

November 6, 2012

Mr. Jack Crawford  
Radiation Safety Officer  
The Curators of the University of Missouri  
Environmental Health & Safety  
8 Research Park Development Bldg.  
Columbia, MO 65211

SUBJECT: NRC REVIEW OF LICENSEE AMENDMENT REQUEST FOR ALTERNATIVE  
DECOMMISSIONING SCHEDULE FOR PICKARD HALL – THE CURATORS  
OF THE UNIVERSITY OF MISSOURI (MAIL CONTROL NO. 574562)

This refers to your letter dated February 17, 2011, (ML110540477) and your Characterization Survey Report dated July 16, 2010, (ML102800311, ML102800322, ML102800330, ML102800336, ML102800398, ML102800412, ML102800452, ML102800455, ML102800458, ML102800463, ML102800467, and ML102800563) requesting an Alternate Schedule for submittal of a decommissioning plan (Pickard Hall) as permitted by Title 10 of the Code of Federal Regulations (CFR) 30.36(g)(2).

In addition to these documents, the U.S. Nuclear Regulatory Commission (NRC) also reviewed NRC Reactive Inspection Report 030-02278/10-01(DNMS) dated February 24, 2010 (ML100600810), NRC Inspection Report 030-02278/11-01(DNMS), Cover letter and Notice of Violation (NOV) dated September 16, 2011, (ML11264A063 and ML112720592) and the licensee's response to the NOV dated November 2, 2011 (ML11353A101, ML11353A106, and ML11353A107) which included additional characterization of Pickard Hall.

During the acceptance review process, the NRC had noted the following overall deficiencies regarding the licensee's request for an Alternate Decommissioning Schedule of Pickard Hall:

- The licensee had not performed a full characterization of Pickard Hall to reasonably address all areas that may possess radiological contamination. Specifically regarding the ground soil under the building, the NRC identified areas of radiological contamination within Pickard Hall after the licensee had performed their characterization. Therefore, the NRC is not confident that a full characterization has been performed to ensure the necessary health and safety procedures could be developed, implemented and maintained to protect workers or the public over an extended period of time.
- The licensee did not address radiological emergency procedures or the training of emergency responders in an event involving fire, flood, tornado or other disaster that could release radiological contamination into the surrounding environment.
- The licensee did not address the consequences of a potential release of radioactive material which could result from a fire, flood, tornado or other disaster which could have an impact on members of the general public.

- The licensee did not commit to specific procedures to reasonably address the long term potential for individuals to inadvertently move material or equipment within Pickard Hall (e.g.: maintenance, renovation, etc.) which could contaminate individuals working in the area and members of the public.

The NRC is requesting additional information (RAI) which can be found in the attached Enclosure. The answers to the RAIs will be used to support our review of your request for an Alternate Schedule. The NRC is requesting that each denoted RAI and any other licensee identified issue be addressed and forwarded to the NRC within 90 days of this letter. If you are unable to provide the information within the timeframe requested, the NRC is requesting the licensee forward to the NRC a letter explaining why such information cannot be provided within 90 days and when the licensee believes the information can be sent to the NRC. Please note in addressing the RAI's, you should consider any and all long term radiological impacts associated with maintaining radiological controls of the building and surrounding areas.

Finally, in your letter dated February 17, 2011, the licensee requested an indefinite alternate schedule (delay) in submitting the Decommissioning Plan for Pickard Hall. However, the licensee did not provide an adequate justification concerning the reasons why it would be in the best interest of the public nor provide long term radiological controls for the NRC to grant an indefinite alternate schedule. In addition to the licensee's responses to RAI's, the NRC is requesting the licensee provide a specific date for which the licensee will submit a decommissioning plan. If the licensee is unable to provide a specific date, the licensee should provide an explanation of why a specific date cannot be provided (e.g. funding).

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and enclosure will be available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

J. Crawford

-3-

If you have any questions concerning the enclosed information, please contact Michael LaFranzo of my staff at 630-829-9865.

Sincerely,

**/RA/**

Christine A. Lipa, Chief  
Materials Control, ISFSI  
and Decommissioning Branch  
Division of Nuclear Materials Safety

Docket No. 030-02278  
License No. 24-00513-32

Enclosure:  
Request for additional information

cc w/encl:     Maureen Kotlas, Director,  
                  Environmental Health and Safety  
                  Silvia Jurisson, MU Radiation Safety  
                  Committee Chair  
                  State of Missouri

J. Crawford

-3-

If you have any questions concerning the enclosed information, please contact Michael LaFranzo of my staff at 630-829-9865.

Sincerely,

**/RA/**

Christine A. Lipa, Chief  
Materials Control, ISFSI  
and Decommissioning Branch  
Division of Nuclear Materials Safety

Docket No. 030-02278  
License No. 24-00513-32

Enclosure:  
Request for additional information

cc w/encl: Maureen Kotlas, Director,  
Environmental Health and Safety  
Silvia Jurisson, MU Radiation Safety  
Committee Chair  
State of Missouri

**ADAMS Accession Number: ML12312A095**

DOCUMENT NAME: G:\DNMS\II\Work in progress\LTR- Curators of the University of Missouri-Pickard Hall.docx

☒ Publicly Available ☐ Non-Publicly Available ☐ Sensitive ☒ Non-Sensitive

To receive a copy of this document, indicate in the concurrence box "C" = Copy without attach/encl "E" = Copy with attach/encl "N" = No copy

OFFICE	RIII DNMS	E	RIII DNMS	E				
NAME	MMLaFranzo: jm MML		CALipa CAL					
DATE	11/03/12		11/06/12					

**OFFICIAL RECORD COPY**

**INFORMATION REQUIRED FOR ACCEPTANCE OF PROPOSED ALTERNATE SCHEDULE  
FOR THE CURATORS OF THE UNIVERSITY OF MISSOURI, PICKARD HALL;  
COLUMBIA, MISSOURI**

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its technical review of the licensee's Amendment Request for an Alternate Schedule as requested by the licensee pursuant to Title 10 of the Code of Federal Regulations (CFR) 30.36(g)(2). During the review, the NRC has identified areas for which the NRC is requesting additional information from the licensee prior to making a determination whether the request for an Alternate Schedule will be accepted or rejected. To assist the licensee in providing responses to the requesting additional information (RAIs), the RAIs have been segmented into the following sections:

1. The NRC has additional questions relating to overall justification of the Alternate Schedule;
2. Letter dated February 17, 2011;
3. Pickard Hall Characterization Survey Report received on August 10, 2010;
4. RAI-04a through RAI-04d are associated with the licensee's containment and control of radiological issues associated with emergency events; and
5. An NRC inspection was conducted on August 25 and 26, 2011. During that inspection, the NRC identified that the licensee had not properly addressed all areas within Pickard Hall that may have been contaminated with radioactive materials. Specifically, the licensee had not properly evaluated McLorn Gallery (room 205), wall of the storage room on the second floor (room 213). Research Laboratory 17, the Lecture Hall (room 106), outside of Staff Office 9 in the corridor, above the 9 foot level of Offices 111 and 112 and the Julius Carlebach Gallery (room 206) where elevated radiation levels were identified.

Sections 2 and 3 are further segmented into specific areas that are referenced in the documents referred to.

Below are the RAIs.

**The NRC has additional questions relating to overall justification of the Alternate Schedule.**

**RAI-01a:** The licensee should provide specific dates for the proposed Alternate Schedule.

**RAI-01b:** The licensee should provide a description of how the University will begin planning for and a proposed schedule for the movement of artifacts located within the museum that would allow for the start of decommissioning.

**RAI-01c:** The licensee should demonstrate that conditions of Pickard Hall will not significantly deteriorate and potentially cause a radiological hazard during the proposed Alternate Schedule timeframe.

**RAI-01d:** The licensee should discuss the current decommissioning cost estimate and the potential for increased decommissioning costs, if an Alternate Schedule is approved.

Enclosure

**Letter dated February 17, 2011**

Page 4 of 13, second paragraph, last sentence states “These ducts are within walls and likely extend to the basement, and may be a source of slightly elevated dose rates in limited areas on all elevations.”

**RAI-02a:** The licensee should provide schematics for the ducts to demonstrate that removable contamination does not have a pathway to areas where members of the public or occupation workers are located.

**RAI-02b:** The licensee should develop, implement and maintain procedures to ensure members of the public or occupation workers do not gain unauthorized access to the ducts within the walls without authorization from the licensee’s radiation safety program.

Page 4 of 13, third paragraph, last sentence states “There may also be subsurface soil contamination under the basement floor.”

**RAI-02c:** The licensee should provide documentation to show that the contamination will not migrate from under the basement floor to areas where members of the public or occupation workers could be exposed to radioactive material over the timeframe of the Alternate Schedule.

**RAI-02d:** The licensee should demonstrate whether contamination under the soil has the potential to impact the ground water, potable or not, in the area of Pickard Hall.

**RAI-02e:** The licensee should develop, implement and maintain procedures to ensure members of the public or occupation workers do not gain access to the contamination under the basement floor without authorization from the licensee’s radiation safety program.

Page 6 of 13, Section 3.5 states that “Building occupants are trained as occupational radiation workers...”

**RAI-02f:** The licensee should provide a detailed description of the workers in Pickard Hall who will be considered occupational radiation workers and what training those individuals are to have received as occupational workers. This includes current and future workers within Pickard Hall.

Page 8, paragraph 1 of Section 4.0 and Page 9 of Section 4.2.5 refers to the licensee monitoring and approving any “invasive activities” either inside or outside of Pickard Hall.

**RAI-02g:** The licensee should provide a description of what is meant by “invasive activities” and how the licensee plans to control them in accordance with 10 CFR 30.36.

Page 8 of Section 4.1.1 indicates that wall and floor surfaces were covered with an encapsulant product to limit the spread of radiological contamination.

**RAI-02h:** The licensee should provide a description of how and how often the licensee will inspect the integrity of the encapsulant.

**RAI-02i:** The licensee should provide a description of what actions the licensee will take if the encapsulant is determined to be compromised.

Page 9 of Section 4.2.4 provided information associated with the licensee's inspection and surveillance program associated with Pickard Hall.

**RAI-02j:** The licensee should provide a description of the locations and periodicity of the routine surveillance program that will be used for Pickard Hall.

**RAI-02k:** The licensee should provide the type of instruments and capabilities of each instrument that will be used to monitor the building.

Page 11 of 13, paragraph 2 of Section 6 states that "Pickard Hall houses the MU's Museum of Art and Archaeology and is listed on the National Register for Historic Buildings."

**RAI-02l:** The licensee should provide a description of why the listing of Pickard Hall on the National Register for Historic Buildings affects conduct of decommissioning operations and how this effect will be changed if the Alternate Schedule is granted or denied.

Page 11 of 13, paragraphs 2 and 3 of Section 6 implies that decommissioning activities would significantly impact of the educational, cultural, and historical value of the museum and Pickard Hall.

**RAI-02m:** The licensee should describe how the conduct of decommissioning operations would affect these activities which include, but are not limited to, operation of the museum; undergraduate, graduate, and other instructional programs; current and future museum contracts; and museum artifacts both in the basement and the upper floors storage and viewing areas. Additionally, the licensee should provide an estimated timeline for the length of disruption during decommissioning activities for each area.

Attachment 1 – Pickard Hall Radon Monitoring Results. Portions of the Attachment are unreadable.

**RAI-02n:** The licensee should provide legible copy of Attachment 1.

#### **Pickard Hall Characterization Survey Report received on August 10, 2010**

Page 12 of 20, Section 7.5 Titled "Efficiency Determination," last sentence states "Due to cleanliness of smears, no correction was made for alpha shielding from dust loading." Section 9.4.1 states "Large Area Wipes (LAWs) of 100% of accessible floor surfaces were performed by wiping a Masslinn cloth over an area of 400 ft<sup>2</sup> or more per wipe and then performing alpha and beta static measurements on the cloth."

**RAI-03a:** The licensee should provide documentation that 400 ft<sup>2</sup> did not collect a sufficient amount of dust so that no correction was necessary for alpha shielding from dust loading.

**RAI-03b:** The licensee should provide documentation regarding efficiency corrections for alpha shielding from dust loading, if applicable.

Page 14 of 20, Section 9.2.2 Titled "Gamma Scans," last sentence states for indoor and outdoor gamma scans, "It should be noted that, even though elevated radiation levels were identified, all of the more than 13,000 measurements were less than twice background rate." Appendix F (Indoor Gamma Scans) and Appendix G (Outdoor Gamma Scans) contains maps and gamma scan results which indicate some measurements were greater than twice background rate.

Comment: The report's statement in Section 9.2.2 appears to contradict data results from Appendix F and Appendix G.

**RAI-03c:** The licensee should provide information that clarifies the statements in Section 9.2.2 in relationship to Appendix F and Appendix G.

**RAI-03d:** The licensee should provide explanation of how the gamma scans noted in Appendix F and Appendix G relate to dose rates and potential spread of contamination for those individuals who have access to those areas.

Page 11 of 20, Table 7-2 denotes a gross alpha surface scan rate of 0.2 inches per second and a gross beta surface scan rate of 0.5 inches per second for a Ludlum Model 43-68.

**RAI-03e:** The licensee should provide documented training and/or survey procedures to ensure that scanning techniques could achieve the scanning rates for the Ludlum Model 43-68.

Page 11 of 20, Table 7-2 denotes an MDA of 2.8 pCi/g for Ra-226, 1.8 pCi/g for Th-232 and 80 pCi/g for  $U_{nat}$  using a Ludlum 44-10.

**RAI-03f:** The licensee should provide procedures or other documentation used to convert cpm (the readout for a Ludlum 44-10) to pCi/g for Ra-226, Th-232 and  $U_{nat}$ .

Page 17 of 20, Section 9.8 titled "Sample Chain-of-Custody" states "Samples sent off-site for analysis used an approved Chain of Custody Procedure."

**RAI-03g:** The licensee should provide Chain of Custody Procedure.

Page 18 of 20, section 11 titled "Encapsulation of Mechanical Rooms and section 12 titled "Interpretation of Survey Results" documents numerous locations where residual radioactivity exists.

**RAI-03h:** The licensee should develop, implement and maintain procedures on how the licensee will ensure the proper control and encapsulation of those and any other areas where radioactive material are located. The procedures shall include appropriate encapsulation and control verification over time and actions to be taken if encapsulation and/or control have been compromised. Contamination areas identified both inside and outside of the building shall be considered.

**RAI-03i:** The licensee should develop, implement and maintain training procedures for any and all groups of individuals who have access to any area where residual radioactivity exists that have the ability to compromise the encapsulation and/or control of areas. Contamination areas identified both inside and outside of the building shall be considered.



**RAI-03j:** The licensee should develop, implement and maintain procedures to limit the intrusion of water into areas where residual radioactivity exists.

**RAI-03k:** The licensee should develop, implement and maintain procedures regarding contingency plans of water intrusion into areas where residual radioactivity exists. These procedures shall address radiological analysis of water, contamination control and disposal of potentially contaminated water.

**RAI-03l:** The licensee should develop, implement and maintain procedures to ensure unauthorized individuals do not gain access to the Feeder or Steam Tunnels.

**RAI-03m:** The licensee should provide schematics of known and potentially contaminated drain and sewer lines.

**RAI-03n:** The licensee should develop, implement and maintain procedures to ensure unauthorized individuals do not gain access to known contaminated drain and sewer lines.

**RAI-03o:** The licensee should develop, implement and maintain procedures to periodically verify contamination from the steam tunnel, drains and sewer lines has not spread beyond the known contamination confines.

**RAI-04a through RAI-04d are associated with the licensee's containment and control of radiological issues associated with emergency events.**

**RAI-04a:** The licensee should develop, implement and maintain procedures to address fire suppression systems in those areas where residual contamination exists.

**RAI-04b:** The licensee should provide analysis of potential onsite and off-site radiological contamination and dose to members of the public if a fire were to consume areas where residual contamination exists.

**RAI-04c:** The licensee should develop, implement and maintain training procedures for any and all responders to an emergency within the building that could involve the release of radiological contamination. (e.g. fire and police departments)

**RAI-04d:** The licensee should provide analysis of potential onsite and offsite radiological contamination and dose to members of the public if a natural disaster were to occur (tornado, flood, earthquake, etc.) and cause damage to the Pickard Hall in areas where residual contamination exists.

**An NRC inspection was conducted on August 25 and 26, 2011. During that inspection, the NRC identified that the licensee had not properly addressed all areas within Pickard Hall that may have been contaminated with radioactive materials. Specifically, the licensee had not properly evaluated McLorn Gallery (room 205), wall of the storage room on the second floor (room 213). Research Laboratory 17, the Lecture Hall (room 106), outside of Staff Office 9 in the corridor, above the 9 foot level of Offices 111 and 112 and the Julius Carlebach Gallery (room 206) where elevated radiation levels were identified.**

**RAI-05a:** The licensee should provide radiological evaluations of all areas above concerning fixed and removable contamination.

**RAI-05b:** The licensee should develop, implement and maintain procedures for movement of any and all furniture, mechanical equipment or any other item to address and/or identify any fixed or removable contamination that may have resulted, either directly or indirectly, from such movement.

**RAI-05c:** The licensee should develop, implement and maintain procedures on how to control any fixed or removable contamination, as identified from actions concerning RAI-05b, to ensure members of the general public and occupational workers are not unnecessarily exposed to radiation and/or radioactive material.