

March 20, 2001

Mr. Michael Whalley, Manager  
KSU Nuclear Reactor Facility  
Department of Mechanical and  
Nuclear Engineering  
112 Ward Hall  
Kansas State University  
Manhattan, KS 66506-5204

SUBJECT: KANSAS STATE UNIVERSITY TRIGA MARK II RESEARCH REACTOR  
ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT  
IMPACT FOR RECOVERY OF CONSTRUCTION PERIOD ON OPERATING  
LICENSE NO. R-88 (TAC NO. MB1107)

Dear Mr. Whalley:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for amendment dated February 1, 2001, and supplement dated February 12, 2001. The proposed amendment would amend Facility Operating License No. R-88 to allow extension of the license expiration date from August 15, 2001, to October 16, 2002. The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

**/RA/**

Marvin M. Mendonca, Sr. Project Manager  
Events Assessment, Generic Communications, and  
Non-Power Reactors Branch  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 50-188

Enclosure: Environmental Assessment

cc w/enclosure:  
Please see next page



Kansas State University

Docket No. 50-188

cc:

Office of the Governor  
State of Kansas  
Topeka, KS 66612

Mayor of Manhattan  
P.O. Box 748  
Manhattan, KS 66502

Test, Research, and Training  
Reactor Newsletter  
University of Florida  
202 Nuclear Sciences Center  
Gainesville, FL 32611

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**TEMPLATE #: NRR-056**

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UNITED STATES NUCLEAR REGULATORY COMMISSION

KANSAS STATE UNIVERSITY

TRIGA MARK II NUCLEAR RESEARCH REACTOR

DOCKET NO. 50-188

ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering the issuance of a license amendment to Facility Operating License No. R-88, issued to Kansas State University (the licensee) for operation of the Kansas State University TRIGA Mark II nuclear research reactor.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action

The proposed action would allow extension of the license expiration time from August 15, 2001, to October 16, 2002, for the Kansas State University TRIGA Mark II nuclear research reactor. By letter dated February 1, 2001, and supplement dated February 12, 2001, the licensee requested this license extension by the provisions of 10 CFR 50.90. The licensee submitted an environmental report with their application.

Need for the Proposed Action

The proposed action is needed to allow continued operation of the Kansas State University TRIGA Mark II nuclear research reactor for research, development and educational activities beyond the current term of the license.

### Environmental Impact of the Proposed Action

The Kansas State University TRIGA Mark II nuclear research reactor is on the University's campus in Manhattan, Kansas. The research reactor is housed in a closed room designed to restrict air flow.

The Kansas State University TRIGA Mark II nuclear research reactor is a low power (250 kilowatts), pool-type research reactor. The NRC licensed the facility for operation up to a power level of 100 kilowatts in 1962 and authorized operations up to 250 kilowatts with pulsing capability in 1968. From fiscal year 1981 to fiscal year 1999, the facility has operated ~800 megawatt-hours total. Data from recent operations, from 1995 to 1999, was assessed. The gaseous radiological release of Argon-41, the primary airborne effluent, has conservatively been estimated to result in 2.8 millirem exposure outside the facility. All gaseous releases were and are expected to remain well within regulatory requirements. Liquid effluents have been relatively small with the highest concentration in 1997 at 250 pCi/ml. Low-level solid radioactive waste between 1988 and 1998 was less than 245 mCi in 116 cubic feet of material.

The Commission concludes that the radiological effects of the continued operation will be minimal based on past radiological releases. The radiological exposures for facility operations have been within regulatory limits. Conditions are not expected to change significantly. The proposed action will not increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released off site, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

As for potential non-radiological impacts, the proposed action does not involve any historic sites. It does not affect non-radiological effluents and has no other environmental

impact. Therefore, no significant non-radiological environmental impacts are associated with the proposed action.

In addition, the environmental impact associated with operation of research reactors has been generically evaluated by the staff and is discussed in the attached generic evaluation. This evaluation concludes that no significant environmental impact is associated with the operation of research reactors licensed to operate at power levels up to and including 2 megawatts thermal. The NRC staff has determined that this generic evaluation is applicable to operation of the Kansas State University TRIGA Mark II nuclear research reactor and that there are no special or unique features that would preclude reliance on the generic evaluation.

Accordingly, the Commission concludes that there are no significant environmental impacts associated with the proposed action.

#### Alternatives to the Proposed Action

An alternative to the proposed action for the facility is to deny the application (i.e., "no action" alternative). If the application is denied, the licensee has indicated that it would apply for license renewal and operate under the timely renewal provisions of 10 CFR 2.109 until the Commission renewed or denied the license renewal application. With operation under timely renewal or renewal, the actual conditions of the reactor would not change. If the Commission denied license renewal, operations would stop and decommissioning would be required with a likely small impact on the environment. The environmental impacts of the proposed action and alternative action are similar.

#### Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the Hazards Analysis prepared for the issuance of the construction permit in 1961 and for operating license in 1962.

#### Agencies and Persons Contacted

On March 1, 2001, the NRC staff consulted with the State of Kansas, Vick L. Cooper, Chief, Radiation Control Program, Kansas Department of Health and Environment, Bureau of Air and Radiation regarding the environmental impact of the proposed action. The State official had no comment.

#### FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated February 1, 2001, and supplement dated February 12, 2001, which is available for public inspection, and/or copied for a fee, at the U.S. Nuclear Regulatory Commission's Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records will be accessible electronically from the ADAMS Public Library component on the NRC Web site, <http://www.nrc.gov> (the Electronic Reading Room). Dated at Rockville, Maryland, this 20<sup>th</sup> day of March, 2001.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/***

Ledyard B. Marsh, Chief  
Events Assessment, Generic Communications, and  
Non-Power Reactors Branch  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation



Attachment:  
Environmental Considerations

# ENVIRONMENTAL CONSIDERATIONS REGARDING THE LICENSING OF RESEARCH REACTORS AND CRITICAL FACILITIES

## Introduction

This discussion deals with research reactors and critical facilities which are designed to operate at low power levels, 2 MWt and lower, and are used primarily for basic research in neutron physics, neutron radiography, isotope production, experiments associated with nuclear engineering, training and as a part of a nuclear physics curriculum. Operation of such facilities will generally not exceed a 5-day week, 8-hour day, or about 2000 hours per year. Such reactors are located adjacent to technical service support facilities with convenient access for students and faculty.

Sited most frequently on the campuses of large universities, the reactors are usually housed in already existing structures, appropriately modified, or placed in new buildings that are designed and constructed to blend in with existing facilities. However, the environmental considerations discussed herein are not limited to those which are part of universities.

## Facility

There are no exterior conduits, pipelines, electrical or mechanical structures or transmission lines attached to or adjacent to the facility other than for utility services, which are similar to those required in other similar facilities, specifically laboratories. Heat dissipation is generally accomplished by use of a cooling tower located on the roof of the building. These cooling towers typically are on the order of 10' x 10' x 10' and are comparable to cooling towers associated with the air-conditioning systems of large office buildings.

Make-up for the cooling system is readily available and usually obtained from the local water supply. Radioactive gaseous effluents are limited to Ar-41 and the release of radioactive liquid effluents can be carefully monitored and controlled. Liquid wastes are collected in storage tanks to allow for decay and monitoring prior to dilution and release to the sanitary sewer system. Solid radioactive wastes are packaged and shipped offsite for storage at NRC-approved sites. The transportation of such waste is done in accordance with existing NRC-DOT regulations in approved shipping containers.

Chemical and sanitary waste systems are similar to those existing at other similar laboratories and buildings.

### Environmental Effects of Site Preparation and Facility Construction

Construction of such facilities invariably occurs in areas that have already been disturbed by other building construction and, in some cases, solely within an already existing building. Therefore, construction would not be expected to have any significant effect on the terrain, vegetation, wildlife or nearby waters or aquatic life. The societal, economic and aesthetic impacts of construction would be no greater than those associated with the construction of a large office building or similar research facility.

### Environmental Effects of Facility Operation

Release of thermal effluents from a reactor of less than 2 MWt will not have a significant effect on the environment. This small amount of waste heat is generally rejected to the atmosphere by means of small cooling towers. Extensive drift and/or fog will not occur at this low power level.

Release of routine gaseous effluents can be limited to Ar-41, which is generated by neutron activation of air. Even this will be kept as low as practicable by using gases other than air for supporting experiments. Yearly doses to unrestricted areas will be at or below established guidelines in 10 CFR Part 20 limits. Routine releases of radioactive liquid effluents can be carefully monitored and controlled in a manner that will ensure compliance with current standards. Solid radioactive wastes will be shipped to an authorized disposal site in approved containers. These wastes should not require more than a few shipping containers a year.

Based on experience with other research reactors, specifically TRIGA reactors operating in the 1 to 2 MWt range, the annual release of gaseous and liquid effluents to unrestricted areas should be less than 30 curies and 0.01 curies, respectively.

No release of potentially harmful chemical substances will occur during normal operation. Small amounts of chemicals and/or high-solid content water may be released from the facility through the sanitary sewer during periodic blowdown of the cooling tower or from laboratory experiments.

Other potential effects of the facility, such as aesthetics, noise, societal or impact on local flora and fauna are expected to be too small to measure.

### Environmental Effects of Accidents

Accidents ranging from the failure of experiments up to the largest core damage and fission product release considered possible result in doses that are less than 10 CFR Part 20 guidelines and are considered negligible with respect to the environment.

### Unavoidable Effects of Facility Construction and Operation

The unavoidable effects of construction and operation involve the materials used in construction that cannot be recovered and the fissionable material used in the reactor. No adverse impact on the environment is expected from either of these unavoidable effects.

### Alternatives to Construction and Operation of the Facility

To accomplish the objectives associated with research reactors, there are no suitable alternatives. Some of these objectives are training of students in the operation of reactors, production of radioisotopes, and use of neutron and gamma ray beams to conduct experiments.

### Long-Term Effects of Facility Construction and Operation

The long-term effects of research facilities are considered to be beneficial as a result of the contribution to scientific knowledge and training. Because of the relatively small amount of capital resources involved and the small impact on the environment, very little irreversible and irretrievable commitment is associated with such facilities.

### Costs and Benefits of Facility Alternatives

The costs are on the order of several millions of dollars with very little environmental impact. The benefits include, but are not limited to, some combination of the following: conduct of activation analyses, conduct of neutron radiography, training of operating personnel, and education of students. Some of these activities could be conducted using particle accelerators or radioactive sources which would be more costly and less efficient. There is no reasonable alternative to a nuclear research reactor for conducting this spectrum of activities.

### Conclusion

The staff concludes that there will be no significant environmental impact associated with the licensing of research reactors or critical facilities designed to operate at power levels of 2 MWt or lower and that no environmental impact statements are required to be written for the issuance of construction permits or operating licenses for such facilities.