted with this letter are replacement Tech Spec pages that correct minor typographical errors in the Technical Specification pages of the June 19, 2006 submittal that are not intended to be changed per discussions with NRC Senior Project Manager Al Adams on July 19, 2006. Tech Spec pages affected and attached to replace those in the June 19 package are pages 4, 6, 8, 9, 15, 16 and 23.

Second, on page 6, in Section 3.2.1, Reactor Control System, there is a further correction in paragraph (4) to return the control-blade-drop time limit to "not exceed 1 sec" versus the previously proposed 1.5 sec since this change is not required by the HEU to LEU conversion and so is not justified.

Finally, on page 23, in Section 5.3, Reactor Fuel, in item (1) the possession limit for contained uranium-235 is changed from the previously proposed 9.00 kg to 5.20 kg of contained uranium-235 as a clarification based on the conversion analysis to reflect the possession limits after conversion.

These corrected pages as submitted are considered to have minor safety significance. These changed pages simply replace the corresponding pages in the previous submittal.

A020

Extra Copies forwarded to Al Adams

This entire submittal consists of one signed original letter of transmittal plus Attachment I (Replacement Tech Spec Changed Pages) containing the pages comprising the change to the requested Amendment 26. Thirteen additional photocopied sets are enclosed.

We appreciate your consideration of this submittal. Please advise if further information is needed.

Sincerely,

William G. Vernetson
Director of Nuclear Facilities

WGV/dms

Attachment I plus
Enclosures (13 sets of letter with Attachment I)

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

Sworn and subscribed this 20 day of July 2006.

Diana L. Dampier
Notary Public

NOTARY PUBLIC STATE OF FLORIDA
Diana L. Dampier
Commission # DD452982
Expires July 20, 2009
Bonded Troy Fain - Insurance, Inc. 800-385-7019

ATTACHMENT I

REPLACEMENT TECH SPEC CHANGED PAGES
FOR ADDENDUM TO
JUNE 19, 2006 SUBMITTAL

2.0 SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS

2.1 Safety Limits

Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity. The principal physical barrier shall be the fuel cladding.

Applicability: These specifications apply to the variables that affect thermal, hydraulic, and materials performance of the core.

Objective: To ensure fuel cladding integrity.

Specifications:

(1) The fuel and cladding temperatures shall not exceed 986° F.

(2) The specific resistivity of the primary coolant water shall not be less than 0.4 megohm-cm for periods of reactor operations over 4 hours.

Bases: Operating experiences and detailed calculations of Argonaut reactors and for the HEU to LEU conversion have demonstrated that Specification (1) suffices to maintain core flow conditions to assure no onset of nucleate boiling within the core and the fuel and fuel cladding below temperatures at which fuel degradation would occur. Specification (2) suffices to maintain adequate water quality conditions to prevent deterioration of the fuel cladding and still allow for expected transient changes in the water resistivity.

2.2 Limiting Safety System Settings

Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions.

Applicability: These specifications are applicable to the reactor safety system set points.

Objective: To ensure that automatic protective action is initiated before exceeding a safety limit or before creating a radioactive hazard that is not considered under safety limits.

3.0 LIMITING CONDITIONS FOR OPERATION

Limiting conditions for operation are the lowest functional capabilities or performance levels required of equipment for safe operation of the facility.

3.1 Reactivity Limitations

(1) Shutdown Margin: The minimum shutdown margin, with the most reactive control blade fully withdrawn, shall not be less than 2% Δk/k.

(2) Excess Reactivity: The core excess reactivity at cold critical, without xenon poisoning, shall not exceed 1.4% Δk/k.

(3) Coefficients of Reactivity: The primary coolant void and temperature coefficients of reactivity shall be negative.

(4) Maximum Single Blade Reactivity Insertion Rate: The reactivity insertion rate for a single control blade shall not exceed 0.06% Δk/k sec, when determined as an average over any 10 sec of blade travel time from the characteristic experimental integral blade reactivity worth curve.

(5) Experimental Limitations: The reactivity limitations associated with experiments are specified in Section 3.5 of this report.

(6) Bases: These specifications are provided to limit the amount of excess reactivity to within limits known to be within the self-protection capabilities of the fuel, to ensure that a reactor shutdown can be established with the most reactive blade out of the core, to ensure a negative overall coefficient of reactivity, and to limit the reactivity insertion rate to levels commensurable with efficient and safe reactor operation.

3.2 Reactor Control and Safety Systems

3.2.1 Reactor Control System

(1) Four cadmium-tipped, semaphore-type blades shall be used for reactor control. The control blades shall be protected by shrouds to ensure freedom of motion.

(2) Only one control blade can be raised by the manual reactor controls at any one time. The safety blades shall not be used to raise reactor power simultaneously with the regulating blade when the reactor control system is in the automatic mode of operation.

(3) The reactor shall not be started unless the reactor control system is operable.

(4) The control-blade-drop time shall not exceed 1 sec from initiation of blade drop to full insertion (rod-drop time), as determined according to surveillance requirements.

Table 3.1 Specifications for reactor safety system trips

Specification	Type of safety system trip
Automatic Trips	
Period less than 3 sec	Full
Power at 119% of full power	Full
Loss of chamber high voltage (≥10%)	Full
Loss of electrical power to control console	Full
Primary cooling system	Rod-drop
Loss of pump power Low-water level in core (< 42.5") No outlet flow Low inlet water flow (< 36 gpm)	
Secondary cooling system (at power levels above 1 kW)	Rod-drop
Loss of flow (well water < 60 gpm, city water < 8 gpm) Loss of pump power	
High primary coolant average inlet temperature (≥109° F)	Rod-drop
High primary coolant average outlet temperature (≥155° F)	Rod-drop
Shield tank	Rod-drop
Low water level (6" below established normal level)	
Ventilation system	Rod-drop
Loss of power to dilution fan Loss of power to core vent system	
Manual Trips	
Manual scram bar	Rod-drop
Console key-switch OFF (two blades off bottom)	Full

Table 3.2 Safety system operability tests

Component or scram function	Frequency
Log-N period channel Power level safety channels	Before each reactor startup following a shutdown in excess of 6 hr, and after repair or deenergization caused by a power outage
10% reduction of safety channels high voltage	4/year (4-month maximum interval)
Loss of electrical power to console	4/year (4-month maximum interval)
Loss of primary coolant pump power	4/year (4-month maximum interval)
Loss of primary coolant level	4/year (4-month maximum interval)
Loss of primary coolant flow	4/year (4-month maximum interval)
High average primary coolant inlet temperature	With daily checkout
High average primary coolant outlet temperature	With daily checkout
Loss of secondary coolant flow (at power levels above 1 kW)	With daily checkout
Loss of secondary coolant well pump power	4/year (4-month maximum interval)
Loss of shield tank water level	4/year (4-month maximum interval)
Loss of power to vent system and dilution fan	4/year (4-month maximum interval)
Manual scram bar	With daily checkout

3.2.4 Bases

The reactor control system provides the operator with reactivity control devices to control the reactor within the specified range of reactivity insertion rate and power level. The operator has available digital blade position indicators for the three safety blades and the regulating blade. The three safety blades can only be manipulated by the UP-DOWN blade switches (manual); the regulating blade can be manually controlled or placed under automatic control, which uses the linear channel as the measuring channel, and a percent of power setting control. The two independent reactor safety channels provide redundant protection and information on reactor power in the range 1%–150% of full power. The linear power channel is the most accurate neutron instrumentation channel, and provides a signal for reactor control in automatic mode. The percent of power information is displayed by the linear channel two-pen recorder. It does not provide a protective function. The log wide range drawer provides a series of information, inhibit, and protection function from extended source range to full power. The safety channel 1 signal and the period protection signal are derived from the wide range drawer. The wide

(1) The evacuation alarm is actuated automatically when two area radiation monitors alarm high ($\geq$25 mrems/hr) in coincidence.

(2) The evacuation alarm is actuated manually when an air particulate monitor is in a valid alarm condition.

(3) The evacuation alarm is actuated manually when a reactor operator detects a potentially hazardous radiological condition and preventive actions are required to protect the health and safety of operating personnel and the general public.

Bases: To provide early and orderly evacuation of the reactor cell and the reactor building and to minimize radioactive hazards to the operating personnel and reactor building occupants.

3.7 Fuel and Fuel Handling

Applicability: These specifications apply to the arrangement of fuel elements in core and in storage, as well as the handling of fuel elements.

Objectives: The objectives are to establish the maximum core loading for reactivity control purposes, to establish the fuel storage conditions, and to establish fuel performance and fuel-handling specifications with regard to radiological safety considerations.

Specifications:

(1) The maximum fuel loading shall consist of 24 full fuel elements consisting of 14 plates each containing enriched uranium and clad with high purity aluminum.

(2) Fuel element loading and distribution in the core shall comply with the fuel-handling procedures.

(3) Fuel elements exhibiting release of fission products because of cladding rupture shall, upon positive identification, be removed from the core. Fission product contamination of the primary water shall be treated as evidence of fuel element failure.

(4) The reactor shall not be operated if there is evidence of fuel element failure.

(5) All fuel shall be moved and handled in accordance with approved procedures.

(6) Fuel elements or fueled devices shall be stored and handled out of core in a geometry such that the k_{eff} is less than 0.8 under optimum conditions of moderation and reflection.

(7) Irradiated fuel elements or fueled devices shall be stored so that temperatures do not exceed design values.

Bases: The fuel loading is based on the present fuel configuration. The reactor systems do not have adequate engineering safeguards to continue operating with a detectable release of fission products into the primary coolant. The fuel is to be stored in a safe configuration and shall be handled according to approved written procedures for radiological safety purposes.

3.8 Primary Water Quality

Applicability: These specifications apply to primary cooling system water in contact with fuel elements.

Objective: To minimize corrosion of the aluminum cladding of fuel plates and activation of dissolved materials.

Specifications:

(1) Primary water temperature shall not exceed 155° F.

(2) Primary water shall be demineralized, light water with a specific resistivity of not less than 0.5 megohm-cm after the reactor is operated for more than 6 hr.

(3) Primary water shall be sampled and evaporatively concentrated, and the gross radioactivity of the residue shall be measured with an adequate measuring channel. This specification procedure shall prevail (a) during the weekly checkout, (b) upon the appearance of any unusual radioactivity in the primary water or the primary water demineralizers, and (c) before the release of any primary water from the site.

(4) Primary equipment pit water level sensor shall alarm in the control room whenever a detectable amount of water (1 in. above floor level) exists in the equipment pit.

(5) Primary water pH shall be < 7.0.

Bases: Specifications 3.8.3(1), 3.8.3(2) and 3.8.3(5) are designed to protect the fuel element integrity and are based upon operating experience. At the specified quality, the activation products (of trace minerals) do not exceed acceptable limits. Specification 3.8.3(3) is designed to detect and identify fission products resulting from fuel failure and to fulfill reportability requirements pertaining to liquid wastes. Specification 3.8.3(4) is designed to alert the operator to potential loss of primary coolant, to prevent reactor operations with a reduced water inventory, and to minimize the possibility of an uncontrolled release of primary coolant to the environs.

3.9 Radiological Environmental Monitoring Program

3.9.1 General

The UFTR Radiological Environmental Monitoring Program is conducted to ensure that the radiological environmental impact of reactor operations is as low as reasonably achievable (ALARA); it is conducted in addition to the radiation monitoring and effluents control specified under Section 3.8 of these Technical Specifications.

prevent entrance during reactor operation. The freight door and panel shall not be used for general access to or egress from the reactor cell. This is not meant to preclude use of these doors in connection with authorized activities when the reactor is not in operation.

5.3 Reactor Fuel

Fuel elements shall be of the general MTR type, with thin fuel plates clad with aluminum and containing uranium fuel enriched to no more than about 19.75% U-235. The fuel matrix may be fabricated from uranium silicide-aluminum (U_3Si_2-Al) using the powder metallurgy process. There shall be nominally 12.5 g of U-235 per fuel plate.

The UFTR facility license authorizes the receiving, possession, and use of

(1) up to 5.20 kg of contained uranium-235
(2) a 1-Ci sealed plutonium-beryllium neutron source
(3) an up-to-25-Ci antimony-beryllium neutron source

Other neutron and gamma sources may be used if their use does not constitute an unreviewed safety question pursuant to 10 CFR 50.59 and if the sources meet the criteria established by the Technical Specifications.

5.4 Reactor Core

The core shall contain up to 24 fuel assemblies of 14 plates each. Up to six of these assemblies may be replaced with pairs of partial assemblies. Each partial assembly shall be composed of either all dummy or all fueled plates. A full assembly shall be replaced with no fewer than 13 plates in a pair of partial assemblies.

Fuel elements shall conform to these nominal specifications:

Item	Specification
Overall size (bundle)	2.845 in. x 2.26 in. x 25.6 in.
Clad thickness	0.015 in.
Plate thickness	0.050 in.
Water channel width	0.111 in.
Number of plates	Standard fuel element – 14 fueled plates Partial element – no fewer than 13 plates in a pair of partial assemblies
Plate attachment	Bolted with spacers
Fuel content per plate	12.5 g U-235 nominal