

February 2, 2017

Mr. Ralph Butler, Executive Director  
University of Missouri-Columbia  
Research Reactor Center  
1513 Research Park Drive  
Columbia, MO 65211

SUBJECT: UNIVERSITY OF MISSOURI AT COLUMBIA – U.S. NUCLEAR REGULATORY COMMISSION STAFF REQUEST FOR TECHNICAL INFORMATION REGARDING THE REVIEW OF LETTER ON PROPOSED LICENSING APPROACH FOR AN EXPERIMENTAL FACILITY AT THE UNIVERSITY OF MISSOURI - COLUMBIA RESEARCH REACTOR TO PRODUCE MOLYBDENUM-99 (CAC NO. A11010)

Dear Mr. Butler:

The U.S. Nuclear Regulatory Commission (NRC) staff received your letter, "Proposed Licensing Approach for an Experimental Facility at the University of Missouri-Columbia Research Reactor [MURR] to Produce Molybdenum-99," dated January 17, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17019A006). Your letter requested formal responses from the NRC to your position on key licensing considerations for the proposed production of molybdenum-99 using the Selective Gas Extraction method. You also requested that the NRC identify any areas of regulatory concern associated with the proposed licensing approach.

The NRC staff reviewed your request and needs additional information in order to understand your approach and provide a response. The NRC will host a public meeting on February 13, 2017, for the NRC staff and MURR staff to discuss the licensing and technical aspects of a facility to produce molybdenum-99, and to discuss information provided in your January 17, 2017 letter. A list of proposed discussion items is provided in the attached enclosure and is not exhaustive. The NRC staff may identify additional areas for further discussion during the meeting and as dialogue on this topic continues.

R. Butler

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If you need additional information, please contact me at (301) 415-0893, or by electronic mail at [Geoffrey.Wertz@nrc.gov](mailto:Geoffrey.Wertz@nrc.gov).

Sincerely,

***/RA by Alexander Adams for/***

Geoffrey A. Wertz, Project Manager  
Research and Test Reactors Licensing Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-186

Enclosure:  
As stated

cc: See next page

University of Missouri-Columbia

Docket No. 50-186

cc:

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UNIVERSITY OF MISSOURI AT COLUMBIA – U.S. NUCLEAR REGULATORY COMMISSION  
STAFF REQUEST FOR TECHNICAL INFORMATION REGARDING THE REVIEW OF LETTER  
ON PROPOSED LICENSING APPROACH FOR AN EXPERIMENTAL FACILITY AT THE  
UNIVERSITY OF MISSOURI - COLUMBIA RESEARCH REACTOR TO PRODUCE  
MOLYBDENUM-99 (CAC NO. A11010) DATE: February 2, 2017

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**ADAMS Accession No: ML17024A316; \*concurrence via email**

**NRR-106**

OFFICE	DPR/PRLB/PM*	DPR/PRLB/LA*	DPR/PRLB/BC	OGC	DPR/PRLB/PM
NAME	GWertz	NParker	AAdams	MYoung	GWertz (AAdams for)
DATE	1/25/17	1/25/17	1/25/17	2/2/17	2/2/17

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PROPOSED LICENSING APPROACH FOR AN EXPERIMENTAL FACILITY AT THE  
UNIVERSITY OF MISSOURI-COLUMBIA RESEARCH REACTOR  
TO PRODUCE MOLYBDENUM-99

In its letter dated January 17, 2017, staff from the University of Missouri-Columbia Research Reactor (MURR) requested that the U.S Nuclear Regulatory Commission (NRC) staff respond to questions concerning, and identify any additional areas of regulatory concern associated with, the proposed production of molybdenum-99 using the Selective Gas Extraction (SGE) low-enriched uranium (LEU) separation method.

The NRC staff reviewed the January 17, 2017, letter, as well as the information provided by MURR and its partners, General Atomics, Inc., and Nordion (Canada), in the June 2, 2016, public meeting. The June 2016 meeting notice, agenda and MURR presentation slides, can be found at ADAMS Accession Nos. ML16139B063, and ML16216A186, respectively.

Given the unique nature of your proposal and the scope of information needed for the NRC staff to understand your approach and identify regulatory concerns, the NRC staff proposes the following discuss topics for the upcoming public meeting planned for February 13, 2017. Following the public meeting, the NRC staff will consider any supplemental information provided by MURR and may issue a request for additional information to complete its review and respond to MURR's request. Items A through D restate the questions provided in the MURR letter.

General Discussion Topics:

- Discuss the anticipated submission and needed licensing approval schedules for the SGE experimental facility at MURR.
- Discuss the type and number of NRC licenses that will be requested.
- Discuss the SGE LEU separation technology, including any safety-related structures, systems and components (SSCs).

Discussion Topics:

**A. Will a Construction Permit be required (Title 10 of the *Code of Federal Regulations* [10 CFR] Section 50.23)?**

- Discuss the anticipated modifications to the existing MURR facility to accommodate the SGE project.
- Discuss whether the operation of the proposed experimental irradiation facility and the proposed production facility are integral to the operation of the reactor.
- Discuss whether the installation of the SGE hot cells will require a construction permit.
- Discuss any examples of a Part 50 production facility being constructed at a reactor.

**B. Will a change be required to MURR's licensed maximum operating power limit of 10 MWt due to the heat produced from the irradiation of the LEU targets?**

- Discuss the neutronic and thermal-hydraulic coupling between the SGE LEU targets and the reactor core.
- Discuss any new accidents, changes to the maximum hypothetical accident (MHA), safety-related SSCs, or engineering safety features created by irradiating the SGE LEU targets.
- Discuss the k-effective of the SGE LEU targets during irradiation and when the reactor is shutdown, and any impact on the MURR shutdown margin.
- Discuss if the proposed SGE module cooling system is completely separate and independent from the existing cooling systems used to cool the MURR core.

**C. Will a production facility license be required?**

- Discuss the process MURR intends to follow to request a license for the production facility (e.g., Interim Staff Guidance to NUREG-1537 for radioisotope production facilities to support this licensing request).

**D. Will a change from a class 104c license (10 CFR 50.21) to class 103 (10 CFR 50.22) be required? (non-commercial vs. commercial)**

- Discuss whether MURR's proposed production facility, dedicated to commercial molybdenum-99 production, could qualify as a non-commercial facility without taking credit for the educational and research activities conducted at the reactor.
- Discuss the basis for MURR's position that the production facility and utilization facility (reactor) can be considered jointly under the 10 CFR 50.22 criteria for a commercial facility.