# SAFETY EVALUATION REPORT

# RENEWAL OF SPECIAL NUCLEAR MATERIAL

# LICENSE SNM-2013 FOR

# OREGON STATE UNIVERSITY

# DOCKET NUMBER 70-7019

Enclosure 4

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 10 CFR | Title 10 of the *Code of Federal Regulations* |
| ALARA | As Low As Reasonably Achievable |
| ANSI | American National Standard Institute |
| CAA | Controlled Access Area |
| DOE | U.S. Department of Energy |
| DOT | U.S. Department of Transportation |
| EA | Environmental Assessment |
| EH&S | Environmental Health and Safety |
| EIS | Environmental Impact Statement |
| HazMat | hazardous material |
| IROFS | items relied upon for safety |
| ISA | integrated safety analysis |
| LAR | license amendment request |
| LRA | license renewal application |
| MC&A | Material Control and Accounting |
| NFPA | National Fire Protection Association |
| NRC | U.S. Nuclear Regulatory Commission |
| OR | Oregon |
| OSHA | Occupational Safety and Health Administration |
| $^{239}$Pu | Plutonium-239 |
| PSP | Physical Security Plan |
| OSU | Oregon State University |
| Pu | plutonium |
| RAI | request for additional information |
| RC | Radiation Center |
| RP | Radiation Protection |
| RPP | Radiation Protection Program |
| RSO | Radiation Safety Officer |
| RTR | research test reactor |
| SER | Safety Evaluation Report |
| SI | System of International units |
| SNM | Special Nuclear Material |
| SRP | Standard Review Plan |
| $^{233}$U | Uranium-233 |
| $^{235}$U | Uranium-235 |
| U | Uranium |
| U.S. | United States |

## I. INTRODUCTION

Oregon State University (OSU) was first issued a special nuclear material (SNM) license in 2011, License SNM-2013, dated August 29, 2011. On July 29, 2021 (ML21211A614), OSU submitted a timely, non-public, application for renewal of the license. The current license is in timely renewal because OSU submitted its license renewal application before July 30, 2021, in accordance with 10 CFR 70.38, "Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas." Subsequently, on July 31, 2021, the OSU submitted a public version of the application (ML21235A325). The term of the license, if granted, would be 10 years. On September 15, 2021, the U.S. Nuclear Regulatory Commission (NRC) sent OSU an acceptance letter (ML21257A435), noting that the license renewal application (LRA) contained sufficient information for a technical review. After reviewing the OSU license renewal application (LRA), the NRC sent a request for additional information (RAI) to OSU dated October 29, 2021 (ML21300A112). On January 5, 2022, OSU responded to the RAI (ML22006A036). OSU subsequently supplemented its license renewal application by letter dated April 19, 2022 (ML22122A105), requesting an exemption from the criticality alarm requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) 70.24, "Criticality accident requirements."

A notice of opportunity to request a hearing on the license application was published in the *Federal Register* (FR) on October 1, 2021 (86 FR 54485). No requests for a hearing were received.

In addition to OSU's SNM-2013, OSU holds other licenses issued by NRC. OSU has a research test reactor (RTR) licensed by NRC (Docket 50-0243, License R-106). Though some programs involving SNM and the RTR overlap, the RTR license is independent of the SNM license. Additionally, Agreement State licenses issued by the State of Oregon are independent of the subject of this license renewal. Therefore, the RTR license and the Agreement State licenses are not discussed in this safety evaluation.

## II. SCOPE OF REVIEW

The NRC staff conducted its safety and safeguards review in accordance with 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material;" 10 CFR Part 20, "Standards for Protection Against Radiation;" 10 CFR Part 73, "Physical Protection of Plants and Materials;" 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material;" and other applicable regulations. The NRC staff used the guidance documents listed in Section VII, "References" of this SER, to conduct its safety review. NUREG-1520, "Standard Review Plan [SRP] for Fuel Facilities License Applications," provides guidance to staff reviewers who perform safety and environmental impact reviews of applications using SNM.

The NRC staff reviewed the information submitted in the renewal application and supplements. The renewal application contains 15 sections; Section 1, "General Information," describes the site overview, possession limits and authorized activities under the license, institutional information, equipment and facilities; Section 2, "Organization and Administration," describes in detail the licensee's organizational structure; Section 3, "Integrated Safety Analysis [ISA]," concludes that an ISA is not applicable to the OSU application; Section 4, "Radiation Protection," describes training programs, monitoring, written procedures, ventilation and respiratory protection, and control of radiological risk; Section 5, "Nuclear Criticality Safety," discusses why a critical safety program is not required. Section 6, "Fire Safety," describes the

fire system inspections, testing and maintenance; Section 7, “Decommissioning Funding Plan and Financial Assurance,” describes the decommissioning funding plan and financial assurance mechanism; Section 8, “Management Measures,” describes procedures review, audits, and records management; Section 9, “Radioactive Waste Disposal,” describes the stated method for radioactive waste disposal; Section 10, “Incident Reporting” describes the requirements for immediate and 24-hour notifications of incidents; Section 11, “Chemical Process Safety,” evaluates the chemical safety aspects of the proposed activity, and Section 12, “Emergency Management,” describes planning for emergency events; Section 13, “Environmental Protection,” describes the proposed environmental protection measures; Section 14, “Physical Security,” describes physical protection measures at a fixed site; and Section 15, “Material Control and Accounting” describes material control and accounting practices to detect and protect against the loss, theft, or diversion of SNM. The NRC staff’s safeguards review included the review of OSU’s Physical Security Plan (PSP) and a description of its material control and accounting (MC&A) plan. The NRC staff’s review of the LRA in the sections below corresponds to the same numbered sections in the LRA.

## 1.0 General Information

Purpose of Review

The staff reviewed the applicant’s site description and overview, generally described in Section 1 of the LRA, against the acceptance criteria in NUREG-1520, Rev. 2, Section 1 of the Standard Review Plan (ML101390110).

1.2 Staff Review and Analysis

1.2.1 Facility Layout

OSU is a non-profit educational institution incorporated under the laws of the State of Oregon. Possession and use of radioactive materials are limited to the Radiation Center (RC), either under an Agreement State license or an NRC license. The NRC license (SNM-2013) only pertains to the RC, at the main campus of Oregon State University in Corvallis, Oregon. OSU has a Training, Research, Isotopes, General Atomics (TRIGA) research reactor which operates under NRC Reactor License No. R-106. Activities associated with this R-106 license are independent of the SNM license renewal request and are not discussed in this SER.

The LRA appendices provide a description of the major roads and campus orientation.

1.2.2 Process Overview

The Department of Nuclear Engineering and Radiation Health Physics of OSU, located within the RC, will use the SNM to conduct experiments to determine hydro-mechanical properties of single fuel elements. The fuel elements come from five high performance research reactors in the United States: the Advanced Test Reactor, High Flux Isotope Test Reactor, Massachusetts Institute of Technology Reactor, Missouri University Research Reactor, and National Bureau of Standards Reactor. The fuel elements are not, and will not be, irradiated at OSU’s facility. All testing on the fuel elements containing SNM will be non-destructive. The material will be used for research and development only.

1.2.3 Descriptive Summary of Licensed Material

The following sections contain a description of the possession limits, authorized activities, place of use, organization, technical qualifications, training, radiation safety, calibration, effluent control, criticality safety, environmental protection, emergency planning, material control and security, financial assurance, and compliance history.

The NRC staff confirmed that the LRA described the locations where the SNM is to be used in sufficient detail on the OSU campus. The licensee submitted drawings describing the relationship of specific facility features. Drawings illustrate the layout of the buildings and structures. The LRA described the types and amounts of waste materials as well as the end-destination of radioactive wastes.

1.2.4 Possession Limits

The maximum quantity of SNM that may be possessed and used is identified by isotope, enrichment, chemical and physical form, and mass in grams. Table 1 lists the quantities requested and the maximum quantities of SNM that may be possessed by OSU under License SNM-2013:

| TABLE 1: Possession Limits Under License SNM-2013 | | |
|---|---|---|
| MATERIAL | FORM | QUANTITY |
| Uranium enriched to less than 20% in U-235 | Solid U-Mo metal alloy clad in the aluminum plate type fuel elements | [ ] grams U-235 |

The LRA requests no additions or increases in the amounts or types of radioactive material beyond what is currently authorized.

The SNM is used and stored in two buildings on OSU's campus. A diagram of the facility location and floor plan for each building are included in Appendices 1-4 of the LRA. The primary location for storage and use of the special nuclear material will be RC rooms [ ] and [ ], respectively.

In the appendices to the LAR, three diagrams show, in progressive detail, the location of the SNM. The location of the campus is illustrated on an outline of the State of Oregon. The locations of buildings where the SNM is located are indicated on a map of the main campus. Locations of authorized activities within buildings are indicated on floor plans.

1.3 Evaluation Findings

The NRC staff reviewed the LRA and concludes that OSU adequately described its facility and the proposed uses of the SNM for which the renewal is sought. The NRC staff concludes that the information in the OSU application and supplements is consistent with the applicable criteria in NUREG-1520. The NRC staff also finds that the application meets the requirements of 10 CFR 70.22 and 10 CFR 70.33 and is acceptable.

## 2.0 Organization and Administration

### 2.1 Purpose of Review

The staff reviewed the applicant's organization and the qualifications of administrative and radiation protection personnel, generally described in Section 2 of the LRA, against the acceptance criteria in NUREG-1520, Section 2 of the Standard Review Plan (ML101390110). The administration of the facility involves operations, organizational structure, and facility security. In addition, an application should present information on the facility's organization, training programs, operational reviews and audits, radiation protection procedures and actions, recordkeeping and reports. The following discussion summarizes information provided by the applicant and the staff's evaluation as to whether the information provided by the applicant meets the acceptance criteria.

### 2.2 Staff Review and Analysis

As described in the application, the licensee's management is headed by and reports to the President of OSU via the Vice President for Finance and Administration. Current Principal Officers of OSU are:

- Daniel Harlan, Radiation Safety Officer, 100 Oak Creek Building, Oregon State University, Corvallis OR 97331
- Scott Menn, Senior Health Physicist, Radiation Center, Oregon State University, Corvallis OR 97331;
- Steve Reese, Director, Radiation Center, Oregon State University, Corvallis OR 97331;
- Irem Tumer, Vice President for Research, A312 Kerr Administration Building, Oregon State University, Corvallis OR 97331; and
- Michael Green, Vice President for Finance and Administration, 640 Kerr Administration Building, Oregon State University, Corvallis OR 97331.

The OSU management structure is illustrated with two organization charts in appendices of the application. The radiation safety officer (RSO) is responsible, through several levels of management, to the President of OSU. The RSO reports to the Director of the Environmental Health and Safety (EH&S) Department. The RSO is not under the College of Engineering. The RSO oversees the RC, which is under EH&S. The RC staff address radiation aspects of EH&S.

While the Vice President of Research has ultimate responsibility for License SNM-2013, authority is delegated to the RSO, and to the RC staff. OSU has a policy stating that neither employees nor students are to perform work that is known to be hazardous without proper instruction.

OSU has staff with varying levels of qualifications and corresponding levels of responsibilities:

- The RSO must have a bachelor's degree in health physics, physics, science, or a related area.
- A user of the RC must complete the RC orientation program and fulfill associated training requirements.

The primary management representative for OSU is the Vice President for Research, and he has the ultimate authority to stop work. By a letter of delegation, equal authority is delegated to the RSO for all radioactive material and radiation-related activities. Documented OSU policy states that employees and students are not to perform hazardous functions and operations without proper instructions and authorization. The policy states that employees and students are to report unsafe conditions, practices, or equipment to the supervisor, instructor, or safety officer.

OSU has documented policies that prohibit retaliation by any member of the university faculty, staff, or student body for directing that unsafe work stop and for reporting safety concerns. Protection from such retaliation is also provided by Oregon's Whistleblower Law, SB 1559. Retaliation is subject to disciplinary sanctions ranging from a warning to termination or expulsion from the university.

Additionally, OSU maintains a fully qualified hazardous materials response team that supports the county and regional police, fire, and hazardous material (HazMat) response organizations. The team is cross-trained in chemical, biological, and radiological emergency response and is the first responder to all incidents involving radioactive materials that are beyond the control of the laboratory personnel.

OSU maintains an armed police force trained to respond to radiological security incidents. The police maintain radiation detection equipment and train with local, regional, U.S. Department of Homeland Security, and Federal Emergency Management Agency organizations.

The local fire department provides firefighting services to the OSU campus, and are HazMat trained to Oregon State standards including chemical, biological, and radiological response. The local fire department works in conjunction with the OSU campus police and the OSU HazMat team to respond to all buildings and laboratories as needed.

All required records are maintained by the RC either electronically or in hardcopy. Electronic records are maintained on Oregon State network storage which is backed up regularly. Paper records are maintained in an office environment or archive facility.

## 2.3 Evaluation Findings

OSU described its organization and management policies for providing adequate safety management for the safe operation of the facility. The NRC staff reviewed the senior organizational management structure and policies and found them acceptable for the following reasons: the corporate-level management and technical support structure, as demonstrated by organizational charts and descriptions of functions and responsibilities, is clear with respect to assignments of primary responsibility and the OSU management is qualified, experienced, has appropriate written procedures in place.

The staff reviewed the information and concludes that OSU has an acceptable organization, administrative policies, and sufficient qualified resources to provide for the safe operation of the facility under both normal and abnormal conditions. The staff determined that the organization and administration for OSU is consistent with the applicable criteria in NUREG-1520. The staff also finds that the RPP meets the requirements of 10 CFR 70.22(a)(6) and 70.23(a)(2).

## 3.0 Integrated Safety Analysis Summary

The NRC staff reviewed the LRA to determine whether OSU was required to provide an Integrated Safety Analysis (ISA) Summary, pursuant to the provisions in 10 CFR Part 70 Subpart H, "Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material." Under its License SNM-2013, OSU is not to be 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 SNM, or any other activity that the Commission determines could significantly affect public health and safety.

Thus, the NRC staff finds that the activities proposed under the renewed license are not activities described in 10 CFR 70.60, "Applicability," and therefore, could not significantly affect public health and safety. For these reasons, 10 CFR Part 70, Subpart H is not applicable to the LRA. As a result, the NRC staff concludes that OSU is not required to submit an ISA Summary in support of its LRA.

## 4.0 Radiation Protection

### 4.1 Purpose of Review

The NRC staff conducted this review to assess whether the Radiation Protection Program (RPP) described in OSU's LRA complies with the regulatory requirements in 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," 10 CFR Part 20, "Standards for Protection Against Radiation," and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material." The regulatory requirements for the review of the radiation protection are generally described in 10 CFR 70.23(a)(3) and (4). Approval of an application requires that the proposed equipment and facilities are adequate to protect health and minimize danger to life or property; and the applicant's proposed procedures to protect health and to minimize danger to life or property are adequate. Section 13 of this report discusses protection of the public and the environment.

### 4.2 Staff Review and Analysis

#### *4.2.1 Commitment to Radiation Protection Program Implementation*

The RPP is the means by which the licensee meets the requirements of 10 CFR Part 20. Per 10 CFR 20.1101, an RPP must include: (1) development, implementation, and documentation of a radiation protection program; (2) an as low as reasonably achievable (ALARA) program; (3) periodic review of the radiation protection program; and (4) a constraint on air emissions of radioactive material to the environment.

In its license application, OSU provided a description of the RPP used at the facility to meet the requirements of 10 CFR 20.1101. Among other things, it describes practices for personnel monitoring and training, leak-testing sources, maintaining doses as low as is reasonably achievable (ALARA), and waste disposal. The license application also discussed the roles and responsibilities of the different individuals implementing the RPP.

As discussed below, the applicant's RPP minimizes radiation doses to ALARA. The program consists of reviews of new uses of radiation or materials and major modifications of facilities

which could change personnel exposures or result in radioactive material releases. The program is documented with summaries of reviews and actions taken. The applicant performs reviews of radiation doses of staff, students, and visitors periodically. The NRC staff reviewed the application and concluded, for the reasons discussed below, that the RPP meets the requirements in 10 CFR Part 20.1101.

*(1) Development, implementation, and documentation of a radiation protection program*

Paragraph 20.1101(a) of 10 CFR requires that an applicant develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions Part 20.

The application provided a description of the RPP used at the facility to meet the requirements of 10 CFR Part 20 provisions. The RPP contains the documentation for the program. The RPP includes practices for leak-testing sources, maintaining doses ALARA, waste disposal, personnel monitoring and training, a periodic review, and a constraint on air emissions. The LAR discussed the roles and responsibilities of the different individuals implementing the RPP. Subsequent sections provide more detail of each element of the RPP as well as an evaluation against the relevant regulatory requirements.

The NRC staff reviewed OSU's development, documentation and implementation of its RPP. For the reasons stated above, the NRC staff determined that the RPP is consistent with the applicable criteria in NUREG-1520.The staff also finds that the RPP meets the requirement of 10 CFR 20.1101(a).

*(2) As low as reasonably achievable (ALARA) program;*

Consistent with the format of NUREG-1520, the requirements of 10 CFR 20.1101(b) are addressed in section 4.2.2 below.

*(3) Periodic review of the radiation protection program*

Paragraph 20.1101(c) of 10 CFR requires a licensee to periodically (at least annually) review the radiation protection program content and implementation.

OSU will calibrate radiation monitors annually in accordance with ANSI N323A using National Institute of Standards and Technology (NIST) traceable standards and the status of special nuclear material will be verified by annual inventory every 12 months. The status of the fuel assemblies will be monitored by leak tests of the sources on a 6-month cycle. A wipe sample will be taken of the entire assembly. It will be analyzed for radioactive contamination with the appropriate instrument capable of detecting the presence of 0.005 µCi of radioactive material. If the test reveals the presence of 0.005 µCi or more of removable radioactive material, the assembly will be removed from testing for further evaluation.

The NRC staff reviewed OSU's periodic reviews of their RPP and confirmed that OSU reviews its RPP at least annually and is consistent with the applicable criteria in NUREG-1520. The NRC staff also finds that the licensee meets the requirement of 10 CFR 20.1101(c).

*(4) A constraint on air emissions of radioactive material to the environment*

Paragraph 20.1101(d) of 10 CFR states, in part, that to implement the ALARA requirements of 10 CFR 20.1101(b), a constraint on air emissions of radioactive material to the environment shall be established such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 10 mrem (0.1 mSv) per year from these emissions.

The NRC staff reviewed the implementation of ALARA of the radiation protection program in regard to air emissions using the regulatory acceptance criteria in NUREG-1520. As stated in section 9 of this SER, there is no waste expected to be generated that would be contaminated by the SNM allowed under this license. Since all the material is encapsulated, there is no ventilation monitoring in the room in which experiments will be performed and water in the test loop will be monitored to assure it meets the limits in 10 CFR 20, Appendix B prior to disposal. If low-level waste is created, it will be collected and disposed of in accordance with OSU Environmental Health and Safety written procedures. The NRC staff has determined that this commitment to the monitoring liquid effluents is acceptable because it ensures the licensee meets regulatory limits.

When not in use during testing, the fuel assemblies are stored in the reactor bay area which has a ventilation system that provides fresh air to the reactor bay area at the rate of 4.4E6 cm3 s-1 and is independent of the attached buildings and laboratories. The exhaust is monitored for both particulate and gaseous radioactive effluents.

The NRC staff reviewed OSU's air emissions program and confirmed that an individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 10 mrem (0.1 mSv) per year from these emissions and is consistent with the applicable criteria in NUREG-1520. The NRC staff also finds that the licensee meets the requirement of 10 CFR 20.1101(d).

4.2.2 *A documented management commitment to keep exposures as low as reasonably achievable (ALARA)*

Paragraph 20.1101(b) of 10 CFR requires a licensee to "use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as reasonably achievable (ALARA)."

The ALARA program at OSU consists of a senior health physicist responsible for proposed new uses of radiation or radioactive materials, and major modifications of facilities which could change personnel exposures or radioactive material releases. The health physics staff shall ensure that radiological activities are carried out in accordance with ALARA principles. All radiological activities at the facility undergo assessment by the health physics (HP) staff to evaluate key ALARA concepts such as time, distance, and, shielding. The HP staff monitors any individual likely to receive above 10 percent of the annual dose limits. The HP Staff will investigate results above 10 percent of the dose limits and implement corrective actions if appropriate. The senior health physicist and the reactor operations committee will periodically assess radiation dose to staff, students, and visitors.

Additionally, the NRC staff determined that: the policy and practices are adequate to keep exposures to ionizing radiation ALARA, OSU has thresholds for taking action before regulatory limits are exceeded, and licensee staff and students have equipment to prevent and mitigate

exposures. The NRC staff reviewed OSU's process and determined that OSU has a documented management commitment to keep exposures ALARA. Therefore, the NRC staff finds that the licensee meets the requirement of 10 CFR 20.1101(b).

*4.2.3 Organization and Personnel Qualifications*

Regulations in paragraph (a)(6) of 10 CFR 70.22 apply to the organization and qualifications of radiological protection staff.

The LRA contains a description of the OSU organization that is relevant to the radiation protection program. The RSO is authorized to act on radiological safety concerns without further administrative approval. The RSO and OSU have a policy instructing all employees and students to only perform any hazardous function with proper instructions and authorization. OSU has documented policies that specifically prohibit retaliation by any member of the faculty, staff, or student body for reporting unsafe conditions. Such reporting can be done in confidence or anonymously. If the person is not satisfied with the action taken, then the matter can be brought to the attention of the Oregon State Department of Environmental Protection, or the NRC.

The RSO is responsible for the following duties:

- Managing the RC staff,
- Managing the radiation safety program,
- Ensuring compliance of the radiation safety program with State and Federal regulations and NRC license conditions,
- Providing training and recommendations to individuals that use radioactive materials,
- Serving as representative of the University to regulatory agencies to act in licensing matters,
- Providing corrective action when deficiencies are identified, and
- Reviewing procedures, policies, and practices as part of annual reporting.

The NRC staff determined that the licensee describes an adequate organizational structure, providing appropriate management oversight of SNM, ensuring the radiation safety organization is adequately trained and staffed with sufficient independence to ensure effective safety oversite, and annually reviewed by key management personnel. The RSO has stop work authority in circumstances where unsafe conditions arise. OSU policy provides for facility, staff, and students to report unsafe conditions to the University, the State of Oregon, or the NRC, without fear of retaliation.

The licensee has established clear organizational relationships among the individual positions responsible for the RPP and other line managers. The acceptance criteria in NUREG-1520 state that a suitably educated, experienced, and trained radiation protection program director (i.e., the RSO) has the following:

- Direct access to managers at the university,
- Skills in interpreting data and regulations pertinent to radiation protection,
- Familiarity with the operations at the university,
- Participation as a resource in radiation safety management decisions, and

- Responsibility for establishing and implementing the radiation protection program.

The minimum education, experience, and training requirements for the RPP director and staff are discussed in Section 2.0 of this SER and satisfy the above criteria.

The NRC staff reviewed the OSU organization and personnel qualifications in OSU's RPP. The NRC staff determined that the RPP satisfies the applicable criteria in NUREG-1520 and therefore meets the requirements of 10 CFR 70.22(a)(6) as it relates to the organization and qualifications of radiological protection staff. Section 4.2.5 below discusses the rest of the requirements of 10 CFR 70.22(a)(6).

*4.2.4 Written Procedures*

Paragraph 70.22(a)(8) of 10 CFR states that each application for a license shall contain "proposed procedures to protect health and minimize danger to life or property …." The application specified that the RSO shall be responsible for establishing and updating guidance, procedures, instructions, and other internal rules required to promote radiation safety. Staff, researchers, and students shall review the procedures, instructions and other internal rules during training as radiation workers and at regular interval after initial training. Rather than having procedures which cover only this SNM program, the licensee uses joint procedures which cover both the research and test reactor program and the SNM programs. Modification to existing joint procedures or new joint procedures shall be established according to 10 CFR 50.59. Access to the RC shall require personal dosimetry according to exposure procedures. Sources must be leak tested every 6 months and periodic inventory of radioactive materials shall be recorded according to exposure procedure.

The NRC staff determined that the licensee has written approved procedures to carry out activities related to the radiation protection program. Staff finds reasonable assurance that the operation of the OSU facility will be in accordance with approved written procedures. These written procedures provide adequate safety to the workers and are consistent with the applicable criteria in NUREG-1520. The staff also finds that OSU meet the requirements of 10 CFR 70.22(a)(8).

4.2.5 Radiation Safety Training

Paragraph 70.22(a)(6) of 10 CFR states that each application for a license shall contain the technical qualifications, including training and experience, of the applicant and members of his staff to engage in the proposed activities in accordance with the regulations in this chapter. Paragraph 19.12(a) of 10 CFR specifies training requirements for all individuals who in the course of employment are likely to receive in a year an occupational dose in excess of 100 millirem (1 mSv). The staff reviewed the applicant's training commitments against the acceptance criteria in NUREG-1520, Section 4.4.5.3. The following discussion identifies each acceptance criterion from NUREG-1520 and provides the staff's evaluation as to whether the information provided by the applicant is consistent with the criterion:

(1) Design and implement an employee RP training program that complies with the requirements of 10 CFR Parts 19 and 20.

Section 4.2 of the LRA states that all radiation workers receive instruction in accordance with 10 CFR 19.12 prior to beginning work with licensed material. Radiation workers are initially trained by staff in the RC. The LRA states that this training program consists of material on radiation interactions, radiation hazards, dose measurements, and laboratory procedures.

(2) Provide training, to all personnel and visitors entering restricted areas, that is commensurate with the health risk to which they may be exposed or provide trained escorts.

Section 4.2 of the LRA describes the training program that personnel must complete if they desire unescorted access. The content of the training generally follows that described in NUREG-1556, Vol. 7, "Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope, Including Electron Capture Devices and X-Ray Fluorescence Analyzers," Appendix J.

(3) Provide a level of training based on the potential radiological health risks associated with that employee's work responsibilities.

In addition to the general training discussed above, specialized training appropriate to the material used and for the hazards anticipated will be provided by the RSO.

(4) Incorporate, in the RP training program, the provisions of 10 CFR 19.12 and additional relevant topics such as: correct handling of radioactive materials; the storage, transfer, or use of radioactive material as relevant to the individual's activities; minimization of exposures to radiation and/or radioactive materials; access and egress controls and escort procedures; radiation safety principles, policies, and procedures; monitoring for internal and external exposures; monitoring instruments; contamination control procedures, including protective clothing and equipment; ALARA and exposure limits; radiation hazards and health risks; emergency response; and responsibility to report promptly any condition that may lead to, or cause, a violation of regulations and license or create unnecessary exposure;

The training requirements correspond to the training requirements specified in 10 CFR 19.12. The training includes, but is not limited to understanding the radiological, chemical, and health hazards of the SNM requested and the requested experimental use, the need for physical security appropriate to the special nuclear material requested; and the safety measures to be used appropriate to the requested SNM being requested.

(5) Review and evaluate the accuracy, effectiveness, and adequacy of the radiation protection training program curriculum and instructors, as applicable, at least every 3 years and to conduct refresher training at least every 3 years.

The LRA describes the annual standard refresher training provided to all individuals working with SNM material. The OSU training includes instruction and information on radiation interactions, radiation hazards, dose measurements, and laboratory procedures. The effectiveness of this training is evaluated through quarterly lab inspections where compliance with specific use requirements is checked. The LRA further provides that retraining may be required at any time if deemed necessary by the RSO or the supervisor of the user to ensure the performance of the user meets the requirements. Documentation of training is retained by EH&S for at least 3 years.

The NRC staff reviewed the training program and concludes that the program is consistent with the criteria in Section 4.4.5.3 of NUREG-1520 and that this program is acceptable. Based on the staff's evaluation of the LRA, the staff finds that the OSU training program will continue to ensure that personnel are qualified by reason of training and experience to safely use licensed material in accordance with the requirements in 10 CFR Part 19, 10 CFR Part 20, and 10 CFR 70.23(a)(2) .

*4.2.6 Ventilation and Respiratory Protection Programs*

Paragraph 70.22(a)(7) of 10 CFR states that each application for a license shall contain a description of equipment and facilities which will be used by the applicant 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, criticality accident alarms, etc.). The NRC staff has determined that OSU's use of SNM under SNM-2013 is not expected to produce airborne activity warranting respiratory protection or bioassay, and therefore compliance with this regulation is not applicable. If any new uses or locations in the future produce airborne activity warranting respiratory protection or bioassay, OSU must submit a license amendment request (LAR) for review against the applicable criteria.

*4.2.7 Radiation Survey and Monitoring Programs*

Paragraph 70.22(a)(8) of 10 CFR states that each application for a license shall contain 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). The staff reviewed the applicant's radiation survey and monitoring program commitments against the acceptance criteria in NUREG-1520, Section 4.4.7.3. The following discussion identifies each acceptance criterion from NUREG-1520 and summarizes the staff's evaluation as to whether the information provided by the applicant is consistent with NUREG-1520. The staff also reviewed the application to ensure that OSU meets the requirements in 10 CFR 20 subparts C, D, and F.

(1) Criterion: Provide radiation survey and monitoring programs that are necessary to comply with the requirements of 10 CFR Part 20 and that are reasonable to evaluate the magnitude and extent of radiation levels, the concentrations or quantities of radioactive material, and the potential radiological hazards.

> OSU controls possession and use of radioactive materials and requires compliance with NRC and State regulations. The RC has a fully implemented health physics (HP) monitoring and survey program in accordance with 10 CFR part 20 that includes documentation of spills or other contamination events. All contamination events, personnel radiation exposure and facility effluent releases are tracked, and records are retained for the lifetime of the facility and materials license. The HP program is inspected every other year by the NRC staff as a part of the monitoring of the reactor facility license (R-106). After reviewing OSU's radiation survey and monitoring program, the NRC staff concludes that the procedures are reasonable to evaluate the magnitude and extent of radiation levels, the concentration of radioactive material, and the potential radioactive hazards because the program is consistent with the applicable criteria in NUREG-1520. The NRC staff also finds that the licensee meets the requirements of 10 CFR Part 20.

(2) Criterion: Prepare written procedures for the radiation survey and monitoring program that include an outline of the program objectives, sampling procedures, data analysis methods, types of equipment and instrumentation to be used, frequency of measurements, recordkeeping and reporting requirements, and actions to be taken when measurements exceed 10 CFR Part 20 occupational dose limits or administrative levels established by the RC.

OSU controls possession and use of radioactive material in accordance with the applicant's general procedures for conducting routine radiological surveys. The procedures outline the possession, use, and transfer of all licensed material on university-controlled property and presents the applicant's general procedures for conducting routine radiological surveys. The procedures discuss the monitoring procedures that include access controls, dosimetry, annual inventory, and leak tests of the fuel assemblies every six months. The NRC staff concludes that the procedures include an outline of the program objectives, sampling procedures, data analysis methods, types of equipment and instrumentation to be used, frequency of measurements, recordkeeping and reporting requirements, and actions to be taken when measurements exceed 10 CFR Part 20 occupational dose limits or administrative levels established by the RC, and are acceptable. The NRC staff also finds that the licensee meets the requirement of 10 CFR Part 20.

(3) Criterion: Design and implement a personnel-monitoring program for external occupational radiation exposure that outlines methods or procedures to do the following:

- Identify the criteria for worker participation in the program,
- Identify the types of radiation to be monitored,
- Specify how exposures will be measured, assessed and recorded,
- Identify the type and sensitivity of personal dosimeters to be used, when they will be used, and how the collected data will be processed and evaluated, and
- Identify the plant's administrative exposure levels or action levels at which actions are taken to investigate the cause of exposures exceeding these levels.

OSU describes personnel-monitoring requirements in the LRA. OSU uses a National Voluntary Laboratory Accreditation Program certified vendor. Dose investigations will be performed when necessary, as described in specific procedures. Periodic review of radiation doses of staff, students and visitors is carried out by the senior health physicist and the ROC. Radiation monitoring is supplemented with pocket ionization chambers to allow the estimation of personnel dose in between badge readouts. Pocket ionization chambers are calibrated periodically, and the results are recorded at pre-set levels. Personnel dosimetry appropriate for the material being used is provided by a vendor as required. Direct reading dosimeters such as ionization chambers and electronic dosimeters are available for gamma radiation if necessary. All individual monitoring results, incidents, and exposures exceeding the dose limits in 10 CFR 20 will be submitted consistent with the applicable criteria of 10 CFR 20, Subpart M. The RSO specifies that dosimetry is required for individuals mentioned 10 CFR 20.1502. Therefore, the NRC staff concludes that OSU's personnel-monitoring program for external occupational radiation exposures outlines methods or procedures is consistent with the applicable criteria in NUREG-1520. The NRC staff also finds that the licensee meets the requirement of 10 CFR Part 20.

(4) Criterion: Design and implement a personnel-monitoring program for internal occupational radiation exposures based on the requirements of 10 CFR 20.1201, 20.1204, and 20.1502(b), that outlines methods or procedures to do the following:

- Identify the criteria for worker participation in the program,
- Identify the type of sampling to be used, the frequency of collection and measurement, and the minimum detection levels,
- Specify how worker intakes will be measured, assessed, and recorded,
- Specify how the data will be processed, evaluated, and interpreted, and
- Identify the plant's administrative exposure levels or the levels at which actions are taken to investigate the causes of exposures exceeding these levels.

Although there is no current use of authorized SNM material that could result in an individual's intake of the material because they are all in sealed form, OSU has a personnel-monitoring program. OSU commits to monitoring any individual who could receive in excess of 10 percent of the annual limit on intake. Potential exposure levels for individuals are evaluated by the RC staff during the registration and training of radiation workers. Dosimeters are processed on a quarterly basis and provide the dose record. Radiation monitoring is supplemented with pocket ionization chambers to allow the estimation of personnel dose in between badge readouts. Pocket ionization chambers are calibrated periodically, and the results are recorded at pre-set levels.

The NRC staff concludes that OSU's personnel-monitoring program for internal occupational radiation exposures outlines methods or procedures that satisfy the requirements in 10 CFR 20.1201, 20.1204, and 20.1502(b) and are therefore acceptable.

(5) Criterion: Design and implement an air sampling program in areas of the plant identified as potential airborne radioactivity areas, to conduct airflow studies and to calibrate and maintain the airborne sampling equipment in accordance with the manufacturer's recommendations.

OSU uses local airborne monitoring equipment to monitor potential exposures to individuals. However, the SNM under this license is in a sealed form and is unlikely to become airborne. OSU evaluates airflow studies, face velocities of fume hoods, and negative pressures. The LRA also describes the calibration and record keeping of all instruments. Therefore, OSU's local airborne monitoring program identifies potential airborne radioactivity areas, conducts airflow studies and involves calibrating and maintaining the airborne sampling equipment in accordance with the manufacturer's recommendations. The NRC staff concludes that the program is consistent with the applicable criteria in NUREG-1520 and is acceptable. The NRC staff also finds that the licensee meets the requirements of 10 CFR Part 20.

(6) Criterion: Implement additional procedures, as may be required by 10 CFR Part 20 and the ISA Summary, to control the concentration of airborne radioactive material (e.g., control of access, limitation of exposure times to licensed materials, and use of respiratory protection equipment).

The NRC staff has determined that OSU's use of SNM is not expected to produce airborne activity warranting respiratory protection or bioassay, and therefore compliance

with this regulation is not applicable. If OSU employs new uses or locations in the future that produce airborne activity warranting respiratory protection or bioassay, OSU must submit an LAR and the NRC will review OSU's program against the applicable criteria. Therefore, the NRC staff concludes that this criterion is not applicable to OSU's license SNM-2013.

(7) Criterion: Conduct a contamination survey program in areas of the facility identified in the ISA Summary most likely to be radiologically contaminated (the program must include the types and frequencies of surveys for various areas of the facility and the action levels and actions to be taken when contamination levels are exceeded).

OSU is not required to have an ISA because it is not engaged in activities listed in 10 CFR 70.60. However, the status of the fuel assembly will be monitored by leak tests of the sources on a 6-month cycle. A wipe sample will be taken of the entire assembly. The wipe sample will be analyzed for radioactive contamination with the appropriate instrument capable of detecting the presence of 0.005 µCi of radioactive material. If the test reveals the presence of 0.005 µCi or more of removable radioactive material, the assembly will be removed from testing for further evaluation. The staff concludes that this criterion is not applicable to OSU's SNM-2013.

(8) Criterion: Implement the facility's corrective action program when the results of personnel monitoring, personnel contamination monitoring, or contamination surveys exceed the applicant's administrative personnel contamination levels.

Due to the nature of the limited materials and uses, OSU is not required to have a formal corrective action program. Any deficiencies that are identified are reviewed during administrative update reviews and the annual review of radiation protection activities. Therefore, the NRC staff concludes that this criterion is not applicable to OSU license SNM-2013.

(9) Criterion: Use equipment and instrumentation with sufficient sensitivity for the type or types of radiation being measured and calibrate and maintain equipment and instrumentation in accordance with manufacturers' recommendations or applicable ANSI standards.

Portable radiation monitors utilized in OSU's reactor facility capable of detecting alpha, beta, gamma, and neutron radiation are also available for use with the special nuclear material. The RC maintains and calibrates these instruments or has the means for the instruments to be calibrated. Radiation monitors will be calibrated annually in accordance with ANSI N323A using NIST traceable standards. Procedures will require that check sources will be utilized to verify correct instrument operation prior to use at the beginning of the day. Dosimetry will be processed by a National Voluntary Laboratory Accreditation Program accredited vendor. Specialized detection systems are available for analytical radiation measurements. These include high purity germanium spectroscopy systems, proportional counters, a liquid scintillation counter and other miscellaneous detectors and equipment to analyze radioactive materials. The NRC finds that OSU uses equipment and instrumentation with sufficient sensitivity for the types of radiation being measured and calibrates and maintains equipment and instrumentation in accordance with manufacturer's recommendations. The NRC staff concludes that the program is consistent with the criteria in NUREG-1520 and is acceptable. The NRC staff also finds that the licensee meets the requirements of 10 CFR Part 20.

(10) Criterion: Establish policies to ensure that equipment and materials removed from restricted areas to unrestricted areas are not contaminated above the release levels presented in Appendix A, “Acceptable Surface Contamination Levels,” to Regulatory Guide 8.24.

The OSU will monitor status of the fuel assembly by leak tests of the sources on a 6-month cycle. A sample will be taken of the entire assembly. The wipe sample will be analyzed for radioactive contamination with the appropriate instrument capable of detecting the presence of 0.005 µCi of radioactive material. If the test reveals the presence of 0.005 µCi or more of removable radioactive material, the assembly will be removed from testing area (the restricted area in which the material will be) to an unrestricted area for further evaluation. The NRC staff finds that OSU has established policies to ensure that equipment and materials removed from restricted areas to unrestricted areas are not contaminated above the release levels presented in Appendix A, “Acceptable Surface Contamination Levels,” to Regulatory Guide 8.24. Therefore, the NRC staff concludes that OSU has established policies that are consistent with the criteria in NUREG-1520 and are acceptable. The NRC staff also finds that the licensee meets the requirement of 10 CFR Part 20.

(11) Criterion: Leak test all sealed sources consistent with direction provided in Appendix C, “Leak Test Requirements,” to Regulatory Guide 8.24 or the applicable regulations for the materials involved (e.g., 10 CFR 31.5(c)(2) has direction for leak testing of certain byproduct devices).

The OSU will monitor status of the fuel assembly by leak tests of the sources on a 6-month cycle. A wipe sample will be taken of the entire assembly. The wipe sample will be analyzed for radioactive contamination with the appropriate instrument capable of detecting the presence of 0.005 µCi of radioactive material. If the test reveals the presence of 0.005 µCi or more of removable radioactive material, the assembly will be removed from testing for further evaluation. The NRC staff finds that OSU’s process of leak testing sealed sources is consistent with direction provided in Appendix C, “Leak Test Requirements,” to Regulatory Guide 8.24. Therefore, the NRC staff concludes that the program meets the criteria in NUREG-1520 and is acceptable. The NRC staff also finds that the licensee meets the requirements of 10 CFR Part 20.

(12) Criterion: Establish and implement an access control program that ensures that (1) signs, labels, and other access controls are properly posted and operative, (2) restricted areas are established to prevent the spread of contamination and are identified with appropriate signs, and (3) step-off pads, change facilities, protective clothing facilities, and personnel-monitoring instruments are provided in sufficient quantities and locations.

The LRA describes the physical security and control of SNM under SNM-2013. The SNM is used and stored in two buildings on campus. A diagram of the facility location and floor plan are included in Appendices 1–4 of the LAR. The primary location for storage and use of the special nuclear material will be rooms [ ] and [ ], respectively, which are secure. Access is limited to people that are deemed "trustworthy and reliable" and have the facility Director's approval. All radioactive material will be labeled in accordance with 10 CFR 20.1904 and University requirements. NRC staff finds that OSU’s access control program ensures that signs, labels, and other access controls are properly posted and operative; restricted areas are established to prevent

the spread of contamination and are identified with appropriate signs; and step-off pads, change facilities, protective clothing facilities, and personnel-monitoring instruments are provided in sufficient quantities and locations. Therefore, the NRC staff concludes that OSU's access control program is consistent with the criteria in NUREG-1520 and is acceptable.

(13) Criterion: Establish a radiation reporting program consistent with the requirements of 10 CFR Parts 19 and 20.

OSU describes its RPP, which includes a documented program to ensure that occupational radiological exposures are ALARA; an organization with adequate qualification requirements for the radiation protection personnel; approved, written radiation protection procedures and radiation work permits (RWPs) for radiation protection activities radiation protection training for all personnel who have access to restricted areas; a program to control airborne concentrations of radioactive material with engineering controls and respiratory protection; a radiation survey and monitoring program that includes requirements for controlling radiological contamination within the facility and monitoring of external and internal radiation exposures; other programs to maintain records, report to the NRC in accordance with 10 CFR Part 20 and 10 CFR Part 70 and correct for releases of radioactive material at the facility. The NRC staff finds that the applicant's RPP is consistent with the requirements of 10 CFR Parts 19 and 20. Therefore, the NRC staff concludes that OSU's RPP is consistent with the criteria in NUREG-1520 and is acceptable. The NRC staff also finds that the licensee meets the requirements of 10 CFR Parts 19 and 20.

The OSU LRA does not propose any significant changes to the radiation survey and monitoring programs, which have been successfully implemented for many years. Based on the staff's evaluation of OSU's commitments to follow the acceptance criteria in Section 4.4.7.3 of NUREG-1520, the staff finds that the proposed equipment and procedures to be used in the radiation survey and monitoring programs will continue to adequately protect health and minimize danger to life and property as required by 10 CFR 70.23(a)(3) and (a)(4). Therefore, the NRC staff finds that these programs are acceptable.

*4.2.8 Control of Radiological Risk Resulting from Accidents*

Under 10 CFR 70.22(i)(1), each application to possess uranium or plutonium for which a criticality accident alarm system is required, uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total, or in excess of 2 curies of plutonium in unsealed form of on foils or plated sources, much contain either: (1) an evaluation showing that the maximum dose to a member of the public offsite due to a release of radioactive materials would not exceed 1 rem effective dose equivalent or an intake of 2 milligrams of soluble uranium or (2) an emergency plan for responding to the radiological hazards of an accidental release of special nuclear material and to any associated chemical hazards directly incident thereto. Further, 10 CFR part 70, subpart H contains requirements for performing ISAs, designating items related on for safety (IROFS), and having management measures in place, both to ensure the IROFS are readily available and reliable to provide facility change management and configuration control.

OSU does not possess any uranium hexafluoride; as discussed below, OSU is exempt from the requirement to possess a criticality alarm, and does not possess in excess of 2 curies of

plutonium in unsealed form or on foils or plated sources. Therefore, OSU does not need to have an emergency plan in place in accordance with 10 CFR 70.22(i)(1).

The NRC staff finds that the activities proposed under the renewed license are not activities described in 10 CFR 70.60, "Applicability," and cannot significantly affect public health and safety. For these reasons, 10 CFR Part 70, Subpart H is not applicable to the LRA. As a result, the NRC staff concludes that OSU is not required to submit an ISA Summary in support of its LRA and an analysis of radiological risks from accidents is not needed in the safety evaluation report for the renewal of this 10 CFR Part 70 license.

*4.2.9 Additional Program Requirements*

Each licensee shall maintain records of the RPP, including the provisions of the program, survey records, audits and other records identified in Subpart L of 10 CFR Part 20. Each licensee shall make reports and notifications, including theft or loss, notification of incidents, and other reports as required by Subpart M of 10 CFR Part 20. The staff reviewed the applicant's additional program commitments against the acceptance criteria in NUREG-1520, Section 4.4.9.3. The following discussion identifies each acceptance criterion from NUREG-1520 and summarizes the staff's assessment of whether the information provided in the application is consistent with the criterion.

Maintain records of the RPP (including program provisions, audits, and reviews of the program content and implementation), radiation survey results (air sampling, bioassays, external-exposure data from monitoring of individuals, internal intakes of radioactive material), and results of its corrective action program referrals, RWPs, and planned special exposures.

(1) Criterion: Retain records of the RPP
The RC has a fully implemented health physics monitoring and survey program in accordance with 10 CFR 20 that includes documentation of spills or other contamination events. All contamination events, personnel radiation exposure and facility effluent release are tracked, and records are retained for the lifetime of the facility and materials license. The HP program is inspected every other year by the NRC as part of the monitoring of the reactor facility license (R-106). Recordkeeping commitments are and will be consistent with the requirements of 10 CFR 20, Subpart L. The NRC finds that OSU's record keeping program facilitates the maintenance of records of the RPP, radiation survey results, RWPs, and planned special exposures. The NRC concludes that OSU's record keeping program is consistent with the criteria in NUREG-1520 and is therefore acceptable.

(2) Criterion: Establish program to report incidents under 10 CFR 20.2202
Establish a program to report to the NRC, within the time specified in regulations, incidents specified in 10 CFR 20.2202, "Notifications of incidents," and 10 CFR 70.74, any event that results in an occupational exposure to radiation exceeding the dose limits in 10 CFR Part 20. Refer reportable events to the facility's corrective action program and report to the NRC both the corrective action(s) taken (or planned) to protect against a recurrence and any proposed schedule to achieve compliance with applicable license conditions.

OSU's program states that all individual monitoring results, incidents, and exposures exceeding the dose limits in 10 CFR 20 will be submitted consistent with the applicable

criteria of 10 CFR 20, Subpart M. The NRC staff finds that OSU's program allows for the reporting of incidents within the prescribed time and describes the safety significance specified in regulations. The NRC concludes that OSU's reporting program is consistent with the criteria in NUREG-1520 and is therefore acceptable.

(3) Criterion: Annual report of individual monitoring
OSU's program states that all individual monitoring results, incidents, and exposures exceeding the dose limits in 10 CFR 20 will be submitted consistent with the applicable criteria of 10 CFR 20, Subpart M. The NRC staff finds that OSU's program allows for the reporting of incidents within the prescribed time and describes the safety significance specified in regulations. The NRC concludes that OSU's reporting program is consistent with the criteria in NUREG-1520 and is therefore acceptable.

At OSU personnel-monitoring devices are required of all persons working in the Radiation Center with radiation sources for whom 10 CFR 20.1502 requires monitoring. Monitoring of additional individuals or environments is at the discretion of the senior health physicist. Personnel dosimetry appropriate for the material being used is provided by a vendor as required. Direct reading dosimeters such as ionization chambers and electronic dosimeters are available for gamma radiation if necessary. OSU submits all individual monitoring results, incidents, and exposures exceeding the dose limits in 10 CFR 20 consistent with 10 CFR 20.2206(b) on an annual basis. The NRC concludes that OSU's process of preparation and submission of annual reports to the NRC is consistent with the criteria in NUREG-1520 and is therefore acceptable.

The OSU LRA does not propose any significant changes to the recordkeeping and reporting commitments discussed in its application. Based on the staff's evaluation of the application, the staff finds the application ensures that OSU will comply with the requirements in 10 CFR 20.2202, 20.2206 and 70.74. Therefore, the NRC staff finds that these program commitments are acceptable.

4.3 Evaluation Findings

The applicant has committed to an acceptable RPP that includes the following:

- An effective, documented program to ensure that occupational radiological exposures are ALARA,
- An organization with adequate qualification requirements for the radiation protection personnel,
- Approved, written radiation protection procedures and RWPs for radiation protection activities,
- Radiation protection training for all personnel who have access to restricted areas,
- A program to control airborne concentrations of radioactive material with engineering controls and respiratory protection,
- A radiation survey and monitoring program that includes requirements for controlling radiological contamination within the facility and monitoring of external and internal radiation exposures, and
- Other programs to maintain records; report to the NRC in accordance with 10 CFR Part 20 and 10 CFR Part 70; and appropriately respond to, investigate, and

prevent incidents and accidents involving radiological exposures or uncontrolled releases of radioactive material.

The NRC staff concludes that the applicant's radiation protection program will meet the applicable requirements of 10 CFR Parts 19, 20, and 70 as discussed in Section 4.2 above, and is acceptable.

## 5.0 Nuclear Criticality Safety

### 5.1 Purpose of Review

The purpose of this review was to determine whether OSU's Nuclear Criticality Safety (NCS) Program is adequate to support safe operation of the facility, as required by 10 CFR Part 70.

### 5.2 Staff Review and Analysis

The staff conducted its review in accordance with the applicable acceptance criteria in Chapter 5, "Nuclear Criticality Safety," of NUREG-1520, as well as applicable portions of NUREG/CR-6698, "Guide for Validation of Nuclear Criticality Safety Calculational Methodology" (ADAMS Accession No. ML050250061). NUREG-1520 is the Standard Review Plan for fuel cycle facilities licensed under 10 CFR Part 70. The staff recognizes that because OSU is not a fuel cycle facility, not all regulatory requirements and program elements discussed in Chapter 5 of NUREG-1520 apply. For example, compliance with Subpart H of Part 70 is not required. The applicable acceptance criteria are discussed below.

OSU's Application for Materials License Renewal requests authorization to possess, use, and store solid aluminum-clad U-Mo metal fuel elements for the purposes of experimentally acquiring hydro-mechanical properties of single fuel elements. The fuel elements consist of uranium enriched to less than 20 weight percent (wt.%) U-235 with a total U-235 content of [ ] grams.

The staff reviewed the nuclear criticality safety analysis provided by OSU to demonstrate that planned activities do not present any credible criticality concerns under normal and all credible abnormal conditions. The analysis included evaluations of individual fuel elements under conditions of varying moderation and reflection, multiple fuel elements under conditions of varying moderation and reflection in their respective storage configuration, a fire in the storage cabinet, and multiple fuel elements under conditions of varying moderation and reflection outside of their respective storage configuration.

**Individual Fuel Elements.** OSU evaluated (1) a single fuel element with no reflection or moderation and (2) a single fuel element under conditions of full, tight-fitting, light-water reflection. OSU determined that the most reactive configuration for an individual fuel element involved a High Flux Isotope Reactor (HFIR) element under conditions of full, tight-fitting, light-water reflection. OSU determined that such a configuration was subcritical ($k_{eff}$ = 0.75160) and, therefore, does not present any criticality concerns.

**Multiple Fuel Elements in Storage Configuration**. OSU evaluated all five fuel elements in their respective storage configuration (linear array) under conditions of (1) no reflection or moderation and (2) full, tight-fitting light-water reflection and interspersed moderation. OSU determined that under conditions of no moderation and no interspersed moderation, the

configuration remained subcritical ($k_{eff}$ = 0.18860). Under conditions of full, tight-fitting light-water reflection and interspersed moderation, OSU determined that the configuration was, as expected, more reactive, but also remained subcritical ($k_{eff}$ = 0.75161). Therefore, OSU determined that configurations involving more than one fuel element in their respective storage location does not present any criticality concern.

**Fire in the Storage Cabinet.** OSU evaluated an upset condition involving a fire in the storage cabinet, resulting in a loss of fuel element geometry, subsequent accumulation of fuel in the bottom of each cabinet partition, and an introduction of reflection and moderation due to firefighting efforts. OSU determined that such a configuration is subcritical ($k_{eff}$ = 0.65465) and, therefore, does not present a criticality concern.

**Multiple Fuel Elements Outside of Storage Configuration**. OSU evaluated an upset condition involving all five fuel elements placed in close proximity to one another outside of the fixed spacing conditions provided by their respective storage configuration. This evaluation was performed using conditions of (1) no moderation or reflection and (2) conditions of full, tight-fitting, light-water reflection. OSU determined that the most reactive configuration involved full, tight-fitting, light-water reflection. OSU determined that such a configuration was subcritical ($k_{eff}$ = 0.86336) and, therefore, does not present a criticality concern.

The NRC staff reviewed OSU's analysis and performed an independent confirmatory analysis. Based on its independent analysis, the NRC staff determined that OSU's analysis adequately identified and evaluated the normal and credible abnormal conditions associated with its planned activities. In addition, the NRC staff confirmed, via its independent confirmatory analysis, that subcriticality was assured under normal and credible abnormal conditions for individual fuel elements (both inside and outside of storage), multiple fuel elements (both inside and outside of storage), and accumulations of unencapsulated fuel in an unfavorable geometry at the bottom of the cabinet partitions. Under normal conditions, only one fuel element will be removed from the storage location at a time, and OSU commits in Chapter 5.0 of the LRA to using a lockout/tagout system to maintain material control. OSU also commits in Chapter 5.0 of the LRA to applying safety procedures for the safe handling and consistent performance of experiments, and staff and students are required to take general training to gain familiarization with safety principles and facility procedures. Additionally, OSU commits to providing general and specialized training to all staff responsible for handling material and conducting experiments. These measures serve to limit the likelihood of credible upset conditions. In the event that an upset condition were to occur, even under the occurrence of multiple unlikely, concurrent, and independent changes in process conditions, criticality would still not be possible. Therefore, the staff determined that the licensee's planned operations and associated activities do not present any credible criticality concern.

Special Exemptions or Authorizations:

The regulations 10 CFR 70.4 provide thresholds for when inadvertent criticality becomes a concern, defining "critical mass of special nuclear material (SNM)" as SNM in a quantity exceeding 700 grams of contained U-235, 520 grams U-233, 450 grams Pu, 1500 grams of contained U-235 for enrichments of 4 wt.% or less, 450 grams of any combinations thereof, or one-half such quantities if massive moderators or reflectors made of graphite, heavy water, or beryllium are present. The regulations in 10 CFR 70.24 require that each licensee authorized to possess SNM in excess of these quantities to maintain a criticality accident

alarm system (CAAS) that is capable of detecting a criticality that produces an absorbed dose in soft tissue of 20 rads (combined neutron and gamma radiation) at an unshielded distance of 2 meters from the reacting material within 1 minute for all areas in which such licensed SNM is handled, used, or stored. Such areas must be covered by two detectors.

OSU request includes a total of [ ] grams U-235, which is in excess of the 700-gram threshold for U-235 in 10 CFR 70.4 and 10 CFR 70.24, meaning the regulations require OSU to have a CAAS. By letter dated April 19, 2022 (ML22122A105), OSU supplemented its license renewal application requesting that an exemption from the CAAS requirement in 70.24 be included in the renewal of SNM-2013. License SNM-2013 included a similar exemption under 10 CFR 70.17 from the 10 CFR 70.24 CAAS requirement.

In accordance with 10 CFR 70.17, “Specific exemptions,” the Commission may grant exemptions from the requirements of the regulations in Part 70 that it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. Nothing in the NRC’s regulations or in any other law, prevents the NRC from granting an exemption from the CAAS requirement in 10 CFR 70.24. Therefore, this exemption is authorized by law.

As discussed above, the NRC staff determined that the requested materials and associated activities do not present a credible criticality concern. As there is no credible criticality concern, the installation of a CAAS would not provide a meaningful reduction to the risk to the workers or the public associated with the SNM test objects. Therefore, the lack of a CAAS will not endanger life or property or the common defense and security. Further, while OSU’s application did not address how this exemption would be otherwise in the public interest, under its 10 CFR 70.17 authority, the NRC staff will fill-in that criterion on its own initiative. The NRC staff has determined that the exemption will be otherwise in the public interest because OSU is a public university possessing this material so that it can perform experiments for the Department of Energy. Exempting OSU from the requirement to use a CAAS will preserve resources for both OSU and the NRC. It will preserve resources for OSU, a public institution, because it will not have to implement and maintain a CAAS, which as discussed above, is not, in this case, necessary for safety. Further, it will preserve the NRC’s resources because the NRC will not have to evaluate and inspect the system. Thus, because this exemption preserves public resources by exempting a public university from a requirement to implement and maintain a system that, in this case, is not necessary to maintain safety when it conducts and experiment for the Department of Energy.

In summary, the staff determined that an exemption to the requirements of 10 CFR 70.24 is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest. Therefore, the staff is granting the request for exemption from the requirements of 10 CFR 70.24.

The following license condition is included in the license to address the exemption from 10 CFR 70.24:

> 12. The applicant is granted an exemption from the requirements of the Title 10 of the *Code of Federal Regulations* Section 70.24, “Criticality Accident Requirements,” to maintain a criticality accident alarm system.

5.3 Evaluation Findings

The NRC staff reviewed the request for license renewal. Based on the review discussed in this report, the NRC staff has determined that the licensee is not required to meet the requirements of Subpart H to 10 CFR Part 70 and that the requested materials and associated activities do not present a credible criticality concern. As such, an NCS program is unnecessary. Further, as discussed above, the requested exemption from the requirements of 10 CFR 70.24 is authorized by law, would not endanger life or property or the common defense and security, and is otherwise in the public interest.

## 6.0 Fire Protection

6.1 Purpose of Review

The purpose of this review was to determine that the applicant designed a facility that provides adequate protection against fires and explosions that could affect the safety of licensed materials, and thus present an increased radiological risk. The review also established that the application considered radiological consequences of fires and instituted suitable safety controls to protect workers, the public, and the environment.

6.2 Staff Review and Analysis

*6.2.1 Fire Hazards Analysis*

Section 7.4.3.2 of the NRC's SRP (NUREG-1520) states that a licensee should conduct a fire hazards evaluation for each facility (or part), that if totally consumed by fire, could release special nuclear material in quantity and form that could cause at least an intermediate consequence, as defined in 10 CFR 70.61. The NRC staff finds that a formal fire hazards analysis is not required for the LRA because of the low risk to public health and safety of the materials covered by the SNM-2013 license. The activities described in the LRA do not meet the conditions in 10 CFR 70.60 which would require an ISA of hazards, including fires. In accordance with 10 CFR 70.60, the facility is not required to have an ISA of hazards, including fires.

*6.2.2 Facility Design*

The licensee provided that two buildings on campus contain SNM. The location for storage and use of the SNM is in the Radiation Center (RC) building.

All buildings were built in accordance with Oregon State building code. The RC building is inspected annually by the City of Corvallis Fire Department for compliance with applicable building fire codes.

The walls of room [ ] in the RC have a fire rating of 4 hours and the walls of room [ ] in the RC have a minimum fire rating of 3 hours (International Building Code, 2003 Section 720, Table 720.1 or Northwest Concrete and Masonry Association, "Concrete Masonry Fire Resistance" February 2005.). There is no sprinkler or automated fire suppression system required in either room. NFPA 45 , "Standard on Fire Protection for Laboratories Using Chemicals," does not apply since neither room will contain flammable or combustible liquids equal to or greater than 4 liters nor contain greater than 2.2 standard $m^3$ of flammable gas. Each room complies with

most, but not all, of that described in NFPA 801, “Standard for Fire Protection for Facilities Handling Radioactive Materials.”

All elements will be stored in their designated storage rack location at all times when not in use. The storage cabinet, presented in Figure 2.6 of the LAR, is constructed of aluminum. Each element is separated by a wall preventing any possible reconfiguration in spatial geometry as a result of any or all elements falling. The fuel elements are secured within each storage location such that they are horizontally separated at 8 inches on center with exception of the high flux isotope reactor (HFIR) element which is separated via 12 inches on either side. The RC senior health physicist monitors the movement and accumulation of combustible material into and out of [ ] and Room [ ]. OSU’s response to an RAI confirmed that routine checks of accumulation of combustible material are performed and documented.

The use room, Room [ ], building superstructure consists of steel reinforced 8-inch concrete masonry walls with a membrane-lined steel deck roof. The room is under control with controlled access monitoring. This room has four rate-of-rise/fixed temperature detectors. All detectors are connected to the RC building fire alarm distribution panel. Each of the detectors is fully tested annually. The fire extinguishers are inspected annually. Because of the high-bay orientation, there will be no ventilation system for the use area.

The storage Room [ ], has a ventilation system, conditioned air, and four outlet ducts (three near the ceiling and one near the floor) to provide fresh air and exit the exhaust air. The room has four rate-of-rise/fixed temperature detectors located on the ceiling along with one smoke detector located in the exhaust ducting. All detectors are connected to the RC building fire alarm distribution panel and fully tested annually. Both fire extinguishers and emergency lights in the room are checked/inspected annually.

*6.2.3 Fire Protection and Detection Systems*

A fire detection and alarm system is installed in accordance with National Fire Alarm and Signaling (NFPA) Code 72, and the Oregon 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 24/7 by the OSU Police Dispatch Center; the system is maintained in operable condition, routinely inspected, and tested by trained technicians of the OSU Office of Physical Plant.

The Oregon codes do not require evacuation drills. OSU’s Emergency Response Plan requires annual building evacuation tests and exercises, refresher trainings, and emergency drills. The Emergency Response Plan also requires that the emergency drills occur with an outside first responder agency at least biennially. Both the Corvallis Fire Department and Samaritan Regional Medical Center receive annual training on the use and unique nature of the RC.

*6.2.4 Training and Emergency Response*

OSU’s Emergency Response Plan requires annual building evacuation tests and exercises, refresher trainings, and emergency drills. The Emergency Response Plan also requires that the emergency drills occur with an outside first responder agency at least biennially. Both the Corvallis Fire Department and Samaritan Regional Medical Center receive annual training on the use and unique nature of the RC. This training usually consists of an hour lecture on the

Emergency Response Plan and the first responders' own procedures on handling radiological incidents, followed by a tour of the entire facility.

6.3 Evaluation Findings

1) The NRC staff reviewed the fire hazards and facility fire protection, and the fire safety and emergency responses in OSU's application. Based on that review, as discussed above, the NRC staff finds the codes and standards, selected by the applicant for fire protection and detection systems are appropriate. The training and inspection on portable fire extinguishers, maintained by the qualified staff, are appropriate for license renewal. Based on these findings, the NRC staff concludes that the application is consistent with the acceptance criteria as outlined in Sections 7.4.3.1 and 7.4.3.5 of NUREG-1520 and the performance requirements of 10 CFR 70.61 for fire safety.

2) Given the low risk to public health and safety of the materials covered by the license renewal and the guidance provided in Section 7.4.3.2 of NUREG-1520, the NRC staff confirmed that a formal fire hazards analysis is not required, and the facility is not required to have an integrated safety analysis, in accordance with 10 CFR 70.60.

3) OSU provided information on potential fire hazards, fire consequences, and required controls, and the staff finds the procedures meet the requirements of 10 CFR 70.22(a)(7).

4) The NRC staff has determined that the applicant has adequate fire equipment, procedures, and a facility design to meet the applicable requirements in 10 CFR 70.23.

5) In addition, the NRC staff determined that, in the event of a fire, the local fire department is appropriately trained to respond to and address any chemical or radiological hazards and are supported by the OSU Hazardous Materials response team and the RC.

## 7.0 Decommissioning Funding Plan and Financial Assurance

7.1 Purpose of Review

The NRC staff conducted this review to determine that the licensee will be able to decommission the facility safely and in accordance with NRC regulations. Nuclear facilities licensed under 10 CFR Part 70 are required to comply with financial assurance and recordkeeping requirements in 10 CFR 70.25, "Financial assurance and recordkeeping for decommissioning." In addition, licensees must submit decommissioning plans for NRC approval in accordance with 10 CFR 70.38(g).

7.2 Staff Review and Analysis

Financial assurance and decommissioning funding requirements are found in 10 CFR 70.22(a)(9) and 70.25, which require licensed nuclear facilities to establish financial assurance to cover the estimated costs for site decommissioning, decontamination, and reclamation. Paragraph 70.25(a)(2) of 10 CFR requires an applicant for a specific license that authorizes possession and use of unsealed SNM in certain quantities to submit a DFP. Paragraph 70.25(e)(2) of 10 CFR requires a licensee, at the time of license renewal, to resubmit a DFP with adjustments that are necessary to account for any changes to costs or the amount of contamination. OSU's renewed license, if granted, would not authorize it to possess unsealed

sources. Therefore, these financial assurance and decommissioning funding requirements do not apply to OSU.

## 8.0 Management Measures

### 8.1 Purpose of Review

Paragraph 70.22(a)(8) of 10 CFR requires that the applicant submit a description of the proposed procedures that will be used to protect health and minimize danger to life or property. Among those procedures are configuration control, maintenance, training, procedures, audits and assessments, and records management.

### 8.2 Staff Review and Analysis

The requirements for management measures set out in 10 CFR Part 70, Subpart H, do not apply to OSU. (See Section 3 of this SER). Nonetheless, Chapter 11 of the LRA commits the licensee to important aspects of safety. OSU commits to learning from experiences and modifying practices accordingly and has an audit program to ensure that safety aspects are reviewed.

The LRA contains the following elements:

> Procedures Review: The applicant commits to continuous improvement and performs a review of procedures, policies, and practices at least annually. Experiences with SNM are used as opportunities to examine, and revise if needed, procedures, policies, practices, and training.
>
> Audits: All radioactive material use locations are inspected by the RC staff. Audits include, but are not limited to, checks of postings and labeling, waste handling, security, meters and instrumentation, training status, use of personal protective equipment, and general lab safety. Audits are reviewed and signed-off by the RSO.
>
> Records Management: All required records are maintained by the RC or the Office of Research Protection, either electronically or hardcopy. Back-ups and archives ensure the records will persist.
>
> Material Control and Accountability: Special nuclear material accountability is managed in compliance with 10 CFR 74 Subpart B through the RC Laboratory-Specific Chemical Hygiene and Safety Plan (LCHSP).

### 8.3 Evaluation Findings

The NRC staff has determined that the application describes a suitably detailed process for the development, approval, and implementation of procedures. The staff has also reviewed the applicant's plan for audits and assessments and finds it acceptable.

## 9.0 Radioactive Waste Disposal

9.1 Purpose of Review

Paragraph 20.2001 of 10 CFR requires a licensee to dispose of licensed material only by stated methods. A person must be specifically licensed to receive waste containing licensed material from other persons for disposal by stated methods.

9.2 Staff Review and Analysis

There is no waste associated with this license. The fuel assemblies are sealed and unirradiated and will not be unsealed or irradiated. If low-level waste were created, provisions exist through the EH&S program to collect and dispose the material. The five sealed source fuel elements are U.S. Government-owned material. As such, the disposal costs for retrieval and final disposition of these materials will be the responsibility of the U.S. Department of Energy (DOE).

9.3 Evaluation Findings

The NRC staff has reviewed the applicant's radioactive waste disposal process and has determined that OSU has an established means of disposing of radioactive wastes since the material for this research project will be returned to DOE upon completion and any low-level waste created will be disposed of in accordance with the EH&S provisions. Further, apart from the licensed material and potential low-level waste, OSU will not generate any other waste under this license. Therefore, the NRC staff has determined that the applicant has adequate measures to ensure that waste containing licensed materials can be disposed in a manner that meets the requirements of 10 CFR 20.2001.

9.4 *Alternate Means of Waste Disposal*

Section 20.2002 of 10 CFR states that a licensee may apply to the Commission for approval of proposed procedures, not otherwise authorized by regulations, to dispose of licensed material generated in the licensee's activities. The applicant did not propose an alternative radioactive disposal method other than that already approved.

9.5 *Disposal of Waste into Sanitary Sewerage*

9.5.1 Purpose of Review

Section 20.2003 of 10 CFR provides that a licensee may discharge licensed material into sanitary sewerage when specific criteria are met.

9.5.2 Staff Review and Analysis

No gaseous effluents are anticipated from this effort. Liquid effluents are also not expected. However, OSU will put a procedure into place to periodically sample the water of the test loop in which the elements will be used. If results are not below the limits found in 10 CFR 20, Appendix B, the water will be pumped to a storage tank for further evaluation and proper disposal in accordance with the NRC regulations. The water in which the elements will be used will also be sampled before release to the sanitary sewer to ensure there is no radioactivity present above 10 CFR 20 Appendix B limits. If results are not below the limits found in

10 CFR 20, Appendix B, the water will be pumped to a storage tank for further evaluation and proper disposal in accordance with the NRC regulations.

9.5.3 Evaluation Findings

The NRC staff has determined that the applicant has sufficient means to manage potential liquid waste because provisions exist through the EH&S office to collect and dispose the material. Therefore, the NRC staff finds that OSU's disposal of waste into sanitary sewage meets the requirements of 10 CFR 20.2003.

9.6 *Treatment of Waste by Incineration*

Section 20.2004 of 10 CFR provides the requirements under which a licensee may treat or dispose of licensed material by incineration. The applicant did not propose to incinerate waste containing licensed material.

9.7 *Disposal of Specific Wastes*

9.7.1 Purpose of Review

Section 20.2005 of 10 CFR states that a licensee may dispose of the following licensed material as if it were not radioactive: (1) 0.05 microcurie (1.85 kBq), or less, of hydrogen-3 or carbon-14 per gram of medium used for liquid scintillation counting; (2) 0.05 microcurie (1.85 kBq), or less, of hydrogen-3 or carbon-14 per gram of animal tissue, averaged over the weight of the entire animal as if it were not radioactive. Further, under 10 CFR 20.005(b)(2) a licensee may not dispose of tissue in a manner that would permit its use either as food for humans or as animal feed. A licensee shall maintain records in accordance with 10 CFR 20.2108.

9.7.2 Staff Review and Analysis

These specific wastes are not created by OSU and, therefore, the requirements of 20.2005 are not relevant.

9.7.3 Evaluation Findings

The NRC staff has determined that because OSU does not create the types of waste covered by 10 CFR 20.2005, OSU has met its burden under 10 CFR 20.2005.

9.8 *Transfer for Disposal and Manifests*

9.8.1 Purpose of Review

Section 20.2006 of 10 CFR describes the requirements for shipping radioactive waste intended for ultimate disposal at a licensed land disposal facility. Any licensee shipping radioactive waste intended for ultimate disposal at a licensed land disposal facility must document the information on NRC's Uniform Low-Level Radioactive Waste Manifest and transfer this recorded manifest information to the intended consignee. Each shipment manifest must include a certification by the waste generator as specified in Section II of Appendix G to 10 CFR Part 20. Each person involved in the transfer for disposal and disposal of waste must comply with Section III of Appendix G to 10 CFR Part 20. A licensee shipping byproduct material intended for ultimate

disposal at a land disposal facility licensed under Part 61 must document the information required on the NRC's Uniform Low-Level Radioactive Waste Manifest and transfer this recorded manifest information to the intended consignee in accordance with 10 CFR Part 20, Appendix G.

9.8 2 Staff Review and Analysis

The five sealed source fuel elements are U.S. Government-owned material. As such, retrieval and final disposition of these materials will be the responsibility of the U. S. Department of Energy (DOE). DOE will be responsible for the disposal and waste manifests at the completion of the project.

9.8.3 Evaluation Findings

The NRC staff understands that DOE will be responsible for the disposal and waste manifests at the completion of the project and OSU will not be a licensee shipping radioactive waste intended for ultimate disposal at a licensed land disposal facility. Therefore, the NRC staff concludes that the licensee meets the requirements of 10 CFR 20.2006.

9.9 *Compliance with Environmental and Health Protection Regulations*

9.9.1 Purpose of Review

Section 20.2007 of 10 CFR states that nothing in this subpart relieves a licensee from complying with other applicable Federal, State, and local regulations governing any other toxic or hazardous properties of materials that may be disposed of under 10 CFR Part 20, Subpart K.

9.9.2 Staff Review and Analysis

The LRA states that the EH&S office reviews and oversees the waste disposal program in accordance with all local, state, and Federal regulations.

9.9.3 Evaluation Findings

NRC staff reviewed the LRA to confirm OSU's compliance with environmental and health protection regulations. The NRC staff determined that the EH&S office maintains review and oversight functions and ensures that all Federal, State, and local regulations are met. Therefore, the NRC staff finds that the licensee meets the requirement of 10 CFR 20.2007.

9.10 *Disposal of Certain Byproduct Material*

9.10.1 Purpose of Review

Section 20.2008 of 10 CFR states that certain byproduct material set forth in 10 CFR 20.1003 may be disposed of in accordance with 10 CFR Part 61, even though it is not defined as low-level radioactive waste. Therefore, any licensed byproduct material being disposed of at a facility, or transferred for ultimate disposal at a facility licensed under 10 CFR Part 61, must meet the requirements of 10 CFR 20.2006. Such byproduct material may be disposed of at an authorized facility in accordance with any Federal or State solid or hazardous waste law, including the Solid Waste Disposal Act, as authorized under the Energy Policy Act of 2005.

9.10.2 Staff Review and Analysis

Byproduct material is stored in a secure area prior to transfer to a licensed broker for disposal. For activities associated with this license, DOE will be responsible for the disposal and waste manifests at the completion of the project. OSU will package the waste in accordance with broker instructions and the requirements of the final licensed disposal site prior to shipment.

9.10.3 Evaluation Findings

As OSU will return any byproduct material generated under this license to DOE for disposal in accordance with broker instructions and requirements for the final disposal site, the NRC staff determined that the licensee has means of disposal of certain byproduct material. Therefore, the NRC concludes that the licensee meets the requirements of 10 CFR 20.2008.

## 10.0 Incident Reporting

10.1 Purpose of Review

Section 20.2202 of 10 CFR provides the requirements for immediate and 24-hour notifications. In the event of an incident, a report must be prepared and filed with the Commission. The report must be prepared so that names of individuals who have received exposure to radiation or radioactive material are stated in a separate and detachable part of the report. Reports must be made by telephone to the NRC Operations Center at (301) 816-5100. Section 70.74 of 10 CFR provides reporting requirements to the NRC Operations Center.

10.2 Staff Review and Analysis

OSU's LRA provides that all users are instructed to notify the RC of incidents involving radioactive material. Campus police are also available to receive incident notifications and will contact the EH&S office. The EH&S staff will then notify the NRC as required. Notifications required by 10 CFR 20.2202 or 10 CFR 70.74 are made by the RSO, or designee, within the time limits specified by regulation.

10.3 Evaluation Findings

The NRC staff determined that the licensee has a communication system to notify cognizant individuals in EH&S, and appropriate authorities. Therefore, the NRC staff concluded that the licensee meets the requirements of 10 CFR 20.2202 and 10 CFR 70.74.

## 11.0 Chemical Safety

11.1 Purpose of Review

The NRC staff conducted the chemical process safety review to ensure that the licensee will adequately protect workers, the public, and the environment from chemical hazards of licensed material and hazardous chemicals produced from licensed material. The licensee must also protect against facility conditions or operator actions that could affect the safety of licensed materials and thus present an increased radiological risk. This section discusses the staff's evaluation of the OSU program for identifying and managing chemical hazards that could arise

from the activities it will conduct under License SNM-2013. This review applies the requirements for approval of applications identified in 10 CFR 70.23 with a focus on those elements which facilitate the identification and management of the chemical hazards for activities that will be conducted under SNM-2013. A Memorandum of Understanding between NRC and OSHA delineates areas of regulatory responsibility between both agencies and applies the general hazard management principles of NRC guidance for fuel cycle facilities.

11.2 Staff Review and Analysis

The NRC staff examined OSU's LRA and responses to RAIs. The regulatory basis for this review is found in 10 CFR 70.22 and 10 CFR 70.23. These sections describe the required contents of the application and the requirements for NRC approval of applications. The review focused on those elements that address chemical safety. Section 6.4.3 of NUREG-1520 (NRC, 2015) outlines the acceptance criteria for the NRC's review of chemical process safety of licensee's regulated under 10 CFR 70, Subpart H. The staff, however, concluded that Subpart H does do not apply to the activities covered by this license.

The staff's chemical safety review evaluated the chemical safety information in the application to ensure the specific requirements in 70.72 and 70.23 were met. Specifically, the staff evaluated (1) whether the applicant's personnel are qualified by training and experience to use the material for the purpose requested in accordance with the regulations in this chapter, (2) whether the applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life or property, and (3) whether the applicant's proposed procedures are adequate to protect health and to minimize danger to life or property.

The OSU license application describes the activities to be conducted under the license. The described activities do not involve chemical hazards that would be under NRC's regulatory jurisdiction. In response to an RAI, OSU clarified that the RC Laboratory-Specific Chemical Hygiene and Safety Plan (LCHSP) includes requirements for procuring, storage and disposal of chemicals, storage requirements for flammable and combustible material, fire safety equipment, and chemical spill and containment procedures. The LCHSP complies with Oregon Administrative Rule 437-002-0360 Toxic and Hazardous Substances, and the OSU Chemical Hygiene Plan.

Procedures are applied to establish safe operations with chemicals, combustible materials, radioactive materials and radiation sources. These procedures satisfy various requirements, including Federal USNRC and State licenses for radioactive materials, OSU's Chemical Hygiene Plan, and fire codes. OSU EH&S's Fire and Life Safety staff are charged with reviewing OSU facilities for fire hazards, and the Chemical and Lab Safety staff conduct routine evaluation of all RC facilities for chemical hazards.

The staff reviewed the proposed activities and OSU commitments to the review and evaluation of chemical hazards.

The staff concludes that: (1) there are currently no chemical hazards under NRC's regulatory jurisdiction for the planned activities authorized under this license that involve licensed material, and (2) OSU has a process for identifying and controlling chemical hazards if there are changes in the activities involving the material authorized under this license. The conclusion is based on OSU's assessment that there are not chemical hazards associated with the planned activities with license material authorized under this license, the staff's own assessment of chemical

hazards for the planned advanced fuel tests and fuel storage, and the OSU commitment to consider chemical hazards in the development and review of new procedures for activities authorized under this license. The NRC staff considers OSU Chemical and Lab Safety staff qualified for conducting chemical safety reviews of any new procedures because of their training and experience.

### 11.3 Evaluation Findings

The staff reviewed the information supplied in the LRA and the responses to RAIs. The staff finds that OSU provided descriptions of the equipment and facilities in sufficient detail for identifying and managing chemical safety issues related to its licensed activities, as required under 10 CFR Part 70.22. The staff reviewed this information against requirements of 10 CFR 70.23, "Requirements for the approval of applications" with a focus on chemical safety issues. Based on the above, the staff concludes that OSU's personnel are qualified by training and experience to identify and manage any chemical hazards associated with the use of SNM. The staff further concludes that the applicant's processes and written procedures for evaluating laboratory facilities for specific activities are adequate to protect health and minimize danger to life or property from chemical hazards. The staff finally concludes that the applicant's procedures for identifying and managing chemical hazards associated with licensed activities are adequate to protect health and minimize danger to life or property from chemical hazards associated with licensed activities.

## 12.0 Emergency Management

### 12.1 Purpose of Review

Under 10 CFR 70.22(i)(1), an application to possess enriched uranium or plutonium for which a criticality accident alarm system is required, uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total, or in excess of 2 curies of plutonium in unsealed form or on foils or plated sources must include either: (i) an evaluation showing that the maximum dose to a member of the public offsite due to a release of radioactive materials would not exceed 1 rem effective dose equivalent or an intake of 2 milligrams of soluble uranium, or (ii) an emergency plan for responding to the radiological hazards of an accidental release of SNM and to any associated chemical hazards directly incident thereto.

### 12.2 Staff Review and Analysis

OSU does not possess any uranium hexafluoride, is exempt from the requirement to possess a criticality alarm, and does not possess in excess of 2 curies of plutonium in unsealed form or on foils or plated sources. Therefore, 10 CFR 70.22(i)(1) does not require OSU's application to include an emergency plan. OSU's application incorporates, by reference, the Oregon State TRIGA Reactor Emergency Response Plan approved by NRC under License No. R-106.

This license authorizes the storage of special nuclear material in approved storage racks. The location of the storage racks is within the OSU research reactor operations boundary, which is within the emergency planning zone for the reactor. OSU's application incorporates, by reference, the Oregon State TRIGA Reactor Emergency Response Plan approved by NRC under License No. R-106.

12.3 Evaluation Findings

The NRC staff confirmed that OSU does not possess uranium hexafluoride in any quantity, is exempt from the requirement to possess a criticality alarm system, and does not possess in excess of 2 curies of plutonium in unsealed form or on foils or plated sources. Therefore, this requirement is not applicable.

## 13.0 Environmental Protection

13.1 Purpose of the Review

The purpose of the review is to determine whether the licensee's proposed environmental protection measures are adequate to protect the environment and public health and safety and to comply with the regulatory requirements in 10 CFR Part 20.

13.2 Staff Review and Analysis

OSU, an academic institution, proposed to use sealed sources of SNM for research and development. There are no liquid or gaseous effluents anticipated to be created from the renewal of the licensed activity (see SER Section 9.5.2). There is little or no waste associated with the license (see SER Section 9.2). The activities will be performed within the confines of the OSU research facility by trained personnel.

13.3 Evaluation Findings

No effluents are anticipated and as stated in Section 9.5.2, a procedure will be put into place to periodically sample the water in the test loop. Water will also be sampled before release to the sanitary sewer in accordance with 10 CFR Part 20, Appendix B limits. If low-level radioactive waste were created, provisions exist through the licensee's EH&S program to collect and dispose of the material (See Section 9.2 of this SER). There is no likelihood of contamination from operations involving the special nuclear material sources, and there are no accidents nor anticipated consequences from accidents. The controls of 10 CFR Part 70 Subpart H are not required. Management measures do not apply to OSU (see Section 8 of this SER). As stated in Section 3.0, the NRC staff concluded that OSU is not required to submit an ISA Summary in support of its LRA. The NRC staff concluded, in Section 4.3, that the applicant's radiation protection program will meet the applicable requirements of 10 CFR Parts 19, 20, and 70.

## 14.0 Physical Security

14.1 Purpose of Review

Section 73.40 of 10 CFR requires that the licensee provide physical protection at a fixed site, or contiguous sites where licensed activities are conducted against radiological sabotage, or against theft of SNM, or against both, in accordance with the applicable sections of this Part for each specific class of facility or material license. If applicable, the licensee shall establish and maintain physical security in accordance with security plans approved by the NRC.

Paragraph 73.67(a) of 10 CFR provides general performance objectives for the licensee physical protection system for the possession, use, or transport of SNM of moderate or low

strategic significance. Paragraph 73.67(f) of 10 CFR provides specific requirements for a licensee who possesses, stores, or uses SNM of low strategic significance at a fixed site.

## 14.2 Staff Review and Analysis

NRC staff reviewed the information in the LRA for the physical protection of SNM in accordance with 10 CFR 73.67(a) and (f) and the guidance provided in Regulatory Guide 5.59, "Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance."

### 14.2.1 *General Performance Objectives*

The regulations in 10 CFR 73.67(a) require that the licensee shall establish and maintain a physical protection system that will achieve the following objectives: (i) minimize the possibilities for unauthorized removal of special nuclear material consistent with the potential consequences of such actions; and (ii) Facilitate the location and recovery of missing special nuclear material. To achieve these objectives, the physical protection system shall provide: (i) early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing special nuclear material; (ii) early detection of removal of special nuclear material by an external adversary from a controlled access area; (iii) assure proper placement and transfer of custody of special nuclear material; and (iv) respond to indications of an unauthorized removal of special nuclear material and then notify the appropriate response forces of its removal in order to facilitate its recovery.

Through a combination of OSU's application, the Physical Security Plan (PSP), and the responses to RAIs, the NRC staff concludes that the combination of physical security features employed will meet the general performance measures of 10 CFR 73.67(a). OSU has employed a physical protection system that includes a combination of procedures, electronic systems, and personnel to detect and respond to unauthorized access or activities for the removal of SNM. OSU relies on a response force that includes both on-site security and off-site local law enforcement to respond to indications of unauthorized penetration or removal of SNM to facilitate prompt recovery. Additionally, the physical protection systems and/or procedures provide early detection and assessment of unauthorized access or activities by an external adversary.

The NRC staff has reviewed OSU's application, the PSP, and the applicant's responses to the NRC staff's Requests for Additional Information (RAI) and finds that the information meets the requirements of 10 CFR 73.67(a), as described below.

### 14.2.2 *Controlled Access Area*

The provisions of 10 CFR 73.67(f)(1) require licensees to store or use the material only within a controlled access area (CAA).

Section 4.1 of the PSP, "Controlled Access Area (CAA)," lists which rooms are designated as a CAA, that includes [ ]. Section 2 of the application states that the primary location for storage/use of the SNM will be in Rooms [ ] and [ ].

In RAI 5(1), the NRC requested that OSU clarify how it will use the fuel elements only once a controlled access area has been established in Room [ ]. In its RAI response, OSU

committed to amend Section 4.1 of the OSTR Physical Security Plan to include Room [ ] as a temporary CAA during the time when a fuel element(s) is located in Room [ ].

The NRC staff reviewed OSU's description of a CAA in Section 4.1 of the PSP and the RAI response to revise the PSP to include Room [ ] as a temporary CAA and finds they meet the requirements of 10 CFR 73.67(f)(1).

14.2.3 *Monitoring and Intrusion Detection*

The provisions of 10 CFR 73.67(f)(2) require that licensees monitor a CAA with an intrusion alarm or other devices or procedures to detect unauthorized penetrations or activities.

Sections 5.6 of the PSP, "Reactor Building Doors," Section 6.1 of the PSP, "Primary Intrusion Alarm," and Section 6.3 of the PSP, "Secondary Intrusion Alarm," specify that all the entrances to Room [ ] will be either locked or alarmed during non-working hours or when the rooms are not under direct surveillance by reactor operations staff with material present. Otherwise, during normal working hours and under direct surveillance, the alarm systems will be disarmed in Room [ ].

In RAI 5(2), the NRC requested that OSU clarify how it will monitor the CAA established in Room [ ] when the fuel elements are present to detect unauthorized penetrations or activities. In its RAI response, OSU stated that the material will be controlled by an authorized individual that will control access to prevent unauthorized penetrations or activities. If such activities are observed or otherwise discovered, they would report the issue to the Physical Security Officer immediately.

The NRC staff has reviewed OSU's description of monitoring of CAAs in Sections 5.6, 6.1, and 6.3 of the PSP and the RAI response and finds they meet the requirements of 10 CFR 73.67(f)(2).

14.2.4 *Security Response*

The provisions of 10 CFR 73.67(f)(3) require the licensee to assure that a watchman or off-site response force will respond to all unauthorized penetrations or activities.

Section 3.2.1 of the PSP, "OSU Department of Public Safety," Section 5.4.2 of the PSP, "Surveillance After Hours," and Section 9.4 of the PSP, "Observed or Suspected Unauthorized Entry," specify that the CAA for room [ ] (with material present), outside normal working hours, is set to alarm in the OSU Department of Public Safety (DPS); DPS will initiate response procedures upon receipt of such alarms. If an armed response is needed, the response will be provided by OSU DPS or other local or State law enforcement agencies. During normal working hours, surveillance is performed by authorized individuals for Room [ ].

In RAI 5(3), the NRC requested that OSU clarify how it will assure that an off-site response force will respond to all unauthorized penetrations or activities in Room [ ] when the fuel elements are stored or used there. In its RAI response, OSU stated that in situations involving unauthorized penetrations or activities in Room [ ] when the material is present, the authorized individual present will immediately notify the Physical Security Officer who will initiate the appropriate actions described in Section 9.4 of the PSP.

The NRC staff has reviewed OSU's description of actions to respond to unauthorized penetrations or activities in Sections 3.2.1, 5.4.2, and 9.4 of the PSP and the RAI response and finds they meet the requirements of 10 CFR 73.67(f)(3).

14.2.5 *Response Procedures*

The provisions of 10 CFR 73.67(f)(4) require the licensee to establish and maintain response procedures for dealing with threats of thefts or thefts of this material.

In Section 9.3 of the PSP, "Discovery That SNM is Missing," OSU specifies actions that relate to theft of SNM.

In RAI 5(4), the NRC requested that OSU clarify how it will include, in their current response procedures, how to deal with threats or theft of the fuel elements when used or stored in Room [ ]. In its RAI response, OSU stated that in a situation involving threats or theft of material, the authorized individual will immediately notify the Physical Security Officer who will initiate the appropriate actions described in Section 9.3 of the PSP.

The NRC staff has reviewed OSU's description of response procedures in Section 9.3 of the PSP and the RAI response associated with Room [ ] and finds they meet the requirements of 10 CFR 73.67(f)(4).

14.3 Evaluation Findings

The NRC staff reviewed OSU's application, PSP, and RAI responses, to determine if the information satisfies the applicable requirements of 10 CFR 73.67. Based on its review, the NRC finds that OSU's application and supporting materials describe physical protection measures that meet the requirements in 10 CFR 73.67(f). Therefore, the NRC staff finds the OSU application with its supporting material acceptable and finds that the application meets the requirements for the physical protection of SNM of low strategic significance.

## 15.0 Material Control and Accounting

15.1 Purpose of Review

The purpose of this review was to determine whether OSU's MC&A practices are adequate to detect and protect against the loss, theft, or diversion of SNM that the licensee possesses, stores, and utilizes at its facility, and to comply with the applicable regulatory requirements in 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material." Licensees who possess or transfer SNM in a quantity of 1 gram or more of contained $^{235}U$, $^{233}U$, or plutonium are subject to the general reporting and recordkeeping requirements of 10 CFR Part 74.

15.2 Staff Review and Analysis

In Section 8, "Material Control and Accountability," section of the LRA, the licensee stated that SNM accountability under License SNM-2013 is managed by the RSO. In the response to RAIs 6-8, the licensee stated that internal procedures are designed to specify the written control and accountability procedures that enable the licensee to account for the SNM under the materials license SNM-2013 and to meet the applicable requirements of 10 CFR Part 74, Subpart B, "General Reporting and Recordkeeping Requirements."

The following discussion identifies each of the applicable MC&A requirements and summarizes the NRC staff's evaluation as to whether the information provided in the OSU's LRA and RAI responses meets the requirements.

*15.2.1 Reports of loss or theft of attempted theft*

Paragraph 74.11(a) of 10 CFR requires each licensee who possesses 1 gram or more of contained $^{235}U$, $^{233}U$ or plutonium to notify the NRC Operations Center within 1 hour of discovery of any loss or theft or other unlawful diversion of SNM 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 SNM.

The NRC staff reviewed the description of OSU's process for notifying the NRC of loss or theft of SNM. The licensee indicated in Section 9, "Physical Protection of Plants and Materials," of the LRA that a report shall be made to the NRC within one hour of the discovery of a loss or theft of SNM or any incident in which an attempt has been made to commit a theft or unlawful diversion of SNM in accordance with 10 CFR 74.11. In the RAI response, the licensee stated that internal procedures are designed and specifically intended to achieve compliance with the requirements of 10 CFR 74.11.

Based on the review of the LRA and RAI responses, the NRC staff determined that the licensee's MC&A program includes adequate procedures to ensure that NRC is notified in a timely manner in the event of a loss or theft or attempted theft of SNM. Therefore, the NRC staff finds that the licensee meets the requirements of 10 CFR 74.11.

*15.2.2 Material Status Reports (10 CFR 74.13)*

Section 74.13 of 10 CFR requires each licensee possessing SNM in a quantity totaling 1 gram or more of contained $^{235}U$, $^{233}U$, or plutonium to complete and submit, in computer-readable format material balance reports concerning SNM that the licensee has received, produced, possessed, transferred, consumed, disposed, or lost. The physical inventory listing report must be submitted with each material balance report. Each licensee shall prepare and submit the reports as specified in the instructions in NUREG/BR-0007.

The NRC staff reviewed the licensee's description of its material status reports. In Section 8, "Material Control and Accountability," of the LRA, the licensee stated that the RC maintains a special nuclear material inventory and reporting program in accordance with 10 CFR 74.13. The licensee also stated that annual material status reports are submitted to the Nuclear Material Managements and Safeguards System (NMMSS) within 60 days of the beginning of the physical inventory. The licensee also committed to completing the reports and submitting them in accordance with NUREG/BR-0007. In RAI responses 6-8, the licensee stated that internal procedures are designed and specifically intended to achieve compliance with the requirements of 10 CFR 74.13.

Based on the review of the LRA and RAI responses, the NRC staff determined that the licensee's MC&A program includes adequate procedures to ensure that material balances and physical inventory listings are reported as required. Therefore, the NRC staff finds that the licensee meets the requirements of 10 CFR 74.13(a).

*15.2.3 Nuclear Material Transaction Reports (10 CFR 74.15)*

Section 74.15 of 10 CFR requires each licensee who transfers or receives SNM in a quantity of 1 gram or more of contained $^{235}U$, $^{233}U$, or plutonium to 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 the SNM shall submit a nuclear material transaction report no later than the close of business the next working day. Each licensee who receives the SNM shall submit a nuclear material transaction report within 10 days after the material is received.

The NRC staff reviewed the licensee's description its nuclear material transaction reports processes. In Section 8, "Material Control and Accountability," of the LRA, the licensee states that the transfers and receipts of SNM are reported to the NMMSS in accordance with 10 CFR 74.15. The licensee also committed to completing the reports and submitting them in accordance with NUREG/BR-0006. In RAI responses 6-8, the licensee stated that internal procedures are designed and specifically intended to achieve compliance with the requirements of 10 CFR 74.15.

Based on the review of the LRA and the RAI responses, the NRC staff determined that the licensee's MC&A program includes adequate procedures to ensure that receipts and transfers of SNM are reported through nuclear material transaction reports as required. Therefore, the NRC staff finds that the licensee meets the requirements of 10 CFR 74.15(a).

*15.2.4 Recordkeeping*

Paragraph 74.19(a) of 10 CFR requires a licensee to keep records showing the receipt, inventory (including location and unique identity), acquisition, transfer, and disposal of all SNM in its possession regardless of its origin or method of acquisition. Each record relating to material control or material accounting required by the regulations or license condition must be maintained and retained for the period specified by the appropriate regulation or license condition. Each record of receipt, acquisition, or physical inventory of SNM maintained pursuant to paragraph 74.19(a)(1) must be retained as long as the licensee retains possession of the material and for 3 years following transfer or disposal of the material. Each record of transfer of SNM to other persons must be retained by the licensee that transferred the material until the Commission terminates the license authorizing the licensee's possession of the material.

The NRC staff reviewed the licensee's description of completing and maintaining certain MC&A records. In its response to RAIs 6-8, OSU stated that it has internal procedures, such as OSTRP #20, "SNM Control and Accounting Procedures," that are designed to specify the written control and accountability procedures. It also noted that these procedures are intended to satisfy, among other requirements, the requirements of 10 CFR 74.19. Further, in section 5.II.A, "Responsibilities of the Radiation Safety Officer (RSO)," of the LRA, the licensee stated that the RSO administers the SNM license and has the primary responsibility for assuring the SNM licensee's compliance. This includes maintaining material control records and records management.

Based on the review of the LRA and RAI responses, the NRC staff determined that the licensee's MC&A program includes adequate procedures to ensure MC&A records are

completed and maintained. Therefore, the NRC staff finds that the licensee meets the requirements of 10 CFR 74.19(a).

*15.2.5 Physical Inventory*

Paragraph 74.19(c) of 10 CFR requires certain licensees who are authorized to possess SNM in a quantity greater than 350 grams of contained $^{235}U$, $^{233}U$, or plutonium at any one time, to conduct a physical inventory of all SNM in their possession under the license at intervals not to exceed 12 months. The results of these physical inventories shall be retained in records by the licensee until the Commission terminates the license authorizing the possession of the material.

The NRC staff reviewed the licensee's description of the actions that are taken concerning physical inventory of its SNM. In Section 7.I, "Monitoring Procedures," of the LRA, the licensee stated that the status of SNM will be verified by annual (every 12 months) inventory. In Section 8, "Material Control and Accountability," of the LRA, the licensee stated that the RC maintains an SNM inventory and reporting program. This includes performing the annual inventory and reporting the results as required by 10 CFR 74.19(c). In RAI responses 6-8, the licensee stated that internal procedures are designed and specifically intended to achieve compliance with the requirements of 10 CFR 74.19.

Based on the review of the LRA and RAI responses, the NRC staff determined that the licensee's MC&A program includes adequate procedures to ensure physical inventories of its SNM are completed at the required frequency and the results are reported. Therefore, the NRC staff finds that the licensee meets the requirements of 10 CFR 74.19(c).

15.3 Evaluation Findings

Based on the review of the LRA and subsequent submittals, the NRC finds that the licensee's MC&A practices as described satisfy the applicable requirements found in 10 CFR 74.11, 74.13, 74.15, and 74.19. Therefore, the NRC staff finds that the licensee's MC&A practices are acceptable.

## III. NATIONAL ENVIRONMENTAL POLICY ACT REVIEW

In accordance with 10 CFR 51.22(a), licensing, regulatory, and administrative actions eligible for categorical exclusion are those actions that belong to a category of actions that 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. Paragraph 51.22(c)(14)(v) and 51.22(c)(25) of 10 CFR provide categorical exclusions for the categories of actions under the OSU license.

The NRC has determined that the renewal of materials licenses issued under 10 CFR Parts 30 or 70, for research and development and for educational purposes, and the issuance of exemptions from inspection or surveillance requirements as well as recordkeeping and reporting requirements do not individually or cumulatively have a significant effect on the human environment. OSU's license is a Part 70 license and OSU will use the radioactive materials to conduct experiments to determine certain properties of the materials. Consequently, it will be using the radioactive materials for research and development. Thus, the renewal of the license is categorically excluded under 10 CFR 51.22(c)(14)(v).

As discussed above, by letter dated April 19, 2022, OSU requested an exemption from the 70.24(a) requirement for a criticality accident alarm system. The Commission has found that exemptions meeting the requirements of 10 CFR 51.22(c)(25)(i)-(vi) are categorically excluded. Specifically, 10 CFR 51.22(c)(25) states that an exemption is categorically excluded provided that: "(i) There is no significant hazards consideration; (ii) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; (iii) There is no significant increase in individual or cumulative public or occupational radiation exposure; (iv) There is no significant construction impact; (v) There is no significant increase in the potential for or consequences from radiological accidents; and (vi) The requirements from which the exemption is sought involve" specified activities.

As discussed in Section II.5, there will be no criticality or criticality-related gamma or neutron radiation resulting from the research activities using SNM sources and, therefore, will not increase the chances of a radiological release or exposure. Accordingly, there is no significant hazards consideration; no significant change or increase in the types or amounts of effluents released offsite; no significant increase in individual, cumulative public or occupational radiation exposure; and no significant increase in the potential for or consequences from radiological accidents. Additionally, because there are no construction activities associated with this request, there is no significant construction impact. Also, the exemption involves the types of activities enumerated in 10 CFR 51.22(c)(25)(vi). Specifically, in accordance with 10 CFR 51.22(c)(25)(vi)(A), (B), and (C), this exemption pertains to inspection or surveillance requirements as well as the related recordkeeping and reporting requirements. The regulations in 10 CFR 70.24 require installation of a CAAS which would provide continuous monitoring and surveillance for criticality events, and the CAAS provides continuous recordkeeping. Accordingly, the requirements in 10 CFR 51.22(c)(25)(i)-(vi) are met.

Because the requirements under 10 CFR 51.22(c)(14)(v) have been met, the NRC staff finds that the OSU activities described in the application are categorically excluded from the requirement to prepare an EA or EIS. In addition, because an exemption from 10 CFR 70.24 meets the provisions identified in 10 CFR 51.22(c)(25), the NRC staff also finds that the exemption from this regulatory requirement is categorically excluded from the requirement to prepare an EA or EIS.

## IV. CONCLUSION

The staff concludes that the in OSU's LRA and subsequent submittals meet the requirements of 10 CFR 70.23, "Requirements for the approval of applications." The NRC staff also concludes that OSU will continue to meet the applicable requirements in 10 CFR Parts 19, 20, 70, 73, and 74. Therefore, the staff finds that the information provides reasonable assurance that the proposed operations at OSU will not have an adverse impact on the public health and safety, the common defense and security, or the environment, and that an adequate level of safety will be maintained for operations during the license renewal term.

The NRC finds that the license for OSU should be renewed for a 10-year term in accordance with the statements, representations, and conditions in the license renewal application dated July 29, 2021, as supplemented, subject to the identified license conditions detailed in this SER.

Therefore, the NRC approves the OSU request to renew the SNM license for a 10-year period, in accordance with the commitments and subject to the license conditions specified in this SER. As such, License Condition 9 of SNM-2013 is revised as follows:

9. Authorized use: For use in accordance with the statements, representations, and conditions specified in the license renewal application dated July 29, 2021, as supplemented by letters dated July 31, 2021, January 5, 2022, and April 19, 2022.

Further, as discussed above, the NRC staff reviewed OSU's requested exemption from the 10 CFR 70.24 CAAS requirement against the criteria in 10 CFR 70.17 and concluded that it met all the requirements for an exemption. The NRC staff is, therefore, granting OSU the exemption request, which is documented in License Condition 12 of SNM-2013.

Since the NRC staff issued SNM-2013, the name of the Region IV organization that OSU will notify at least 60 days prior to receipt of material has changed from "Division of Nuclear Materials" to "Division of Radiological Safety and Security". Consequently, the NRC staff is making an administrative change to License Condition 13 of SNM-2013 to reflect the new name to ensure that the pre-notification of material receipt is received in a timely fashion. As such, License Condition 13 of SNM-2013 is revised as follows:

13. At least 60 days prior to receipt of special nuclear material, the licensee shall notify, in writing, the Director, Division of Radiological Safety and Security, U.S. Nuclear Regulatory Commission Region IV, 1600 E. Lamar Blvd., Arlington, Texas 76011, that the licensee plans to receive materials authorized by this license. The receipt and use of any special nuclear material pertinent to License SNM-2013 shall not occur until the Commission completes an Operational Readiness Review to verify that the licensee is meeting the commitments made in the application for the license for the storage and use of the special nuclear materials.

## V. PRINCIPAL CONTRIBUTORS

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|---|---|
| Jenny Tobin | General Information, Organization and Administration, Integrated Safety Analysis, Management Measures |
| James Hammelman | Chemical Safety |
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| Beth Alferink | Environmental Protection |
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| Tom Pham/Suzanne Ani | Material Control and Accountability |

## VI. REFERENCES

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Oregon State University, “Oregon State University Application for Special Nuclear Material License Request for Additional Information Revised Application,” June 16, 2010 (ML101790338, non-public).

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Oregon State University, “Modification to the OSTR Physical Security Plan (PSP) to Close Out Confirmatory Action Letter No. NRR-04-001,” July 29, 2021 (ML21225A083).

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