

DOCKET: 70-7019

LICENSEE: Oregon State University

SUBJECT: SAFETY EVALUATION REPORT: LICENSE APPLICATION FOR OREGON  
STATE UNIVERSITY, SPECIAL NUCLEAR MATERIAL LICENSE NO.  
SNM-2013

## **I. INTRODUCTION**

By letter dated October 28, 2009, Oregon State University (OSU) submitted an application (ML093620036) to the U.S. Nuclear Regulatory Commission (NRC) requesting a Special Nuclear Material (SNM) License. The request is made pursuant to the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 70, "Domestic Licensing of Special Nuclear Material." OSU proposes that it be licensed to possess and use SNM for training, educational, and testing purposes; as described in the license application. OSU supplemented its application with a revised application (ML101790338) dated February 11, 2010. OSU requested a license term of 10 years.

The NRC staff conducted its safety and safeguards review in accordance with 10 CFR Part 20, "Standards for Protection against Radiation;" 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material;" 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 various guidance documents listed in Section XV, REFERENCES, herein to conduct its safety review. The NRC staff's safeguards review included the review of OSU's Physical Security Plan and Emergency Plan.

OSU has a Training, Research, Isotopes, General Atomics (TRIGA) research reactor, which operates under NRC Reactor License No. R-106. Activities associated with this license are independent of the SNM license and are not discussed in this Safety Evaluation Report.

A notice of opportunity to request a hearing on the license application was published in the *Federal Register* on May 12, 2010 (75 FR 26807). No requests for a hearing were received.

## **II. DISCUSSION**

### **a) General Information**

The Department of Nuclear Engineering and Radiation Health Physics of OSU, located within the Radiation Center (RC), will use the SNM to conduct experiments to acquire hydro-mechanical properties of single fuel elements. The fuel elements are from five high-performance research reactors in the U.S. The fuel elements are not, and will not be, irradiated at this facility. All testing on the fuel elements containing SNM are to be non-destructive.

The license application described the characteristics and composition of the SNM to be used in these applications. It also included acceptable drawings illustrating the facility location and floor plan where the proposed activities would take place.

The NRC staff reviewed the license application to determine whether OSU was required to provide Integrated Safety Analysis (ISA) Summary information, 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." The NRC staff notes that the proposed activities for which the license would be used do not meet the criteria in 10 CFR 70.60 (i.e., that the licensee 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 special nuclear material or any other activity). The Staff determined that the activity is not one of the listed activities and could not significantly affect public health and safety. Therefore, 10 CFR Part 70, Subpart H is not applicable to the license application. As a result, the NRC staff concludes that OSU is not required to submit an ISA Summary in support of its license application. OSU is requesting approval to use SNM for its educational and testing programs as described below:

MATERIAL	FORM	QUANTITY	AUTHORIZED USE(S)
Uranium Enriched to less than 20% in the isotope U-235	Solid U-Mo metal alloy clad in aluminum plate-type fuel elements	█ grams U-235	Instruction, Education, and Research Programs at OSU

The NRC staff reviewed the license application and concludes that OSU adequately described its facility and the proposed uses of the SNM for which the license is sought. The NRC staff concludes that the information provided by OSU meets the applicable requirements in 10 CFR 70.22 and is, therefore, acceptable.

b) Organization and Administrative Structure

The administrative structure of OSU is part of a broader organization that oversees the radiation protection (RP) program. This organization consists of: (a) the Radiation Safety Committee (RSC); (b) the Radiation Safety Officer (RSO); (c) the Reactor Operations Committee (ROC); (d) the RC Director; and (e) the RC reactor staff. The license application described the responsibilities and qualifications of the individuals in these positions, such as education requirements and professional experience. The license application also provided an acceptable organizational chart illustrating the reporting relationship of the different functional groups within OSU.

The RSC members are appointed by the Vice President for Finance and Administration. The RSC's purpose is defining policies and practices regarding the safe use of radioisotopes and radiation sources within OSU's campus. The RSC consists of between five and ten members, including the RSO, and is constituted with the expertise in the principles and practices of the control of hazards from the use of radioisotopes and radiation producing equipment.

The University's RSO is appointed by and reports administratively to the Environmental Health and Safety Manager. The RSO is responsible for managing the day-to-day affairs of radiation

safety. The RSO will administer the SNM license and is responsible for licensing and regulatory compliance, including liaison with the NRC.

The NRC staff reviewed the license application and concludes that OSU has an acceptable organization; administrative policies; and sufficient, competent resources that provide reasonable assurance of adequate safety for the proposed activities. Therefore, the NRC staff concludes that the information provided by OSU meets the applicable requirements in 10 CFR 70.22 and 10 CFR 70.23(a)(2) and is, therefore, acceptable.

c) Radiation Protection

In its license application, OSU provided a description of the RP program used at the facility to meet the requirements of 10 CFR Parts 19, 20, and 70; including personnel monitoring and training practices, commitments for leak-testing sources, commitments for maintaining doses as low as is reasonably achievable (ALARA), and waste disposal practices. The license application also discussed the roles and responsibilities of the different individuals implementing the RP program.

The applicant has an established program in the RC to minimize radiation doses 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. Reviews of radiation doses of staff, students and visitors are performed periodically. The NRC staff has concluded that the information provided by OSU meets the applicable requirements in 10 CFR 70.22 and is, therefore, acceptable.

d) Technical Qualifications

The administration of the RP program in support of activities at OSU is the responsibility of the RSO. The organization within OSU supporting the RP program also includes the RSC, the RC Director, the ROC, and the RC reactor staff; including reactor operators and health physics personnel. The RSO has the primary responsibility for implementing the RP program on a daily basis. The specific qualifications of each OSU staff member with responsibilities under the RP program are defined in the license application. In addition to the senior staff, trained technicians and faculty work with students under health physics supervision to conduct experiments and work with radioactive material. These individuals work together to ensure a robust RP program that complies with internal procedures and regulatory requirements. OSU's technical qualification requirements demonstrate compliance with the requirements in 10 CFR 70.22(a)(6) and is, therefore, acceptable.

e) Written Procedures

OSU maintains written procedures that are applied to establish safe conduct of activities with radioactive materials and radiation sources. Procedures are reviewed by staff, researchers and students during initial training as radiation workers. Creation of new procedures or modification of procedures will occur through OSU's existing procedures.

OSU established procedures for monitoring, operating the facility, and for emergency response activities. Exposure procedures limit access to the RC, require personal dosimetry, and require a periodic inventory of the radioactive material. Sources must be leak tested on a 6-month cycle in accordance with internal procedures. Operation of the test facility will only be done by personnel specifically trained to operate the facility and only according to specific, written procedures.

OSU's program to operate the facility in accordance with approved, written procedures and augmented with training provides reasonable assurance of adequate safety to life and property, and meets the requirements in 10 CFR 70.22(a)(8) and 70.23(a)(4) and is acceptable.

f) Training Program

The RC is OSU's institutional facility for the accommodation of teaching, research and statewide service programs involving the use of ionizing radiation. The RC's orientation program is mandatory for all personnel who require unescorted access to rooms or laboratories posted as radiation areas or containing radioactive materials in accordance with 10 CFR 19.12. This program consists of training material on personnel radiation exposures, radiation hazards, dose measurements, and laboratory procedures. The program to train staff, maintaining the training content, and employing qualified staff described in the license application demonstrates reasonable assurance of compliance with 10 CFR 19.12 and 10 CFR 70.22(a)(6) and is acceptable.

g) Radiation Surveys and Monitoring Programs

The potential for radioactive contamination or exposures from the fuel elements to be used under this license is limited due to the fuel not being irradiated and to being sealed in cladding. Use of the materials will be limited to non-destructive testing and analysis of the hydro-mechanical performance of the fuel elements themselves. All testing is non-destructive. No gaseous effluents are anticipated from this effort. Liquid effluents are also not expected. A procedure will be put in place by OSU to periodically sample the water of the test loop where the assemblies will be used in order to confirm that there has not been any release of effluents.

OSU maintains radiation monitors capable of detecting alpha, beta, gamma, and neutron radiation. These monitors are calibrated in accordance with procedures maintained in the RC. These monitors are available for use under this SNM license.

The limited activity of the fuel elements combined with the survey and monitoring programs described in the application demonstrate compliance with 10 CFR Part 20, Subpart F, "Surveys and Monitoring" and is acceptable.

h) Contamination Control and Waste Handling

Since the fuel elements are completely encased, there is minimal risk of airborne or external contamination. The fuel assemblies are sealed and unirradiated and will not be unsealed or irradiated. If low-level waste were created, provisions exist through Environmental Health and Safety to collect and dispose of the material. The waste handling, contamination monitoring,

and radiation precautions described in the license application meet the regulatory requirements in 10 CFR Part 20, and are found acceptable.

### III. RADIATION PROTECTION REVIEW

#### a) Radiation Safety

OSU's license request involves radioactive material (uranium) encapsulated in various fuel elements for hydro-mechanical experiments. The fuel elements will be verified to be un-irradiated during receipt surveys. This will confirm that it is un-irradiated, and that it poses little external hazard. Because it is encased in cladding designed for the interior of a nuclear reactor, it also poses little internal hazard. Use of the materials will be limited to non-destructive testing, so there is minimal risk that the internal hazard level will vary significantly over time. Because of the nature of planned operations with this material, no gaseous or liquid effluents are anticipated; although monitoring of the water utilized for experimentation will be performed prior to disposal, as well as leak tests of the fuel elements every 6 months. With these considerations, the RP program was evaluated for program elements necessary to ensure compliance with regulations.

#### b) As Low as Reasonably Achievable (ALARA) Program

The OSU Radiation Center's (RC) ALARA program will consist of a review by the senior health physicist of proposed new uses of radiation or radioactive materials, and major modifications of facilities which could change personnel exposures or radioactive material releases. The ALARA program will be documented with summaries of the reviews or descriptions of actions taken. 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 Reactor Operations Committee (ROC).

#### c) Control of Personnel Exposure

As stated previously, there is little external hazard associated with this material; regardless, personnel monitoring devices are required by OSU of all persons working in the RC with radiation sources if the individual is likely to exceed 10 percent of their allowable annual limits in accordance with 10 CFR 20.1502. Monitoring of additional individuals for particular environments is at the discretion of the senior health physicist. Personnel dosimetry appropriate for the material being used are provided and processed by a vendor who is accredited through the National Voluntary Laboratory Accreditation Program. Direct reading dosimeters, such as ionization chambers and electronic dosimeters, are available for gamma radiation if necessary. If evidence is discovered of dispersible material and an uptake is suspected, bioassay will be performed to determine the uptake and any internal exposure.

#### d) Control of Contamination

SNM under this license at OSU is encapsulated in fuel elements. The potential for contamination is low and will be monitored by periodic leak tests of the fuel elements.

Personnel will also be required to perform a contamination survey after handling the material, which will help ensure that any leaks are discovered and contamination is addressed in a timely manner.

e) Calibration of Instruments

The RC maintains and calibrates radiation protection instruments or has the means for the instruments to be calibrated. Portable radiation monitors utilized in the reactor facility are capable of detecting alpha, beta, gamma, and neutron radiation and are also available for use with SNM. These instruments are calibrated annually in accordance with the American National Standards Institute N323A using the National Institute of Standards and Technology's traceable standards. Procedures require that the instruments are verified to be operating correctly prior to using check sources.

f) Effluent Control

There is no waste expected to be generated that would be contaminated by the SNM allowed under this license. Because 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 ensure it meets the limits in 10 CFR 20, Appendix B prior to disposal. Low-level waste, if created, will be collected and disposed of in accordance with OSU's Environmental Health and Safety written procedures. The NRC staff determined that this commitment to the monitoring of liquid effluents is adequate to maintain effluents within regulatory limits.

g) Conclusion Regarding the Radiation Protection Program

The NRC staff concludes that the radiation protection program described in the application meets the requirements in 10 CFR Parts 19, 20, and 70.

#### **IV. NUCLEAR CRITICALITY SAFETY REVIEW**

In its license application, OSU provided a description of the safety procedures applied to establish safe conduct of activities related to the fuel elements. These procedures are reviewed by staff, researchers and students during initial training and at two year intervals as part of their emergency plan training. OSU proposed that a criticality safety plan should not be necessary based on the design and construction of the fuel elements, the tests to be performed using the fuel elements and the administrative controls used for their safe handling and storage.

In support of their assertion that a criticality safety plan was not necessary, OSU performed a series of calculations for the fuel elements under normal and accident conditions. As specified in American National Standards Institute/American Nuclear Society (ANSI/ANS-8.1), OSU analyzed both normal conditions and credible abnormal conditions. The highest  $k_{eff}$  for a single element is 0.17108 under normal conditions. For expected storage of the fuel elements in the RC, the  $k_{eff}$  of the full storage rack is 0.18868 (all five fuel elements stored together), which is higher than the highest  $k_{eff}$  for a single element; suggesting some interaction between the fuel elements. The highest  $k_{eff}$  for a single element in an infinite pool of water is 0.75160, with the  $k_{eff}$  for the other elements individually in an infinite pool of water significantly below that number.

For the unexpected situation where the room in which the storage rack sits is flooded, the  $k_{eff}$  is 0.75161. Calculations to study the effects of reducing the water volume fraction between fuel elements in storage (thereby analyzing for interaction) resulted in the highest  $k_{eff}$  being from the flooded condition (e.g., 0.75161). The applicant also analyzed the scenario where the fuel elements are put together in a close configuration (closer than the storage rack allows) in the same water-filled room; the  $k_{eff}$  for this scenario was 0.86335. For a worst-case accident scenario, OSU assumed that all five fuel elements were involved in a fire and subsequently completely melt and pool at the bottom of the storage rack without the cladding material. The  $k_{eff}$  for this scenario was 0.65465.

The storage and transport of the fuel elements were reviewed by NRC staff to determine whether there was a nuclear criticality safety (NCS) concern. Based on the type, form, and/or quantity of material, NRC staff concluded that storage and transport of the fuel elements are not an NCS concern, since the  $k_{eff}$  results for normal and accident conditions are subcritical (e.g., the highest  $k_{eff}$  was 0.86355). As a basis for this conclusion, the only authorized activities for the fuel elements are storage in Room [REDACTED] at the RC, transport to and from storage at the RC to the Hydro-Mechanical Fuel Test Facility (HMFTF)—Room [REDACTED] of the RC—and testing at the HMFTF.

OSU requested an exemption from the criticality monitoring requirements of 10 CFR 70.24 in the RC and HMFTF. Section 70.17 provides that upon application of any interested person the NRC may grant an exemption from the requirements of the regulations in Part 70 that “are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.” As indicated in 10 CFR 70.24(d)(2), the provisions of section 70.24 may be exempted. Given that OSU cannot alter the physical form of the material, the storage rack will only handle one each of the individual elements for a total of five (all that is allowed by the license), OSU will only be allowed to remove one element at a time, and that all criticality calculations show that  $k_{eff} < 0.9$  at the 95 percent confidence interval, a criticality accident is not credible. Therefore, the absence of a criticality monitoring system in the RC and HMFTF would not be detrimental to the public health and safety or the common defense and security, nor would it endanger life or property.

Based on the above, the NRC staff concludes that the storage configuration of the five U.S. high-performance research reactor fuel elements should remain subcritical under both normal and credible abnormal conditions. Therefore, the NRC staff agreed that granting the 10 CFR 70.24 exemption is appropriate. Accordingly, the NRC staff imposes the following condition:

The licensee is hereby exempted from the requirements of 10 CFR 70.24 for the authorized activities.

As stated previously, the only authorized activities for the fuel elements are storage in Room [REDACTED] at the RC, transport to and from storage at the RC to the HMFTF (Room [REDACTED] of the RC), and testing at the HMFTF.

The NRC staff concluded from its review of OSU’s license application that there is reasonable assurance that a criticality accident would not occur under both normal and credible abnormal conditions.

## **V. FIRE PROTECTION REVIEW**

The Radiation Center (RC) was constructed in accordance with the applicable building code regulations at the time of construction (State of Oregon Building Code) in the late 1960s. The portion of the RC containing the nuclear research reactor and stored licensed materials is fabricated of non-combustible construction material. The walls surrounding the storage room for the material at risk were shown to have a calculated equivalent fire resistance rating of 3 hours. The walls surrounding the usage room for the material at risk are designed to have a fire resistance rating of 4 hours. A lightning arrestor system is not required; however, the building is grounded in accordance with the applicable edition(s) of the National Fire Protection Association (NFPA) 70, "National Electrical Code." Building renovations and operations are reviewed by the RC Director with oversight by the Reactor Operations Committee to ensure adequate safety of the building.

The installed fire protection systems at the RC include smoke and heat detection. Fire loading in the RC is minimal. The fire protection systems interface with the university's police dispatch and local 911 emergency systems.

Portable fire extinguishers are deployed within the building in accordance with industry standards. Fire hydrants are located throughout the campus in accordance with industry standards.

The RC is inspected annually by the City of Corvallis Fire Department (CCFD) for compliance with applicable building and fire codes. The CCFD also performs periodic emergency drills with the OSU's RC. The CCFD responders periodically tour the RC for familiarization training. Procedures are in place to allow the fire department efficient access to process areas during fire emergencies. Worker egress is designed and maintained in accordance with the applicable edition(s) of NFPA 101, "Life Safety Code." Fire prevention, inspection, testing, and maintenance of fire protection systems, and the qualification, drills, and training of facility personnel are in accordance with applicable NFPA codes and standards.

The NRC staff's review determined that the applicant has met the applicable guidance provided in NFPA 801, "Standard for Fire Protection for Facilities Handling Radioactive Material." The NRC staff notes that a complete release of the licensed material at OSU would be highly unlikely since the material at risk is contained in a hard metal alloy that is unlikely to volatilize or otherwise readily disperse as a result of a fire. Given the low risk to public health and safety of the materials covered by the SNM-2013 License, and the guidance provided in Section 7.4.3.2 of NUREG-1520, a formal fire hazards analysis was not required. In accordance with 10 CFR 70.60, the facility is not required to have an integrated safety analysis.

The NRC staff reviewed the OSU RC's fire protection program and determined that the RC maintains an adequate level of fire protection at the facility to protect public health and safety. The NRC staff concludes that the applicant's equipment, facilities, and procedures provide a reasonable level of assurance that adequate fire protection will be provided and is consistent with the requirements of 10 CFR Part 70.



## **VI. EMERGENCY PLANNING REVIEW**

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, pursuant to 10 CFR 70.22(i)(1), OSU is not required to have an emergency plan. This license authorizes the movement of special nuclear material from the original shipping containers to approved storage racks. The location of the storage racks is within the reactor operations boundary, which is 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.

## **VII. DECOMMISSIONING**

The NRC staff reviewed the license application for any applicability of the requirements in 10 CFR 70.22(a)(9) and 70.25. OSU is requesting authorization to possess and use special nuclear material in the form of clad fuel elements, which poses less risk to the health and safety of the workers and the environment than unsealed SNM. Sections 70.22(a)(9) and 70.25 require an applicant for a specific license for a uranium enrichment facility or authorizing possession and use of unsealed special nuclear material in certain quantities to submit a decommissioning funding plan or certification of financial assurance for decommissioning. As previously indicated, OSU will only possess and use sealed special nuclear material. The NRC staff concludes that the requirements in 10 CFR 70.22(a)(9) and 70.25 do not apply to the proposed activities, and that OSU is not required to provide decommissioning financial assurance in support of its license application.

## **VIII. ENVIRONMENTAL PROTECTION**

As required by the facility reactor License R-106 (Docket No. 50-243), a program of environmental radiation monitoring has been established to ensure that radiation doses to members of the public are in compliance with the requirements in 10 CFR 20 and as low as is reasonably achievable. This monitoring program utilizes fixed integrating dosimetry provided by a contracted National Voluntary Laboratory Accreditation Program vendor. The NRC staff notes that the special nuclear materials licensed under License No. SNM-2013 will not generate additional effluents that would warrant modifications to the program developed for the reactor license. The NRC staff determined that the effluent control and monitoring program established for R-106 is sufficient for the materials licensed by SNM-2013, and would provide reasonable assurance that the radiological effluents will not pose an adverse impact to public health and safety or the environment.

## **IX. PHYSICAL PROTECTION AND PHYSICAL SECURITY**

The NRC's review concluded that the measures identified in the physical security plan met the fixed site and in-transit requirements specified for facilities with material of low strategic significance, in accordance with the requirements in 10 CFR 73.67. OSU's reactor license (R-106) includes a license condition that requires the licensee to maintain and fully implement all provisions of the NRC approved physical security plan, including amendments and changes made to the plan. The approved security plan consists of documents withheld from public disclosure pursuant to 10 CFR 73.21, "Requirements for the Protection of Safeguards

Information,” and is entitled “Oregon State University TRIGA Reactor Physical Security Plan,” as revised.

The material subject to this License will be located in the same building, but in a separate space from material licensed under Facility Operating License No. R-106. The fuel elements will be afforded the same level of protection as described in the approved physical security plan.

Materials License SNM-2013 requires OSU to maintain security measures in accordance with the provisions of 10 CFR 73.67(f). OSU meets these requirements through implementation of the NRC-approved Physical Security Plan.

Therefore, the NRC staff concludes that the OSU activities are covered by the NRC-approved Physical Security Plan which meets the applicable requirements in 10 CFR 73.67(f) and is, therefore, acceptable.

## **X. MATERIAL CONTROL AND ACCOUNTING**

The NRC staff reviewed the license application for any applicability of the requirements in 10 CFR 70.22(b). Since the licensed material for OSU is in the form of clad fuel elements, the NRC staff concludes that the requirements in 10 CFR 70.22(b) do not apply for the proposed operations. As a result, OSU is not required to submit a Fundamental Nuclear Material Control Plan in support of its license application.

In the license application, OSU commits to maintaining a SNM inventory and reporting program consistent with the requirements in 10 CFR 74.13. OSU also commits to conducting physical inventories of their SNM and maintaining the required records in accordance with the requirements in 10 CFR 74.19. Finally, the OSU staff will report the transfer and receipts of special nuclear materials consistent with the requirements in 10 CFR 74.15.

The NRC staff reviewed the information and commitments in the license application and concludes that OSU will have adequate measures to report and account for any SNM owned, acquired, received, and transferred in support of the proposed activities at the licensed facility. Therefore, the NRC staff concludes that the information and commitments in the license application meet the applicable requirements in 10 CFR Part 74.

## **XI. ENVIRONMENTAL ANALYSIS-CATEGORICAL EXCLUSION DETERMINATION**

The NRC staff determined that the proposed activities do not individually or cumulatively have a significant effect on the human environment because the activities involve the use of encapsulated radioactive materials for research and development and for educational purposes. OSU’s licensed activities are categorically excluded from the requirement to prepare a site-specific environmental assessment under 10 CR 51.22(c)(14)(v), which is applicable to materials licenses issued under 10 CFR Part 70 that authorize the “[u]se of radioactive materials for research and development and for educational purposes.”

OSU, an academic institution, proposes to use sealed sources of special nuclear material for research and development. OSU’s application does not propose to release to the environment radioactive materials that originated on-site, and OSU will be conducting only non-destructive experiments that will not irradiate the nuclear material. Further, the proposed action will be

performed within the confines of the OSU research facility by trained personnel. Therefore, consistent with 10 CFR 51.22(c)(14)(v) and the criteria in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," Section 2.2.7.5, pp. 2-9 and 2-10, this licensing action is categorically excluded from the need to prepare an environmental assessment or an environmental impact statement for this action.

Additionally, as noted above in Section IV of this SER, the staff conducted a nuclear criticality safety review of the research activities to be performed on the fuel elements. As a result of that review, the staff found that there was no accident scenario, even a worse-case accident scenario, under which a criticality would occur. Because the proposed activities under this license cannot result in a criticality or any associated gamma or neutron radiation to detect, OSU also requested an exemption from 10 CFR 70.24 criticality monitoring, surveillance, and associated recordkeeping and reporting requirements. Also, because there will be no criticality or criticality-associated radiation resulting from the proposed research activities to be performed on the fuel elements, these research activities will not individually or cumulatively have a significant effect on the human environment.

An exemption from the regulatory requirements of 10 CFR 70.24 qualifies for a categorical exclusion from preparing an environmental assessment if it comes within one of the categories of action identified in 10 CFR 51.22(c). In this case, an exemption from the criticality accident alarm system (CAAS) requirement in 10 CFR 70.24 is categorically excluded from the requirement to prepare an environmental assessment if it meets the criteria under 10 CFR 51.22(c)(25). An exemption from the NRC's regulations that involve inspection or surveillance requirements, such as the CAAS, as well as any related recordkeeping and reporting requirements, are 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; and (v) there is no significant increase in the potential for or consequences from radiological accidents; and (vi) the requirements from which an exemption is sought involve inspection or surveillance requirements. As discussed in more detail in Section IV - Nuclear Criticality Safety Review, an exemption from 10 CFR 70.24 under this proposed license would not significantly change or increase the types or amounts of effluents released offsite; the individual, cumulative public or occupational radiation exposure; construction impacts; or the potential for or consequences from radiological accidents; nor would it introduce a significant hazards consideration because there will be no criticality or criticality-related gamma or neutron radiation to detect resulting from the research activities on fuel elements as described above.

Therefore, because the requirements under 10 CFR 51.22(c)(14)(v) have been met, the staff finds that OSU's licensed activities are categorically excluded from the requirement to prepare a site-specific environmental assessment. In addition, because an exemption from the regulatory requirements of 10 CFR 70.24 meets the provisions identified in 10 CFR 51.22(c)(25), the staff also finds that the exemption from those regulatory requirements are categorically excluded from the requirement to prepare a site-specific environmental assessment.

## **XII. CONCLUSION**

The NRC staff concludes that the information and commitments provided by Oregon State University in their license application provide reasonable assurance of adequate safety of the proposed operations. The NRC staff concludes 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 meet the applicable requirements in 10 CFR Parts 19, 20, 51, 70, 73, and 74.

#### **XIV. PRINCIPAL CONTRIBUTORS**

Mary Adams  
Richard Thompson  
James Downs  
Craig Hrabal  
Greg Chapman  
Barry Wray  
Linda Allen  
James Anderson

#### **XV. REFERENCES**

(NRC, 1983) U.S. Nuclear Regulatory Commission, 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," February 1983.

(ANSI/ANS, 1997) ANSI/ANS 8.3, "Criticality Accident Alarm System (CAAS)," 1997  
(Reaffirmed in 2003).

(ANSI/ANS, 1998) ANSI/ANS 8.1, "Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors," 1998.

(NRC, 2010) U.S. Nuclear Regulatory Commission, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," May 2010.

(NFPA, 2003) NFPA 801, "Standard for Fire Protection for Facilities Handling Radioactive Material," 2003.

NFPA 101, "Life Safety Code"

(NFPA) 70, "National Electrical Code."

(ANSI/ANS, 2007) ANSI/ANS 8.23, "Nuclear Criticality Accident Emergency Planning and Response," 2007.