

DOCKET: 70-113

LICENSEE: Pennsylvania State University

SUBJECT: Use of Special Nuclear Material at an Alternate Location

## 1. GENERAL INFORMATION

Special nuclear materials (SNM) license SNM-95, held by Pennsylvania State University (PSU), specifies that SNM is to be used at the [REDACTED] Facility and the [REDACTED] Building located at University Park, Pennsylvania (Ref. 1). By letter (Ref. 2) dated December 18, 2013, PSU submitted a request to use SNM for research and development of spectroscopy techniques at the [REDACTED] Building, which is also at the University Park site; this additional location is requested because the research equipment cannot be readily relocated. PSU resubmitted the application (Ref. 3) by letter dated February 4, 2014. The staff at the U.S. Nuclear Regulatory Commission (NRC) evaluated the request using the Standard Review Plan (SRP) (4).

### 1.1. Background

The NRC staff accepted the application (Ref. 5) for a detailed technical review by letter dated February 24, 2014. Requests for additional information (RAIs) (Ref. 6) were sent by letter dated March 19, 2014. PSU responded (Ref. 7) to the RAIs by letter dated April 1, 2014. The NRC had several discussions during the week of July 28, 2014, to clarify several items while drafting the Safety Evaluation Report; at the request of the NRC staff, the licensee documented the clarifying information (Ref. 9).

## 2. EQUIPMENT AND PROCEDURES

10 CFR 70.22(a)(7) requires a description of equipment and facilities which will be used to protect health and minimize danger to life or property, such as handling devices, working areas, shields, measuring and monitoring instruments, devices for the disposal of radioactive effluents and wastes, storage facilities.

10 CFR 70.22(a)(8) requires a description of the proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures).

PSU states (Ref. 3) that the spectroscopy process consists of placing SNM in a high vacuum chamber through an opening at the top of the chamber. The chamber has windows that allow the laser light to enter and the plasma light to exit. The chamber is evacuated using a vacuum pump that draws air from the chamber through a high efficiency particulate (HEPA) filter. In the chamber, the SNM is irradiated with a terawatt laser, pulsing at durations of a nanosecond to femtosecond. About  $3 \times 10^{-9} \text{ cm}^{-3}$  of SNM per laser pulse is expected to ablate into the chamber. The resulting ionization of the target is analyzed using optical emission spectrometry to determine the elemental and isotopic composition of the materials and contaminants present. After the irradiation, but before the chamber is opened, the chamber is vented and evacuated for three (3) cycles. The vacuum path from the chamber 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 (Ref. 7).

Enclosure 4

The [REDACTED] building is constructed of concrete block walls and floors. The room where the experiments take place is a laboratory that is below grade. The SNM is to be stored in a safe (Ref. 7). See also Section 8.3.

The staff has reviewed the general facility description of PSU according to Section 1.1 of the Standard Review Plan. PSU has adequately described the facility and its processes so that the staff has an overall understanding of the relationships of the facility features and the function of each feature. Therefore, the NRC staff concludes that PSU has complied with the general requirements of 10 CFR 70.22, "Contents of Applications".

### 3. ORGANIZATION AND ADMINISTRATION

10 CFR Part 70.22(a)(6) requires that the technical qualifications, including training and experience of the applicant and staff members to engage in the proposed activities.

PSU states (Ref. 3) that the organization and administration of license SNM-95 remains unchanged. PSU is requesting that SNM be allowed to be used at the [REDACTED] Building at the same site.

The NRC staff approved the organization and administration section during the renewal of the SNM-95 license in 2003 (Ref. 8). Because no change is proposed by PSU, the NRC staff finds that the PSU meets the requirements of 10 CFR Part 70.22(a)(6).

### 4. INTEGRATED SAFETY ANALYSIS AND INTEGRATED SAFETY ANALYSIS SUMMARY

10 CFR Part 70.60(a) states that the regulations in § 70.61 through § 70.76 apply to an applicant or licensee that possess greater than a critical mass of special nuclear material, and is engaged in enriched uranium processing, fabrication of uranium fuel or fuel assemblies, uranium enrichment, enriched uranium hexafluoride conversion, plutonium processing, fabrication of mixed-oxide fuel or fuel assemblies, scrap recovery of special nuclear material, or any other activity that the Commission determines could significantly affect public health and safety.

PSU is not engaged in the processing that is specified in § 70.60(a). Therefore, PSU is not required to conduct an Integrated Safety Analysis and submit an Integrated Safety Analysis Summary.

### 5. RADIATION PROTECTION

#### § 19.12

10 CFR Part § 19.12 (a) states that all individuals who in the course of employment are likely to receive in a year an occupational dose in excess of 100 mrem (1 mSv) shall be--

- (1) Kept informed of the storage, transfer, or use of radiation and/or radioactive material;
- (2) Instructed in the health protection problems associated with exposure to radiation and/or radioactive material, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed;



- (3) Instructed in, and required to observe, to the extent within the workers control, the applicable provisions of Commission regulations and licenses for the protection of personnel from exposure to radiation and/or radioactive material;
- (4) Instructed of their responsibility to report promptly to the licensee any condition which may lead to or cause a violation of Commission regulations and licenses or unnecessary exposure to radiation and/or radioactive material;
- (5) Instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation and/or radioactive material; and
- (6) Advised as to the radiation exposure reports which workers may request pursuant to § 19.13.

(b) In determining those individuals subject to the requirements, a licensee must take into consideration assigned activities during normal and abnormal situations involving exposure to radiation and/or radioactive material which can reasonably be expected to occur during the life of a licensed facility. The extent of these instructions must be commensurate with potential radiological health protection problems present in the work place.

PSU stated (Ref. 7) that 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 University Isotope Committee (UIC)<sup>1</sup>. For this amendment request there are no criticality or unsealed/dispersible SNM concerns that warrant SNM specific training.

During its review of the license renewal dated May 22, 2003 (Ref. 10), the NRC staff approved the training (Ref. 8). Because no changes are proposed, the NRC concludes that the proposed research is encompassed by the instruction given to users of SNM. Therefore, the NRC staff finds that PSU meets the requirements of 10 CFR 19.12.

#### § 20.2001(a)

10 CFR 20.2001(a) requires that a licensee specify the means of disposal of radioactive waste.

Section 10 of the subject application (Ref. 3) describes the radioactive wastes that are expected from the use of the SNM. PSU estimates that about 10 pounds of waste will be made during the course of the research. The waste will consist of bench paper, gloves, vacuum hoses, vacuum filters, and paper towels used for cleaning. This waste will contain an estimated ■ nCi of

<sup>1</sup> The University Isotopes Committee (UIC) is described in Reference 10. The UIC is responsible for overseeing activities under the licenses issued to the University for the use of radioactive materials and for insuring that such uses meet Federal, State, and University regulations. The Committee is composed of faculty members representing those areas of research and teaching that are the main users of radioactive materials. The UIC has a member who represents senior management, and may include non-university personnel with experience with radioactive material. The Penn State Radiation Safety Officer (title: Manager of Radiation Protection, Environmental Health and Safety) is also a member and will attend all meetings. All current members of Penn State's radiation safety committee are tenured faculty except for the administrative representative and the RSO. Each member of the UIC, except for the administrative representative, will have a bachelor's degree in science or engineering and have at least three years experience with radioactive materials or have a medical degree.



uranium that will be disposed as long-lived radioactive waste. Disposal procedures are specified in Section 11 of Reference 10, where the waste management program for handling, characterization, minimization, storage and disposal of radioactive wastes are described.

During its review of the license renewal dated May 22, 2003 (Ref. 10), the NRC staff had approved of the radioactive waste disposal procedures at PSU (Ref. 8). The NRC staff concludes that the expected waste from the subject research can be safely disposed by the existing procedures. Because no changes are proposed to the existing procedure, the NRC staff finds that the applicant meets the requirement of 10 CFR 20.2001(a).

#### § 20.2110

10 CFR 20.2110 requires that records must be legible throughout the specified retention period. The record may be the original or a reproduced copy or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, must include all pertinent information, such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

The renewal application dated May 22, 2003 (Ref. 10) states that PSU supervisors are responsible for maintaining a current record of the radioactive materials in their possession. The PSU Department of Environmental Health and Safety (EHS) retain records of training, transport, dosimetry, and permissions. Dosimeter records are maintained by EHS and are available to each individual upon written request.

The subject application (Ref. 3) does not discuss record keeping. The license renewal dated May 22, 2003 (Ref. 10) discusses recording keeping in that dosimeter records are maintained by EHS. Dosimeters must be returned to EHS as soon as replacements are received, even though an individual may not have worked with radiation during the issue period, to ensure that the University has a continuous record for the time periods during which an individual might have been exposed to radiation. Each request for acquiring radioactive material must be approved by EHS; approvals records are kept by EHS. Requests to use radioactive materials that are evaluated by the UIC, which meets quarterly, are maintained by EHS. Survey instruments used by EHS for radiation measurements are calibrated by EHS staff annually, with records of calibrations kept for at least three years. The subject application proposes no changes to record keeping.

During its review of the license renewal dated May 22, 2003 (Ref. 10), the NRC staff approved (Ref. 8) of record keeping. PSU does not discuss, and proposes no changes to record keeping by the subject application (Ref. 3). Therefore, the NRC staff finds that PSU meets the requirements of 10 CFR § 20.2110.

#### § 20.1101(a)

10 CFR 20.1101(a) requires a licensee to develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities.

Supplement C of the license renewal application dated May 22, 2003 (Ref. 10), describes the radiation protection program. During its review of license renewal, the NRC staff had approved



the radiation safety program (Ref. 8). The subject application (Ref. 3) does not change the radiation safety program. The NRC staff determined that the proposed use of SNM is encompassed by the radiation protection program.

Because no changes are made to the approved radiation protection program, and the proposed use of SNM is encompassed by the radiation program, the NRC staff finds that PSU meets the requirements of 10 CFR 20.1101(a).

#### § 20.1101(b)

10 CFR 20.1101(b) requires that a licensee use, to the extent practical, procedures, and engineering controls to achieve occupational doses and doses to the members of the public that are as low as reasonably achievable (ALARA). In regards to the subject application, § 20.1101(b) has two aspects:

- The subject application (Ref. 7) states eating, drinking, and smoking are prohibited in Room ■■■, where the subject research will be conducted; eating and drinking are allowed in Room ■■■ (adjacent office area).
- By Section 7.1 of Supplement C of the license renewal dated May 22, 2003 (Ref. 10), PSU committed to keeping releases of radioactive material and the exposure of people to ionizing radiation ALARA. In particular, occupational exposures of personnel to radiation may not exceed the limits in the Federal and State regulations. In addition, occupational exposure of personnel that exceed 100% of permissible limits will be investigated by EHS to determine whether the exposures or releases were ALARA and whether or not action is required to limit future exposures or releases.

During its review of the license renewal dated May 22, 2003 (Ref. 10), the NRC staff had approved of the ALARA program (Ref. 8). The NRC staff finds that PSU will keep radiation dose as ALARA by prohibiting food, drink, and smoking in Room 9, and by previously approved measures. The staff finds that PSU meets the requirement of 10 CFR 20.1101(b).

#### § 20.1501(a)(2)

10 CFR 20.1501(a)(2) requires a licensee to make, or cause to be made, surveys of areas, including the subsurface that are reasonable under the circumstances to evaluate (i) the magnitude and extent of radiation levels; (ii) the concentrations or quantities of residual radioactivity; and (iii) the potential radiological hazards of the radiation levels and residual radioactivity detected.

Section 4.2 of the subject application (Ref. 3) states that contamination surveys will be performed using a Geiger-Mueller (GM) detector through the course of a day's work. At the completion of the work day, the work areas will be surveyed with a Zinc-Sulfide (ZnS) detector, as a second check for alpha particulate. PSU states (Ref. 7) that the daily surveys will not be documented, but are used as a means of routinely verifying that no contamination is present. Quarterly surveys will be performed and documented relative to decommissioning.

The NRC staff concludes that the surveys are sufficient to evaluate the magnitude and extent of radiation levels, the concentrations or quantities of residual radioactivity, and the potential radiological hazards of the radiation levels and residual radioactivity detected. The NRC staff finds that PSU meets the requirements of 10 CFR 20.1501(a).

#### § 20.1701

10 CFR 20.1701 requires a licensee to use, to the extent practical, process or engineering controls to control the concentration of radioactive material in air.

Sections 4.1 and 4.2 of the subject application (Ref. 3) describe the process of using of SNM in the proposed experiments. As stated by the NRC staff in Section 2, the spectroscopy process consists of placing in a test chamber where it is irradiated with laser light, causing some of SNM to ablate. The test chamber is eventually vented through High Efficiency Particulate (HEPA) filters. Three cycles of evacuating and venting the test chamber are to be done prior to opening the test chamber.

The NRC staff concludes that PSU has process controls (i.e., repeated evacuation/venting cycles) and engineering controls (i.e., HEPA filters) to control the concentration of SNM in air. The NRC staff finds that PSU meets the requirement of 10 CFR 20.1701.

#### § 20.1201(d) and § 20.1502(b)(1)

10 CFR 20.1201(d) states that the Derived Air Concentration (DAC) and Annual Limit on Intake (ALI) values presented in Table I of Appendix B to Part 20 may be used to determine an individuals' dose and to demonstrate compliance with the occupational dose limits.

10 CFR 20.1502(b)(1) requires a licensee to monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits. At a minimum, a licensee is to monitor the occupational intake of radioactive material by, and assess the committed effective dose equivalent to, adults likely to receive, in one year, an intake in excess of 10 percent of the applicable ALI(s) in Table 1, Columns 1 and 2, of Appendix B to § 20.1001-20.2402.

PSU performed a preliminary evaluation of the effect of the experimental process using thorium ( $^{232}\text{Th}$ ) and uranium ( $^{238}\text{U}$ ) samples. Fixed and removable contamination surveys indicated no activity above background levels.

An analytical analysis was performed to evaluate the potential for airborne activity given the following:

- Samples of  $^{238}\text{U}$  and  $^{235}\text{U}$ ,
- 50,000 laser pulses over the course of a year
- an ablation amount of  $3 \times 10^{-9} \text{ cm}^3/\text{pulse}$ , and
- all of the ablated SNM is inhaled.

The Committed Effective Dose Equivalent (CEDE) was calculated to be 762 mrem; this value is below the limit of 10 CFR 20.1201(a)(1)(i), but it is in excess of the 10% rule of 10 CFR 20.1502(b)(1).

PSU performed air sampling using natural uranium in the experimental process. The natural uranium was irradiated with 18,000 pulses of laser light, representing 36% of a year's work. The chamber was purged through a filter; the evacuation and venting cycle was done three



times prior to opening the test chamber. When the filters were analyzed using a variety of techniques, no radioactivity was detected. This test was repeated, yielding the same result.

The NRC staff concludes that monitoring would not be required for the proposed procedure by 10 CFR 20.1502(b)(1). The NRC staff finds that PSU meets the requirements of 10 CFR 20.1201(d).

#### § 20.1801

10 CFR 20.1801 requires the licensee to secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas.

By Reference 3, the SNM was to be stored in a locked cabinet affixed to a wall. By Reference 7, the licensee decided instead to use a safe, with a one (1) hour fire rating at 1700 °F, that is anchored to the concrete floor of Room [REDACTED]. The safe is sealed with a combination lock. The safe is within a room that is secured from general access. The Principal Investigator maintains the combination of the safe. A logbook is kept of when the safe is opened or closed.

The NRC staff concludes that these measures are sufficient to prevent unauthorized removal or access of the SNM. The NRC staff finds that PSU meets the requirements of 10 CFR 20.1801.

#### § 20.1802

10 CFR 20.1802 requires the licensee to control and maintain constant surveillance of licensed material that is in a controlled or uncontrolled or unrestricted area and that is not in storage.

The licensee stated (Ref. 7) that Room [REDACTED], where the SNM is stored and used, is through Room [REDACTED]. There are emergency egress doors from Room [REDACTED] directly to the exterior hallway; these doors are not used for routine to access Room [REDACTED] from the hallway. The laboratory (Room [REDACTED]) is accessible from the office (Room [REDACTED]), through a door that will be equipped with has a cypher lock; the passcode of the lock is to be known only to participating researchers. Room 7 is to be locked when no one is present, but unlocked when Room 7 is occupied. The two side doors in Room 9 that lead to the hallway are always locked and are emergency exits only for use by Room 9 occupants. The door between the office and the laboratory does not have a wire mesh window commonly found in classroom doors (Ref. 9).

By controlling access to the laboratory (Room 9) through the office (Room 7), the NRC staff concludes that PSU will be able to maintain constant surveillance of the SNM. The NRC staff finds that PSU meets the requirements of 10 CFR 20.1802.

#### § 20.1902(e)

10 CFR 20.1902(e) requires a licensee to post each area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in Appendix C to Part 20 with conspicuous signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)."

PSU states (Ref. 7) that Rooms [REDACTED] and [REDACTED] of the [REDACTED] Building will be posted in accordance with 10 CFR 20.1902(e). The safe for storing the SNM will also be accordingly posted.

The NRC staff finds that PSU meets the requirements of 10 CFR 20.1902(e).

§ 20.1904(a)

10 CFR 20.1904(a) requires a licensee to ensure that each container of licensed material bears a durable, clearly visible label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" OR "DANGER, RADIOACTIVE MATERIAL." The label must also include information, such as radionuclide, estimate of radioactivity, date for which the activity is estimated, and radiation levels to permit individuals handling or using these materials to take precautions.

Section 4.3 of the subject application (Ref. 3) describes of the type of container to be used. PSU supplemented the description (Ref. 7) with a photograph and description of the containers that will be used. PSU states that the containers will be labeled in accordance with 10 CFR 20.1904(a).

The NRC staff finds that PSU meets the requirements of 10 CFR 20.1904(a).

§ 20.2103(a)

Title 10 CFR 20.2103(a) requires that a licensee maintain records showing the results of surveys and calibrations required by § 20.1501 and that a licensee shall retain these records for three years after the record is made.

Section 4.2 of the amendment request describes the surveys that will be performed during the extent of the subject research.

By Reference 3, PSU states that laboratory personnel will perform contamination surveys at completion of a work day. PSU states (Ref. 7) that surveys at the end of a day surveys will not be documented, but are used to provide informal verification that no SNM contamination is present. PSU claims, and the NRC staff agrees, that this is reasonable given the both low risk, discrete, solid, non-dispersible materials being used. Quarterly surveys (e.g., meter scans and wipes) of SNM material are documented on survey forms.

PSU states (Ref. 7) that surveys required for decommissioning will be made and retained by EHS for the duration of the license.

The license renewal dated May 22, 2003, states that survey instruments used by EHS for radiation measurements are calibrated by EHS staff annually, with records of calibrations kept for at least three years. The NRC staff had approved of the calibration record keeping (Ref. 8). By the subject application (Ref. 3), PSU does not propose to change the record keeping.

The NRC staff finds that PSU meets the requirements of 10 CFR 20.2103(a).

## 6. NUCLEAR CRITICALITY SAFETY

10 CFR Part 70.24(a) states that each licensee authorized to possess special nuclear material in a quantity exceeding 700 grams of contained <sup>235</sup>U, 520 grams of <sup>233</sup>U, 450 grams of plutonium, 1,500 grams of contained <sup>235</sup>U if no uranium enriched to more than 4 percent by weight of <sup>235</sup>U is present, 450 grams of any combination thereof, or one-half such quantities if



massive moderators or reflectors made of graphite, heavy water or beryllium may be present, shall maintain in each area in which such licensed special nuclear material is handled, used, or stored, a monitoring system meeting stated requirements.

By the subject application (Ref. 3), the possession limits that are authorized by the SNM-95 license are not changed. PSU states that materials specified in Conditions 6.A and 6.C of license SNM-95 are to be used in Rooms [REDACTED] and [REDACTED] of the [REDACTED] Building.

The NRC staff previously determined that, based on the type, form, and/or quantity of SNM, Materials 'A' and 'C' are not an nuclear criticality concern. PSU proposes no changes to the possession limits. The NRC staff finds that nuclear criticality remains as not a concern. Therefore, the NRC staff finds that 10 CFR 70.24(a) remains inapplicable.

## 7. CHEMICAL SAFETY

10 CFR 70.4 defines hazardous chemicals produced from licensed materials means substances having licensed material as precursor compound(s) or substances that physically or chemically interact with licensed materials; and that are toxic, explosive, flammable, corrosive, or reactive to the extent that they can endanger life or health if not adequately controlled. These include substances commingled with licensed material, and include substances such as hydrogen fluoride that is produced by the reaction of uranium hexafluoride and water, but do not include substances prior to process addition to licensed material or after process separation from licensed material.

PSU stated (Ref. 3) that no chemicals will be used with the materials requested.

The NRC staff finds that a chemical a safety review is not required.

## 8. FIRE SAFETY

10 CFR 70.22(a)(7) requires a description of equipment and facilities which will be used by the applicant to protect health and minimize danger to life or property.

10 CFR 70.22(a)(8) requires a description of the proposed procedures to protect health and minimize danger to life or property.

### 8.1. Fire Safety Management Measures

The subject application (Ref. 3) and response to a request for additional information (Ref. 7) reflect a commitment to ensure the facility maintains fire safety awareness among employees, controls transient ignition sources, and combustibles, and maintains a readiness to extinguish or limit the consequences of a fire.

### 8.2. Fire Hazards Analysis

The NRC staff determined that PSU has met the applicable guidance provided in the National Fire Protection Association Standard (NFPA) 801 (Ref. 11). Furthermore, given a fire, a release of the SNM is doubtful because the SNM is in a form that is unlikely to volatilize or otherwise readily disperse as a result of a fire.

Given the low risk to public health and safety of the materials covered by the SNM-95 license, and the guidance provided in Section 7.4.3.2 of the NRC's Standard Review plan (Ref. 4), a formal fire hazards analysis is not required.

### 8.3. Facility Design

The [REDACTED] Building was originally built in 1960 in accordance with 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 (State-wide building code) which includes the National Electrical Code (NFPA 70), International Fire Code, and International Fuel Gas Code.

Rooms [REDACTED] and [REDACTED] of the [REDACTED] Building, constructed of concrete block walls and floors, are located below grade. When not in use, the SNM is stored in a safe that is bolted to the floor; the safe has a fire rating of up to one (1) hour protection at 1700°F. The building construction features fire rated corridors and doors with self-closing mechanisms.

Normal and emergency power circuits are provided to all required exit signs and specific light fixtures to provide constant illumination of exits and exit-ways. Ventilation is for room air comfort only as there are no fume hoods or other experimental specific exhaust drops.

The transport procedure of licensed material between licensed locations (Breazeale Nuclear Reactor, [REDACTED] Building, and [REDACTED] Building) will be appropriate to the material being moved. The method of transport may be either by walking or by vehicle. When transported by vehicle, licensed material will be packaged according to U.S. Department of Transportation requirements in 49 CFR 173, Subpart I.

### 8.4. Process Fire Safety

Portable fire extinguishers are installed throughout the [REDACTED] Building. On each floor, a standpipe system has fire hose connections. Portable fire extinguishers are maintained in operable condition, inspected quarterly, and tested by trained technicians of the PSU Office of Physical Plant.

A fire detection and alarm system is installed in accordance with NFPA 72 (Ref. 12), and the Pennsylvania Uniform Construction Code Standards. The fire alarm system is actuated by manual pull stations (with horn/strobe units to notify occupants) or automatic smoke detectors. The fire detection and alarm system is monitored by the PSU Police Dispatch Center; the system is maintained in operable condition, routinely inspected, and tested, and trained, by technicians of the PSU Office of Physical Plant.

### 8.5. Fire Protection And Emergency Response

Fire extinguisher training for faculty, staff, and students is voluntary. Training consists of classroom instruction on fire prevention for offices and laboratories, 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. The [REDACTED] Building has a written evacuation plan covering exit locations, designated meeting areas, and fire extinguisher locations.



The local fire department is trained in hazardous material response for chemical and radiological incidents in accordance with State of Pennsylvania standards. The PSU Hazardous Materials response team and Radiation Protection Office provide support when radiological materials are involved in an incident. PSU has met with the local fire department in the past to discuss the hazards, including radiological, in University laboratories. The RSO, working through the PSU EHS Fire Marshall, will inform the fire department chiefs when licensed material is located at the alternate location and that the material is of low risk, and in a discrete, solid, non-dispersible form, that is not a criticality concern.

#### 8.6. Evaluation Findings

The NRC staff concludes that the PSU fire protection program at the [REDACTED] Building provides an adequate level of fire protection, and is maintained as such, to protect public health and safety. PSU stated (Ref. 7) that fire detection and alarm systems are installed in accordance with NFPA 72 National Fire Alarm Code and the Pennsylvania Uniform Construction Code Standards. Systems are maintained in operable condition, routinely inspected, and tested by Penn State Office of Physical Plant trained technicians. Portable fire extinguishers are maintained in operable condition, inspected quarterly, and tested by Penn State Office of Physical Plant trained technicians. Renovations, alterations, and additions since 2004 have been designed and constructed to the Pennsylvania Uniform Construction Code (UCC State wide building code) which includes the National Electrical Code (NFPA 70). Thus, the NRC staff concludes that the licensee's equipment, facilities, and procedures provide a reasonable level of assurance that adequate fire protection.

The NRC staff finds that PSU meets the requirements of 10 CFR 70.22(a)(7) and 10 CFR 70.22(a)(8) to describe the facilities, equipment, and processes that will be used to protect health.

#### 9. EMERGENCY MANAGEMENT

The applicant does not possess uranium hexafluoride, is exempt from the requirement to possess a criticality alarm (see Section 6), and does not possess in excess of [REDACTED] curies of plutonium in unsealed form or on foils or plated sources. The NRC staff finds that PSU is not required to have a site emergency plan pursuant to 10 CFR 70.22(i)(1).

#### 10. ENVIRONMENTAL REVIEW

PSU is holder of a materials license authorizing the use of radioactive materials for research and development and for educational purposes. Amendments of materials licenses issued pursuant to 10 CFR Part 70 authorizing such use is a licensing action that belongs to a category of actions which the Commission, by rule or regulation, has declared to be a categorical exclusion, after first finding that the category of actions does not individually or cumulatively have a significant effect on the human environment. Therefore, in accordance with 10 CFR 51.22(c)(14)(v), amendment of SNM-95 to authorize use of special nuclear material in Rooms 7 and 9 of the [REDACTED] Building is an action categorically excluded from the requirement to prepare an Environmental Assessment or Environmental impact Statement.

#### 11. DECOMMISSIONING

70.25(e) requires that decommissioning funding plan must be submitted for review and approval.



The license renewal dated May 22, 2003 (Ref. 10) states that PSU has one Decommissioning Funding Plan to cover all licenses for the use of radioactive material. PSU submitted a revised decommissioning funding plan by letter dated December 13, 2013 (Ref. 13). By the subject application, the possession limits remain unchanged. The licensee stated that the SNM for the proposed research is in solid, non-dispersible form. The NRC staff determined that the use of the SNM in the [REDACTED] Building would not change the costs of decommissioning.

Therefore, the NRC staff finds that PSU meets the requirements of 10 CFR 70.25(e).

## 12. MANAGEMENT MEASURES

As discussed in Section 4, PSU is not required to comply with 10 CFR Part 70, Subpart H. Therefore, the NRC staff does not make a finding in this regard. 10 CFR 70.62 (d) requires an applicant or licensee to establish management measures to ensure compliance with the performance requirements of § 70.61.

## 13. MATERIAL CONTROL AND ACCOUNTABILITY

10 CFR § 74.11 requires each licensee who possesses one gram or more of contained uranium-235,  $^{233}\text{U}$ , or plutonium to notify the NRC Operations Center within 1 hour of discovery of any loss or theft or other unlawful diversion of special nuclear material which the licensee is licensed to possess, or any incident in which an attempt has been made to commit a theft or unlawful diversion of special nuclear material.

10 CFR 74.13 requires each licensee possessing SNM in a quantity totaling one gram or more of contained  $^{235}\text{U}$ ,  $^{233}\text{U}$ , or plutonium shall complete and submit, in computer-readable format Material Balance Reports concerning special nuclear material that the licensee has received, produced, possessed, transferred, consumed, disposed, or lost. This prescribed computer-readable report replaces the DOE/NRC form 742 which has been previously submitted in paper form.

10 CFR 74.15 requires each licensee who transfers or receives SNM in a quantity of one gram or more of contained  $^{235}\text{U}$ ,  $^{233}\text{U}$ , or Pu shall complete, in computer-readable format, a Nuclear Material Transaction Report. In addition, each licensee who adjusts the inventory in any manner, other than for transfers and receipts, shall submit a Nuclear Material Transaction Report, in computer-readable format, to coincide with the submission of the Material Balance report. Each licensee who transfers or receives SNM shall submit a Nuclear Material Transaction Report in computer-readable format, later than the close of business the next working day.

10 CFR 74.19 requires a licensee to keep records showing the receipt, inventory (including location and unique identity), acquisition, transfer, and disposal of all special nuclear material in its possession regardless of its origin or method of acquisition. Each record relating to material control or material accounting must be maintained and retained for the period specified by the appropriate regulation or license condition. If a retention period is not otherwise specified by regulation or license condition, the licensee shall retain the record until the Commission terminates the license that authorizes the activity that is subject to the recordkeeping requirement. Each record of receipt, acquisition, transfer, or physical inventory of SNM that must be maintained pursuant to paragraph must be retained as long as the licensee retains possession of the material and for 3 years following transfer or disposal of the material.



PSU states that material control and accountability under license SNM-95 is accomplished with Administrative Procedure AP-19 for Special Nuclear Material (SNM) Control and Accounting (Ref. 9 and 10). The NRC staff approved the material control and accountability during the renewal of the SNM-95 license in 2003 (Ref. 8). PSU proposes no changes (Ref. 9) to material control and accountability.

The NRC finds that the licensee complies with 10 CFR 74.11, 10 CFR 74.13, 10 CFR 74.15, 10 CFR 74.19.

#### 14. PHYSICAL SECURITY

The NRC staff reviewed the proposed amount of material to be used in the [REDACTED] Building. The amount of SNM is below the amount of low strategic significance as defined in 10 CFR 73.2. Therefore, the NRC staff finds that § 73.2 does not apply.

#### 15. FINDINGS

The NRC staff finds that the applicant meets applicable requirements of 10 CFR Part 19, Part 20, Part 70, Part 73, and Part 74.

10 CFR § 70.23 (a) states that an application for a license will be approved if the Commission determines that:

- (1) The special nuclear material is to be used for the conduct of research or development activities of a type specified in section 31 of the Act in activities licensed by the Commission under section 103 or 104 of the Act, or for such other uses as the Commission determines to be appropriate to carry out the purposes of the Act;
- (2) The applicant is qualified by reason of training and experience to use the material for the purpose requested in accordance with the regulations in this chapter;
- (3) The applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life or property;
- (4) The applicant's proposed procedures to protect health and to minimize danger to life or property are adequate;
- (5) Where the nature of the proposed activities is such as to require consideration by the Commission, that the applicant appears to be financially qualified to engage in the proposed activities in accordance with the regulations in this part;
- (6) Where the applicant is required to submit a summary description of the fundamental material controls provided in his procedures for the control of and accounting for special nuclear material pursuant to § 70.22 (b), the applicant's proposed controls are adequate;
- (9) Where the applicant is required to submit a plan for physical protection of special nuclear material in transit pursuant to § 70.22(g), of this chapter, the applicant's plan is adequate;

PSU proposes to use the SNM in the conduct of research of the kind specified in Section 31 of the Atomic Energy Act.

PSU is qualified by reason of training and experience to use the material for the purpose requested.

PSU proposes equipment and facilities that are adequate to protect health and minimize danger to life or property.

The procedures that PSU proposes to protect health and to minimize danger to life or property are adequate;

PSU appears to be financially qualified to engage in the proposed activities.

PSU submitted a summary description, in the form of a reference to a specific procedure, for the control of and accounting of SNM.

The NRC staff finds that the PSU meets the requirements of 10 CFR Part 70.23(a).

## 16. PRINCIPAL CONTRIBUTORS

Christopher Ryder  
Tyrone Naquin  
James Downs  
Dennis Lawyer  
Michael Wasem  
Mary Adams

## 7. REFERENCES

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