January 4, 2005

Dr. William G. Vernetson
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SUBJECT: UNIVERSITY OF FLORIDA—AMENDMENT RE: FUEL AND CONTROL BLADE SURVEILLANCE (TAC NO. MC4483)

Dear Dr. Vernetson:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 24 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 of September 17, 2004, as supplemented on December 15, 2004.

The amendment increases the interval of the surveillance for the control blades and drive system and the in-core reactor fuel elements.

A copy of the safety evaluation supporting Amendment No. 24 is also enclosed.

Sincerely,

/RA/

Alexander Adams, Jr., Senior Project Manager
Research and Test Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-83

Enclosures: 1. Amendment No. 24
2. Safety Evaluation

cc w/enclosures: See next page

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ACCESSION NO.: ML043510043 **TEMPLATE #: NRR-106**

OFFICE	RNRP:PM	RNRP:LA	OGC	RNRP:SC
NAME	AAdams*	EHylton*	SZipkin*	PMadden
DATE	12/20/2004	12/17/2004	12/27/2004	1/3/2005

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UNIVERSITY OF FLORIDA

DOCKET NO. 50-83

AMENDMENT TO AMENDED FACILITY OPERATING LICENSE

Amendment No. 24
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 September 17, 2004, as supplemented on December 15, 2004, 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. 24, 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

/RA/

Patrick M. Madden, Chief
Research and Test Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Enclosure: Appendix A, Technical Specifications Changes

Date of Issuance: January 3, 2005

ENCLOSURE TO LICENSE AMENDMENT NO. 24

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
19	19
21	21

Table 4.1 Control blade withdrawal inhibit interlocks operability tests

Inhibit	Limit	Frequency
Reactor period	# 10 sec	Daily checkout
Safety channels and wide range drawer not in OPERATE position	-	Daily checkout
Multiple blade withdrawal	Any 2 or more blades simultaneously in Manual	Daily checkout
	Any 2 safety blades In Automatic	Daily checkout
Source count rate	<2 cps	Verification only when count rate <2 cps during daily checkout

(4) The mechanical integrity of the control blades and drive system shall be inspected during each incore inspection but shall be fully checked at least once every 10 years at intervals not to exceed 12 years. * *

(5) Following maintenance or modification to the control blade system, an operability test and calibration of the affected portion of the system, including verification of control blade drive speed, shall be performed before the system is to be considered operable.

(6) The reactor shall not be started unless (a) the weekly checkout has been satisfactorily completed within 7 days prior to startup, (b) a daily checkout is satisfactorily completed within 8 hr prior to startup, and (c) no known condition exists that would prevent successful completion of a weekly or daily check.

(7) The limitations established under Paragraph 4.2.2(6)(a) and (b) can be deleted if a reactor startup is made within 6 hr of a normal reactor shutdown on any one calendar day.

(8) The following channels shall be calibrated annually, at intervals not to exceed 13 months, and any time a significant change in channel performance is noted:

(a) log N - period channel
(b) power level safety channels (2)
(c) Linear power level channel

4.2.6 Reactor Building Evacuation Alarm Surveillance

(1) The coincidence automatic actuation of two area monitors and the manual actuation of the evacuation alarm shall be tested as part of the weekly checkout.

(2) The automatic shutoff of the air conditioning system and the reactor vent system shall be tested as part of the weekly checkout.

(3) Evacuation drills for facility personnel shall be conducted quarterly, at intervals not to exceed 4 months, to ensure that facility personnel are familiar with the emergency plan.

4.2.7 Surveillance Pertaining to Fuel

(1) The incore reactor fuel elements shall be inspected every 10 years at intervals not to exceed 12 years, in a randomly chosen pattern, as deemed necessary. At least 8 elements will be inspected. *

(2) Fuel-handling tools and procedures shall be reviewed for adequacy before fuel loading operations. The assignment of responsibilities and training of the fuel-handling crew shall be performed according to written procedures.

4.2.8 Primary and Secondary Water Quality Surveillance

(1) The primary water resistivity shall be determined as follows:

(a) Primary water resistivity shall be measured during the weekly checkout by a portable Solu Bridge using approved procedures. The measured value shall be larger than 0.4 megohm-cm.

(b) Primary water resistivity shall be measured during the daily checkout at both the inlet and outlet of the demineralizers (DM). The measured value, determined by an online Solu Bridge alarming in the control room, shall be larger than 0.5 megohm-cm at the outlet of the DM.

(2) The primary water radioactivity shall be measured during the weekly checkout for gross $-(and gross " activity.

(a) The measured " activity shall not exceed 50 dpm above background level.

(b) The measured $-(activity shall not exceed 25% above mean normal activity level.

(3) The secondary water system shall be tested for radioactive contamination during the weekly checkout according to written procedures.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 24 TO

AMENDED FACILITY OPERATING LICENSE NO. R-56

THE UNIVERSITY OF FLORIDA

DOCKET NO. 50-83

1.0 INTRODUCTION

By letter dated September 17, 2004, as supplemented on December 15, 2004, 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 Specification (TS) interval of fuel element inspection from at least 4 elements every 5 years with the interval between inspections not to exceed 6 years to at least 8 elements every 10 years with the interval between inspections not to exceed 12 years. The request would also change the TS interval of inspection and checks of the control blades and drive system from every 5 years with the interval between inspections not to exceed 6 years to every 10 years with the interval between inspections not to exceed 12 years.

2.0 BACKGROUND

The UF operates an Argonaut-type research reactor with a maximum licensed power level of 100 kW(t). The reactor uses Material Testing Reactor (MTR)-type plate fuel. A design feature of the Argonaut-type research reactor is a massive biological shield over the reactor core that makes access to the core area of the reactor very difficult. On December 28, 2001, Amendment No. 23 to the UF license was issued which changed the same TSs surveillance requirements that the licensee is requesting be changed by the current amendment request. Amendment No. 23 increased the interval of fuel element inspection and control blades and drive system inspection and checks from biennially to the current five years.

3.0 EVALUATION

The regulations in 10 CFR 50.36 require nuclear reactors to have TSs. The regulations require TSs to include surveillance requirements which are discussed in 10 CFR 50.36(c)(3). The regulation states that surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met. The staff has determined that the changes proposed by the licensee continue to meet the requirements of 10 CFR 50.36.

The UF has requested a change to TS 4.2.7 (1) for surveillance of in-core reactor fuel elements that would change the interval on the surveillance from every 5 years (interval not to exceed 6 years) to every 10 years (interval not to exceed 12 years) and would increase the minimum number of fuel elements inspected per inspection from 4 to 8. TS 4.2.7 (1) currently reads:

> The incore reactor fuel elements shall be inspected every 5 years at intervals not to exceed 6 years, in a randomly chosen pattern, as deemed necessary. At least 4 elements will be inspected.

The licensee has proposed changing this TS to read:

> The incore reactor fuel elements shall be inspected every 10 years at intervals not to exceed 12 years, in a randomly chosen pattern, as deemed necessary. At least 8 elements will be inspected.

TS 4.2.2 (4) concerning surveillance of the control blades and drive system reads as follows:

> The mechanical integrity of the control blades and drive system shall be inspected during each incore inspection but shall be fully checked at least once every 5 years at intervals not to exceed 6 years.

The licensee has proposed changing this TS to read:

> The mechanical integrity of the control blades and drive system shall be inspected during each incore inspection but shall be fully checked at least once every 10 years at intervals not to exceed 12 years.

The licensee has requested this change to reduce the considerable effort needed to carry out the inspection. Access to the core of an Argonaut reactor requires disassembly of the primary shielding which consists of a number of large, heavy shield blocks. The fuel inspection process takes about two weeks to accomplish. This change to TS 4.2.7 (1) also impacts TS 4.2.2 (4). Technical Specification 4.2.2 (4) has requirements to perform control blades and drive system inspections and checks. The checks have an interval stated in the TS (currently 5 years with the licensee proposing changing to 10 years) but the inspection interval is tied to the performance of in-core inspections. The proposed change to the fuel element inspection interval would also change the interval for control blades and drive system inspections from 5 to 10 years. The licensee would carry out both inspections and checks on the control blades and drive system during the same reactor disassembly for fuel inspection.

The purpose of the fuel surveillance is to reduce the possibility of operating the reactor with failed fuel. The surveillance consists of a visual inspection of the fuel elements. This inspection would only detect gross problems with fuel elements and would not detect pin hole defects in the fuel, the most likely fission product release path. Over 33 years of fuel element inspections have not found any failed fuel. The primary indication of cladding failure is the presence of fission products in the primary coolant. TS 4.2.8 (2) requires weekly measurement of primary water radioactivity. TS 3.7 (4) prohibits reactor operation if there is evidence of fuel element failure and TS 3.7 (3) requires fuel elements exhibiting the release of fission products to be removed from the core. TS 3.7 (3) states that fission product contamination of the primary water shall be treated as evidence of fuel element failure. Indication of fission products in the primary water would require disassembly of the reactor to locate and remove the failed fuel

element. The staff's experience with fuel failures in research reactors had been that the overwhelming majority of failures have been detected by monitoring of the primary coolant for fission products.

The surveillance interval proposed by the licensee would not result in any decrease of total fuel elements inspected over time. For example, for a 20-year period, both the current and proposed surveillance interval would require inspection of 16 elements.

The licensee discusses several advantages to the proposed TS: reduction in wear and tear on the reactor from reduced disassembly, reduced radiation dose to the facility staff, and increased efficiency of operation and utilization.

The inspection of the control blades and drive system consists of a visual inspection of the in-core components of the system. The check of the system consists of the visual inspection of the in-core components and partial disassembly of drive system components such as gearboxes to check for oil level, hardened grease, foreign matter and wear. Control blade drop times, controlled insertion times and withdrawal times are measured when the reactor is reassembled to help ensure proper reassembly. The visual inspections of the in-core control blades and drive system have never identified any problems. In addition, the regular measurement of control blade drop times (semiannually), controlled insertion times (semiannually) and withdrawal times (weekly) would provide indication of system degradation between inspections and checks of the system. The advantages listed above for an increased surveillance interval for the fuel elements also apply to the control blades and drive system inspections and checks.

The NRC staff concludes that the existing requirement on primary coolant monitoring for fission products will detect failed fuel in an acceptable manner. Based on these existing requirements, the fact that the licensee will continue to inspect fuel elements, a reduction in radiation dose to the reactor staff, and the reduction of wear and tear on the reactor from reduced disassembly, the proposed change in the surveillance requirement for fuel element inspection is acceptable to the staff. Also based on the history of positive results of visual inspections of the control blades and drive system and the existing surveillance on control blade drop times, controlled insertion times and withdrawal times, the staff concludes that degradation of the control blades and drive systems will be detected in an acceptable manner and that the interval for inspection and check of the control blades and drive system can be increased from 5 to 10 years.

The proposed changes to the TSs also increase the "not to exceed" interval to 12 years. This gives the licensee flexibility in performance of the surveillance. ANS/ANSI 15.1-1990, "American National Standard for the Development of Technical Specifications for Research Reactors," which is supported by the NRC staff for research and test reactor TS format contains suggested "not to exceed" intervals. While a 10-year surveillance interval is not addressed in the standard, the "not to exceed" interval for a 5-year surveillance is 6 years. The licensee has proposed a 12-year "not to exceed" interval for the proposed 10-year surveillance. This is double the time for a 5-year surveillance and is consistent with the standard. Because the proposed surveillance interval is consistent with that given in ANS/ANSI 15.1-1990, the addition of a maximum 12-year surveillance interval is acceptable to the staff.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in inspection and surveillance requirements. The staff determines that this amendment involves no significant hazards consideration, no significant increase in the amounts, and no significant change in the types, of any effluents that may be released off site, and no significant increase in individual or cumulative occupational radiation exposure. Accordingly, this 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 this amendment.

5.0 CONCLUSION

The staff concludes, on the basis of the considerations discussed above, that (1) the amendment does not involve a significant hazards consideration because the amendment does not involve a significant increase in the probability or consequences of accidents previously evaluated, create the possibility of a new kind of accident or a different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety; (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities; and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or the health and safety of the public.

Principal Contributor: A. Adams, Jr.

Date: January 3, 2005