UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 16, 2019

Dr. Lei Raymond Cao, Director
Nuclear Reactor Laboratory
Ohio State University
1298 Kinnear Road
Columbus, OH 43212

SUBJECT: THE OHIO STATE UNIVERSITY – REQUEST FOR ADDITIONAL INFORMATION RE: LICENSE AMENDMENT REQUEST TO MODIFY TECHNICAL SPECIFICATIONS 3.5 AND 5.1.2 OF RENEWED FACILITY OPERATING LICENSE NO. R-75 OF THE OHIO STATE UNIVERSITY RESEARCH REACTOR (EPID NO. L-2018-LLA-0231)

Dear Dr. Cao:

The U.S. Nuclear Regulatory Commission (NRC) staff is continuing its review of the Ohio State University (OSU) license amendment request (LAR) to modify technical specifications 3.5 and 5.1.2 for the OSU Research Reactor by letters dated August 27, October 16, and November 14, 2018 (available on the NRC's public website at www.nrc.gov under Agencywide Documents Access and Management System Accession Nos. ML18242A075, ML18291A913, and ML18324A585 respectively).

During the NRC staff's review, questions have arisen for which additional information is needed. The enclosed request for additional information (RAI) identifies the information needed to continue the NRC staff's review. It is requested that OSU provide responses to the enclosed RAI within 30 days from the date of this letter.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.30(b), "Oath or affirmation," OSU must execute its response in a signed original document under oath or affirmation. The response must be submitted in accordance with 10 CFR 50.4, "Written communications." Information included in the response that is considered sensitive or proprietary, that OSU seeks to have withheld from the public, must be marked in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Any information related to security should be submitted in accordance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements." Following receipt of the additional information, the NRC staff will continue its evaluation of the LAR.

If you have any questions, please contact me at 301-415-1404, or by electronic mail at Xiaosong.Yin@nrc.gov.

Sincerely,

/RA/

Xiaosong Yin, Project Manager
Research and Test Reactors Licensing Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No. 50-150
License No. R-75

Enclosure:
As stated

cc: w/enclosure: See next page

cc:

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SUBJECT: THE OHIO STATE UNIVERSITY – REQUEST FOR ADDITIONAL INFORMATION RE: LICENSE AMENDMENT REQUEST TO MODIFY TECHNICAL SPECIFICATIONS 3.5 AND 5.1.2 OF RENEWED FACILITY OPERATING LICENSE NO. R-75 OF THE OHIO STATE UNIVERSITY RESEARCH (EPID NO. L 2018-LLA-0231) DATE: JANUARY 16, 2019

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OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

FOR THE LICENSE AMENDMENT REQUEST

TO MODIFY TECHNICAL SPECIFICATIONS 3.5 AND 5.1.2

AT THE OHIO STATE UNIVERSITY RESEARCH REACTOR

LICENSE NO. R-75; DOCKET NO. 50-150

The U.S. Nuclear Regulatory Commission (NRC) staff is continuing its review of the Ohio State University (OSU) license amendment request (LAR) to modify technical specifications (TSs) 3.5 and 5.1.2 for the OSU Research Reactor (OSURR), by letters dated August 27, October 16, and November 14, 2018 (available on NRC's public website at www.nrc.gov under Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML18242A075, ML18291A913, and ML18324A585 respectively, hereafter referred to as References (Ref.) 1, 2, and 3 respectively). The NRC staff has reviewed OSU LAR and identified the items which need additional information or clarification.

These requests for additional information have been developed based on the following requirements and guidance applicable to the OSU LAR:

- The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR).

- The regulations in 10 CFR Part 20, "Standards for Protection against Radiation," require that radiation doses to workers and members of the public be limited. To support meeting the public dose limits, 10 CFR Part 20, also limits the release of radioactive materials from the licensed facility to the environment (e.g., 10 CFR Part 20, Appendix B, Table 3).

- The regulations in 10 CFR 50.9, "Completeness and accuracy of information," require that information provided to the Commission by a licensee shall be complete and accurate in all material respects.

- The regulations in 10 CFR 50.36, "Technical specifications," require each applicant to propose TSs. Additionally, 10 CFR 50.36(c) provides requirements to include safety limits, limiting safety system settings, limiting conditions for operation, surveillance requirements, design features, and administrative controls requirements. These TSs are derived from the analyses and evaluation included in the safety analysis report (SAR) and submitted pursuant to 10 CFR 50.34, "Contents of applications; technical information." Furthermore, American National Standards Institute/American Nuclear Society-15.1-2007, "The Development of Technical Specifications for Research Reactors," as discussed in NUREG-1537, Part 1, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Format and Content," Chapter 14, "Technical Specifications," provides guidance acceptable to the NRC staff, and, unless acceptable alternatives are justified by the licensee, should be utilized whenever appropriate.

- The regulations in 10 CFR 50.90, “Application for amendment of license, construction permit, or early site permit,” require that the applicant submit an application fully describing the changes desired, and following as far as applicable, the form prescribed for original applications.

- NUREG-1537, Part 1 and Part 2, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Format and Content,” and “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Standard Review Plan and Acceptance Criteria,” issued February 1996 (ADAMS Accession Nos. ML042430055 and ML042430048, respectively).

We request that you provide responses to the following within 30 days from the date of this letter.

1. The NRC staff reviewed the supplemental information provided in Ref. 2, OSURR safety analysis report (SAR), change No. 2, which described the calculational methodology using an average over five effective half-lives of Argon (Ar)-41, in which the effective half-life takes into account losses from exhaust. The NRC staff is not clear, based on this SAR change, how the use of an effective half-life would account for losses from the ventilation exhaust.

   The regulations in 10 CFR 50.90 require that the applicant submit an application fully describing the changes desired, and following as far as applicable, the form prescribed for original applications. Furthermore, the guidance provided in NUREG-1537, Part 1, Chapter 11, “Radiation Protection Program and Waste Management,” Section 11.1.1.1, “Airborne Radiation Sources,” states, in part, that “the models and assumptions used for the prediction and calculation of the dose rates and accumulative doses in both the restricted, controlled (if present), and unrestricted areas should be provided in detail.”

   Provide a detailed description of the methodology used, including any calculations and the resulting Ar-41 concentrations, which indicated that the average of the five effective Ar-41 half-lives would take into account losses from exhaust, or justify why no additional information is needed.

2. The NRC staff observed, in its review of Ref. 2, that several OSURR SAR changes involved calculations of the Ar-41 concentration, at different volumetric flow rates (500 cubic feet per minute (cfm), 1000 cfm, and 1500 cfm), which resulted in concentrations that exceeded the derived air concentration (DAC). See OSURR SAR change Nos.: 3), 7), and 8). The NRC staff is not clear, how OSURR complies with the requirements in 10 CFR 20.1702, “Use of other controls,” to limit exposure to workers during the periods when the Ar-41 concentration exceeds the DAC.

   The regulations in 10 CFR 20.1702 requires licensees to increase monitoring to limit the intake of airborne radioactive isotopes when an airborne radioactive area exists, and other processes or engineering controls are not practical. Furthermore, the regulations in 10 CFR 20.1702 provides methods, as listed in 10 CFR 20.1702 (1) through (4).

   Provide a description of the methods used to limit the intake of Ar-41 during the occurrences when its concentration exceeds the DAC, as required by 10 CFR 20.1702, or justify why no additional information is needed.

3. The NRC staff observed, in its review of Ref. 2, that OSURR SAR change No. 9), stated that the average Ar-41 concentration over the past decade (2008-2017), was unaffected by the assumed 1000 cfm nominal volumetric flow rate of the exhaust fan, as the effluent monitor directly measures the Ar-41 concentration upstream of the exhaust fan. The NRC staff does not understand how the concentration is unaffected by the exhaust fan.

   The regulations in 10 CFR 50.90 require that the applicant submit an application fully describing the changes desired, and following as far as applicable, the form prescribed for original applications. Furthermore, the guidance provided in NUREG-1537, Part 1, Chapter 11, "Radiation Protection Program and Waste Management," Section 11.1.1.1, "Airborne Radiation Sources," states, in part, that "the models and assumptions used for the prediction and calculation of the dose rates and accumulative doses in both the restricted, controlled (if present), and unrestricted areas should be provided in detail."

   Provide a description indicating how the Ar-41 concentration is unaffected by a change to the volumetric flow rate of the exhaust fan, or justify why no additional information is needed.