April 3, 2008

Mr. William Bonzer Reactor Manager Missouri University of Science and Technology 226 Fulton Hall Rolla, MO 65409-0170

#### SUBJECT: MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY NUCLEAR RESEARCH REACTOR FACILITY – ISSUANCE OF AMENDMENT NO. 21 TO FACILITY OPERATING LICENSE R-79 (TAC NO. MD8063)

Dear Mr. Bonzer:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed amendment No. 21 to Facility Operating License No. R-79 for the Missouri University of Science and Technology Nuclear Reactor Facility. The amendment changes the facility operating license in response to your application of December 27, 2007.

The amendment changes the name of the licensee from "the University of Missouri – Rolla" to "the Missouri University of Science and Technology" wherever the name appears in the license and technical specifications.

A copy of the safety evaluation supporting Amendment No. 21 is also enclosed. If there are any questions please contact me at 301-415-4007.

Sincerely,

/RA/

John Nguyen, Project Manager Research and Test Reactors Branch A Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

Docket No. 50-123 License No. R-79

Enclosures: 1. Amendment No. 21 2. Safety Evaluation

cc w/enclosures: See next page April 3, 2008

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## MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

## DOCKET NO. 50-123

## AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 21 License No. R-79

- 1. The U.S. Nuclear Regulatory Commission (Commission) has found that:
  - A. The application for an amendment to Facility Operating License No. R-79 filed by the University of Missouri-Rolla here-in-after referred to as the Missouri University of Science and Technology (licensee) on December 27, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the rules and regulations of the Commission as set forth in Chapter 1 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 Amended Facility License No. R-79 which is hereby amended to read as follows:
  - 1. The title on page 1 of the license shall read:

UNITED STATE NUCLEAR REGULATORY COMMISSION DOCKET NO. 50-123 MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY RENEWAL OF THE FACILITY OPERATING LICENSE 2. Paragraph 1.A of the license shall read:

The application for amendment to Facility Operating License No. R-79 filed by the University of Missouri, Rolla (here-in-after referred to as the Missouri University of Science and technology or licensee), on December 27, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the rules and regulations of the Commission as set forth in Chapter 1 of Title 10 of the Code of Federal Regulations (10 CFR);

3. Paragraph 2.A of the license shall read:

This license applies to the pool-type nuclear reactor (the reactor) which is owned by The Curators of the Missouri University of Science and Technology (the licensee) located on the Missouri University of Science and Technology campus at Rolla, Missouri, and described in the application for renewal dated December 27, 2007, as supplemented (the application).

4. Paragraph 2.B of the license shall read:

Subject to the conditions and requirements incorporated herein, the Nuclear Regulatory Commission (Commission) hereby licenses The Curators of the Missouri University of Science and Technology:

5. Paragraph 2.C.2 of the license shall read

The Technical Specifications contained in Appendix A, as revised through Amendment No. 21, 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 issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

### /RA/

Daniel S. Collins, Branch Chief Research and Test Reactors Branch A Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

Enclosures: 1. Revised License Pages

2. Appendix A Technical Specifications Changes

Date of Issuance: April 3, 2008

#### ENCLOSURE TO LICENSE AMENDMENT NO. 21

#### FACILITY OPERATING LICENSE NO. R-79

#### DOCKET NO. 50-123

1. Replace the following pages of the facility operating license issued on April 16, 1985 with the enclosed pages. The revised pages are vertical lines indicating the areas of changes.

Remove	Insert
Page 1	Page 1
Page 2	page 2

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

Remove APPENDIX A Page ii, Table of Contents Page 1 Page 34 Page 37 Page 38 Insert APPENDIX A Page ii, Table of Contents Page 1 Page 34 Page 37 Page 38

## UNITED STATES NUCLEAR REGULATORY COMMISSION

## DOCKET NO. 50-123

### MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

### RENEWAL OF THE FACILITY OPERATING LICENSE

Amendment No. 21 License No. R-79

- 1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for an amendment to Facility Operating License No. R-79 filed by the University of Missouri-Rolla here-in-after referred to as the Missouri University of Science and Technology (licensee) on December 27, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the rules and regulations of the Commission as set forth in Chapter I of Title 10 of the Code of Federal Regulations (10 CFR);
  - B. Construction of the facility was completed in substantial conformity with Construction Permit No. CPRR-44 dated November 20, 1959, the provisions of the Act, and the rules and regulations of the Commission;
  - C. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - D. There is reasonable assurance (i) that the activities authorized by this license can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - E. The licensee is technically and financially qualified to engage in the activities authorized by this operating license in accordance with the rules and regulations of the Commission;
  - F. The licensee is a nonprofit educational institution and will use the facility for the conduct of educational activities, and has satisfied the applicable provisions of 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements," of the Commission's regulations;
  - G. The issuance of this license will not be inimical to the common defense and security or to the health and safety of the public;
  - H. The issuance of this license is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied; and

- I. The receipt, possession and use of the byproduct and special nuclear materials as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Parts 30 and 70, including Sections 30.33, 70.23 and 70.31.
- 2. Facility Operating License No. R-79 is hereby amended in its entirety to read as follows:
  - A. This license applies to the pool-type nuclear reactor (the reactor) which is owned by The Curators of the Missouri University of Science and Technology (the licensee) located on the Missouri University of Science and Technology campus at Rolla, Missouri, and described in the application for renewal dated December 27, 2007, as supplemented (the application).
  - B. Subject to the conditions and requirements incorporated herein, the Nuclear Regulatory Commission (Commission) hereby licenses The Curators of the Missouri University of Science and Technology:
    - 1. Pursuant to Section 104c of the Atomic Energy Act of 1954, as amended (hereinafter the Act), and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess, use and operate the reactor as a utilization facility at the designated location in Rolla, Missouri.
    - 2. Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to receive, possess and use up to a maximum of 5.55 kilograms of contained uranium-235 at various enrichments, up to a maximum of 200 grams of plutonium-239 in the form of sealed plutonium-beryllium neutron sources in connection with operation of the reactor, and to possess, but not separate, such special nuclear material as may be produced by the operation of the facility. Without exceeding the foregoing maximum possession limits, the maximum limits on specific enrichment of uranium-235 are as follows:

Maximum uranium-235 <u>(kilograms)</u>	Enrichment %	<u>Form</u>
5.50	< 20%	Materials Test Reactor-type fuel
0.05	Any	Fission Chambers and flux foils used in connection with operation of the reactor

# APPENDIX A

# FACILITY LICENSE NO. R-79

# TECHNICAL SPECIFICATIONS

# AND BASES

## FOR THE

# MISSOURI UNIVERSITY OF SCIENCE

# AND TECHNOLOGY REACTOR

# DOCKET NO. 50-123

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## 1. INTRODUCTION

### 1.1 <u>Scope</u>

This document constitutes the Technical Specifications for Facility License No. R-79 and supersedes all prior Technical Specifications. Included are the "Specifications" and the "Bases" for the Technical Specifications. These bases, which provide the technical support for the individual technical specifications, are included for information purposes only. They are not part of the Technical Specifications, and they do not constitute limitations or requirements to which the licensee must adhere.

This document was written to be in conformance with ANSI/ANS-15.1-1982<sup>(1)</sup> and NRC Regulatory Guide 1.16<sup>(2)</sup>. The content of the Technical Specifications includes: Definitions, Safety Limits, Limiting Safety System Settings, Limiting Conditions for Operation, Surveillance Requirements, Design Features, and Administrative Controls.

## 1.2 Application

## 1.2.1 Purpose

These Technical Specifications have been written specifically for the Missouri University of Science and Technology Reactor.

The Technical Specifications represent the agreement between the licensee and U.S. Nuclear Regulatory Commission on administrative controls, equipment availability, and operational parameters.

Specific limitations and equipment requirements for safe reactor operation and for dealing with abnormal situations, typically derived from the Safety Analysis Report (SAR), are called specifications. These specifications represent a comprehensive envelope for safe operation. Only those operational parameters.

# 5. DESIGN FEATURES

Only those design features of the facility describing materials of constructions and geometric arrangements, which if altered or modified would significantly affect safety (and which are not included in sections 2, 3, or 4 of the Technical Specifications), are included in this section.

The Safety Analysis Report contains the details necessary for establishing criteria for the following Technical Specifications.

# 5.1 <u>Site and Facility Description</u>

- 5.1.1 The Nuclear Reactor Building is located on the east side of the Missouri University of Science and Technology campus in Rolla, Missouri, near 14<sup>th</sup> Street and Pine Street.
- 5.1.2 The reactor is housed in a steel-framed, double-walled aluminum building designed to restrict leakage. All air and other gases will be exhausted through vents in the reactor bay ceiling 30 feet (or 11 meters) above grade. The Reactor Building free volume is approximately 1700 cubic meters.
- 5.2 <u>Reactor Coolant System</u>
- 5.2.1 The minimum temperature of the reactor pool should be no less then  $15.5^{\circ}C$  ( $60^{\circ}F$ ) when the reactor is operated.
- 5.3 <u>Reactor Core and Fuel</u>
- 5.3.1 Core Configurations

Various core configurations may be used to accommodate experiments.

5.3.2 Fuel Elements

### 6. ADMINISTRATIVE CONTROLS

### 6.1 Organization

### 6.1.1 Structure

The Nuclear Reactor Facility is a part of the Department of Mining and Nuclear Engineering of the Missouri University of Science and Technology. The organizational structure is shown in Figure 6.1

### 6.1.2 Responsibility

The Chair of Mining and Nuclear Engineering is the individual responsible for the reactor facility's license (Level 1).

The Director of the Nuclear Reactor Facility is the contact person for the NRC and will have overall responsibility for management of the facility (Level 2). The Director shall have a minimum of six years of nuclear experience. The Director shall have a Bachelor's (or higher) degree in engineering or science. Equivalent education or experience may be substituted for a degree. The degree may fulfill four years of the six years of nuclear experience required.

The Reactor Manager (Level 3) shall be responsible for the day-to-day operation and for ensuring that all operations are conducted in a safe manner and within the limits prescribed by the facility license and the provisions of the Radiation Safety Committee. During periods when the Reactor Manager is absent, his responsibilities may be delegated to a Senior Operator (Level 4).

The Reactor Manager shall have three years of nuclear related experience. A maximum of two years equivalent full-time academic training may be substituted for two of the three years of nuclear related experienced required. As soon as reasonably possible after being assigned to the position, the Reactor Manager shall obtain and maintain a NRC Senior Operators license.



Figure 6-1 Organizational structure of the University of Missouri related to the Missouri S&T Nuclear Reactor Facility

Rev.

## SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

## SUPPORTING AMENDMENT NO. 21 TO

## FACILITY OPERATING LICENSE NO. R-79

### MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

## DOCKET NO. 50-123

### 1.0 INTRODUCTION

By letter dated December 27, 2007, the University of Missouri-Rolla (here-in-after referred to as the Missouri University of Science and Technology or Missouri S&T or licensee) submitted a request for amendment of Facility Operating License No. R-79 for the Missouri S&T Nuclear Research Reactor (MSTR). The amendment would change the name of the licensee from "the University of Missouri – Rolla" to "the Missouri University of Science and Technology" wherever the name appears in the license and technical specifications.

### 2.0 BACKGROUND

The Missouri S&T is located in a separate building on the east side of the main campus in Rolla, Missouri. In December 1961, the U.S. Atomic Energy Commission (AEC) issued an operating license to the Missouri S&T for operation of an MTR-type research reactor on its campus. This license, R-79, authorized the MSTR to operate at steady-state power levels up to 10 kW(t). In 1967, the license was amended to allow operation up to its current power level of 200 kW(t). The MSTR is a pool reactor that utilizes low enriched uranium (LEU) fuel for the core. Light water is used as the coolant and moderator. The low power level of the core allows for sufficient cooling by natural convection. The reactor's experimental facilities include a pneumatic transfer system, in-core irradiation tube, a beam tube, and a thermal column.

### 3.0 REGULATORY EVALUATION

The Licensee has proposed to change the name of the University of Missouri – Rolla to the Missouri University of Science and Technology wherever the name appears in the license and technical specifications. The change in name is made to reflect a change in the legal name of the University. An identical change was previously approved by the NRC for the Oyster Creek Nuclear Generating Station (Amendment No. 194, issued on January 14, 1998) and Saxton Nuclear Experimental Corporation (Amendment 17, issued on March 19, 2001).

The NRC staff has reviewed the proposed changes to the license and concluded that it is a change in name only. The change will not alter the existence of the University, or its obligations, responsibilities or liabilities as a licensee for the MSTR. In addition, organization, structure, functions, assignments, and responsibility for the management and operation of the reactor facility would remain the same. It is consistent with the guidance and does not impact the licensee's ability to meet the requirements of 10 CFR 50.36 and ANS/ANSI 15.1. The staff has determined that this is an administrative change, and therefore acceptable.

### 4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in the category of recordkeeping, reporting, and administrative procedures and requirements. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(10). 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 has concluded, based on the considerations discussed above, that (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously evaluated, 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; (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: John T. Nguyen, NRR

Date: April 3, 2008