

June 25, 2001

Mr. Ron Kucera, Director
Intergovernmental Cooperation
and Special Projects
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT AND FINDING OF NO
SIGNIFICANT IMPACT RELATED TO EXTENSION OF LICENSE EXPIRATION
DATE FOR THE UNIVERSITY OF MISSOURI (MB0850)

Dear Mr. Kucera:

In response to your request, please find enclosed a copy of the predecisional Environmental Assessment and Finding of No Significant Impact related to the application for amendment to Amended Facility License No. R-103 for the University of Missouri-Columbia Research Reactor dated December 27, 2000, as supplemented on April 12 and June 6, 2001. The proposed amendment would extend the license expiration date from November 21, 2001, to October 11, 2006, to recapture the construction time between the issuance date of Construction Permit No. CPRR-68 and issuance of the operating license.

Please provide any comments you have within 15 days of the date of this letter. If you have any questions concerning the environmental assessment or the related license amendment, please contact me at 301-415-1127.

Sincerely,

/RA/

Alexander Adams, Jr., Senior Project Manager
Events Assessment, Generic Communications and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-186

Enclosures: As stated

cc w/enclosures: Please see next page

University of Missouri-Columbia

Docket No. 50-186

cc:

University of Missouri
Associate Director
Research Reactor Facility
Columbia, MO 65201

A-95 Coordinator
Division of Planning
Office of Administration
P.O. Box 809, State Capitol Building
Jefferson City, MO 65101

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UNITED STATES NUCLEAR REGULATORY COMMISSION

UNIVERSITY OF MISSOURI-COLUMBIA

DOCKET NO. 50-186

UNIVERSITY OF MISSOURI-COLUMBIA RESEARCH REACTOR

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of an amendment to Amended Facility License No. R-103, issued to the University of Missouri-Columbia (the licensee), for operation of the University of Missouri-Columbia Research Reactor (MURR), located in Columbia, Missouri.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed action would revise Amended Facility License No. R-103 to extend the license expiration date from November 21, 2001, to October 11, 2006, to recapture the

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construction time between the issuance date of Construction Permit No. CPRR-68 and issuance of the operating license.

The proposed action is in accordance with the licensee's application for amendment dated December 27, 2000, as supplemented by letter dated April 12 and June 6, 2001.

The Need for the Proposed Action:

The proposed action is needed to allow continued operation of the MURR reactor for education, medical, environmental and physical science research, and developmental activities beyond the current term of the license.

Environmental Impacts of the Proposed Action:

The MURR is located on a 7.5-acre lot in University Research Park, about one mile (1.6 km) southwest of the University of Missouri main campus in Columbia, Missouri. MURR is a pressurized, reflected, light-water moderated and cooled heterogeneous design reactor. The reactor is fueled with high-enriched, aluminum-clad, plate type fuel. The reactor has a maximum steady-state power level of 10 Megawatts thermal [MW(t)] with the reactor core located in a pressure vessel. The reactor pressure vessel is located in a cylindrically shaped pool and is covered by about 23 feet (7 m) of water during operation for radiation shielding. The reactor pool is surrounded by a biological shield. The reactor is located within a containment building.

The construction permit for the facility (CPRR-68) was issued to the University of Missouri on November 21, 1961. On October 11, 1966, Facility Operating License No. R-103 was issued to the University with a maximum power level of 5 MW(t). On July 9, 1974, Amendment No. 2 to the license was issued increasing the maximum operating power level to 10 MW(t). The facility normally operates on a 24-hour-a-day schedule with a shutdown once a week for refueling and

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maintenance.

The NRC has completed its evaluation of the proposed action and concludes that the proposed amendment to extend the expiration date of the facility license to recapture time between construction and operation will not result in a significant increase in environmental impacts. The licensee has not requested any changes to the facility as part of this amendment request. Data from the last ten years of operation was assessed to determine the radiological impact of the facility on the environment.

Environmental surveys are performed by measuring the exposure to 41 thermoluminescent dosimeters (TLDs) placed on and off site at various distances and directions from the facility. The results of this monitoring for all TLDs averaged by year from 1991 to 2000, and the TLD with maximum exposure (both do not include TLDs affected by shipping operations) is as follows:

Year	Average(mrem/yr)	Maximum (mrem/yr)
2000	-1.3	18.6
1999	13.5	43.5
1998	3.4	51.9
1997	9.2	34.8
1996	9.2	34.9
1995	14.6	44.2
1994	20.5	49.7
1993	18.1	28.2
1992	6.3	26.7
1991	4.4	27.3

In addition, the licensee has calculated the dose to the individual member of the public likely to receive the highest dose from air emission of radioactive material to the environment to demonstrate compliance with 10 CFR 20.1101(d). This regulation provides as low as is reasonably achievable criteria for air emissions which must result in an individual member of the

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public receiving a total effective dose equivalent (TEDE) of less than 10 mrem per year. The results of calculations for the years 1991 - 2000, is as follows:

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Year	Dose (mrem/yr)
2000	0.8
1999	0.9
1998	0.9
1997	0.7
1996	0.6
1995	0.7
1994	0.5
1993	0.6
1992	0.4
1991	0.4

These doses are within the constraint on air emissions of 10 mrem per year total effective dose equivalent in 20.1101(d).

The radioactive material released from the facility in airborne effluents is given as follows:

Year	Curies Released (Argon-41)	Curies Released (Total)
2000	975	982
1999	1130	1137
1998	1130	1134
1997	861	870
1996	728	739
1995	878	888
1994	370	385
1993	409	425
1992	470	475
1991	440	441

Airborne effluent releases from the facility consist primarily of argon-41. The releases from the facility met the average concentration requirements of the facility technical specifications. The increase in the amount of radioactive effluents reported released between 1994 and 1995 was the result of a change in the method used by the licensee to sample the effluent. Prior to 1995, the results were based on the analysis of a daily grab sample. From 1995, the activity released was based on calculations performed on data recorded from the gas channel of the

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exhaust stack radioactivity monitor which is in operation 24 hours a day. Analysis of continuous data provided better accuracy than the grab sample method that only measured the radioactive material concentration in the airborne effluent once per day at the time the sample was taken.

Liquid effluent releases to the sanitary sewer were as follows:

Year	Curies Released (Hydrogen-3)	Curies Released (Total)
2000	0.1199	0.1420
1999	0.1670	0.1740
1998	0.5901	0.5980
1997	0.1460	0.1510
1996	0.1487	0.1560
1995	0.0818	0.0900
1994	0.1089	0.1270
1993	0.2574	0.3160
1992	0.1711	0.2150
1991	0.2094	0.2580

Liquid effluent releases from the facility to the sanitary sewer consisted primarily of hydrogen-3. The NRC inspection program confirmed that monthly concentrations met regulatory requirements found in Appendix B Table 3 of 10 CFR Part 20 in accordance with 10 CFR 20.2003.

Shipments of radioactive waste offsite for disposal at approved sites was as follows:

Year	Volume (cubic feet)	Activity (mCi)
2000	1,207.5	249
1999	565.0	281
1998	910.0	53
1997	420.0	404
1996	337.5	1,409
1995	0.0	0
1994	460.0	1,228
1993	392.0	60,105
1992	679.0	1,924
1991	772.5	1,146

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The NRC inspection program confirmed that waste shipments met the requirements of the regulations in 10 CFR Part 20 for waste disposal.

Radiological releases from the facility and associated doses to the public are within regulatory limits or the facility technical specifications and do not have a significant impact on human health or the environment. Monitoring of radiation levels in the environment includes soil, vegetative, and water sampling and direct radiation readings. Results of the monitoring program are reported in the Reactor Operations Annual Report and indicate that the facility does not have a significant impact on human health or the environment. Releases of radioactive material from the facility to the environment for the proposed license extension are estimated to continue at levels similar to those above, which are well within regulatory limits.

Occupational doses to MURR staff and users meet the regulatory requirements found in 10 CFR Part 20, Subpart C, and are as low as is reasonably achievable. No changes in reactor operation that would lead to an increase in occupational dose is expected as a result of the proposed action.

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.

With regard to potential non-radiological impacts, the proposed action does not have any significant impact to historic properties. The facility uses and disposes of small quantities of chemicals [i.e., up to about 5 gallons (20 liters) per year of hydrochloric acid, nitric acid, aqua regia and isopropyl alcohol] in research laboratories. These chemicals are disposed of in compliance with Environmental Protection Agency (EPA) and Missouri Department of Natural

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Resources requirements by the University of Missouri Environmental Health and Safety Department. These chemical forms and quantities are consistent with small university laboratory use.

The quality of the secondary cooling water is maintained using two commercial biocides, a corrosion inhibitor, and sulfuric acid (for pH control). These chemicals are similar to those used in cooling towers for the air conditioning systems of large buildings and enter the environment by evaporation from the tower to the air and by blowdown to the sanitary sewer. About 105 gallons (400 liters) of the two biocides, 700 gallons (2,650 liters) of corrosion inhibitor, and 4,000 gallons (15,150 liters) of sulfuric acid are used annually. The use of these chemicals is approved by EPA. These chemicals are stored in a manner that will contain the chemicals in the event of material storage container failure. The use and disposal of these chemicals will not have a significant impact on the environment. The proposed action will not result in significant increases in the use of these chemicals.

The facility uses approximately 38 million gallons of water annually. The water is supplied by university owned and maintained deep wells which provide water to the campus. Most of the water (28 million gallons) is used in the cooling tower with the majority of the water lost to the atmosphere as water vapor. Wastewater from the facility discharges to the City of Columbia sewer system and is treated at the Columbia Regional Wastewater Treatment Plant.

The Missouri Department of Conservation has determined that no Federal or State listed plants or animals are known to occur on the MURR site, but did identify two species in the vicinity of the project site. One species, the Topeka Shiner, is listed as endangered. MURR withdraws a minimal amount of groundwater for reactor operation, has no major refurbishment or construction activities planned, and will have no significant change in the types or amounts of

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effluents leaving the facility as a result of license extension. Therefore, the proposed action is not expected to affect aquatic and terrestrial biota. The staff concludes there are no significant non-radiological environmental impacts associated with the proposed action.

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

Alternatives to the Proposed Action:

As an alternative to the proposed action, the staff considered denial of the proposed action. Denial of the proposed action would result in expiration of the current license in November 2001, and the commencement of decommissioning if an application for license renewal is not made. If the application is denied, it is expected that the licensee would apply for renewal of the license. With operation under the proposed action or with a renewed license approved by the Commission, the environmental impacts of the proposed action and the alternative are similar. If the Commission denied the application for license renewal, facility operations would end and decommissioning would be required with a likely small impact on the environment. In addition, the benefits of education and research conducted by the facility would be lost. The environmental impacts of the proposed action and this 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 Report prepared for initial licensing of the facility and the power upgrade to 10 MW(t).

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Agencies and Persons Consulted:

In accordance with its stated policy, on [insert date] the staff consulted with the Missouri State official, Mr. Ron Kucera, Director of Intergovernmental Cooperation and Special Projects of the Missouri Department of Natural Resources, regarding the environmental impact of the proposed action. The State official _____.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the NRC 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 December 27, 2000, as supplemented by letter dated April 12 and June 6, 2001, which are available for public inspection, and can be copied for a fee, at the U.S. Nuclear Regulatory Commission's Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. The NRC maintains an Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. These documents may be accessed through the NRC's Public Electronic Reading Room on the internet at <http://www.nrc.gov/NRC/ADAMS/index.html>. Persons who do not have access to ADAMS or who have problems in accessing the documents located in ADAMS may

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contact the PDR reference staff at 1-800-397-4209, 301-415-4737 or by email at pdr@nrc.gov.

Dated at Rockville, Maryland, this day of .

FOR THE NUCLEAR REGULATORY COMMISSION

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

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