

**SAFETY EVALUATION REPORT
RENEWAL OF SPECIAL NUCLEAR MATERIAL
LICENSE SNM-1373 FOR
IDAHO STATE UNIVERSITY
DOCKET NUMBER 70-1374**

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LIST OF ACRONYMS AND ABBREVIATIONS

10 CFR.....	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Documents Access and Management System
AGN	Aerojet-General Nucleonics
ALARA	As Low As Reasonably Achievable
ANSI.....	American National Standard Institute
CAA.....	Controlled Access Area
DAC	Dose Assessment Coordinator
DEO	Director of Emergency Operations
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DP	Decommissioning Plan
EA	Environmental Assessment
EH&S	Environmental Health and Safety
EIS	Environmental Impact Statement
ENDF	Evaluated Nuclear Data File
EP	Emergency Plan
FR	<i>Federal Register</i>
HazMat.....	hazardous material
ISA	integrated safety analysis
ISU	Idaho State University
ISUPSD.....	ISU Public Safety Department
LAR	license amendment request
LEL.....	Lillibridge Engineering Building
LRA	license renewal application
MC&A.....	Material Control and Accounting
NCS	nuclear criticality safety
NDA/NDE	nondestructive assays and evaluation
NFPA.....	National Fire Protection Association
NMMSS.....	Nuclear Materials Management and Safeguards System
NRC	U.S. Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OSHA.....	Occupational Safety and Health Administration
PFD.....	Pocatello Fire Department
PSP.....	Physical Security Plan
²³⁹ Pu.....	Plutonium-239
Pu.....	Plutonium
RAI	request for additional information
RC	Radiation Center
RPP	Radiation Protection Program
RS	radiation safety
RSI	request for supplemental information
RSO	Radiation Safety Officer
RTR.....	research test reactor
SCA.....	subcritical assembly
SER.....	Safety Evaluation Report

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SI.....	System of International units
SNM.....	Special Nuclear Material
SRP.....	Standard Review Plan
T&R.....	Trustworthy and Reliability
TSO.....	Technical Safety Office
²³³ U.....	Uranium-233
²³⁵ U.....	Uranium-235
U.....	Uranium
U.S.	United States
VPR.....	Vice President for Research

1. INTRODUCTION

Idaho State University (ISU) was first issued special nuclear material license number 1373 (SNM-1373) in July 1973. The current license was scheduled to expire on August 11, 2021. However, pursuant to the timely renewal provisions in Title 10 of the *Code of Federal Regulations* (10 CFR) Paragraph 70.38(a), ISU is permitted to continue using its SNM in accordance with the existing license, pending a final decision by the Commission on ISU's license renewal application (LRA, see section 1.1 below). This safety evaluation report (SER) documents the U.S. Nuclear Regulatory Commission (NRC) staff evaluation of ISU's LRA.

1.1. Background Information on ISU's License Renewal Application (LRA)

By letter dated July 9, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21190A251), ISU submitted a timely application for renewal of SNM-1373 requesting a 10-year renewal. The NRC staff performed an acceptance review of ISU's LRA to determine if it contained sufficient technical information in scope and depth to allow the NRC staff to proceed with detailed technical review. However, the NRC staff determined that the LRA did not contain sufficient information to proceed with its review. The NRC staff discussed its findings during a call with ISU on September 8, 2021. Following the call, by letter dated September 9, 2021 (ADAMS Accession No. ML21246A164), the NRC staff documented its findings and decision to decline to proceed with a detailed technical review and provided ISU the opportunity to supplement the application by addressing the issues discussed in the enclosure to the request for supplemental information (RSI) letter. The NRC staff requested ISU to provide their response within 60 days from the date of the letter. In the RSI, the NRC staff also informed ISU, that since it filed the LRA at least 30 days before the license's expiration date of August 11, 2021, pursuant to the timely renewal provisions in Title 10 of the *Code of Federal Regulations* (10 CFR) Paragraph 70.38(a), ISU was permitted to continue using its special nuclear material (SNM) in accordance with the existing SNM-1373 license, pending a final decision by the Commission on the LRA.

By electronic communication (email) dated September 10, 2021 (ADAMS Accession No. ML21259A200), ISU requested a 30-day extension to the due date for providing their responses to the RSI. In its email, ISU stated that it needed this additional time to allow its Radiation Safety Committee to review the modified LRA. The NRC staff reviewed ISU's request, and, by electronic communication dated September 15, 2021 (ADAMS Accession No. ML21259A202), approved ISU's request. Subsequently, by letter dated December 6, 2021 (ADAMS Accession No. ML21351A166), ISU provided its response to the RSI. With its response, ISU provided revised public (ADAMS Accession No. ML21351A100) and Non-Public (ADAMS Accession No. ML21351A102) versions of the LRA addressing the issues the NRC staff discussed in its September 9, 2021, RSI. ISU's submittal also included Revision 8 of its Physical Security Plan (PSP, ADAMS Accession No. ML21351A101, Non-Public). The NRC staff performed a review of ISU's RSI responses and revised applications, and as a result, did not identify any administrative omissions that would prevent proceeding with a detailed review. As such, by letter dated January 20, 2022 (ADAMS Accession No. ML22018A285), the NRC staff formally accepted ISU's LRA. A notice of opportunity to request a hearing and petition for leave to intervene on the license application was published in the *Federal Register* (FR) on February 23, 2022 (87 FR 10259). No requests were received. During its detailed review phase of the LRA review, the NRC staff determined that additional information was needed. As such, by letter dated February 7, 2022 (ADAMS Accession No. ML22033A444), the NRC staff issued ISU a request for additional information (RAI). In the enclosures to the RAI letter, the NRC staff

requested additional information on the following technical areas: material control and accounting, nuclear criticality safety, decommissioning, and physical security. ISU provided its response to the RAI by letter dated March 4, 2022 (ADAMS Accession No. ML22075A290). The NRC staff reviewed ISU's responses to the RAI and determined that some of the responses needed clarification and/or correction. Therefore, to obtain this information, via electronic communication dated March 21, 2022 (ADAMS Accession No. ML22081A296), the NRC staff issued a "Request for Clarification of RAI Responses." ISU provided its response to this request via letter dated March 24, 2022 (ADAMS Accession No. ML22091A298). ISU's response included revisions to its public (ADAMS Accession No. ML22306A112) and Non-Public (ADAMS Accession No. ML22103A269) versions of its LRA, and Revision 10 of the PSP (ADAMS Accession No. ML22103A268 - Non-Public).

1.2. Scope of the 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 19, "REFERENCES," of this SER, to conduct its safety review. Guidance document NUREG-1520, "Standard Review Plan (SRP) for Fuel Facilities License Applications," Revision 2, provides guidance to NRC staff performing safety and environmental impact reviews of applications using SNM. The NRC staff's safeguards review included the review of ISU's PSP.

The NRC staff reviewed the information submitted in the LRA and supplemental information. The LRA contains 16 sections: section 1, Introduction, describing the 10 CFR Part 70 requirements the application addresses (i.e., 10 CFR Part 70, Subpart D) and the time period for which the license is being requested; section 2, Information about the applicant, which provides the full name and address of the applicant, and the university officials with overall responsibility for the SNM-1373 licensed activities; section 3, Location of Material and Activity for Which it Will Be Used, discusses where within ISU's campus the SNM will be used and/or stored and where the principal activities will be performed and the purpose for which the SNM will be used; section 4, Period of Time for License, which specifies the number of years for which the license is being requested; section 5, Specification of the SNM, which discusses the specific SNM, forms, and other relevant information on the SNM that ISU requests authorization for possessing and use; section 6, Technical Qualifications of the Applicant and Staff, which lists the officials with overall responsibility for the activities authorized under the SNM-1373 license and their qualifications (provided in Attachment I of the LRA); section 7, Equipment and Facilities to Protect Health and Minimize Danger to Life and Property, which discusses, among others, ISU's equipment and facilities, measuring and monitoring instruments, and storage facilities and security measures; section 8, Proposed Procedural Requirements to Protect Health and Minimize Danger to Life and Property, which generally discusses ISU's administrative controls and other measures to provide and maintain adequate protection of public health and safety and personnel; section 9, Material Control and Accountability, discussing ISU's process and practices for adequately maintaining control and accounting of all SNM; section 10, Transportation Security, discussing ISU's transportation of SNM proposed plans; section 11, Emergency Plan, which references ISU's Emergency Plan previously approved by the NRC and contains ISU's procedures for responding to radiological emergency events; section 12, Physical Security Plan, which details how ISU meets the requirements of 10 CFR 73.67(f)(4); section 13, Criticality Accident Requirements, describing ISU's program for preventing inadvertent criticality; section 14, Financial Assurance for Decommissioning,

discusses financial assurance requirements applicable to ISU's SNM program and decommissioning plans for the period for which the license is requested; describes the current decommissioning plan status, and decommissioning funding; section 15, Environmental Protection, which describes ISU's proposed environmental protection measures; and section 16, Chemical Safety, which describes ISU's plans for evaluation of potential chemical hazards associated with the SNM licensed activities and for ensuring adequate protection and safety of the public and workers/users from chemical hazards.

2. GENERAL INFORMATION ABOUT THE APPLICANT

2.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the information about the Idaho State University (ISU) discussed in section 2 of the license renewal application (LRA) against the acceptance criteria in NUREG-1520, "Standard Review Plan for Fuel Facilities License Applications," Revision 2 (ADAMS Accession No. ML15176A258), section 1, Facility and Process Overview, to establish whether the license application included adequate information identifying the applicant, the applicant's characteristics, and the proposed activity.

2.2. Staff Review and Analysis

2.2.1. Institutional Information

In section 2 of the LRA, in accordance with the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) 70.22(a)(1), the applicant provided its full name and address as follows:

Name: Idaho State University (ISU)

Address: 921 S. 8th Avenue, Pocatello, ID 83209

Description of Business or Occupation: Institution of Higher Learning

ISU is operated by the State of Idaho with its principal office at Pocatello, Idaho. The Idaho State Board of Education provides oversight and direction of the higher education institutions in Idaho and is located at 650 West State Street Suite 307, Boise, Idaho 83702 (mailing address: P.O. Box 83720, Boise, ID 83720-0037).

In accordance with the requirements in 10 CFR 70.22(a)(1), in section 2 of its LRA, ISU provided the roster of officials with responsibility for the activities regulated under special nuclear materials license number 1373 (SNM-1373). The roster includes the following positions: (a) President of the University; (b) Vice President for Research; (c) Chairperson of the Reactor Safety Committee (RSC); (d) Radiation Safety Officer; (e) Chair of the Department of Nuclear Engineering; (f) Reactor Administrator; and (g) Reactor Supervisor. ISU further stated that the Vice President of Research is designated as the university official who has overall responsibility for the activities conducted pursuant to their SNM-1373 license. A roster of current university officials with complete contact information was provided in Attachment I of the LRA. However, ISU noted that the information given in this attachment may be subject to change due to personnel reassignments and any changes to the information will be notified to the NRC. ISU further stated that there is no control or ownership exercised over the application by any alien, foreign corporation, or foreign government.

2.2.2. Proposed Use, Description of SNM, General Use Plan, Location Where Activities Will be Performed, and Period of Time for the License

2.2.2.1. Proposed Use

In accordance with the requirements in 10 CFR 70.22(a)(2), in section 3 of the LRA, ISU discussed the proposed activities for which the SNM is requested. ISU stated that the SNM authorized under the SNM-1373 license is intended to be used primarily for instructional purposes in senior and graduate-level laboratory courses. The fuel plates will be used primarily to create a subcritical assembly (SCA) in which they are loaded in various lattice arrangements

in a water-filled tank. The fuel plates may be used singly for a quasi-homogeneous assembly or in groups of two or more to produce a more homogeneous configuration.

2.2.2.2. Description of SNM

In accordance with 10 CFR 70.22(a)(4), in section 2 of its LRA, ISU identifies the forms, quantities, and specifications of the SNM it requests authorization to possess and use. In its LRA, ISU requests no additions or increases in the amounts or types of radioactive material beyond what is currently authorized and are the same as specified in ISU’s current license. This SNM to be possessed by ISU is as follows:

- ²³⁵U contained in uranium-aluminum (U-Al) fuel plates
- ²³⁵U contained in a fission counter
- ²³⁵U in U-Al foils

In section 5, “Specification of the Special Nuclear Material,” of its LRA, ISU discussed specific details of the SNM it requests authorization to possess and use under the SNM-1373 license. Table 1 below summarizes the information provided by ISU. Attachment III of ISU’s LRA provides specific information on the fuel plates, U-Al foils, and the fission counter.

Table 1: Forms and Quantities of SNM

MATERIAL	FORM	QUANTITY	AUTHORIZED USE(S)
Uranium Enriched to less than 20 % in the isotope ²³⁵ U	clad uranium-aluminum fuel plates	[Security-Related Information – Withheld Under 10 CFR 2.390]	Instruction and Educational Programs at ISU
Uranium Enriched to 93 weight % in the isotope ²³⁵ U	Fission counter	[Security-Related Information – Withheld Under 10 CFR 2.390]	Instruction and Educational Programs at ISU
Uranium Enriched to 93 weight % in the isotope ²³⁵ U	U-Al foils	[Security-Related Information – Withheld Under 10 CFR 2.390]	Instruction and Educational Programs at ISU

ISU also possesses and uses a neutron source—either Plutonium/Beryllium, Californium-252, Americium/Beryllium, or equivalent—as approved by the RSC¹ or Radiation Safety Committee. This source is not listed above as it is already authorized for ISU’s use under NRC Broad Scope License No. 11-27380-01.

2.2.2.3. General Use Plan

In accordance with 10 CFR 70.22(a)(2), in section 2 of its LRA, ISU discusses its general plans for using the requested SNM. Specifically, in section 3.1, “General use plan for the requested SNM,” ISU stated that it intends to use the SNM primarily for instructional purposes in senior and graduate-level laboratory courses.

¹ See information on the RSC in section 5.2.1.1, “Organization and Qualifications,” of this SER.

Uranium-aluminum fuel plates

In section 3.1, “General use plan for the requested SNM,” of its LRA, ISU stated that the fuel plates will be primarily used to create a SCA for instructional purposes. For this purpose, the plates will be loaded in various lattice arrangements in a water-filled tank and may be used singly for a quasi-homogeneous assembly or in groups of two or more to produce a more homogeneous configuration. ISU also listed some experiments to be conducted with the subcritical assembly including:

- Approach to critical;
- Flux distribution measurements;
- Exponential pile measurements;
- Fermi age determination;
- Determination of optimal cell dimensions of a heterogeneous subcritical assembly; and,
- Effect of fuel-plate thickness on multiplication factor.

Uranium-aluminum foils

In section 3.1, “General use plan for the requested SNM,” of its LRA, ISU stated that the U-Al foils may be used as neutron monitors in some experiments performed with the Aerojet-General Nucleonics (AGN) 201M nuclear reactor. ISU noted that the U-Al foils have too small a uranium-235 (²³⁵U) content to be usefully activated in the subcritical assembly.

In section 3.1, “General use plan for the requested SNM,” of its LRA, ISU also stated that it will encourage research programs utilizing the above discussed materials. For example, ISU states that fuel plates and U-Al foils may be used as sources of fissile material for research and development of advanced methods for nondestructive assays and evaluation (NDA/NDE) of fissile material content in various configurations. The U-Al foils would be used to monitor neutron flux levels. The fuel plates would be used to represent fissile material in various shipping arrangements to investigate effectiveness of NDA/NDE interrogation techniques. ISU further stated that all experiment procedures will be reviewed by the RSC prior to execution and that no experiments or activities involving the use of the SNM will be performed without the prior approval of the Reactor Administrator or Reactor Supervisor.

In section 3.2, “The place in which the activity is to be performed,” of its LRA, ISU stated that on the occasion when SNM is being used in the SCA tank, its procedures allow for fuel plates to remain in the assembly tank. When stored unattended in this tank, the fuel will be secured with a locked aluminum lid on the top. Small amounts of SNM may be transported to locations adjacent to the SCA for temporary one-day use. These alternate locations are: (a) the Counting and Radiation Laboratory and, (b) the Nuclear Reactor Laboratory. During one-day uses of the SNM, the material will be continuously in the custody of an authorized custodian, one of the Nuclear Engineering Department personnel with trustworthy and reliability (T&R) status. These personnel include the Reactor Administrator, Reactor Supervisor, Nuclear Engineering Department Chair, or a trained SCA operator.

2.2.2.4. Location Where Activities Will Be Performed

In accordance with the requirements in 10 CFR 70.22(a)(2), ISU provided a general description of the location where the SNM activities will take place. In section 3.2, “The place in which the activity is to be performed,” ISU stated that the SNM will be used exclusively in the Lillibridge Engineering Building (LEL).

The SNM will be used primarily in the SCA of the LEL and stored in a locked steel storage container in this same room when not in use. The SNM will not be stored overnight at alternate locations and will be returned at the end of each day to its storage container. The SCA is a controlled access area (CAA) in the LEL with below grade reinforced concrete walls on three of the sides and a steel, fireproof, entry door on the fourth side. The floor is a 40-inch-thick reinforced concrete slab and will safely accommodate the weight of the entire SCA. The concrete floor for the main floor of the building is above the SCA.

Section 3.2.1, “The Counting and Radiation Lab,” of ISU’s LRA describes this facility. The laboratory consists of below grade reinforced concrete walls on three of its sides. The fourth side contains the entry door. There is a false ceiling consisting of fire-retardant tiles. The southwest corner of the laboratory contains a small concrete vault where radioactive material is stored. This area is separately locked and controlled from the laboratory and will not be used to permanently store SNM authorized under the SNM-1373 license.

Section 3.2.2, “The Nuclear Reactor Lab,” of ISU’s LRA refers to the description of the Nuclear Reactor Lab provided in section 3.2.1 of the AGN-201M Safety Analysis Report (ADAMS Accession No. ML030350340 (Non-Public)). The Nuclear Reactor Lab is in the LEL. Earth shielding exists on the outside of the west, north, and south walls of the lab.

2.2.2.5. Period of Time Requested for Renewal of License

In accordance with the requirements in 10 CFR 70.22(a)(3), in section 4 of its LRA, ISU requested that its SNM-1373 license be renewed for a period of 10 years.

2.3. Evaluation Findings

The NRC staff reviewed the information provided by ISU in the LRA and finds that, in accordance with the requirements in 10 CFR 70.22, ISU provided its full name, address, location where SNM activities will be conducted, the positions of its principal officers and, as stated in its LRA, that there is no control or ownership exercised over ISU’s SNM-1373 program by any alien, foreign corporation, or foreign government. The NRC staff also finds that ISU adequately described its facility, and the names, amounts, specifications, and proposed uses of the SNM being requested. The NRC staff also finds that ISU adequately specified the period of time for which the SNM-1373 license is requested. Therefore, the NRC staff finds the information in ISU’s application and supplements acceptable and that it meets the requirements of 10 CFR 70.22(a)(1)-(4) and 10 CFR 70.33.

3. ORGANIZATION AND ADMINISTRATION

3.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed ISU's organization and qualifications of administrative and radiation protection personnel, generally described in section 2 of its license renewal application (LRA), against the acceptance criteria in NUREG-1520, "Standard Review Plan for Fuel Facilities License Applications," Revision 2 (Agencywide Documents Access, and Management System (ADAMS) Accession No. ML15176A258), section 2, "Organization and Administration." 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 ISU and the staff's evaluation as to whether the information provided by ISU meets the acceptance criteria.

3.2. Staff Review and Analysis

In section 2 of its LRA, ISU stated that the current President of the University has designated the Vice President of Research as the university official who has the overall responsibility for the activities authorized under the special nuclear materials license number 1373 (SNM-1373). Attachment 1 of ISU's LRA, as amended by ISU letter dated December 20, 2021 (ADAMS Accession No. ML22025A203) (see footnote 2), lists the officials' names with responsibility over the SNM-1373 licensed activities as follows:

- Kevin Satterlee, J.D., President of the University, 264 Administration Building, Mail Stop 8310 Idaho State University, Pocatello, ID 83209-8310
- Donna L. Lybecker, Ph.D., Vice President for Research, 106 Administration Building, Mail Stop 8130 Idaho State University, Pocatello, ID 83209-8130
- Chad Pope, Ph.D., Chair of the Department of Nuclear Engineering, 235 Lillibridge Engineering Building (LEL), Mail Stop 8060, Idaho State University, Pocatello, ID 83209-8060
- Kermit Bunde, P.E., Chairperson of the Reactor Safety Committee, U.S. Department of Energy, Idaho Operations Office 1995 Fremont Street, Idaho Falls, ID 83415
- Mason Jaussi, M.S., Radiation Safety Officer (RSO), Idaho Accelerator Center Idaho State University Pocatello, ID 83209-8263²
- Mary Lou Dunzik-Gougar, Ph.D. Reactor Administrator and Reactor Supervisor, Center for Advanced Energy Studies Idaho State University, Pocatello, ID 83209-8060
- Jonathan Scott, Reactor Supervisor in Training, Lillibridge Engineering Laboratory Mail Stop 8060, Idaho State University Pocatello, ID 83209-8060

Attachment IV of the LRA lists the minimum qualifications of the above listed individuals. The NRC staff had previously evaluated the technical qualifications of these individuals against the minimum qualification requirements established by ISU (ADAMS Accession No. ML16279A282) which ISU later updated via letter dated November 13, 2020 (ADAMS Accession

² Mr. Longley retired during the NRC staff's review of ISU's LRA and was replaced by Mr. Mason Jaussi, M.S. ISU submitted a LAR, dated December 20, 2021 (ADAMS Accession No. ML22025A203), to include Mr. Jaussi as the new RSO and member of ISU Roster of Officials, which the NRC approved (ADAMS Accession No. ML22034A805). Mr. Jaussi's contact information is: 206 Idaho Accelerator Center, Mail Stop 8042, Idaho State University, Pocatello, ID 83209-8263.

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No. ML20332A026), and determined that the individuals met ISU's minimum qualifications for inclusion in ISU's SNM-1373 roster of officials. The documented evaluations for each of these individuals can be found in ADAMS as follows:

- Dr. Donna L. Lybecker - see ADAMS Accession No. ML21026A295
- Dr. Chad Pope - see ADAMS Accession No. ML22095A230
- Mr. Kermit Bunde - see ADAMS Accession No. ML21160A250
- Mr. Mason Jaussi - see ADAMS Accession No. ML22034A805
- Dr. Mary Lou Dunzik-Gougar - see ADAMS Accession Nos. ML19044A550 and ML22034A805
- Mr. Jonathan Scott - see ADAMS Accession No. ML21026A295

The NRC staff concludes that all of the above individuals possess appropriate experience with varying levels of qualifications and corresponding levels of responsibilities.

ISU's SNM-1373 licensed activities are supported by both on- and off-campus organizations. On campus organizations include:

- ISU Public Safety Department (ISUPSD) - maintains a permanent detachment of armed police officers, in constant communications, on ISU's campus. The ISUPSD full-time director is responsible for the enforcement of physical security and personnel access regulations. The ISUPSD maintains a liaison with other law enforcement agencies, including city, county sheriff department and state police, to ensure effective traffic control and crowd control in emergency situations. The ISUPSD coordinates with the Director of Emergency Operations (DEO) to initiate actions that would improve the posture of any security measures that may have been degraded as a result of a radiological accident.
- ISU Radiation Safety Department (RSD) - evaluates and controls radiological hazards related to ISU activities. Included in the normal operation of the RSD is the monitoring of personnel radiation doses and routine radiological emissions at ISU. ISU's RSO serves as the Dose Assessment Coordinator (DAC) in a radiological emergency. The RSD provides monitoring and control of radioisotope emission through a staff of trained radiation safety technicians. This includes personnel dose assessment, air sampling, surface contamination sampling and bioassay where designated by the DAC.

ISU receives off-campus support during emergencies. Emergency support organizations include:

- City of Pocatello Police Department - provides assistance, coordinated by ISUPSD, in the event of a bomb threat or civil disturbance directed against the LEL. In addition, they provide assistance with traffic and crowd control. Written agreements with the Pocatello Police Department are updated biennially and are maintained by the RSO.
- Pocatello Fire Department (PFD) - provides fire-fighting services and rescue squad services in the event of an emergency. PFD also provides ambulance services in the event of an emergency including transportation of injured and/or radioactivity contaminated individuals to the Portneuf Medical Center. Written agreements with PFD are updated biennially and are maintained by the RSO.
- Portneuf Medical Center - provides emergency medical service to radioactively contaminated patients. This service is coordinated by the PFD. Written agreements with the Portneuf Medical Center are updated biennially and are maintained by the RSO.

- Idaho Bureau of Hazardous Materials (IBHM) - provides support services for emergencies involving hazardous materials. IBHM is notified of emergencies at ISU by the DEO and their support is coordinated by the DEO and the DAC.
- Idaho National Engineering and Environmental Laboratory Oversight Office - provides support services for radiological emergencies. They are notified of emergencies by the DEO and their support is coordinated by the DEO and the DAC.

Section 8, "Procedural Requirements to Protect Health and Minimize Danger to Life and Property," of the LRA discusses ISU's program and management policies to provide adequate protection of public health and safety and its workers and students. ISU states that the Reactor Safety Committee reviews and approves plans and procedures for the usage of the material in the subcritical assembly (SCA). ISU's LRA further explains that the Reactor Safety Committee shall review and approve all new experimental plans and procedures for the use of the licensed material prior to implementation, and that ISU's RSO shall review radiation dose data annually to ensure that doses are maintained as low as reasonably achievable and shall report the findings of the assessment to the Reactor Safety Committee. There must be a minimum of two persons who have been trained to the SCA Procedure of ISU, at least one person must have current Trustworthy & Reliability (T&R) status³ in controlled access areas whenever operations involving SNM are in progress and access is controlled by key card access. In addition, all personnel shall have received training or shall be under the supervision of persons who have received training in operating the SCA from the Reactor Supervisor or their designee prior to working or handling licensed nuclear material.

3.3. Evaluation Findings

The NRC staff has reviewed the organization and administration for ISU against the acceptance criteria in Chapter 2 of NUREG-1520 and the relevant regulatory requirements in 10 CFR 70.22 and 10 CFR 70.23. The NRC staff finds that ISU adequately described its organization, and supporting organizations, to ensure the safe operation of the facility in accordance with the acceptance criteria in section 2, "Organization and Administration," of NUREG 1520, Revision 2, and the relevant requirements in 10 CFR 70.23(a). The NRC staff also finds that ISU adequately discussed the qualifications of key management positions to provide reasonable assurance that public health and safety and the environment will be adequately protected in accordance with the requirements in 10 CFR 70.22(a)(6) and 70.23(a)(2). The NRC staff also finds that ISU adequately discussed its proposed practices to protect health and to minimize danger to life or property in accordance with 10 CFR 70.23(a)(4). The NRC staff, therefore, finds that ISU has an acceptable organization, administrative policies, and sufficiently qualified resources to provide for the safe operation of the facility under both normal and abnormal conditions.

³ As defined in ISU Administrative Procedure 2, "Trustworthy & Reliability Assessment Procedure for the Idaho State University Nuclear Engineering Laboratory," a trustworthy and reliable individual is one who has passed the NRC criminal background check and passed the personal references and employment check done by the Approved Reviewing Official.

4. INTEGRATED SAFETY ANALYSIS SUMMARY

4.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the license renewal application (LRA) to determine whether Idaho State University (ISU) was required to provide an Integrated Safety Analysis (ISA) Summary, pursuant to the provisions in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70, Subpart H, “Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material,” in support of its LRA.

4.2. Staff Review and Analysis

Under special nuclear materials license number 1373 (SNM-1373), ISU is not engaged in any of the activities described in 10 CFR 70.60 (i.e., enriched uranium processing, fabrication of uranium fuel or fuel assemblies, uranium enrichment, enriched uranium hexafluoride conversion, plutonium processing, fabrication of mixed-oxide fuel or fuel assemblies, scrap recovery of special nuclear material) or any other activity that the Commission determines could significantly affect public health and safety. Because ISU did not propose to conduct any activities in the LRA described under 10 CFR 70.60 for the proposed license renewal term, the staff concludes that no ISA Summary is required.

4.3. Evaluation Findings

The NRC staff finds that the activities to be conducted by ISU under its SNM-1373 license do not involve any of those described in 10 CFR 70.60. In addition, the NRC staff finds that the requirements in 10 CFR Part 70, Subpart H are not applicable to ISU and, therefore, ISU is not required to submit an ISA Summary in support of its LRA.

5. RADIATION SAFETY

5.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff assessed whether the Idaho State University (ISU) Radiation Protection Program (RPP), as described in ISU's license renewal application (LRA), is adequate to protect the radiological health and safety of ISU personnel, students, and the public, and complies with the regulatory requirements in Title 10 of the *Code of Federal Regulations* (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 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 that the applicant's proposed procedures to protect health and to minimize danger to life or property are adequate. Section 14 of this safety evaluation report discusses protection of the public and the environment.

5.2. Staff Review and Analysis

5.2.1. Commitment to Radiation Protection Program Implementation

5.2.1.1. Organization and Qualifications

In section 2 of its LRA, ISU stated that the current President of the University has designated the Vice President of Research (VPR) as the university official who has overall responsibility for the activities conducted under special nuclear materials license number 1373 (SNM-1373). The information in ISU's Radiation Safety Manual (RS Manual) state that the VPR appoints the Radiation Safety Committee (RSC) chairperson, the Reactor Safety Committee (ReSC) chairperson, and members and any alternates for the members of the RSC and of the ReSC. The VPR also selects and appoints individuals who meet the qualifications for the position of Radiation Safety Officer (RSO) and Reactor Administrator. Responsibility for the supervision and operation of licensed activities will reside with the Reactor Administrator, the Reactor Supervisor, and the RSO. The Reactor Administrator is responsible for the safe storage and use of the special nuclear material (SNM).

ISU's RSC and the ReSC are ISU's organizations responsible for the oversight, supervision, and operation of NRC licensed activities at ISU. In section 6.1, "Reactor Safety Committee," of its LRA, ISU stated that the RSC membership consists of individuals knowledgeable in fields that relate to nuclear reactor safety, radiation safety, and radioactive material safety and has authority over all uses of radioactive materials at ISU. The LRA explains that the RSC shall consist of the Chair, the Reactor Administrator, the RSO, the VPR, and at least two other members. The RSC has the function of revising new procedures and substantial changes to procedures, and facility changes based on their broad technical knowledge and focus on safety of ISU personnel and the public during these reviews.

5.2.1.2. Administrative Controls

In section 8.1, “Administrative Controls,” ISU stated that safe storage and use of the SNM are responsibility of the Reactor Administrator. The RSC shall review and approve, prior to implementation, any new experimental plans, change to existing plans or procedure, new plans, or procedure that may affect safety. The RSO shall review the radiation dose data annually to ensure doses are maintained as low as reasonably achievable (ALARA) and shall report the findings of this assessment to the RSC. At least one person with status of Trustworthy & Reliability (T&R) should be present when the operations involving nuclear materials in the Subcritical Assembly Facility (SCA) are in progress. The T&R is defined in ISU Administrative Procedure 2. Access to the SCA is controlled by key card access maintained by ISU Public Safety. Only the Reactor Administrator can grant permission to an individual to access the SCA. The Reactor Administrator, Reactor Supervisor, RSO, and RSC members have access to the SCA. Any other person, authorized by the Reactor Administrator, may be granted access to a controlled access area upon being granted T&R status. The control key to securing the SNM storage container and assembly access cover and override locks to bypass the electronic magnetic lock in case of emergency are maintained by Reactor Administrator and the Reactor Supervisor. ISU further stated that all authorized personnel shall have received training in handling nuclear materials prior to working or, if not, handling nuclear materials shall be under the supervision of a person who has received such training.

5.2.1.3. Radiation Hazard

In section 8.2, “Radiation Hazard,” of its LRA, ISU stated that it maintains an RS Manual which documents its radiation safety program. The RS Manual defines responsibilities of individuals and organizations for radiation control and specifies the policies that guide specific decisions on radiation control matters. The RS Manual is reviewed annually for needed revisions by the RSC. The RS Manual includes the following subject areas:

1. ALARA Policy and Dose Limits
2. Radiation Safety Training
3. Radiation Safety Program Audits
4. Control of Areas and Postings
5. Control of Contamination
6. Dose Measurement and Reporting (external and internal dosimetry)
7. Surveys
8. Records
9. Radiation Monitoring Equipment
10. Sealed Source Leak Tests
11. Radioactive Material Requirements (Shipment, receipt, inventory, labeling, leak tests)
12. Radioactive Waste Management
13. Emergency Preparedness
14. Decommissioning of Laboratories and Facilities

In addition to the RS Manual, the RSC will review and approve all plans and procedures for the use of the licensed materials in the SCA. The RSC will review and approve all new experimental plans and procedures for the use of the licensed material prior to implementation as well as approving all changes to existing experimental plans and procedures that may affect safety.

5.2.1.4. Control Area

In section 8.2.1 of its LRA, ISU stated that areas where materials are used are managed as restricted areas and radiation use areas, in accordance with ISU's RS Manual. All areas are posted "Caution Radioactive Material" and "Authorized personnel only." In addition, ISU stated that, since there are no dispersible materials in SCA operations, no step off pads are required.

5.2.1.5. Personnel Monitoring

In section 8.2.2, "Personnel Monitoring," of its LRA, ISU stated that it issues personal dosimeters sensitive to beta, gamma, and neutron radiation to reactor personnel (reactor operators, certified observers, the Reactor Administrator, the Reactor Supervisor, graduate research and teaching assistants, and faculty) working with SNM. These personal dosimeters are supplied by an outside vendor that holds current National Voluntary Laboratory Accreditation Program (NVLAP) accreditation. ISU further states that all visitors and laboratory students are monitored with direct reading dosimeters or equivalent. ISU stated that over the past five years, no reactor personnel have received a whole-body dose greater than the limit for members of the public (i.e., 100 millirem (mrem) per year). In addition, ISU stated that personnel hands and gloves are frisked after handling the SCA fuels.

ISU also states, in section 8.2.3, "Material Handling," of its LRA, that radiation exposures from the SCA plates are expected to be minimal because of the low amount of fission produced while the SCA is in operation. In section 8.2.4, "Radiation monitoring," of its LRA, ISU stated that radiation levels (gamma and neutron) from the SCA are monitored after each fuel addition as specified in the SCA operating procedures. If the combined dose rate (gamma and neutron) exceeds 2 mrem/hr at 30 cm, visitors and laboratory students are removed from the area. If the combined dose rate at 30 cm exceeds 5 mrem/hr, water is drained from the tank. Each time the fuel assembly is lifted from the water, the gamma exposure is measured and recorded. A gamma radiation monitor (Ludlum 300 or equivalent) serves as a criticality monitor and is located on the wall approximately five feet from the subcritical assembly. If the detector measures an exposure rate of 10 mR/hr, the water is automatically drained from the system.

5.2.1.6. Material Monitoring

There will be a small amount of fission produced during SCA fuel plates subcritical experiments. Therefore, dose rates to personnel are minimal (the dose rate is less than 0.1 millisievert per hour [mSv/h] or 10 millirem per hour [mrem/hr]). All personnel handling fuel plates and fission foils will wear disposable gloves to protect the material and the workers in event of unexpected leakage of radioactive materials.

5.2.1.7. Radiation Monitoring

ISU has committed to enacting an ALARA policy as documented in the facility's RS Manual (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22144A055). In section 8.1, "Administrative Controls," of its LRA, ISU stated that its ALARA Program includes an annual review of radiation exposures by the RSO for adherence to the ALARA concept. ISU also stated in section 8.2.4, "Radiation monitoring," that radiation levels (i.e., gamma and neutron) are monitored after each fuel addition to the SCA, as specified in operating procedures. The combined gamma and neutron dose rates should be less than 2 mrem/hr at 30 cm. If this dose rate is exceeded, all visitors and laboratory students are removed from the area. In case that dose rate exceeds 5 mrem/hr at 30 cm, the water in the tank is drained to stop a criticality test. Radiation levels are recorded after each time the fuel assembly

is removed from the water. A gamma radiation monitor serves as criticality alarm/monitor and is located on the wall approximately five feet from the SCA. If an exposure rate of 10 mrem/hr is measured by criticality alarm/monitor, the water is automatically drained from the system.

5.2.1.8. Leak Tests

The SNM at ISU is either encapsulated or incorporated into a non-dispersible form in fuel plates, U-Al foils, and a fission counter. Personnel use disposable gloves or other hand coverings while handling the plates or foils. Ten percent of the fuel plates will be leak tested at the conclusion of experiments and during one of the biannual inventories. All sources will be leak tested once a year. The box containing the U-Al foils will be swiped on the exterior each time a plate sampling set is removed. Water used to conduct experiments is analyzed for gross activity after each experiment. Action levels for the experiment water are twice the minimum detectable activity.

5.2.1.9. Surveys and Instrumentation

Contamination surveys of the area will be conducted along with the leak testing at the conclusion of experiments to ensure no radioactive material has been released during experiments. At least bi-annually, general contamination and radiation surveys will be conducted in the SCA room.

Water used to conduct experiments is analyzed for gross activity after each experiment to detect damage or defects in the fuel plates. The water is analyzed by a liquid scintillation counter to determine the tritium (H_3) activity level. If the level of H_3 activity exceeds 20,000 picocuries per liter [pCi/L, action Level 40 CFR 141.66(d)], the RSO will be notified.

All radiation detection instruments will be calibrated by ISU's Radiation Safety Office or qualified vendors in accordance with ISU's RS Manual. The following hand-held survey instruments will be used:

- GM Pancake-Type Detector (Iudlum3/44-9 or equivalent)
- Zinc Sulfide based Alpha Contamination Detector
- Ion Chamber with Beta and Gamma Window (Ludlum 9 or equivalent)
- Neutron Dose Rate Meter (Ludlum 12-4 or equivalent)

A Ludlum 300 or equivalent gamma radiation monitor serves as a criticality safety alarm for the subcritical assembly and the readout from the monitor is observable from the SCA control panel. The gamma monitor system will provide direct radiation readings during experiments and subsequent post-irradiation decay of short-lived fission products and induced activity. In addition, the Radiation Safety Department operates laboratory instruments (a liquid scintillation counter and a gas flow proportional counter) to support surveys involving special nuclear material. Beta/gamma and neutron dose rate survey instruments will be available to personnel to determine radiation fields during and following experimental operations.

5.2.1.10. Training.

In section 8.1, "Administrative Controls," of the LRA, ISU stated that, prior to working with or handling licensed nuclear material, personnel will receive training or work under the supervision of persons who have received training in radiation protection from the Radiation Safety Department. In accordance with section 8.1, "General Radiation Training," of ISU's RS Manual,

each individual working with, or in the presence of, radioactive materials or other radiation sources is required to receive documented 10 CFR Part 19.12 radiation safety training. The extent of the training is to be commensurate with the potential risk of radiation exposure to the individual. ISU's general training for radiation users contains the following subject areas:

1. Characteristics of ionizing radiation,
2. Units of radiation dose and quantities,
3. Biological effects of exposures to ionizing radiation,
4. Safe handling of radioactive materials,
5. External exposure limitation (time/distance/shielding),
6. Internal exposure limitation (contamination control/bioassays),
7. Classification of facilities and postings,
8. Individual dose limits including special limits for declared pregnant workers,
9. Mathematics pertaining to the use and measurement of radioactivity,
10. The ALARA principle; and,
11. Emergency procedures.

5.2.1.11. Radioactive Waste

In section 8.3, "Radioactive Waste," ISU stated that all of the radioactive materials used in association with the SCA are solid or sealed materials and are not dispersible. Therefore, there is no contaminated waste expected. Because the material is in non-dispersible form, there is no ventilation monitoring. If contaminated waste (including experiment water, if necessary) is generated, it will be managed and disposed of by the RSO in accordance with Chapter 17 of the RS Manual, which implements the requirements of 10 CFR 20 Subpart K. The NRC staff has determined that this commitment to the control of contaminated liquids and solid waste, and the lack of gaseous and liquid effluents from ISU's regulated activities, is adequate to ensure effluents are maintained within regulatory limits.

5.2.1.12. Radiation Safety Records

In section 8.4, "Radiation safety records," of its LRA, ISU stated that records are maintained in accordance with Chapter 21 of ISU's RS Manual. The RS Manual includes 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, program review, internal dose measurement, frequency of measurements, recordkeeping and reporting requirements, and actions to be taken when measurements exceed 10 CFR Part 20 occupational dose limits. External dose records are maintained in an NVLAP dosimetry vendor database. All records are maintained in ISU's Box cloud storage application.

5.3. Evaluation Findings

ISU 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 radiation work permits for

radiation protection activities and radiation protection training for all personnel who have access to restricted areas,

- 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 finds that ISU's RPP to ensure that personnel radiation exposures are minimized is adequate. The NRC staff also finds that there is reasonable assurance that, during the renewed license term, ISU's radiation protection activities will continue to meet the applicable requirements of 10 CFR Parts 19, 20, and 70 as discussed above.

6. NUCLEAR CRITICALITY SAFETY

6.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff performed a detailed technical review of the Idaho State University (ISU) license renewal application (LRA) to determine that the risk of inadvertent criticality is adequately managed in accordance with the applicable requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70, “Domestic Licensing of Special Nuclear Material.”

6.2. Staff Review and Analysis

The NRC staff conducted its review of ISU’s LRA in accordance with the applicable acceptance criteria in Chapter 5, “Nuclear Criticality Safety,” of NUREG-1520, Revision 2, as well as applicable portions of NUREG/CR-6698, “Guide for Validation of Nuclear Criticality Safety Calculational Methodology” and the following regulations in 10 CFR Part 70:

- 10 CFR 70.22, “Contents of applications;”
- 10 CFR 70.33, “Applications for renewal of licenses;”
- 10 CFR 70.24, “Criticality accident requirements;”
- 10 CFR 70.50, “Reporting requirements;” and
- 10 CFR 70.52 “Reports of accidental criticality.”

The regulations in 10 CFR 70.4 provide thresholds for which inadvertent criticality becomes a concern, defining “critical mass of special nuclear material (SNM)” as a quantity exceeding 700 grams of contained uranium-235 (^{235}U), 520 grams uranium-233 (^{233}U), 450 grams plutonium (Pu), 1500 grams of contained ^{235}U for enrichments of 4 weight percent (wt.%) or less, 450 grams of any combinations thereof, or one-half such quantities if massive moderators made of graphite, heavy water, or beryllium may be present. ISU’s license renewal request involves more than a critical mass as defined by 10 CFR 70.4, “Critical mass of special nuclear material (SNM).”

In its LRA, ISU requests authorization to possess, use, and store various sources of SNM primarily used for instructional purposes in senior and graduate-level laboratory courses. Although ISU’s request involves the possession, use, and storage of SNM, its planned activities do not include 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, or scrap recovery of SNM. Therefore, the criticality safety-related requirements of 10 CFR Part 70, Subpart H, do not apply. However, because ISU’s request involves SNM quantities in excess of 700 grams ^{235}U , ISU is required to maintain a criticality accident alarm system (CAAS) in accordance with 10 CFR 70.24. Additionally, ISU is required to report the occurrence of inadvertent criticality to the NRC in accordance with the requirements in 10 CFR 70.50 and 10 CFR 70.52.

6.2.1. Relevant Criticality Hazards – Normal and Credible Abnormal Conditions

Although ISU is not subject to the requirements of 10 CFR Part 70, Subpart H, the regulations in 10 CFR 70.22(a)(8) require each application for a license to contain the proposed procedures to protect health and minimize danger to life or property (e.g., procedures to avoid

inadvertent criticality, post-criticality accident emergency procedures, etc.). Section 8.6 of ISU's LRA details ISU's commitments with respect to the prevention of criticality accidents.

The NRC staff reviewed a summary of the nuclear criticality safety (NCS) analysis provided by ISU in section 8.6 of its LRA. The analysis was performed using a 19-energy group diffusion theory code, whose results were validated experimentally with an approach to critical and exponential experiment. The analysis considered the U-Al fuel plates in various geometrical configurations relative to varying conditions of light-water and graphite moderation/reflection and concluded that criticality is not possible for any credible configuration involving these materials given the existing geometry of the subcritical assembly (SCA) tank. The analysis also determined that the existing geometry of the SCA tank would not allow inadvertent criticality if deuterium oxide (i.e., "heavy water") moderation/reflection were to be introduced into the SCA. Still, in section 8.6 ISU stated that heavy water is strictly prohibited in the SCA room.

The NRC staff performed an independent analysis using the SCALE/KENO-VI Monte Carlo N-Particle application with various continuous energy cross section libraries. The NRC staff's analysis focused on the U-Al fuel plates under various geometrical configurations relative to one-another, various moderation/reflection conditions, and various geometrical configurations relative to moderating/reflecting materials. The NRC staff confirmed that no credible risk of criticality exists under any degree of moderation/reflection from light-water, graphite, or heavy water given the geometrical dimensions of the SCA tank. The NRC staff determined that the most reactive credible configuration would be a double plate configuration in an array with a thick graphite radial reflector. The NRC staff determined that such an arrangement is highly contrived and would bound the normal conditions of the SCA and credible upset conditions involving the introduction of heavy water into the SCA tank. The NRC staff noted that the normal conditions of the SCA are far less reactive.

ISU's analysis identified that inadvertent criticality would be possible if: (1) beryllium moderation/reflection were to be introduced into the SCA, or (2) the geometry of the SCA tank were to be increased and heavy water moderation/reflection introduced. Therefore, ISU has imposed administrative controls to prohibit the introduction of any heavy water or beryllium into the SCA room, as described in section 8.6 of the LRA. Graphite is normally present in the SCA room as graphite blocks make up the thermal column below the SCA tank. However, the graphite blocks are stacked in layers within a metal framework that will not be disassembled or otherwise disturbed during operation of the SCA except as to allow for the insertion of a neutron source or fission foils necessary to facilitate experiments. Any additional graphite will not be used in conjunction with the operation of the SCA and will be located away from the licensed material such that there can be only negligible neutronic interactions between the graphite and the licensed material. Additional graphite will not be allowed within four feet of the SCA or the thermal column without prior analysis and approval of the Reactor Administrator. The NRC staff's independent analysis confirmed that criticality could be achieved either via the introduction of beryllium moderation/reflection into the existing geometry of the SCA tank or via the introduction of heavy water moderation/reflection if the SCA tank dimensions were to be increased. However, such conditions are contrived and would require a number of significant, difficult, and unauthorized changes in process conditions. As stated in the NRC staff's safety evaluation report (SER) dated August 11, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML111520258), "...inadvertent criticality might be possible by the deliberate and unauthorized use of superior moderator (heavy water) or reflector materials (beryllium reflector) with the licensed SNM arranged in an optimal geometric configuration. The licensee has not identified a mechanism that would create the

optimal geometric configuration and neither heavy water nor beryllium is permitted in the facility. The prevention of an inadvertent criticality is accomplished through the licensee's commitment to restricting or prohibiting the use of superior moderator or reflector materials in the SCA Room by the Reactor Administrator, controlling access to the shipping container and tank where the SNM is stored, and [the use of a posting detailing the restrictions on moderating materials] at the entrance to the SCA facility. The commitments discussed in section 8.6 of ISU's LRA provide multiple layers in preventing the unauthorized introduction of heavy water, beryllium, or additional graphite into the SCA room, and the arrangement of U-Al fuel plates and such moderating material into a critical configuration would likely require a concerted effort." Consistent with the staff's previous evaluation dated August 11, 2011, the staff determined that a critical configuration within the SCA facility is extremely unlikely short of an unauthorized, concerted effort, and that ISU's commitments discussed above are sufficient for reasonable assurance of adequate protection against all credible criticality hazards.

6.2.2. Nuclear Criticality Safety Evaluations

In the event that an NCS evaluation be performed, such as to support the introduction of additional graphite into the SCA room, section 8.6 of ISU's LRA states that the evaluation will be prepared using guidance in DOE-STD-3007-2017, "Preparing Criticality Safety Evaluations at Department of Energy Nonreactor Nuclear Facilities," and Appendix A to American National Standards Institute/American Nuclear Society (ANSI/ANS)-8.1, "[NCS] in Operations with Fissionable Material Outside Reactors." Necessary calculations will be subject to an upper subcritical limit performed using SCALE 6.2.4 with the Evaluated Nuclear Data File (ENDF)/B-VII.1 continuous energy data library, which will be validated in accordance with ANSI/ANS-8.24, "Validation of Neutron Transport Methods for [NCS] Calculations." In addition to these commitments, in section 8.6 of its LRA, ISU commits to adherence to the double contingency principle, as well as to the assurance of subcriticality under normal and all credible abnormal conditions. In section 8.6 of its LRA, ISU stated that adherence to the double contingency principle and the assurance of subcriticality will be achieved through:

- performance of a criticality safety evaluation that establishes necessary limits and controls;
- implementation of the limits and controls established in the criticality safety evaluation through access controls, training, postings, material configuration, and exclusions;
- documentation of the overall criticality safety program; and
- periodic inspections and reviews.

The NRC staff evaluated ISU's commitments regarding the performance of NCS evaluations. In addition to the commitments discussed above, section 8.6 of the LRA states that ISU will reference and establish relevant compliance with ANSI/ANS-8.1-1998, "[NCS] in Operations with Fissionable Material Outside Reactors," which is endorsed by NRC Regulatory Guide (RG) 3.71, "Nuclear Criticality Safety Standards for Fuels and Material Facilities." Calculations to support NCS evaluations will be performed using a method validated by ANSI/ANS-8.24, which is also endorsed by NRC RG-3.71. The staff determined that ISU's commitments discussed above along with its commitments to adhere to the double contingency principle, assure subcriticality under normal and all credible abnormal conditions, validate its calculational method in accordance with ANSI/ANS-8.24, and comply with the relevant portions of ANSI/ANS-8.1, are sufficient to ensure that NCS evaluations will be performed in a manner consistent with industry standards and regulatory requirements, and provide reasonable assurance of adequate protection against all credible criticality hazards.

6.2.3. Criticality Accident Alarm System

ISU's LRA involves SNM quantities greater than those defined in 10 CFR 70.4. Therefore, ISU is required to maintain a CAAS in accordance with 10 CFR 70.24. In section 8.6 of its LRA, ISU stated that a fixed CAAS that satisfies the requirements of 10 CFR 70.24(a)(2) is installed in the SCA. In section 8.6 of the LRA, ISU also stated that it will reference and establish relevant compliance with ANSI/ANS-8.3-1997 (R2003), "Criticality Accident Alarm System;" and ANSI/ANS-8.23-2007, "Nuclear Criticality Accident Emergency Planning and Response." Given that ISU's original SNM license was issued prior to December 6, 1974, the NRC staff determined that ISU's commitment to maintain a CAAS in accordance with 10 CFR 70.24(a)(2) is appropriate, and the NRC staff determined that ISU's commitments are sufficient to ensure that adequate CAAS coverage is maintained in accordance with the applicable requirements of 10 CFR 70.24.

As previously discussed, the licensed material will be stored in a locked steel storage container in the SCA when not in use. However, in section 3.1 of its LRA, ISU stated that small amounts of SNM may be transported to the Counting and Radiation Lab or the Nuclear Reactor Lab for temporary one-day use. These labs do not have CAAS coverage; however, the total ²³⁵U- mass of the U-Al foils and U-Al fuel plates is far below the ²³⁵U threshold for requiring CAAS coverage. As stated in the staff's evaluation dated August 11, 2011, "[b]ased on the form and quantity of material, NRC staff determined that a criticality monitor is not required [for the Counting and Radiation Lab or the Nuclear Reactor Lab]." Consistent with the NRC staff's previous evaluation dated August 11, 2011, the NRC staff determined that CAAS coverage is not necessary for these labs.

6.3. Evaluation Findings

Based on its review as discussed above, the NRC staff concludes that ISU's LRA and commitments provide reasonable assurance of subcriticality under normal and all credible abnormal conditions, provide reasonable assurance of adequate protection against the risk of criticality accidents, and otherwise, satisfies the applicable requirements of 10 CFR Part 70. Therefore, the NRC staff recommends that ISU's request for renewal of SNM-1373 be approved.

7. FIRE PROTECTION

7.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff performed a detailed technical review of Idaho State University's (ISU's) license renewal application (LRA) to determine, with reasonable assurance, that that ISU's facility provides adequate protection against fires and explosions that could affect safety of the licensed special nuclear material (SNM) and thus present an increased radiological risk. The NRC staff's review also established that the application considered radiological consequences of fires and instituted suitable safety controls to protect workers, the public, and the environment.

7.2. Staff Review and Analysis

7.2.1. Fire Hazards Analysis

Section 7.4.3.2 of NUREG-1520 Revision 2, "Standard Review Plan for Fuel Cycle Facilities License Applications," states that a licensee should conduct a fire hazards evaluation for each facility (or part), that if totally consumed by fire, could release SNM in a quantity and form that could cause at least an intermediate consequence, as defined in Title 10 of the *Code of Federal Regulations* (10 CFR) 70.61. In addition, the regulations at 10 CFR 70.23(a)(3) require that the applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life or property.

In section 3.2 of its LRA, ISU stated that the SNM will be stored in the steel storage container located in the Subcritical Assembly Facility (SCA) of the Lillibridge Engineering Laboratory (LEL) Building. There are no materials or chemicals stored in the SCA that could present a fire hazard, but the wood dividers in the steel storage container are combustible. Therefore, ISU performed a calculation assuming that all wood dividers in the steel storage container for the fuel plates would burn and the resulting heat of combustion be absorbed by the aluminum plates. The calculation shows that there is not enough heat to melt the aluminum which was not in a dispersible form. Also, the storage container will not allow enough air inside to react with the wood dividers for complete combustion and will protect the fuel plates from radiant energy transfer from a nearby fire within the SCA.

Based on results of the applicant's calculation, the NRC staff's analysis below confirmed that: (1) melting of the aluminum plates is essentially impossible under the current conditions of storage; (2) there is nothing combustible in the SCA; and, (3) there is nothing combustible in the criticality tank to raise the aluminum plates. The NRC staff also confirmed that dispersal of SNM material is unlikely to occur in a fire accident and a release of radioactivity by fire is highly unlikely and therefore, in accordance with section 7.4.3.2 of NUREG-1520 Revision 2, a formal fire hazards analysis is not needed.

7.2.2. Facility Design

The Nuclear Engineering Laboratories are located in the LEL Building in a controlled access area (CAA).

The LEL Building was designed and constructed with all exterior wall construction made of brick and reinforced concrete. The NRC staff considers this equivalent to the National Fire Protection

Association Standard 220 (NFPA 220), “Standard on Types of Building Construction,” Type II non-combustible construction as required by NFPA 801, “Standard for Fire Protection for Facilities Handling Radioactive Materials.” The NFPA 220 contains tables which equate the fire rating of various building components to construction type. There are no standpipes in the building but there are three nearby fire hydrants for use by the Pocatello City Fire Department outside of the building.

The SCA has below grade reinforced concrete walls on three sides and sheet rock construction on the fourth side and has a fireproof entry door of steel construction. The 12-foot ceiling is constructed with fire-retardant tiles. The SCA contains a nuclear grade graphite pile with removable slabs of graphite in which irradiation foils can be inserted. The nuclear grade graphite will burn only when an external heat source is applied. It will self-extinguish under normal atmospheric conditions. Written procedures, which are posted on the door of the SCA, do not permit other combustibles to be brought into the facility except temporarily, for less than 24 hours, without the written approval of the Reactor Supervisor or the Reactor Administrator. Small amounts of SNM, may be transported to the Nuclear Reactor Lab and the Counting and Radiation Lab for temporary one-day use.

The NRC staff recognized that, with small amounts of non-flammable SNM for temporary 1-day use and under the custody of an authorized custodian, it is highly unlikely for a fire hazard occurring in the SCA and/or the Counting and Radiation Lab. The NRC staff has reviewed the design of the LEL Building and has reasonable assurance that the LEL Building meets the requirements in 10 CFR 70.23(a)(3) for providing adequate protection of public health and safety and minimize danger to life or property.

7.2.3. Fire Protection and Detection Systems

In section 3.2, “The place in which the activity is to be performed,” of the LRA, ISU stated that the SNM will be used exclusively in the nuclear engineering laboratory, which is located in the LEL Building. The LEL Building’s exterior wall construction is all brick and the floors, on all LEL Building levels, are made out of reinforced concrete. To provide adequate protection against fires and explosions that could affect safety of licensed materials and present an increased radiological or chemical risk, ISU’s nuclear engineering laboratory has reinforced concrete and an entry steel, fireproof door in one of its walls. Walls are of sheet rock construction. There are fire-retardant ceiling tiles, above which there is concrete. Fire hydrants are on campus for use by the Pocatello Fire Department, with the nearest dispatch station being approximately 0.5 miles away. ISU stated that other fire safety features include:

- A dry-chemical fire extinguisher is located next to the door of the SCA. Two other fire extinguishers are located nearby in the nuclear engineering complex. Reactor operators and security personnel are trained in the use of fire extinguishers.
- A monitored fire alarm is installed near the exit of the LEL Building to initiate the building evacuation in case of fire. There are additional fire alarm pull-stations in the CAAs of the building.
- The SCA contains a heat-rise sensor. Activation of the sensor by a fire will sound the building fire alarm, energize an indicator light on a fire location annunciator panel, and alert campus security who will investigate the building and notify the Pocatello Fire Department.

- Fire hydrants are distributed on campus for use by the Pocatello Fire Department which is about 0.5 miles away and provides fire-fighting services and rescue squad service in the event of fire.
- The SNM will not be stored overnight in the nuclear reactor lab nor the counting and radiation lab but will be stored in a steel container that has adequate fire ratings at the end of each day.
- LEL Building ventilation system will be cut-out (off-line) to prevent further air exchange in case of fire.

The NRC staff has reviewed fire protection and detection systems of the LEL Building and has reasonable assurance that adequate fire protection and detection systems will continue to be provided in the license renewal term consistent with the requirements of 10 CFR Part 70.

7.2.4. Training and Emergency Response

In its LRA, ISU stated that it requires the operators at reactor facility to receive training in both emergency plan and implementing procedures during their initial license training program and shall review the plan and implementing procedures at least annually, thereafter. Emergency drills will be conducted annually to test the onsite integrated capability (e.g., safety equipment and communication/ alarm systems) in response to the hazards, including fire. Communication links and notification procedures with offsite support agencies will be tested at least every 2 years.

In response to an emergency, the Reactor Administrator, the Radiation Safety Officer and the Reactor Supervisor or their designated alternates are all on the list of emergency call and will be notified of the emergency. The Pocatello Police Department, Pocatello Fire Department, and Portneuf Medical Center are the external organizations providing support services through the communication dispatch.

7.3. Evaluation Findings

The NRC staff reviewed the facility design, facility equipment, and fire protection features of the LEL Building and finds that the LEL Building will maintain an adequate level of fire protection to protect public health and safety, in accordance with applicable building codes and in compliance with 10 CFR 70.23. In addition, the NRC staff finds that a release of the SNM is unlikely due to fire because the licensed SNM is in a form that is unlikely to volatilize or otherwise readily disperse because of fire. The LEL Building is made of non-combustible materials and the SNM is stored in a locked steel storage container that have adequate fire ratings.

The NRC staff also finds that a formal fire hazards analysis is not required because of the low risk to public health and safety of the SNM possessed and used under the SNM-1373 license. Accordingly, the activities described in ISU's license renewal application do not meet the conditions in 10 CFR 70.60 which would require an ISA of hazards, including fires. The NRC staff reviewed the training and drills in response to hazards, including fires and finds that the corresponding procedures meet the requirements of 10 CFR 70.22(a)(7).

Based on the information discussed above, the NRC staff finds that ISU's Fire Protection Program will provide a reasonable level of assurance that adequate fire protection will be provided through the renewal term consistent with the requirements of 10 CFR Part 70.

8. DECOMMISSIONING FUNDING AND FINANCIAL ASSURANCE

8.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted this review to determine whether Idaho State University (ISU) will be able to decommission the facility safely and in accordance with the NRC requirements. Applicants or licensees may be required to submit a decommissioning funding plan (DFP) in accordance with the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) 70.25(b). The purpose of the NRC's evaluation of the DFP is to determine whether ISU: (1) considered decommissioning activities that may be needed in the future; (2) performed a credible site-specific cost estimate for those activities; and (3) presented the NRC with financial assurance to cover the cost of those activities in the future.

8.2. Staff Review and Analysis

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."

The regulations in 10 CFR 70.25(a)(2) require an applicant for a specific license that authorizes possession and use of unsealed special nuclear material (SNM) in certain quantities to submit a DFP. In addition, the regulations in 10 CFR 70.25(e)(2) require 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.

In accordance with the requirements in 10 CFR 70.22(a)(4), in section 2 of its license renewal application (LRA), ISU identified the forms, amounts, and specifications of the SNM it requests authorization to possess and use under the SNM-1373 license. In section 5, "Specification of the Special Nuclear Material," of its LRA, ISU further discussed the specific details of this SNM. All the SNM described by ISU is in the form of sealed sources (i.e., fuel plates, uranium-aluminum foils, and the fission counter). ISU did not request authorization to possess and use SNM in unsealed form.

8.3. Evaluation Findings

The NRC staff reviewed the information provided by ISU in its LRA and determined that all of the SNM that ISU is requesting authorization to possess and use is in the form of sealed sources. During the review of ISU's LRA, the NRC staff noted that ISU's SNM sources had been previously evaluated and the results of that evaluation communicated to ISU by letter dated February 13, 2009 (Agencywide Documents Access, and Management System Accession No. ML083430564). The NRC staff noted that the SNM sealed sources evaluated at that time are the same sealed sources ISU is currently requesting authorization to continue to possess and use. Accordingly, the NRC staff finds that ISU is not subject to the financial assurance for decommissioning requirements under 10 CFR 70.25; as such, ISU is not required to submit a DFP as required under 10 CFR 70.25(e); and, therefore, reconfirms its decision documented in its February 13, 2009, letter.

9. DECOMMISSIONING

9.1. Purpose of Review

As stated in section 10.1 of NUREG-1520, “Standard Review Plan (SRP) for Fuel Facilities License Applications,” Revision 2, at the time of license renewal, the U.S. Nuclear Regulatory Commission (NRC) staff evaluates the licensee’s conceptual approach for meeting NRC’s decommissioning requirements, including the licensee’s plans for meeting the decommissioning recordkeeping requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) 70.25(g). In this section of this safety evaluation report the NRC staff also evaluates the Idaho State University (ISU) plans for decommissioning in accordance with NUREG-1757, “Consolidated Decommissioning Guidance,” Volume 2 (Final Report), Revision 2.

9.2. Staff Review and Analysis

9.2.1. Conceptual Approach to Decommissioning and Minimization of Contamination

In NUREG-1757, Volume 1, section 7, “Decommissioning Groups,” the NRC describes decommissioning groups 1 through 7, which categorize decommissioning actions in a graded manner. Group 1 activities are the least complex of the seven groups and apply to those licensees for which licensed radioactive material is contained in sealed sources with no evidence of either leakage or activation of adjacent materials and for which decommissioning activities do not require a decommissioning plan. The NRC staff observed that ISU is not currently required by license condition to submit a decommissioning plan. In addition, the NRC staff evaluated the four case examples in 10 CFR 70.38(g)(1)(i) through (iv) and determined that operating procedures and activities that will be required by this licensee to carry out decommissioning are similar to those previously approved by the NRC, and the cases described in 10 CFR 70.38(g)(1)(i)-(iv) do not apply. Based on information contained in section 14 of ISU’s LRA, the NRC staff determined that, at the time of final decommissioning of the facility, ISU will develop a decommissioning plan in accordance with the requirements in 10 CFR 70.38, the guidance in NUREG-1757, Volume 2, Revision 2, and the guidance in NUREG-1575, “Multi-Agency Radiation Survey and Site Investigation Manual,” Revision 1, that will:

- (i) involve techniques applied routinely during cleanup or maintenance operations;
- (ii) upon permanent cessation of operations, ISU’s employees will not enter areas not normally occupied where surface contamination and radiation levels are significantly higher than routinely encountered during operations;
- (iii) ISU’s decommissioning procedures will not result in significantly greater airborne concentrations of radioactive materials than are present during operation; and
- (iv) ISU’s decommissioning procedures will not result in significantly greater releases of radioactive material to the environment than those associated with operation.

In section 14 of the license renewal application (LRA), ISU explained that the licensed fuel plates, fission counter, and foils will be returned to the U.S. Department of Energy (DOE). The NRC staff determined that this meets the transfer requirements in 10 CFR 70.42(b)(1), which provides that any licensee may transfer special nuclear material (SNM) to the DOE. Furthermore, since no leakage of SNM or fission products have occurred, or are expected to

occur, the NRC staff anticipates that little to no residual radioactive material from the SNM sources will remain after they are returned.

The regulation at 10 CFR 20.1406(a) requires licensees to describe how facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of radioactive waste. The regulation at 10 CFR 20.1406(c) requires that licensees shall, to the extent practical, conduct operations to minimize the introduction of residual radioactivity into the site, including the subsurface, in accordance with the existing radiation protection requirements in 10 CFR 20, Subpart B and radiological criteria for license termination in 10 CFR 20, Subpart E.

To evaluate whether 10 CFR 20.1406(a) and (c) are met, the NRC staff evaluated ISU's description of the licensed material and activities contained in sections 3, 5, and 7.6 of the LRA. ISU stated the licensed material is aluminum-clad sealed source fuel plates, a fission counter, and foils. These materials are stored and used in the Subcritical Assembly Facility, which is constructed of reinforced concrete walls on three sides, a sheet rock and steel-studded wall on the fourth side, and reinforced concrete slab floors. The critical assembly tanks, waste lines, pumps, storage cabinets, and other equipment are operated entirely above the floor, with no floor penetrations or sumps. The NRC staff determined that ISU has taken all reasonable measures to minimize the introduction of residual radioactivity into the site, including the subsurface because: the licensed material is contained in sealed sources that are routinely leak tested; there exists a low likelihood that any liquid will be contaminated with licensed material; and there are no likely flow paths for contaminated liquids to the subsurface. Based on the information discussed above, the NRC staff determined that ISU conducts operations to minimize the introduction of residual radioactivity into the site and, as such, the requirements of 10 CFR 20.1406(a) and (c) are met.

9.2.2. Decommissioning Recordkeeping

In its LRA, ISU stated that all decommissioning-related records required by 10 CFR 70.25(g) will be retained electronically on the licensee's cloud storage server until the site is released for unrestricted use. The NRC staff determined that this meets the requirement in 10 CFR 70.25(g) that licensees keep records of information important to the decommissioning of a facility in an identified location until the site is released for unrestricted use.

9.3. Evaluation Findings

The NRC staff has evaluated ISU's plans for decommissioning in accordance with 10 CFR 70.25(g) and NUREG-1757 and finds that ISU's plans for decommissioning comply with the NRC's applicable regulations and provide reasonable assurance of protection for workers, the public, and the environment.

10. MANAGEMENT MEASURES

10.1. Purpose of Review

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) 70.22(a)(8) require 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.

10.2. Staff Review and Analysis

The activities proposed by the Idaho State University (ISU) are not subject to the requirements in 10 CFR Part 70, Subpart H. Specifically, ISU activities are not subject to the requirements in 10 CFR 70.62(d), "Management Measures." However, the U.S. Nuclear Regulatory Commission (NRC) staff noted that section 8 of ISU's LRA discusses ISU's activities for adequately protecting public health and safety, including a description of its administrative controls, radiation protection practices, radiation monitoring, and radiation safety records management. In its LRA, ISU also made several commitments to ensure adequate protection of public health and safety and the environment from radiation hazards. These activities are conducted in accordance with ISU's Radiation Safety Program, as documented in ISU's Radiation Safety Manual, and are directed by the Radiation Safety Committee and Reactor Safety Committee. The program is implemented by the Radiation Safety Department (RSD) and managed by the Radiation Safety Officer. The RSD includes professional staff members and technicians with adequate technical qualifications and appropriate experience in radiation safety.

10.3. Evaluation Findings

The NRC staff finds that ISU's radiation protection activities meet the requirements at 10 CFR 70.22(a)(8). Since ISU's regulated activities do not fall under any of those activities described in 10 CFR 70.60, the NRC staff finds that management measures, as they pertain to 10 CFR Part 70, Subpart H, do not apply to ISU. (See section 3 of this safety evaluation report).

11. RADIOACTIVE WASTE MANAGEMENT

11.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the information discussed in section 8.3, "Radioactive Waste," of the Idaho State University (ISU) license renewal application (LRA) against the acceptance criteria in NUREG-1520, "Standard Review Plan for Fuel Facilities License Applications," Revision 2 (ADAMS Accession No. ML15176A258), sections 9.4.3.2.1, "Effluent Controls and Waste Minimization," and 9.4.3.2.2, "Effluent and Environmental Monitoring," to determine whether the LRA adequately described ISU's radioactive waste management program and activities. Applicants should describe their waste management programs for minimizing and controlling waste generation, and for its disposal in accordance with regulatory requirements. The following discussion summarizes the information provided by ISU and the staff's evaluation as to whether the information provided by ISU meets the acceptance criteria.

The regulations at Title 10 of the *Code of Federal Regulations* (10 CFR) 70.22(a)(7) require, in part, that each application for a license shall provide a description of the 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 and devices for the disposal of radioactive wastes.

The regulations at 10 CFR 20.2001 require a licensee to dispose of licensed material only by stated methods. Specifically, the regulations in 10 CFR 20.2001(a)(2) provide that licensees may dispose of licensed material by decay in storage.

The regulations at 10 CFR 20.2003 provide that a licensee may discharge licensed material into sanitary sewerage when specific criteria are met.

The regulations at 10 CFR 20.2006 describe 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.

The regulations at 10 CFR 20.2007 provide that nothing in Subpart K of 10 CFR Part 20 relieves the 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 this subpart.

11.2. Staff Review and Analysis

In Section 8.3, “Radioactive Waste,” of its LRA, Idaho State University (ISU) lists the methods it will use for disposing of radioactive materials. ISU indicated that, because all special nuclear material (SNM) used in association with the subcritical assembly is solid or sealed materials and are not dispersible, therefore, radioactive waste is not expected. However, any radioactive waste that may be generated will be managed in accordance with Chapter 17 of ISU’s Radiation Safety (RS) Manual, which implements the requirements of 10 CFR 20, “Standards For Protection Against Radiation,” Subpart K, “Waste Disposal.”

In its LRA, ISU states that waste will be disposed of by any of the following: (1) decay in storage, (2) by discharge into the sanitary sewer, or, (3) by transfer to a licensed waste management facility depending on the specific characteristics of the waste. With regard to discharges into the sanitary sewer system, ISU stated that it will comply with the requirements of the City of Pocatello Discharge Permit in addition to the NRC regulations in 10 CFR 20.

11.2.1. Disposal of Waste by Decay in Storage

In section 8.3, “Radioactive Waste,” of the LRA, ISU states that waste may be disposed of by decay in storage.⁴ Section 17.1, “Waste Segregation and Characterization,” of ISU’s RS Manual states that the Radiation Safety Department will perform decay in storage disposal. Section 17.5, “Decay in Storage,” of ISU’s RS Manual states that decay times will be estimated to achieve an activity of 0.1 microcurie (μCi) or less (generic exempt quantity). Once the decay time is reached, the parcel will be surveyed with an appropriate survey instrument. If the survey results are indistinguishable from background at the lowest instrument scale, the waste is eligible for disposal. All radioactive markings will be removed, and the waste will be disposed as ordinary trash.

11.2.1.1. Evaluation Findings

The NRC staff reviewed ISU’s LRA and determined that ISU has an established process for disposing of radioactive waste by decay in storage. The NRC staff finds that ISU provided reasonable assurance that disposal of waste by decay in storage will meet the requirements of 10 CFR 20.2001(a)(2).

11.2.1.2. Evaluation Findings

The NRC staff reviewed ISU’s LRA and noted that ISU did not propose any alternative radioactive disposal methods other than those specifically discussed in its LRA, which are already approved by regulation. Therefore, the NRC staff did not evaluate this information.

⁴ The SNM storage container at ISU is a metal container secured by one or more high-strength padlocks. The regulations in 10 CFR 73.67(f)(1) require licensees to store or use the material within a controlled access area (CAA). ISU Physical Security Plan (PSP, Non-Public) lists most rooms at their facility as a CAA where SNM is to be used/stored. The NRC staff reviewed ISU’s description of the CAAs in its revised LRA and PSP and finds that these meet the requirements in 10 CFR 73.67(f)(1).

11.2.2. Disposal of Waste into Sanitary Sewage

In section 8.3, “Radioactive Waste,” of the LRA, ISU states that all discharges to the sanitary sewer system will be in accordance with the City of Pocatello Discharge Permit (ISU Procedure RS-09) and the NRC’s regulations at 10 CFR Part 20.2003. In section 15.2 of its LRA, ISU further indicated that there are no liquid effluents from the subcritical assembly. However, if the water used in the subcritical assembly becomes activated or contaminated, then it will be managed as radioactive waste and discharged to the sanitary sewer system or, otherwise, disposed of by transfer to a licensed waste broker.

In section 17.4, “Sewer Disposal,” of its RS Manual, ISU stated that the Radiation Safety Department will perform sewer discharges of radioactive waste in accordance with ISU Procedure RS-09, the City of Pocatello Discharge Permit, and 10 CFR 20.2003. Accordingly, the Radiation Safety Officer prepares a quarterly discharge report that is submitted to the City of Pocatello through the Environmental Health and Safety Department.

11.2.2.1. Evaluation Findings

The NRC staff reviewed ISU’s LRA and determined that ISU has established means for disposing of radioactive waste into sanitary sewage, or, if necessary, disposed of by transfer to a licensed waste broker. The NRC staff finds that ISU’s LRA provides reasonable assurance that disposal of waste into sanitary sewage will meet the requirements of 10 CFR 20.2003.

11.2.3. Transfer for Disposal and Manifests

11.2.3.1. Staff Review and Analysis

In section 8.3, “Radioactive Waste,” of the LRA, ISU stated that all radioactive materials used in association with the subcritical assembly are solid or sealed materials and not dispersible and, as such, radioactive waste is not expected. However, ISU stated that any radioactive waste that may be generated will be managed in accordance with Chapter 17 of its RS Manual, which provides for disposal of wastes at an authorized disposal facility). In section 17.3 of its RS Manual, ISU stated that radioactive waste generated by ISU is disposed at the U.S. Ecology facility in Richland, Washington. The RSO will complete actions necessary to maintain permits for use of the U.S. Ecology site and with the State of Washington. In the RS Manual, it is further stated that, approximately once per year, the Radiation Safety Department will work with the waste broker to make a shipment of radioactive and mixed waste to the broker processing facilities and other necessary disposal and treatment facilities. The Radiation Safety Department will ensure that all materials are properly packaged, marked, and labeled for disposal. The Radiation Safety Department will review radioactive waste manifests (NRC Forms 540, “Uniform Low-Level Radioactive Waste Manifest – Shipping Paper,” and 541, “Uniform Low-Level Radioactive Waste Manifest – Container and Waste Description”) and uniform hazardous waste manifests prepared by the broker. An appropriately trained member of the Radiation Safety Department will sign the manifests as shipper. For uniform hazardous waste manifests, the shipper must be trained for radioactive material and hazardous chemicals.

11.2.3.2. Evaluation Findings

The NRC staff reviewed ISU’s LRA and determined that ISU has an established process for shipping radioactive waste intended for ultimate disposal at a licensed land disposal facility. The

NRC staff also determined that any radioactive waste that will be generated as a result of ISU's licensed activities will be managed in accordance with Chapter 17 of ISU's RS Manual, which ISU uses to implement the requirements of 10 CFR Part 20, Subpart K. The NRC staff finds that ISU provided reasonable assurance that ISU's process for shipping radioactive waste intended for ultimate disposal at a land disposal facility will meet the requirements of 10 CFR 20.2006.

11.2.4. Compliance with Environmental and Health Protection Regulations

The NRC staff reviewed the information in ISU's LRA to determine whether ISU's licensed program meets the regulations in 10 CFR 20.2007, which state that nothing in 10 CFR Part 20 Subpart K 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 this subpart.

11.2.4.1. Staff Review and Analysis

In section 6, "Technical Qualifications of the Applicant and Staff [ref. 10 CFR 70.22(a)(6)]" of its LRA, ISU stated that responsibility for the oversight, supervision, and operation of licensed activities will reside with the Responsible University Officer, Nuclear Engineering Department Chair; Reactor Safety Committee Chairperson, Reactor Administrator, Reactor Supervisor, and ISU's Radiation Safety Officer. In section 15 of its LRA, ISU discusses its environmental protection program. Specifically, in section 15.1, "Air Effluents," ISU stated that it follows the guidance of EPA-520/1-89-002, "A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclide Emissions from NRC licensed and non-DOE Federal Facilities," to model air emissions using the COMPLY code. ISU also stated that all of the materials used in the subcritical assembly are sealed sources (fuel plates, fission foils, and neutron sources) and are not included in the emission source term based on the EPA source term guidance and, therefore, the air emissions from the subcritical assembly are zero. In section 15.2, "Liquid Effluents," of its LRA, ISU stated that there are no liquid effluents from the subcritical assembly. In section 16, "Chemical Safety," of its LRA, ISU stated that chemical hazards associated with operation of the subcritical assembly will be evaluated by appropriate personnel in the Environmental Safety and Health (EHS) Department in accordance with ISU's Chemical Hygiene Plan.

11.2.4.2. Evaluation Findings

The NRC staff reviewed the information provided by ISU in its LRA and determined that ISU has established responsibility for the oversight, supervision, and operation of licensed activities. The NRC staff also determined that ISU has procedures and supporting organizations in place to ensure ISU complies with all other Federal, State, and local regulations governing any other toxic or hazardous properties of materials. The NRC staff therefore finds the information in ISU's LRA provides reasonable assurance that ISU's licensed program meets the requirements of 10 CFR 20.2007 for compliance with Federal, State, and local regulations governing toxic or hazardous materials.

11.3. Evaluation Findings

Based on its evaluation of the information discussed above, the NRC staff determined that ISU has established means for disposing of radioactive wastes. The NRC staff finds that ISU's radioactive waste management activities provide reasonable assurance for disposal of waste by

decay in storage in accordance with the requirements of 10 CFR 20.2001(a)(2). The NRC staff also finds that ISU has established means for disposing of radioactive waste into sanitary sewage in accordance with the requirements in 10 CFR 20.2003, and for disposing of wastes by shipping the wastes for ultimate disposal at a licensed land disposal facility in accordance with the requirements in 10 CFR 20.2006. The NRC staff also finds that any radioactive waste that will be generated as a result of ISU's licensed activities will be managed in accordance with Chapter 17 of ISU's RS Manual, which implements the requirements in 10 CFR Part 20, Subpart K. In addition, the NRC staff finds that ISU has procedures and supporting organizations in place to ensure ISU complies with all other Federal, State, and local regulations governing any other environmental and health protection regulations in accordance with the requirements in 10 CFR 20.2007. The NRC staff, therefore, finds that the information in ISU's LRA on ISU's activities for managing and disposing of radioactive wastes provides reasonable assurance that public health and safety and the environment are adequately protected and, therefore, ISU's radioactive waste management activities are acceptable.

12. CHEMICAL PROCESS SAFETY

12.1. Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted the chemical safety review to ensure that Idaho State University (ISU) will adequately protect workers, the public, and the environment from chemical hazards of licensed material and hazardous chemicals produced from licensed material. ISU 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 evaluation of ISU's program for identifying and managing chemical hazards that could arise from the activities it will conduct under special nuclear materials license number 1373 (SNM-1373). This review focuses on licensee commitments which facilitate the identification and management of the potential chemical hazards for activities that will be conducted under the SNM-1373 license.

12.2. Staff Review and Analysis

The NRC staff reviewed ISU's license renewal application (LRA) with a focus on the information in section 3, "Location of Material and Activity for Which it Will Be Used," and section 16 "Chemical Safety." The regulatory basis for this review is found in 10 CFR 70.22, "Contents of applications," and 10 CFR 70.23, "Requirements for the approval of applications." These regulations identify the information required to be provided in a license application and the requirements for the NRC' approval of applications, respectively. The review focused on those elements that are relevant to chemical safety.

In section 3 of its LRA, ISU states that the material will be used for education, research, and training programs. ISU states that the primary use of the special nuclear material (SNM) is for instructional purposes for senior and graduate-level laboratory courses. The LRA discusses how the SNM will be stored in the Lillibridge Engineering Laboratory (LEL) building and how it will be used in experiments. The fuel plates will be loaded into various lattice arrangements in a water-filled tank to produce a subcritical assembly. In addition, other research programs utilizing the materials will be encouraged.

The description of proposed activities did not discuss any chemical hazards. The NRC staff's independent review of description of proposed activities did not identify any chemical hazards.

In section 16 of its LRA, ISU documents its commitment to evaluate all new and revised procedures to determine if they involve chemical hazards. In section 6.1, "Radiation Safety Committee," of its LRA, ISU stated that the Reactor Safety Committee (RSC) will review new procedures, substantial changes to procedures, and facility changes based on their broad technical knowledge and focus on safety of ISU personnel and the public. In addition, ISU stated that the RSC can consult experts either at ISU or at outside institutions if they have questions or concerns that are not covered by the expertise of the RSC members. ISU further states that the RSC will coordinate with ISU's EHS Department to evaluate chemical safety issues by qualified personnel in the EHS in accordance with ISU's Chemical Hygiene Plan.

The NRC staff evaluated the EHS Department staff and expertise and confirmed that, among its members, there are individuals with educational degrees in chemistry, as well as in other

scientific disciplines, such as environmental pollution, hazardous wastes, and environmental health and safety, which can support evaluations of chemical hazards at ISU.

12.3. Evaluation Findings

Based on the information discussed above, the NRC staff determined that: (1) there are currently no identified chemical hazards under NRC's regulatory jurisdiction for the planned activities involving licensed material; and (2) ISU has a process for identifying and controlling chemical hazards if there are changes in the activities involving the material authorized under the proposed renewed license.

The NRC staff finds that, in accordance with the requirements in 10 CFR 70.22, ISU adequately described its equipment and facilities in sufficient detail for identifying chemical safety issues related to its licensed activities

The NRC staff also finds that, in accordance with 10 CFR 70.23, ISU's personnel is qualified by training and experience to identify and manage chemical hazards that might arise in its use of SNM. The NRC staff concludes that ISU's processes, written procedures, and commitment to consider chemical hazards in the revision of existing, and development of new procedures for conducting the activities authorized under this license are adequate to protect health and minimize danger to life or property from chemical hazards that are under NRC's regulatory jurisdiction.

13. EMERGENCY MANAGEMENT

13.1. Purpose of Review

The purpose of reviewing the Idaho State University (ISU) emergency management plan is to determine if it has established adequate emergency management facilities and procedures to protect workers, the public, and the environment.

13.2. Staff Review and Analysis

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 70.22(i)(1)(ii), in part, an application to possess enriched uranium or plutonium must contain an emergency plan (EP) for responding to the radiological hazards of an accidental release of special nuclear material (SNM) and to any associated chemical hazards directly incident thereto.

ISU's EP is a site-wide plan that applies to all nuclear activities at ISU's nuclear facilities, including those at the Aerojet-General Nucleonics (AGN)-201M nuclear reactor [conducted pursuant to the U.S. Nuclear Regulatory Commission (NRC) reactor license number 110 (R-110)] and ISU's Subcritical Assembly [conducted under U.S. NRC special nuclear materials license number 1373 (SNM-1373)], respectively, at ISU's Pocatello, Idaho campus. The EP was developed to in compliance with ANSI/ANS-15.16-1982, "Emergency Planning for Research Reactors," and NUREG-0849, "Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors," and provides the plan of action to follow in the event of a nuclear emergency.

In section 11, "Emergency Plan," of its LRA, ISU referenced its EP (Revision 7) in support of its application. ISU had previously updated Revision 6 of the EP to accommodate changes in the location of the emergency equipment locker, the University Organizational Chart and emergency contact list, and updates to building floor plans. Revision 7 of the EP was subsequently submitted to the NRC by letter dated September 29, 2016, (ADAMS Accession No. ML17144A139). In its letter, ISU stated that the revision of the EP was to accommodate changes in the location of the emergency equipment locker, the University Organizational Chart and emergency contact list, and updates to building floor plans. ISU concluded that the changes did not change the effectiveness of the EP. The NRC staff reviewed the changes made to the EP by ISU under Revision 7 and determined that the changes were administrative in nature. The NRC staff also agrees with ISU's conclusion that the changes do not change the effectiveness of the EP.

13.3. Evaluation Findings

Based on the information discussed above, the NRC staff finds that ISU's EP provides reasonable assurance that ISU will adequately respond to radiological events. The NRC staff also finds that the changes made to the EP since its last NRC revision and approval do not change or decrease its effectiveness. Therefore, the NRC staff finds that ISU's EP, Revision 7, meets the requirements in 10 CFR 70.22(i)(1)(ii).

14. ENVIRONMENTAL PROTECTION

14.1. Purpose of the Review

The purpose of the review is to determine whether Idaho State University's (ISU) proposed environmental protection measures are adequate to protect the environment and public health and safety and to comply with the regulatory requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20.

14.2. Staff Review and Analysis

ISU, an academic institution, proposed to renew its license to continue to use sealed sources of special nuclear material (SNM) for instructional purposes in senior and graduate-level laboratory courses. ISU stated that it does not anticipate any liquid or gaseous effluents to be created from any activities authorized by the renewed license (see section 5.2.1.11 of this safety evaluation report (SER)). ISU further explained that there is very little waste associated with the activities that would be authorized under the license (see section 5.2.1.11 of this SER), and that it would dispose of that waste in accordance with the requirements in 10 CFR Part 20 (see section 11, "Radioactive Waste Management," of this SER. The licensed activities will be performed within the confines of the Lillibridge Engineering Building by trained personnel.

In sections 15.1. "Air Effluents," ISU stated that all of the materials used in the subcritical assembly are sealed sources (fuel plates, fission foils, and neutron sources) and are not included in the emission source term based on the Environmental Protection Agency's source term guidance and, therefore, the air emissions from the subcritical assembly are zero. In section 15.2. "Liquid Effluents," of its LRA, ISU stated that there are no liquid effluents from the subcritical assembly. As stated in section 11.2 of this SER, ISU has procedures in place for releases to the sanitary sewer in accordance with wastewater discharge permit No. ISU080219 issued by the City of Pocatello.⁵ Any release to the sanitary sewer will be in accordance with 10 CFR Part 20, Appendix B limits. If low-level radioactive wastes were created, provisions exist through the licensee's Radiation Safety Manual to evaluate and dispose them in accordance with 10 CFR 20.2001(a)(2), 10 CFR 20.2001(b)(4), and 10 CFR 20.2003.

14.3. Evaluation Findings

Based on the information discussed above, the NRC staff finds that ISU's environmental protection program provides reasonable assurance that public health and safety and the environment will be adequately protected. Since all of the SNM to be possessed and used by ISU under the SNM-1373 license is in the form of sealed sources, there is minimal likelihood of contamination from operations involving the SNM sources. However, in the event that contamination is found, ISU will decontaminate the areas to levels as low as reasonably achievable. In addition, due to the nature of the activities conducted under the SNM-1373 license, there is minimum potential for accidents nor anticipated consequences from accidents that may occur as a result of the activities conducted by ISU. Accordingly, the controls of 10 CFR Part 70 Subpart H are not required, and as stated in section 4.0, the NRC staff concluded that ISU is not required to submit an ISA Summary in support of its license renewal application. Management measures do not apply to ISU (see section 10 of this SER).

⁵ The permit regulates the discharge of wastewater from ISU Pocatello campus to the wastewater treatment plant. The permit was effective 9/1/2019 and expires on 8/31/2024. The permit requires mandatory water quality sampling once per academic year at multiple outfalls across campus.

The NRC staff also finds, based on its review of the information provided by ISU in its LRA regarding its radiation protection program, that there is reasonable assurance that, during the renewed license term, ISU will meet the requirements of 10 CFR 20.1101, 20.1406, and 20.2007 for protecting the environment (see section 5.3 of this SER).

15. PHYSICAL SECURITY

15.1. Purpose of Review

The purpose of this review is to determine whether the Idaho State University (ISU) licensed program meets the security requirements for the physical protection of Category III special nuclear material (SNM) in Title 10 of the *Code of Federal Regulations* (10 CFR) 73.67(a) and (f).

15.2. Staff Review and Analysis

In conducting its review, the U.S. Nuclear Regulatory Commission (NRC) staff used the guidance in Regulatory Guide (RG) 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.”

Following its initial review of ISU’s, December 6, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21351A166) revised license renewal application (LRA) and enclosed Physical Security Plan (PSP), the NRC staff determined that additional information was necessary before it could conduct its review, and therefore, by letter dated February 7, 2022 (ADAMS Accession Nos. ML22033A444 (public) and ML22033A492 (Non-Public)), the NRC staff issued a request for additional information (RAI) to ISU. By letter dated March 4, 2022 (ADAMS Accession No. ML22075A290), ISU provided its responses to the RAI. The response included revised public (ADAMS Accession No. ML22075A235) and Non-Public (ADAMS Accession No. ML22075A223) versions of the LRA and Revision 9 of the PSP (ADAMS Accession No. ML22103A267 - Non-Public).

On March 18, 2022, staff from the Office of Nuclear Material Safety and Safeguards (NMSS) and the Office of Nuclear Security and Incident Response (NSIR) held a closed conference call with ISU representatives to request clarification on some of ISU’s, March 4, 2022, responses to the RAI. Following the call, the NRC staff issued a request for clarification of ISU responses to the NRC RAI (see ADAMS Accession No. ML22081A296) documenting the specific information that needed clarifications. During the call, NMSS and NSIR staff also discussed some editorial errors in ISU’s RAI responses. Following the call, by letter March 24, 2022 (ADAMS Accession No. ML22091A298) ISU provided its response to the NRC staff request for clarification, which included revisions to its public (ADAMS Accession No. ML22306A112) and Non-Public (ADAMS Accession No. ML22103A269) versions of its LRA. ISU’s response also included Revision 10 of the PSP (ADAMS Accession No. ML22103A268 - Non-Public).

The NRC staff reviewed the March 24, 2022, revised LRA and revised PSP, and the September 29, 2016, Emergency Plan (EP, ADAMS Accession No. ML16285A191, Non-Public) to determine whether ISU’s physical security measures meet the requirements in 10 CFR 73.67(a) and 73.67(f). 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: (1) minimize the possibilities for unauthorized removal of special nuclear material consistent with the potential consequences of such actions; and (2) facilitate the location and recovery of missing special nuclear material. To achieve these objectives, the physical protection system shall provide: early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area (CAA) containing special nuclear material; early detection of removal of special nuclear material (SNM) by an external adversary from a CAA; assure proper placement and transfer of custody of special nuclear

material; and 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. ISU employs a physical protection system that includes a combination of procedures, electronic systems, reporting of any transfer of custody of SNM through the Nuclear Materials Management and Safeguards System and personnel to detect and respond to unauthorized access or activities for the removal of SNM. ISU relies on a response force that includes both onsite security and offsite local law enforcement agencies 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. Based on the above discussed information, the NRC staff finds that ISU meets the requirements of 10 CFR 73.67(a).

The regulations in 10 CFR 73.67(f)(1) require licensees to store or use the material within a CAA. ISU's PSP lists most rooms that are designated as a CAA where SNM is to be used/stored. In its February 7, 2022, RAI the NRC requested that the PSP be revised to identify all rooms that SNM will be in use/storage, to be designated as a CAA. In its response, ISU stated that all rooms where SNM will be use/stored will be designated as a CAA and revised the PSP to include these CAAs accordingly. The NRC staff reviewed ISU's description of the CAAs in its revised LRA and PSP and finds these meet the requirements of 10 CFR 73.67(f)(1).

The regulations in 10 CFR 73.67(f)(2) require licensees to monitor, with an intrusion alarm or other device or procedures, the CAAs to detect unauthorized penetrations or activities. ISU's revised PSP describes details of the intrusion alarm system for CAAs to detect unauthorized penetration or activities. The NRC staff reviewed ISU's description of its monitoring of CAAs in the revised PSP and finds it meets the requirements of 10 CFR 73.67(f)(2).

The regulations in 10 CFR 73.67(f)(3) require the licensee to assure that a watchman or offsite response force will respond to all unauthorized penetrations or activities. In the revised PSP, ISU describes actions involving onsite and offsite response forces when responding to unauthorized penetrations or activities. The NRC staff reviewed this information and finds that it meets the requirements of 10 CFR 73.67(f)(3).

The regulations in 10 CFR 73.67(f)(4) require that the licensee establish and maintain response procedures for dealing with threats of thefts or thefts of this material. ISU's revised PSP and EP describe the response procedures for dealing with threats of thefts or thefts of this material. The NRC staff reviewed this information and finds that ISU meets the requirements of 10 CFR 73.67(f)(4).

15.3. Evaluation Findings

The NRC staff reviewed ISU's revised SNM renewal application, revised PSP, EP and RAI responses to determine if the information provided by ISU in these documents satisfies the requirements of 10 CFR 73.67(a) and (f). For the reasons set forth above, the NRC finds that ISU's revised LRA, as supported by ISU's revised PSP, EP and RAI responses, meets the requirements within 10 CFR 73.67(a) and (f). Therefore, the NRC staff finds the revised ISU LRA and supporting documents and information is acceptable and provides reasonable assurance that the requirements for the physical protection of Category III SNM will be met.

16. MATERIAL CONTROL AND ACCOUNTING

16.1. Purpose of Review

The purpose of this review was to determine whether Idaho State University's (ISU) material control and accounting (MC&A) practices are adequate to detect and protect against the loss, theft, or diversion of special nuclear material (SNM) that ISU possesses, stores, and utilizes at its facility, and to comply with the applicable regulatory requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 74, "Material Control and Accounting of Special Nuclear Material."

16.2. Staff Review and Analysis

In accordance with 10 CFR 70.22(b), current applicants requesting a license to possess SNM must submit a full description of their program for the control and accounting of SNM in the applicant's possession and to show compliance with 10 CFR 74.31, 74.33, 74.41, or 74.51, as applicable. However, the requirements in 10 CFR 70.22(b) contain an exclusion for licensees governed by 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," including non-power reactors (e.g., research and test reactors), and for uses of SNM as sealed sources. The same exclusions are contained in the MC&A requirements in 10 CFR 74.31, 74.33, 74.41, and 74.51, which contain specific control and accounting requirements for certain licensees, depending on the different types and quantities of SNM in possession.

Based on the total amount of SNM provided in section 3, "Location of Material and Activity for Which It Will Be Used," of the license renewal application (LRA), ISU possesses less than one effective kilogram (as defined by 10 CFR 74.4, "Definitions"). ISU stated that the SNM possessed under license is used for education, research, and training programs. In section 5, "Specification of the Special Nuclear Material," of the LRA, ISU stated that its SNM consists of sealed sources in the form of uranium-aluminum (U-Al) fuel plates, a fission counter, and U-Al foils. Consistent with the exclusion in 10 CFR 70.22(b), ISU is not subject to the MC&A requirements in 10 CFR 74.31, 74.33, 74.41, and 74.51 because ISU possesses less than one effective kilogram, and applications for use of SNM in the form of sealed sources are excepted.

The MC&A requirements applicable to ISU are contained in 10 CFR Part 74, Subpart B, "General Reporting and Recordkeeping Requirements." Licensees who possess, transfer or receive SNM in a quantity of one gram or more of contained uranium-235 (²³⁵U), uranium-233 (²³³U), or plutonium are subject to the general reporting and recordkeeping requirements of 10 CFR 74.11, 74.13, 74.15, and 74.19. The following discussion identifies each of the applicable MC&A requirements and summarizes the U.S. Nuclear Regulatory Commission (NRC) staff's evaluation as to whether the information provided by ISU in the LRA meets the requirements.

16.2.1. Reports of Loss or Theft or Attempted Theft

The requirement in 10 CFR 74.11 states that each licensee who possesses 1 gram or more of contained ²³⁵U, ²³³U, or plutonium is 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 authorized to possess, or any incident in which an attempt has been made to commit a theft or unlawful diversion of SNM.

In section 12, “Physical Security Plan,” of its LRA, ISU stated that MC&A activities are performed through procedure RS-28, “Special Nuclear Material Physical Inventory.” ISU stated that the procedure was developed to ensure that all SNM is present and has not been lost, stolen, or diverted. ISU also stated that, if an event occurs, the NRC Operations Center will be notified by the Radiation Safety Officer within 1 hour of discovery in accordance with 10 CFR 74.11.

The NRC staff reviewed ISU’s description for notifying the NRC of loss, theft or diversion of SNM. ISU stated that activities are performed to ensure compliance with the reporting requirements of 10 CFR 74.11. Based on the review, the NRC staff has determined that ISU’s MC&A measures include adequate procedures to ensure that the NRC is notified in a timely manner in the event of a loss or theft or diversion of SNM. Therefore, the NRC staff finds that ISU meets the requirement of 10 CFR 74.11.

16.2.2. Material Status Reports

The requirement in 10 CFR 74.13(a) states that each licensee possessing SNM in a quantity totaling one gram or more of contained ²³⁵U, ²³³U, or plutonium must 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, “Instructions for the Preparation and Distribution of Material Status Reports (U.S. Department of Energy (DOE)/NRC Forms 742 and 742C).”

In section 9, “Material Control and Accountability,” of its LRA, ISU stated that, upon completion of the physical inventory, the annual material balance report (DOE/NRC Form 742) and physical inventory listing (DOE/NRC Form 742C) are prepared and submitted following procedure RS-05, “NMMSS Reporting.” ISU stated that the procedure implements the requirements of 10 CFR 74.13 and follows the guidance in NUREG/BR-0007 and the Nuclear Materials Management and Safeguards System (NMMSS) User’s Guide for material owned by the DOE.

The NRC staff reviewed ISU’s description of preparing and submitting material status reports. ISU stated that activities are performed to ensure compliance with the reporting requirements of 10 CFR 74.13. Based on the review, the NRC staff has determined that ISU MC&A measures include adequate procedures to ensure that material balances and physical inventory listings are reported as required. Therefore, the NRC staff finds that ISU meets the requirement of 10 CFR 74.13(a).

16.2.3. Nuclear Material Transaction Reports

The requirement in 10 CFR 74.15 states that each licensee who transfers or receives SNM in a quantity of 1 gram or more of contained ²³⁵U, ²³³U, or plutonium is 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 SNM shall submit a Nuclear Material Transaction Report no later than the close of business the next working day. Each licensee who receives SNM shall submit a Nuclear Material Transaction Report within 10 days after the

material is received. Each licensee shall prepare and submit the reports as specified in the instructions in NUREG/BR-0006, "Instructions for Completing Nuclear Material Transaction Reports (DOE/NRC Forms 741 and 704M)."

In section 9, "Material Control and Accountability," of its LRA, ISU stated that, for all transfers and receipts of SNM above applicable thresholds the DOE/NRC Form 741s are completed and submitted following procedure RS-05, "NMMSS Reporting." ISU stated that, the procedure implements the requirements of 10 CFR 74.15 and follows the guidance in NUREG/BR-0006 and the NMMSS User's Guide for material owned by the Department of Energy.

The NRC staff reviewed ISU's description of completing and submitting Nuclear Material Transaction Reports. ISU stated that activities are performed to ensure compliance with the reporting requirements of 10 CFR 74.15. Based on the review, the NRC staff determined that ISU's MC&A measures include adequate procedures to ensure that transfers and receipts of SNM are reported through Nuclear Material Transaction Reports as required. Therefore, the NRC staff finds that ISU meets the requirement of 10 CFR 74.15.

16.2.4. Recordkeeping

The requirement in 10 CFR 74.19(a) states that a licensee is 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 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 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 who transferred the material until the Commission terminates the license authorizing the licensee's possession of the material.

In section 8.4, "Radiation Safety Records," of the LRA, ISU stated that records of all MC&A activities are maintained, including records of receipts, transfers, NMMSS changes, physical inventories, and annual material status reports. ISU stated that MC&A records are developed following procedure RS-28, "Special Nuclear Material Physical Inventory." ISU stated that the MC&A records are stored electronically on their cloud storage server and maintained and retained in accordance with the requirements of 10 CFR 74.19.

The NRC staff reviewed ISU's description for MC&A records. ISU stated that activities are performed to ensure compliance with the recordkeeping requirements of 10 CFR 74.19(a). Based on the review, the NRC staff has determined that ISU's MC&A measures include adequate procedures to ensure MC&A records are completed and maintained. Therefore, the NRC staff finds that ISU meets the requirement of 10 CFR 74.19(a).

16.2.5. Physical Inventory

The requirement in 10 CFR 74.19(c) states that certain licensees who are authorized to possess SNM in a quantity greater than 350 grams of contained ²³⁵U, ²³³U, or plutonium, are to conduct a physical inventory of all SNM in its possession under 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.

In section 9, “Material Control and Accountability,” of its LRA, ISU stated that an annual physical inventory is performed following procedure RS-28, “Special Nuclear Material Physical Inventory,” to comply with 10 CFR 74.19(c). ISU stated that the procedure specifies the methods to perform the measurement based physical inventory. ISU stated that the inventory results are reported in accordance with 10 CFR 74.13. In section 8.4, “Radiation Safety Records,” ISU stated that annual physical inventory records generated from procedure RS-28 are maintained and retained in accordance with 10 CFR 74.19.

The NRC staff reviewed ISU’s description of physical inventory. ISU stated that activities are performed to ensure compliance with the inventory, recordkeeping, and reporting requirements of 10 CFR 74.19(c). Based on the review, the NRC staff has determined that ISU’s MC&A measures include 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 ISU meets the requirement of 10 CFR 74.19(c).

16.3. Evaluation Findings

Based on the review of the LRA, the NRC staff finds that ISU’s MC&A practices as described provides assurance that ISU will satisfy the applicable requirements found in 10 CFR 74.11, 74.13, 74.15, and 74.19 during the renewed license term. Therefore, the NRC staff finds that ISU’s MC&A practices are acceptable.

17. NATIONAL ENVIRONMENTAL POLICY ACT REVIEW

The National Environmental Policy Act of 1969 (NEPA) was enacted by Congress to ensure Federal agencies consider the environmental impacts of their actions and decisions. Federal agencies are required to systematically assess the environmental impacts of their proposed actions and consider alternative ways of accomplishing their missions, which are less damaging to and protective of the environment. In accordance with the U.S. Nuclear Regulatory Commission's NEPA-implementing regulations at Title 10 of the *Code of Federal Regulations* (10 CFR) section 51.20, "Criteria for and identification of licensing and regulatory actions requiring environmental impact statements," subsection (a), in relevant part, states that NRC licensing and regulatory actions significantly affecting the quality of the human environment require the development of an environmental impact statement (EIS).

However, the NRC's regulations at 10 CFR 51.22 lists those licensing actions that the Commission, by rule or regulation, has declared to be categorically excluded from the requirements to prepare an Environmental Assessment (EA) or an EIS, after first finding that the proposed action does not individually or cumulatively have a significant effect on the human environment. In its license renewal application, Idaho State University (ISU) stated that it intends to use sealed sources of special nuclear material for education, research, and training programs. The NRC staff determined that these proposed activities meet the categorical exclusion in 10 CFR 51.22(c)(14)(v) for the use of radioactive materials for research and development and for educational purposes. Therefore, the NRC staff finds that an EA or an EIS is not required for the proposed renewal of ISU's SNM-1373 license.

18. CONCLUSION

The U.S. Nuclear Regulatory Commission (NRC) staff finds that the Idaho State University (ISU) program under special nuclear materials license number 1373 (SNM-1373) will provide adequate protection of public health and safety and that an adequate level of safety will be maintained during the proposed license renewal term. The NRC staff also finds that ISU's license renewal application (LRA), and its supporting/supplemental information, meets the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 70.23, "Requirements for the approval of applications," and provides reasonable assurance that the proposed operations at ISU will not have an adverse impact on the public health and safety, the common defense and security, or the environment.

Based on the information provided by ISU, as discussed in this safety evaluation report, the NRC staff, therefore, concludes that ISU will continue to meet the applicable requirements in 10 CFR Parts 19, 20, 70, 73, and 74. As such, the NRC staff recommends that ISU SNM-1373 license be renewed for a 10-year term in accordance with the statements, representations, and conditions in the LRA dated July 9, 2021 (Agencywide Documents Access, and Management System (ADAMS) Accession No. ML21190A251), LRA revision dated December 6, 2021 (ADAMS Accession No. ML21351A166), and supplemental information letters dated December 20, 2021 (ADAMS Accession No. ML22025A203), March 3, 2022 (ADAMS Accession No. ML22075A290), and March 24, 2022 (ADAMS Accession No. ML22091A298).

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