December 28, 2001

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

SUBJECT: UNIVERSITY OF FLORIDA - AMENDMENT RE: FUEL SURVEILLANCE (TAC NO. MB3358)

Dear Dr. Vernetson:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 23 to Amended Facility Operating License No. R-56 for the University of Florida Training Reactor. The amendment consists of changes to the Technical Specifications (TS) in response to your application of November 8, 2001, as supplemented on December 13, 2001.

The amendment changes the frequency of fuel element inspections from at least two elements biennially to at least four elements every five years with the interval between inspections not to exceed six years. Because the control blades and drive system are inspected during incore fuel element inspections, changing the frequency of fuel element inspections also changes the frequency of inspection of the control blades and drive system for mechanical integrity from biennially to every five years with the interval between inspections not to exceed six years. Finally, the interval of full checks of the control blades and drive system is changed to match that of the fuel element inspection by adding the requirement that the interval between inspections not exceed six years.

A copy of the safety evaluation supporting Amendment No. 23 is also enclosed.

Sincerely,

/RA by M. Mendonca Acting for/

Alexander Adams, Jr., Senior Project Manager
Operational Experience and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-83

Enclosures:
1. Amendment No. 23
2. Safety Evaluation

cc w/enclosures:
Please see next page

cc:

Mr. James S. Tulenko, Chairman
Nuclear Engineering Sciences
Department
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

Administrator
Department of Environmental Regulation
Power Plant Siting Section
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State Planning and Development
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Office of Planning and Budgeting
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1317 Winewood Boulevard
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Alexander Adams, Jr., Senior Project Manager
Operational Experience and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-83
Enclosures:
1. Amendment No. 23, 2. Safety Evaluation
cc w/enclosures: Please see next page

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UNIVERSITY OF FLORIDA

DOCKET NO. 50-83

AMENDMENT TO AMENDED FACILITY OPERATING LICENSE

Amendment No. 23
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 November 8, 2001, as supplemented on December 13, 2001, 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. 23, 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 by M. Mendonca Acting for/

Patrick M. Madden, Section Chief
Non-Power Reactors and Financial Section
Operational Experience and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Enclosure: Appendix A, Technical
Specifications Changes

Date of Issuance: December 28, 2001

ENCLOSURE TO LICENSE AMENDMENT NO. 23

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	$\leq$ 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 5 years at intervals not to exceed 6 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 5 years at intervals not to exceed 6 years, in a randomly chosen pattern, as deemed necessary. At least 4 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 β-γ and gross α activity.

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

(b) The measured β-γ 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. 23 TO

AMENDED FACILITY OPERATING LICENSE NO. R-56

THE UNIVERSITY OF FLORIDA

DOCKET NO. 50-83

1.0 INTRODUCTION

By letter dated November 8, 2001, as supplemented on December 13, 2001, 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) frequency of fuel element inspection from at least two elements biennially to at least four elements every five years with the interval between inspections not to exceed six years. Because the control blades and drive system are inspected during incore fuel element inspections, changing the frequency of fuel element inspections also changes the frequency of inspection of the control blades and drive system for mechanical integrity from biennially to every five years with the interval between inspections not to exceed six years. Finally, the interval of full checks of the control blades and drive system is changed to match that of the fuel element inspection by adding the requirement that the interval between inspections not exceed six years.

2.0 EVALUATION

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. 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 biennially to every five years and would increase the minimum number of fuel elements inspected per inspection from two to four. TS 4.2.7 (1) currently reads:

> The incore reactor fuel elements shall be inspected biennially at intervals not to exceed 30 months, in a randomly chosen pattern, as deemed necessary. At least two elements will be inspected.

The licensee has proposed changing this TS to read:

> 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.

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.

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 5 years at intervals not to exceed 6 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 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) which states that 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 five years. The proposed change to the fuel element inspection interval would also change the interval for control blades and drive system inspection from two to five years. The licensee would carry out both inspections and checks on the control blades and drives 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. Thirty years of fuel element inspections have not found any failed fuel. The primary indication of cladding failure is the presence of radionuclides 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 surveillance proposed by the licensee would result in a small decrease of total fuel elements inspected over time. For example, for a twenty-year period, the current surveillance would require inspection of 20 fuel elements while the proposed TS would require the 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 incore components of the system. The full check of the system consists of the visual inspection of the incore 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 incore 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 full 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.

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 inspected fuel elements 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 degredation of the control blades and drive systems will be detected in an acceptable manner and that the interval for inspection of the control blades and drive system can be increased from biennially to every five years.

The change to TS 4.2.2(4) to add the inspection interval not to exceed six years gives the licensee flexibility in performance of the surveillance at the same time as the fuel inspection. This is the maximum interval allowed for a five-year surveillance given in 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 non-power reactor TS format. Because the proposed surveillance interval agrees with that given in ANS/ANSI 15.1-1990, the addition of a maximum six-year surveillance interval is acceptable to the staff.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in inspection and surveillance requirements. The staff has determined that this amendment involves 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.

4.0 CONCLUSION

The staff has concluded, on the basis of the considerations discussed above, that (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously evaluated, or create the possibility of a new or different kind of accident from any accident previously evaluated, and does not involve a significant reduction in a margin of safety, the amendment does not involve a significant hazards consideration; (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: December 28, 2001