



Radiation Protection Office
Environmental Health and Safety
201 Academic Projects Building
The Pennsylvania State University
University Park, PA 16802
<http://www.ehs.psu.edu>

April 1, 2014

Director, Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852 - 2738

Re: License Number SNM-95 (Docket Number 070-0113), TAC L33305
PSU letter of February 4, 2014 re-submitting the amendment request originally dated
December 18, 2013.

Subj: Response to Request for Additional Information NRC letter dated March 19, 2014

This letter submits Penn State University's response to NRC's Request for Additional Information letter dated March 19, 2014. There are two copies being provided: the first is an un-redacted response not for public disclosure and the second is a redacted version for public disclosure.

[Redacted]

Please contact me for correspondence or if you need any additional information.

Jeffrey Leavey, CHP
Radiation Safety Officer
201 Academic Projects Building
Penn State University
University Park, PA 16802
814-863-3939
JAL62@psu.edu

Sincerely,

Jeffrey Leavey, CHP
Radiation Safety Officer

Enclosures: 1 – Penn State University RAI response

[Redacted]

[REDACTED]

Enclosure 1 – Penn State University Response to NRC Request for Additional Information (TAC L33305)

RAI #1 – Section 1.1 of the amendment request discusses the alternate location (i.e., [REDACTED] [REDACTED] where special nuclear material (SNM) will be used. Describe the postings for the proposed alternate location, where the SNM is to be used.

Response #1 – [REDACTED] [REDACTED] will be posted as required in 10 CFR 20.1902(e). The SNM storage safe will also be posted with the same wording.

RAI #2 – Section 4.3 of the amendment request describes containers in which the SNM will be stored. The containers are to be stored in a locked cabinet. Describe the intended labeling for both the containers and the cabinet. Provide a photograph or diagram of the high strength, screw-top containers.

Response #2 – All SNM will be kept in individual containers inside the storage safe. All containers for SNM will be labeled as required in 10 CFR 20.1904(a). [REDACTED]
[REDACTED]
[REDACTED], SNM will be kept in a labeled zip-lock plastic bag; both the screw-top container and zip-lock bags will be labeled as stated above. A sample picture of the containers is shown below.



[REDACTED]

RAI #3 – Section 4.3 of the amendment request states that screw-top containers will be stored in a locked cabinet and this cabinet will be affixed to a wall to prevent removal. Attachment 4 gives an example of a storage cabinet. Provide detail on exactly what will be used for storage and how such storage will be affixed to prevent removal.

Response #3 – The Radiation Safety Officer (RSO) and Principal Investigator (PI) have decided to use a [REDACTED] of the amendment request letter dated February 4, 2014. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Label	Segment 1 (Light Blue)	Segment 2 (Light Green)
1	0.8	0.2
2	0.9	0.1
3	0.7	0.3
4	0.9	0.1
5	0.8	0.2
6	0.9	0.1
7	0.7	0.3
8	0.8	0.2
9	0.9	0.1
10	0.7	0.3

[illegible]

[REDACTED]

RAI #6 – Section 4.2 of the amendment request states, “Although airborne activity is not expected, the LIBS procedure for opening the chamber will be to vent and pump down the chamber with air for three cycles.” Describe the venting system (e.g., filtered, common building stem). Discuss the ultimate discharge of the chamber contents.

Response #6 – The vacuum path from the [REDACTED] consists of a high vacuum pump with two HEPA filters in series followed by a roughing vacuum pump. The ultimate discharge of the roughing pump is to the lab environment.

RAI #7 – Section 2.0 of the amendment request states that the authorization for the PI to utilize SNM as described in the submittal is under review by the University Isotopes Committee (UIC). Discuss the criteria that need to be met for such authority to be granted. Include training requirements for staff and students, including laser safety as it pertains to the SNM. Include the manner in which such authorizations are documented.

Response #7 – The PI must submit a proposal for working with radioactive material, including SNM, to the RSO which includes these topics: the proposed use and experimental procedures in sufficient details to allow the UIC to understand the process, materials used (including chemicals), and wastes produced; potential for airborne and control measures to be used; radiation detection equipment available to the lab; waste disposal including the types of waste generated, chemical/biological forms, and segregation by half-life and/or chemical or biological compatibility; non-radioactive and/or biological wastes to be produced and how will they be handled and stored; training plan of the PI and users; security plan for radioactive materials and wastes; and the dosimetry plan. The RSO reviews the proposal for appropriate ALARA goals and risk factors and works with the PI to address missing or incomplete information; additional knowledgeable resources may be used by the RSO during the review. Once the RSO is satisfied with the content of the proposal it is submitted to the UIC for their review. Specifically for SNM, one or more of the UIC members is a Nuclear Engineering faculty member or the UIC may utilize Breazeale Reactor staff as part of their proposal approval process.

Training for SNM use is based on the risk associated with the material to be used and the proposed experimental use. At a minimum, all SNM users attend the standard University radioactive materials training program. Additional SNM specific training is provided when warranted as determined by the RSO and UIC. For this amendment request there is no criticality or unsealed/dispersible SNM concerns that warrant SNM specific training.

Authorizations are documented in an application completed by the PI, reviewed and edited by the PI and RSO, and provided to the UIC. The UIC approval, or request for additional information or changes, are documented by email exchange between the UIC members and the RSO or voted on at one of the quarterly UIC meetings.

RAI #8 – Section 4.2 of the amendment request states that various surveys will be performed during the course of daily work. Section 10.0 describes a termination survey to be completed, relevant to Decommissioning. Describe the documentation and retention requirements for the surveys thus performed.

[REDACTED]

Response #8 – Surveys performed as part of Section 4.2 of the amendment request will not be documented but are used to provide informal verification that no SNM contamination is present. [REDACTED]

[REDACTED]

An unlikely positive indication of contamination would initiate a spill response notification by the lab to the Radiation Protection Office (RPO). The RPO performs quarterly surveys (meter scans and wipes) of SNM material use areas which are documented on survey forms and kept by the RPO.

Quarterly and decommissioning surveys in Section 10 of the amendment request are formally documented on survey forms and kept in the RPO for the duration of the license.

RAI #9 – Section 6.2 of the Rules and Practices for the Use of Radioactive Material at the Pennsylvania State University states that food consumption is authorized and permitted, under certain conditions, in offices where SMN is used. Describe conditions and restrictions on storing and consuming food in the subject areas identified in the amendment request.

Response #9 – [REDACTED]

[REDACTED]

[REDACTED]

RAI #10 – Section 1.1 and Section 4.1 of the amendment request give a general description of a review and approval process. Clarify that there are written procedures of the review and approval process. Clarify that there are detailed procedures, for the PI, lead researcher, and students, regarding specific actions for the research and that these procedures have been reviewed and approved by the UIC. Such procedures include, but are not limited to handling SNM, use of a laser on the SNM, survey of areas, and security of the SNM.

Response #10 – See Response #7 above. In addition, see Section 5 of the *Rules and Practices for the Use of Radioactive Material at the Pennsylvania State University* which describes the process for obtaining an authorization.

RAI #11 – Describe the facility's building construction, fire area determination, electrical installation, emergency lighting, life safety/egress, ventilation, and lightning protection.

Response #11 – [REDACTED] is of concrete, cinderblock, and metal and is considered fire resistive. It was originally built to Pennsylvania Department of Labor and Industry Title 34. Renovations, alterations, and additions since 2004 have been designed and constructed to the Pennsylvania Uniform Construction Code (UCC State wide building code) which has adopted a series of ten (10) International Construction Codes including the International Existing Building Code, International Building Code, National Electrical Code (NFPA 70), International Plumbing Code, International Mechanical Code, International Fire Code, International Fuel gas Code etc.

[REDACTED] and consists of concrete block walls and floors. Doors are fire rated. There is a drop ceiling with a concrete ceiling above. Ventilation is for room air comfort only as there are no fume hoods or other experimental specific exhaust drops.

[REDACTED]

In [REDACTED] the most likely fire scenario would be an electronics failure causing a local fire on a metal laser table. The smoke detector would alarm and campus police would call the fire department. Since SNM is kept either in the [REDACTED], most likely no consequences to SNM will occur.

In addition, the melting point of uranium oxide fuel is more than 2800 °C (>5000 °F) so no SNM will cause contamination or be affected by anticipated fire scenarios.

RAI #16 – Identify the location of the SNM in the alternate location. State the form and amount of SNM in the alternate location. Describe the physical barriers separating the SNM from a potential fire incident. State, if any, the fire rating of barriers.

Response #16 – The location of SNM was described in Section 1.1 of the amendment request. The form and amount of SNM was described in Section 1.1 of the amendment request. [REDACTED]

[REDACTED]

[REDACTED].

In storage, the physical barrier will be the fire resistant safe described in Response #3. In use, the physics barrier will be the [REDACTED].

RAI #17 – Describe hazardous chemicals or processes which may contribute to fire hazards in the areas of the alternate location where the SNM will be used.

Response #17 – [REDACTED] and contains no hazardous chemicals. [REDACTED] with mechanical and electronic contents. For preparing optics and other parts for use, [REDACTED] one liter or less of acetone and less than 100 milliliters of propanol and methanol solvents. No hazardous chemicals are used in the [REDACTED].

RAI #18 – State applicable fire codes, such as National Fire Protection Association (NFPA) 45, Standard for Fire Protection in Laboratory Facilities, or NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials, that the alternate location meets.

Response #18 – See Response #11 and #14.

RAI #19 – Describe the frequency and scope of training for PI, Lead researcher, and students, in response to a fire (e.g., use of a fire extinguisher, safe shutdown protocol, evacuation).

Response #19 – Fire extinguisher training for faculty, staff, and students is voluntary. Training consists of classroom instruction on fire prevention for offices and labs, types and uses of extinguishers, how to use an extinguisher, and practice with a hands-on extinguisher simulator.

The State of Pennsylvania codes do not require evacuation drills. [REDACTED] has a written evacuation plan covering exit locations, designated meeting areas, fire extinguisher locations, and meet OSHA requirements.

[REDACTED]

RAI #20 – If an on-site fire department is at the Pennsylvania State University, describe the responding qualifications and training of such fire department members.

Response #20 – Penn State does not have an on-site fire department.

RAI #21 – Describe pre-fire plan coordination with the responding fire department (e.g., fire drills, preparation for hazardous materials response). Discuss knowledge of responders to both the presence of SNM and the health hazards of the SNM.

Response #21 – Because Penn State is a major research university, the local fire department is trained in hazmat response for chemical and radiological incidents in accordance with Pennsylvania State standards. The Penn State HazMat team and RPO provide support when radiological materials are involved in an incident. Penn State has met with local fire department staffs in the past to discuss the hazards in Penn State labs, including radiological. The RSO, working through the Penn State Environmental Health and Safety Fire Marshall, will inform the fire department chiefs when SNM is located in [REDACTED]
[REDACTED]

RAI #22 – Describe the fire protection used for the transportation of the SNM (e.g., transported in a fire rated safe). Discuss the fire specifications of the transporting containers.

Response #22 – [REDACTED]
[REDACTED]
[REDACTED] will be appropriate to the material being moved. [REDACTED]
[REDACTED]

[REDACTED] SNM will be in the containers described in Response #2 and then packaged according to DOT requirements in 49 CFR 173 Subpart I. A cardboard packaging is sufficient for the SNM requested [REDACTED]
[REDACTED].