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**SAFETY EVALUATION REPORT
RENEWAL OF SPECIAL NUCLEAR MATERIAL
LICENSE SNM-2017 FOR
SENSOR CONCEPTS & APPLICATIONS INC.
DOCKET NUMBER 70-7020**

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LIST OF ACRONYMS AND ABBREVIATIONS

10 CFR.....	Title 10 of the <i>Code of Federal Regulations</i>
AU.....	Authorized User
ALARA.....	As Low As Reasonably Achievable
ANSI.....	American National Standard Institute
BCFD.....	Baltimore County Fire Department
CAA.....	Controlled Access Area
CAAS.....	Criticality Accident Alarm System
DHS.....	Department of Homeland Security
DOD.....	Department of Defense
DOE.....	Department of Energy
DOT.....	Department of Transportation
DTRA.....	Defense Threat Reduction Agency
EA.....	Environmental Assessment
EH&S.....	Environmental Health and Safety
EIS.....	Environmental Impact Statement
HazMat.....	Hazardous Material
HEU.....	Highly Enriched Uranium
ISA.....	Integrated Safety Analysis
K_{eff}	Coefficient of reactivity k-effective
LEU.....	Low Enriched Uranium
LAR.....	License Amendment Request
LLEA.....	Local Law Enforcement Agencies
LRA.....	License Renewal Application
MC&A.....	Material Control and Accounting
NCS.....	Nuclear Criticality Safety
NFPA.....	National Fire Protection Association
NRC.....	Nuclear Regulatory Commission
OSHA.....	Occupational Safety and Health Administration
Pu.....	Plutonium
PSP.....	Physical Security Plan
SCA.....	Sensor Concepts & Applications, Inc.
RAI.....	Request for additional information
RC.....	Radiation Center
RMSA.....	Radioactive Materials Storage Area
RSO.....	Radiation Safety Officer
RPP.....	Radiation Protection Program
SER.....	Safety Evaluation Report
SI.....	System of International units
SNM.....	Special Nuclear Material
SRP.....	Standard Review Plan
U.....	Uranium isotope 233, 235, or 238
U.S.....	United States

I. INTRODUCTION

Sensor Concepts and Applications, Incorporated (SCA) was issued a special nuclear material (SNM) license in 2011, License SNM-2017, dated December 27, 2011 (Agencywide Documents Access and Management System [ADAMS] Accession Number ML113080791). On November 24, 2021, SCA submitted a timely application for renewal of the license (ML22027A596). SCA has maintained this license since 2011 and is currently in the period of timely renewal based on its renewal application date. SCA would like to renew the license to support the Department of Defense (DOD), Defense Threat Reduction Agency (DTRA), and the United States Army. The supporting activities include concept demonstrations, test and evaluation, characterization evaluations and operator training activities to use technology to demonstrate techniques to detect special nuclear materials and clear alarms that represent a non-threat.

On February 9, 2022 (ML22021B672), the U.S. Nuclear Regulatory Commission (NRC) sent SCA an acceptance letter, noting that the license renewal application (LRA) contained sufficient information for a detailed technical review. A notice of opportunity to request a hearing on the license application was published in the *Federal Register* on March 7, 2022 (87FR12740). No hearing requests were received.

SCA supplemented its application with revised submittals dated May 26, 2022 (ML22159A246), and September 22, 2022 (ML22276A223), October 4, 2022 (ML22291A023), and November 17, 2022 (ML22333A720), to incorporate requested information into the documented review.

II. Scope of Review

The NRC staff conducted its safety and safeguards review in accordance with title 10 of the *Code of Federal Regulations (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 the references section to conduct its safety review, primarily NUREG-1520, “Standard Review Plan [SRP] for Fuel Facilities” (ref. 1). This document provides guidance to staff reviewers who perform safety and environmental impact reviews of applications using SNM. However, much of the guidance in NUREG-1520 concerns features applicable to 10 CFR part 70, subpart H and is inapplicable to this applicant because SCA is not and has not applied to be engaged in any of the activities enumerated by 10 CFR 70.60. Therefore the guidance related to subpart H is not evaluated in this review. However, the outline of this evaluation follows the organization of subjects in NUREG-1520.

The NRC staff’s safeguards review included the review of SCA’s physical security plan (PSP) and their description of their material control and accounting plan.

The NRC staff reviewed the information submitted in the renewal application and supplements. The renewal application contains 15 sections:

- section 1, “Applicant,” identifies the Corporation, its address and identifies principal officers;
- section 2, “Activity and location for Special Nuclear Material,” describes the sources (SNM test objects) to be utilized under the proposed activities under the license;
- section 3, “Duration of license,” states requested duration of license renewal for 10 years;
- section 4, “Description of Special Nuclear Material,” describes the sources (SNM test objects) to be utilized under the license and their proposed use;
- section 5, “Technical Qualifications of Applicant,” identifies the Radiation Safety Officer (RSO) and that person’s qualifications;
- section 6, “Facilities and Equipment for Handling Special Nuclear Material,” identifies the areas and circumstances where SNM will be stored and used, and describes shields, equipment, handling devices, measuring, monitoring devices and radioactive waste disposal;
- section 7, “Safety Procedures to Protect Health and Minimize Danger to Life or Property,” identifies the radiation protection program covering training programs, monitoring, written procedures, and control of radiological risk thru test set-up and conduct, and describes fire safety and chemical safety considerations;
- section 8, “Monitoring Procedures,” specifies what and when monitoring is performed;
- section 9, “Operating Procedures,” identifies procedural use and controls;
- section 10, “Emergency Procedures,” outlines the fire and radiological needs and the location of emergency response procedures in the radiation protection program;
- section 11, “Training Program,” identifies types and frequency of training;
- section 12, “As low as Reasonably Achievable, (ALARA) Program,” states the policy of the applicant;

- section 13, “Material Control and Accountability,” outlines the limits to these controls as needed to meet the requirements of 10 CFR part 74 as to inventory and reporting applicable to the licensee’s proposed possession and use;
- section 14, “Physical Protection of Materials,” identifies the configuration of the program; and
- section 15, “Financial Assurance and Recordkeeping for Decommissioning,” describes the responsibility for disposition of SNM sources to be held by the U.S. Government, and that SCA will be responsible for any decommissioning costs.

1.0 General Information

1.1 Purpose of Review

The staff reviewed the applicant’s site description and overview, generally described in the LRA, using the criteria in the SRP, NUREG-1520, rev. 2, section 1 (ref. 1).

1.2 Staff Review and Analysis

1.2.1 Facility Layout

SCA is a commercial for-profit corporation supporting U.S. Government efforts to detect radioactive materials in various transport conveyances. SCA is incorporated under the laws of the State of Maryland. Possession and use of radioactive materials are limited to the SCA facility, 5200 Glen Arm Rd., Glen Arm, MD 21057, which includes corporate offices, warehouse and outside test track, either under an Agreement State license or an NRC license. SCA has indicated that it will also use these materials at yet to be determined locations procured by the U.S. Government. When these locations are determined, SCA will request an amendment to its license to incorporate these chosen locations.

The NRC license (SNM-2017) currently only applies to the SCA facilities in Glen Arm, MD and this evaluation only includes considerations for that location.

1.2.2 Process Overview

SCA will use the SNM to conduct experiments related to radiation detection capabilities and associated characteristics that impact shipping in the U.S. ports. Examples cited in the LRA include two (2) proposals to the DTRA, one (1) proposal to the U.S. Army, and a current activity supporting testing and demonstrations for U.S. Customs and Border Protection. These activities include concept demonstrations, test and evaluation, characterization evaluations and operator training activities. The licensed materials are to be used as test objects for concept demonstrations, training activities and testing where actual SNM signatures are required. These activities may be conducted at the SCA facilities and temporary work sites (U.S. Government Facilities, and vendor facilities, as explained further in section 4.2.1.).

1.2.3 Descriptive Summary of Licensed Material

The LRA contains a description of the possession limits, authorized activities, place of use, organization, technical qualifications, training, radiation safety, calibration, effluent control,

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criticality safety, environmental protection, emergency planning, security, material control and accounting, financial assurance, and compliance history.

The NRC staff confirmed that the LRA described the locations where the SNM is to be stored and used at the SCA facility. The licensee submitted drawings describing the storage and use locations. Drawings illustrate the layout of the buildings and structures. The LRA detailed that the sources are all encapsulated and that the testing activities do not create any radioactive waste.

1.2.4 Possession Limits

The maximum quantity of SNM that may be possessed and used is identified by isotope, enrichment, chemical and physical form, and mass in grams.

Table 1 lists the maximum quantities of SNM that may be possessed by SCA under the current License SNM-2017:

TABLE 1: Possession Limits Under License SNM-2017			
	MATERIAL	FORM	QUANTITY
A.	Uranium enriched to less than [] percent in U-235	Solid Uranium metal plates clad in nickel plating	[] grams U-235
B.	Uranium enriched to less [] percent in U-235	U ₃ O ₈ discs sealed in stainless steel canisters	[] grams U-235
C.	Uranium enriched to [] percent in U-235	Uranium metal discs sealed in titanium containers	[] grams U-235
D.	Plutonium	Stainless steel-tantalum Encapsulated puck	[] grams Pu

The SNM test objects (sources) are U.S. Government owned and as such their possession and use will be under a loan agreement with the U.S. Government suppliers (i.e., DOE national laboratories). The LRA requests no additions or increases in the amounts or types of radioactive material beyond what is currently authorized. However, SCA committed to reducing the total number of LEU metal plates to four, although the current license authorizes five. This reduces the quantity of U-235 from [] grams to [] grams.

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The test objects are described below.

A. Low-enriched Uranium (LEU)

This object is a DTRA designed uranium plate enriched to [] percent. It is 10 cm by 10 cm by 2 cm with 3 to 5 mil nickel plating and a total mass of [] kg. The mass of the U-235 is [] grams per test object. The LEU is sealed and is not dispersible.

At no time will SCA have in their possession more than four (4) of the LEU plates.

B. Uranium Oxides (U_3O_8)

The U_3O_8 sources are enriched to [] percent, contained in a sealed canister 12.1 cm diameter by 2.54 cm thick. The mass of the U-235 is approximately [] grams per source. The U_3O_8 is sealed and not dispersible.

At no time will SCA have in their possession more than ten (10) of the U_3O_8 canisters.

C. Highly Enriched Uranium (HEU)

The HEU sources are uranium enriched to [] percent, shaped in a disc 10.04 cm in diameter and 0.198 cm thick, mass is [] grams each, encapsulated in a titanium housing 11.43 cm in diameter and 0.635 cm thick. The HEU is sealed and is not dispersible.

At no time will SCA have in their possession more than three (3) of the HEU discs. When SCA is in possession of the Pu disc (Source Item D), SCA will have no more than two (2) HEU discs in their possession.

D. Plutonium (Pu)

This item is a Pu disc, 7.62 cm diameter and 0.246 cm thick with a Pu mass of [] g per disc. Pacific Northwest National Laboratory designed, tested, and built this plutonium sealed source (AKA the "puck") for the Department of Homeland Security. This source was designed for use as either a calibration source in the development of new radiation detector systems or to test existing radiation detector systems. The Pu is encapsulated in a tantalum liner that provides an inert barrier between the plutonium disk and the stainless-steel outer housing (11.636 cm diameter by 1.875 cm thick). The Pu is sealed and is not dispersible.

At no time will SCA have in their possession more than a single Pu puck.

SCA explains that a given test requires specific combinations of sources selected for testing sensors under development or being considered for purchase by the U.S. Government to detect the presence of SNM in a variety of scenarios. These tests require signatures that are isotopically sensitive (i.e., can differentiate U-235 from U-238). Depending on the source intensities and detector efficiencies there is a need to employ different amounts of SNM per unit volume hence LEU and HEU to test the sensitivity of various sensor configurations. Pu has individually specific signatures as well. The licensee states in the LRA that SCA will not possess and use at any one time and location SNM in a quantity exceeding one effective kilogram. Thus, combinations of these SNM sources for any experiment is limited to combinations that do not

exceed Category III limits. The applicant provided clarification of source configurations in use for any given combination. The source combinations that may be employed are listed in table 4.II-1, "Allowable Test Object Combinations Below One Effective Kilogram," of the application supplement in September 2022.

When SCA is in possession of the SNM, it will be used and stored at the SCA facility. A small controlled access area (CAA) and secured storage area are described in the application and supplemental information. A diagram of the facility location and floor plan are included in the LRA.

1.3 Evaluation Findings

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

2.0 Organization and Administration

2.1 Purpose of Review

The NRC staff reviewed the applicant's organization and the qualifications of administrative and radiation protection personnel to determine if SCA's LRA meets the requirements of 10 CFR 70.22(a)(6) and § 70.23(a)(2). SCA generally described its organization and qualifications of personnel in section 2 of the LRA, which the NRC staff reviewed using the criteria found in NUREG-1520, rev. 2, section 2. The administration of the facility involves operations, organizational structure, and facility security. An application should present information on the facility's organization, training programs, operational reviews and audits, radiation protection procedures and actions, records keeping and reports. The following discussion summarizes information provided by the applicant and the staff's evaluation as to whether the information provided by the applicant satisfies the regulatory requirements of 10 CFR 70.22(a)(6) and § 70.23(a)(2).

2.2 Staff Review and Analysis

As described in the application, the licensee's management whose mailing address is Sensor Concepts & Applications, Inc., 5200 Glen Arm Rd., Suite A, Glen Arm, MD 21057, consists of the following:

- Thomas W. Cassidy, President,
- Dennis O'Brien, Chief Financial Officer,
- Benjamin Lewis, Radiation Safety Officer,

The SCA organization is described in the application. While the President has ultimate responsibility for license SNM-2017, authority is delegated to the RSO. The RSO is responsible to the President of SCA.

SCA staff is qualified according to their responsibilities:

- The RSO must meet the requirements of NUREG 1556-Volume 4.
- Employees must complete training required by the radiation protection program (RPP).

The SCA RPP describes organizational structure and processes and requirements to control hazards of radioactive materials.

Required records are identified in the SCA manual.

2.3 Evaluation Findings

SCA described its organization and management policies for providing adequate safety management for the safe operation of the facility.

The NRC staff reviewed the organizational structure and policies and found them acceptable for the following reasons: the management and technical support structure is clear with respect to assignments of primary responsibility and the SCA management team is qualified, experienced, and has appropriate written procedures in place. The staff determined that the organization and administration for SCA is consistent with the applicable criteria in NUREG-1520. The staff also finds that the RPP meets the requirements of 10 CFR 70.22(a)(6) and § 70.23(a)(2).

3.0 Integrated Safety Analysis Summary

The NRC staff reviewed the LRA to determine whether SCA was required to provide an Integrated Safety Analysis (ISA), pursuant to 10 CFR 70.62(c). Pursuant to 10 CFR 70.60, the regulations of 10 CFR part 70 subpart H (10 CFR 70.61 through 10 CFR 70.76) apply only if an applicant is engaged in enriched uranium processing, fabrication of uranium fuel or fuel assemblies, uranium enrichment, enriched uranium hexafluoride conversion, plutonium processing, fabrication of mixed-oxide fuel or fuel assemblies, scrap recovery of SNM, or any other activity that the Commission determines could significantly affect public health and safety.

The NRC staff finds that the activities proposed under the renewed license are not activities described in 10 CFR 70.60, and therefore SCA is not required to provide an ISA in its LRA.

4.0 Radiation Protection

4.1 Purpose of Review

The NRC staff conducted this review to assess whether the RPP described in SCA's LRA is adequate to protect radiological health and safety of workers and the public and complies with the regulatory requirements in 10 CFR part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," 10 CFR part 20, and 10 CFR part 70.

An acceptable radiation protection program will satisfy the relevant regulatory requirements of 10 CFR 70.23(a)(3) and (4). The LRA will be approved if it is determined that the proposed equipment and facilities are adequate to protect health and minimize danger to life or property, and the applicant's proposed procedures to protect health and to minimize danger to life or property are adequate.

SCA uses high-enriched uranium sources enclosed and sealed in titanium discs to use as sealed sources. The low-enriched uranium plates are blocks of uranium metal with 3 to 5 mils nickel plating. SCA also uses a []-gram uranium disc with enrichment of []% with 10.04 cm in diameter and with thickness of 0.198 cm encapsulated in titanium housing. They also use up to seven []% enriched uranium oxide sources. Additionally, a []-gram Pu disc of 7.62 cm in diameter and thickness of 0.246 cm. is sometimes employed for testing. The sources are encapsulated and pose little airborne or external hazard to workers. The primary radiological concern is loss of encapsulation.

4.2 Staff Review and Analysis

4.2.1 Radiation Protection Program

SCA is requesting a license renewal for encapsulated SNM test objects of various forms of uranium oxide and plutonium materials.

The high-enriched uranium sources and their containers were fabricated by the DOE at Y-12 and are enclosed and sealed in titanium discs to use as sealed sources. The sources are encapsulated and therefore pose little airborne or external hazard to workers. The primary radiological concern is loss of encapsulation.

The U₃O₈ containers will be made of continuously welded stainless steel which will meet the ANSI/HPS (American National Standards Institute/Health Physics Society) N43.6- 2007, "Sealed Radioactive Sources-Classification," testing requirements for Class 2 sealed sources.

A loss of encapsulation is of radiological concern because it can lead to dispersion of radiological material. To address this concern, SCA stated that it will perform leak tests of the sources every six months, and personnel will perform a contamination survey after handling the materials to identify a possible loss of encapsulation.

If there is evidence of dispersible material from the monitoring or a suspected uptake, SCA stated that it will perform and evaluate appropriate bioassays to determine the uptake and dose.

SCA also stated that the external dose rates to workers are not expected to exceed the individual monitoring requirements of 10 CFR 20.1502.

External monitoring will be performed and will utilize dosimeters that are provided by a national voluntary laboratory accreditation program accredited vendor.

SCA does not anticipate waste or effluents from these operations.

SCA stated that it will return the materials to DOE when testing at the SCA facilities has been completed.

NUREG-1520, revision 2, is generally applicable to this section of the review, but it defers to the details of 10 CFR part 20, and it is concerned with the extreme hazard potential of licenses that allow operations applicable to 10 CFR part 70, subpart H. This part of the review follows the outline of NUREG-1520 where applicable. 10 CFR 20.1101(a) requires a licensee to develop, document, and implement an RPP commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with NRC's radiation protection requirements. SCA developed an RPP to support its Maryland Radioactive Material License (MD-05-193-01), SCA's "Radiation Protection Program," (ML22276A223). This RPP was reviewed by NRC staff and found to be applicable for the operations proposed under this license as it provides direction for: organization, training, radiation monitoring instruments, occupational and public dose, personnel monitoring, safe use of radionuclides and radiation producing systems/devices, emergency procedures, surveys and monitoring, leak tests, and program maintenance/audits. No changes to the RPP are needed to incorporate the uses of SNM requested.

There is no significant change in the radiation safety program for the LRA. Currently, Mr. Benjamin Lewis is SCA's RSO. He was assigned that role in 2018. He has primary responsibility for assuring license and regulatory compliance associated with all licensed radioactive materials and has been trained consistent with guidance in NUREG-1556, Volume 4, "Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Fixed Gauge Licenses." Any future RSOs will be similarly trained. The NRC staff reviewed the applicant's training material and found it acceptable because it is consistent with the applicable NRC guidance.

SCA states in the LRA that the test objects containing SNM will be stored in a fireproof safe in a secured area that will have limited access. SCA also stated that transference of the test objects between the Glen Arm facility and any temporary worksites will require shipping by DOE. Based on the review of SCA's RPP which includes leak testing, and uses only encapsulated sources that are safely and securely stored and shipped, the NRC staff concludes that the RPP meets the requirements in 10 CFR 20.1502 and § 20.1101(a) and is therefore acceptable.

4.2.2 As Low As Reasonably Achievable

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

SCA has a stated policy to minimize radiation doses to ALARA.

In the SCA RPP there are references to ALARA in radiation safety committee reviews and training programs, both of which support the ALARA philosophy. Other terms and conditions of the license are consistent with the philosophy of ALARA. Therefore, the NRC staff finds that SCA's LRA meets the requirements of 10 CFR 20.1101(b).

SCA stated in its RPP that it will review the content and implementation of their RPP at least once per year. The NRC staff finds that this review cycle meets the requirements in 10 CFR 20.1101(c).

Based on the NRC staff's review of SCA's LRA and encapsulated sources, the staff concludes that SCA's ALARA program meets the applicable requirements in 10 CFR 20.1101(b) and (c) and is therefore acceptable.

4.2.3 Written Procedures

10 CFR 70.22(a)(8) states that each application for a license shall contain "proposed procedures to protect health and minimize danger to life or property" The application included the radiation protection plan outlining the facets of control over the radiation protection program. The NRC staff determined that the licensee has sufficient written approved procedures to carry out the activities associated with this license renewal request. Staff finds reasonable assurance that the operation of the SCA facility will be in accordance with approved written procedures. These written procedures provide adequate safety to the workers and meets the criteria of NUREG-1520.

10 CFR 70.22(a)(8) and § 70.23(a) (4) required the applicant to establish procedures to protect health and to minimize danger to life or property. As discussed in section 4.2.2 of its RPP, NRC staff has found that SCA has appropriate procedures to provide for the safe conduct of activities with radiation sources. SCA has procedures for handling the radioactive sources at the facility, and for emergency response activities. Written procedures limit access to restricted areas and require personal dosimetry. Work at the testing facility will only be done by personnel trained beforehand and according to written procedures.

Based on the NRC staff's review of SCA's LRA, the NRC staff concludes that SCA's written procedures—with respect to radiation safety—are adequate to protect health and minimize danger to life and property because its procedures provide for safe conduct of activities dealing with radioactive sources, monitoring, and operating sources and emergency response.

As such, the NRC staff concludes that SCA's written procedures meet the requirements of 10 CFR 70.23(a)(4) and are therefore acceptable.

4.2.4 Radiation Safety Training

As required by 10 CFR 19.12(a), the applicant must establish a radiation safety training program that provides all individuals who are likely to receive an occupational dose more than 100 mrem/year to be instructed in radiation protection reporting requirements and incident response.

SCA's LRA states that all individuals who work in or frequent restricted areas will undergo radiation safety training courses provided by the RSO or someone of similar training and experience, in accordance with outlines approved by the Radiation Safety Committee. This training program is specifically focused on the radioactive materials used at the facility. SCA stated its radiation orientation program is mandatory for all personnel involved in the testing program prior to using any radioactive material. Refresher training is provided annually. This training is provided for personnel who require access to radiation areas or areas that contain radioactive materials (in accordance with 10 CFR 19.12(a)). This program consists of training material on personnel radiation exposures, radiation hazards, dose measurements, and safety procedures.

Based on the information provided in SCA's LRA, the NRC staff concludes that the program to train staff and employ qualified staff described in the LRA meets the requirements of 10 CFR 19.12(a), is consistent with the criteria in section 4.4.5.3 of NUREG-1520, and that this program is acceptable. Based on the staff's evaluation of the LRA, the staff finds that the SCA training program will continue to ensure that personnel are qualified by reason of training to safely use licensed material in accordance with the requirements in 10 CFR part 19, 10 CFR part 20, and 10 CFR 70.23(a)(2).

4.2.5 Radiation Surveys and Monitoring Programs

The regulations in 10 CFR part 20 subpart F, "Surveys and Monitoring," require the applicant to survey the magnitude and extent of radiation levels at a facility, the concentrations or quantities of radioactive material, and the potential radiological hazards to individuals.

SCA stated in its LRA that use of SNM will be limited to non-destructive testing and analysis of the cargo inspection system developed under this program.

SCA maintains portable radiation monitoring equipment capable of detecting any radiation that may result from the testing program. This equipment is calibrated in accordance with procedures maintained by the RSO.

By review of the RPP, the NRC staff concludes that the limited use of the licensed sources combined with the survey and monitoring programs and the radiation detection equipment described in SCA's LRA meet the requirements of 10 CFR 20.1501 and 10 CFR 20.1502 (subpart F) for surveys and monitoring and are therefore acceptable.

4.2.6 Radioactive Waste Disposal Contamination Control and Waste Handling

The 10 CFR 20.1406(a) requires that applicants for a part 70 license shall describe in the application how facility design and procedures for operation will minimize contamination of the facility and the environment, facilitate decommissioning, and minimize the generation of radioactive waste.

SCA has written procedures to collect and dispose of low-level waste material if such waste were created.

Leak tests of SNM sources will be performed consistent with applicable NRC branch technical positions issued in April 1993: “License Condition for Leak-Testing Sealed Uranium Sources,” or “License Condition for Leak-Testing Sealed Plutonium Sources.”

Based on its review of SCA’s LRA, the NRC staff concludes SCA’s operational use of sealed sources is not likely to create contamination and thus minimizes the generation of radioactive waste. Additionally, the procedures SCA described to collect and dispose of low-level waste in the unlikely event that some were to be released during operations, meets the regulatory requirements in 10 CFR 20.1406(a) and is therefore acceptable.

4.3 Evaluation Findings

As discussed above, the staff finds that the minimal radiological risk posed by the contained SNM will be adequately addressed by the RPP described in the LRA, and that SCA’s procedures will be sufficient to assure compliance with the radiological protection requirements in 10 CFR parts 19, 20, and 70. The staff finds that the applicant satisfies the requirements of 10 CFR 70.23(a)(2), (3), and (4) with respect to radiological controls and that the health and safety of the public and the environment are protected by SCA’s RPP.

5.0 Nuclear Criticality Safety

5.1 Purpose of Review

The NRC conducted this review to determine whether SCA’s Nuclear Criticality Safety (NCS) Program is adequate to support safe operation of the facility, as required by 10 CFR part 70.

5.2 Staff Review and Analysis

The staff conducted its review of the SCA license renewal request to ensure that the proposed activities are consistent with the criticality safety-related requirements of 10 CFR part 70, including: § 70.22, “Contents of applications, §70.24, “Criticality accident requirements”; § 70.33, “Applications for renewal of licenses, §70.50, “Reporting requirements, and §70.52 “Reports of accidental criticality.” The staff performed their review in accordance with the applicable criteria in chapter 5, “Nuclear Criticality Safety,” of NUREG-1520, rev. 2.

Although SCA’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 SCA’s request involves SNM quantities more than 700 grams of U-235, the regulations require SCA to maintain a Criticality Accident Alarm System (CAAS) in accordance with § 70.24. Additionally, SCA is required to report the occurrence of inadvertent criticality to the NRC in accordance with § 70.50 and § 70.52.

The requested license renewal reduces the total quantity of SNM below the current license allowed quantities. The applicant will select test objects for use that meet the test objective from a predetermined list of allowable objects. These include:

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- A. Low-Enriched Uranium (LEU) (4 items)
- B. Uranium Oxides (10 items)
- C. Highly Enriched Uranium (HEU) (3 items)
- D. Plutonium (Pu) (1 item)

All SNM test objects are stored in a permanent CAA and used in temporary CAAs during testing events. This renewal would allow SCA to continue licensed activities with SNM for an additional 10 years.

The requested renewal relies on the existing SCA NCS program and does not involve changes to the management, organization, or administration of the NCS program, or changes to SNM possession limits that were evaluated and found to be acceptable by NRC staff as documented in NRC safety evaluation report (SER), "Safety Evaluation Report for the Special Nuclear Material License Application – Sensor Concepts and Applications, Inc., Glen Arm, Maryland" (ML113080791). Staff evaluated the proposed renewed license request and current amendments to SNM-2017 against the previously approved license to ensure that SCA adequately evaluated the credible criticality hazards and to assure that subcriticality under both normal and credible abnormal conditions would be maintained. Given that the possession limits are reduced slightly as part of the renewal, the staff determined that the previous license approval NCS assessment and conclusions documented in the NRC staff's previous SER continue to bound the requested activities in this renewal.

As stated in NRC SER, (ML113080791), "19 SNM test objects were evaluated, including a plutonium source of [] grams. A 'worst-case' accident sphere containing the total of the SNM materials and surrounded by beryllium and water was evaluated by the SCA and determined to have a k_{eff} (coefficient of reactivity) of 0.67166. SCA added beryllium to the evaluation because it has a slightly greater moderation/reflection effect than water and will also be present in the vicinity of the SNM as another test object. This 'worst-case' accident configuration was independently verified by NRC staff using the SCALE 6 code, basic compositions integral to the code, and 'nesting' of the Pu in a sphere with spherical layers of the remaining SNM surrounding it, which in turn was surrounded by a layer of beryllium and a 1-meter radius water sphere. This essentially put the most reactive material in a sphere surrounded by the remaining reactive material in layers from the most to the least reactive and fully reflected by beryllium and water. The k_{eff} calculated by NRC staff for this configuration was slightly less than that calculated by the applicant for a homogeneous sphere surrounded by beryllium and water. The difference in k_{eff} between the two analytical models used by the applicant and NRC staff is not significant. The k_{eff} determined from the two separate analyses are both sufficiently below unity that NRC staff considers the analysis adequate to offset any bias in the calculations that may be present and to assure that the test objects remain subcritical...The staff also determined that the handling, use, storage, and use of the test objects do not pose a credible nuclear criticality concern."

Consistent with the staff's previous conclusions as documented in NRC SER (ML113080791), the staff determined that no credible criticality hazards exist. Additionally, the licensee provided a criticality review to support the original license (ML11159A108) that provided further evidence that the complete assortment of test sources together, stored in a small security safe, would be subcritical, and therefore well below level of concern. The NRC accepted the analysis as within the bounding conditions validated in the initial license issuance review (ML113080794).

5.3 Criticality Accident Monitoring

SCA requested that the NRC renew SCA's exemption from the CAAS requirements of 10 CFR 70.24(a). Given that the possession limits have not increased as part of the renewal, as well as the fact that the NRC staff previously determined that the proposed activities and licensed material do not present any credible criticality concern as documented in NRC SER (ML113080791), the staff determined that a continued exemption from the requirements of 10 CFR 70.24(a) is warranted. As stated in NRC SER, "[b]ecause the form and use of the material assure there will be no credible upsets resulting in a criticality, the applicant requested an exemption from the monitoring requirements of 10 CFR 70.24(a). Given the applicant will not alter the physical form of the material and that all criticality evaluations show $k_{\text{eff}} < 0.7$ at the 95 percent confidence interval, the NRC staff determined that a criticality accident is not a credible scenario; and a criticality monitoring system would serve no purpose." The staff determined that no credible criticality hazards exist and a renewed exemption from the requirements of 10 CFR 70.24(a) is, therefore, warranted.

Under 10 CFR 70.17, the Commission may grant exemptions from the requirements of the regulations as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public's interest. The NRC staff determined that the installation of a CAAS at the applicant's facilities would not significantly reduce the risk to the workers or the public because there is no credible criticality accident associated with the SNM test objects. Therefore, the lack of a criticality alarm system will not endanger life or property or the common defense and security. The NRC staff determined that the exemption will be in the public's interests because it will reduce unnecessary costs, including SCA's expenses and NRC's regulatory costs for evaluating and inspecting the systems. Therefore, the staff recommends granting the requested exemption as provided in appendix E of the LRA. The following license term from the original license will therefore be renewed and included in SCA's renewed license:

The applicant is granted an exemption to the requirements of 10 CFR 70.24 to maintain a criticality accident alarm system.

5.4 Evaluation Findings

The NRC staff reviewed the request for license renewal. Based on the review discussed herein, based on the format of review per NUREG-1520, the NRC staff has determined that the licensee is not required to meet the requirements of subpart H to 10 CFR part 70 and that the requested materials and associated activities do not present a credible criticality concern. As such, a CAAS is unnecessary, and SCA is being granted its request for a continued exemption from 10 CFR 70.24. Further, as discussed above, the requested exemption from 10 CFR 70.24 meets the requirements of 10 CFR 70.17(a) because the exemption is authorized by law, would not endanger life or property or the common defense and security, and is otherwise in the public interest.

As discussed above, based on the information submitted by the applicant and reviewed by the NRC staff, the NRC staff determined that the applicant's equipment, facilities, and procedures will be adequate to assure subcriticality of the SNM test objects consistent with 10 CFR 70.23(a)(3) and (4), thus adequately protecting health and minimizing danger to life or property.

6.0 Fire Protection

6.1 Purpose of Review

The purpose of this review was to determine that the applicant's facility provides adequate protection against fires and explosions that could affect the safety of licensed materials, and thus present an increased radiological risk. The review also established that the application considered radiological consequences of fires and instituted suitable safety controls to protect workers, the public, and the environment. The regulatory basis for the fire safety review can be found in 10 CFR 70.23(a)(3) and (4).

6.2 Staff Review and Analysis

6.2.1 Fire Hazards Analysis

If an applicant's LRA is covered by the applicability criteria of 10 CFR 70.60, it is required under 10 CFR 70.62(c)(iii) to include an ISA of facility hazards, which includes fires. As 10 CFR 70 subpart H, including § 70.60(c)(iii), does not apply to SCA's LRA (see section 3.0 of this SER), SCA's LRA is not required to include an ISA, which would include a fire hazard analysis. For the same reason that all of 10 CFR subpart H does not apply, the performance requirements of an ISA in 10 CFR 70.61, which NUREG-1520 references, are not applicable.

Even though a formal fire hazards analysis is not required, the applicant must show that it meets the requirements for the approval of an application in 10 CFR 70.23(a)(3) and (4). The applicant must show that the proposed equipment and facilities are adequate to protect health and minimize danger to life or property in the event of a fire, and the applicant must show that the proposed procedures to protect health and to minimize danger to life or property are adequate in the event of a fire.

Regardless, the NRC staff finds that a formal fire hazards analysis would not increase safety. The materials covered by the SNM-2017 license pose a low risk to public health and safety in the event of a fire because the materials are all solid encapsulated sources, the building complies with all relevant building codes, and the building is regularly inspected. The licensee has also committed to not store any flammable materials in the areas where the sealed sources are stored and used.

6.2.2 Facility Design

The staff finds that SCA's facility complies with the applicable building code regulations (State of Maryland Building Code). The portion of the facility where the licensed material is used and stored is fabricated of non-combustible construction materials. Material storage precautions will be used to minimize potential for airborne radioactivity from exposure to fire hazards. SCA stated in the LRA that the test objects described in this license will be stored in a [], fireproof safe inside a secure woven wire storage cage free of any combustible materials. The caged area has a radiation monitor and is located inside a fenced radioactive material storage area that is inside the secure [], limited access concrete block warehouse. The building is wired and grounded in accordance with the applicable edition(s) of the National Fire Protection

Agency (NFPA) 70, “National Electrical Code.” Building operations are reviewed by the RSO to ensure adequate safety of the building.

6.2.3 Fire Protection

SCA also stated in the LRA that the fire protection systems installed at SCA’s facility include a sprinkler system and an offsite monitored fire alarm system with manual pull stations available. Fire loading in SCA’s facility is minimal. The fire protection systems interface through an offsite central monitoring station that notifies the local fire department. Portable fire extinguishers are deployed within the building in accordance with industry standards. Fire hydrants are located throughout the area in accordance with industry standards.

SCA stated that its facility is inspected annually by the Baltimore County Fire Department (BCFD) for compliance with applicable building and fire codes concerns. The BCFD responders periodically tour the facility for familiarization training. Procedures are in place to allow the fire department efficient access to process areas during fire emergencies.

The NRC staff reviewed the LRA and finds that the fire prevention, inspection, testing, and maintenance of fire protection systems—and the qualification, drills, and training of facility personnel—are consistent with applicable NFPA codes and standards.

The NRC staff’s review determined that the applicant’s program is consistent with applicable guidance provided in NFPA 801, “Standard for Fire Protection for Facilities Handling Radioactive Material.” The NRC staff notes that a complete release of the licensed material at SCA would be highly unlikely since the material at risk is contained in a hard metal alloy that is unlikely to volatilize or otherwise readily disperse because of a fire.

6.3 Evaluation Findings

The NRC staff reviewed SCA’s fire protection program and determined that the facility maintains an adequate level of fire protection to protect public health and safety. The NRC staff determined that from the use of encapsulated sources, proper storage of the materials and building code requirements for fire protection exist that a formal fire hazards analysis is not necessary. The staff concludes that the applicant’s equipment, facilities, and procedures provide a reasonable level of assurance that adequate fire protection will be provided consistent with the requirements of 10 CFR 70.23(a)(3) and (4).

7.0. Decommissioning Funding Plan and Financial Assurance

The NRC staff reviewed NUREG 1520 and associated regulations to determine with reasonable assurance that the licensee will be able to release the facility safely and in accordance with NRC regulations when the license is terminated. Nuclear facilities licensed under 10 CFR part 70 are only required to comply with financial assurance and recordkeeping requirements in 10 CFR 70.25, “Financial assurance and recordkeeping for decommissioning” if they request a license for a uranium enrichment facility or a license authorizing the possession and use of unsealed special nuclear material. Since SCA is not requesting either to enrich uranium or to use unsealed special nuclear material, the financial assurance and decommissioning funding requirements in 10 CFR 70.25 do not apply.

8.0 Management Measures

NUREG-1520 states that: The purpose of management measures is to provide reasonable assurance of compliance with 10 CFR 70.61, "Performance Measures." Reasonable assurance is established by considering factors such as necessary maintenance, operating limits, common-cause failures, and the likelihood and consequences of failure or degradation of the items relied upon for safety (IROFS) and the measures. However, 10 CFR 70.61, is within subpart H of the regulations. As identified in section 3.0 of this SER, 10 CFR part 70 subpart H does not apply to SCA's LRA. Therefore, SCA does not need to provide management measures to comply with 10 CFR 70.61.

9.0 Radioactive Waste Disposal

10 CFR 20.1406(a) requires that certain applicants, including applicants for a part 70 license, describe in the application how facility design and procedures for operation will minimize contamination of the facility and the environment, facilitate decommissioning, and minimize the generation of radioactive waste.

SCA has written procedures to collect and dispose of low-level waste material if such waste is created.

Leak tests of SNM sources will be performed by SCA consistent with applicable NRC branch technical positions issued in April 1993: "License Condition for Leak-Testing Sealed Uranium Sources," or "License Condition for Leak-Testing Sealed Plutonium Sources."

Based on its review of SCA's LRA, the NRC staff concludes SCA's operational use of sealed sources is not likely to create contamination and thus minimizes the generation of radioactive waste. Additionally, the procedures SCA described to collect and dispose of low-level material in the unlikely event that some were to be released during operations meets the regulatory requirements in 10 CFR 20.1406(a) and is therefore acceptable.

10.0 Incident Reporting

10.1 Purpose of Review

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

10.2 Staff Review and Analysis

SCA's LRA provides that reports are made after finding discrepancies in material inventory or incidents involving radioactive material. Notifications required by 10 CFR 20.2202 are made by the RSO, or designee, within the time limits specified by regulation.

10.3 Evaluation Findings

The NRC staff determined that the licensee has a communication system to notify cognizant employees and appropriate authorities. Therefore, the NRC staff concluded that the licensee meets the requirements of 10 CFR 20.2202.

11.0 Chemical Process Safety

11.1 Purpose of Review

The NRC staff conducted the chemical safety review of the SCA LRA to ensure that the licensee will adequately protect workers, the public, and the environment from chemical hazards of licensed material and hazardous chemicals produced from licensed material. This chapter discusses the evaluation of the SCA program for identifying and managing chemical hazards that could arise from the activities it will conduct under license SNM-2017. This review applies the requirements for approval of applications identified in 10 CFR 70.23 with a focus on licensee commitments for the identification and management of the potential chemical hazards for activities that will be conducted under SNM-2017.

11.2 Staff Review and Analysis

The NRC staff reviewed information in SCA's LRA related to chemical safety, including section 4 (Description of SNM), section 6 (Facilities and Equipment for Handling SNM), and section 7 (Safety Procedures to Protect Health and Minimize Danger to Life or Property). The latter section included information in response to a chemical safety RAI.

The regulatory basis for this review is 10 CFR 70.22 and 10 CFR 70.23. The review focused on information about the proposed activities (§ 70.22(a)(2)); the qualifications and training of the applicant (§ 70.22(a)(6)); the equipment and facilities (§ 70.22(a)(7) and the proposed procedures (§ 70.22(a)(8)). The review evaluated the information against the criteria for approving applicant qualifications (§ 70.23(a)(2)); approving applicant equipment and facilities (§ 70.23(a)(3)); and approving applicants proposed procedures (§ 70.23(2)(4)). These sections of the regulations identify the required contents of the application and the requirements for NRC approval of applications. The review focused on those information and requirements relevant to chemical safety.

Section 4 II, "Usage" of the LRA describes the use of the SNM objects, which involves storage in controlled access areas and use of the test objects to test a variety of SNM sensors.

Section 7, "Safety Procedures to Protect Health and Minimize Danger to Life or Property," includes the SCA response to a chemical safety request for an RAI. This response states that no chemical testing and/or reactions have been planned or are anticipated to be planned in conjunction with nuclear material detection and identification testing. The response also states that each planned test and storage operation is reviewed to identify and assess radiological, chemical and fire hazards and identify any appropriate controls. It also states that the Radiation Safety Committee would review and approve any hazard identification and assessment and any controls identified for planned tests and storage operation. The discussion also states that

identified controls would be incorporated into procedures and training for personnel conducting the specific test and storage activities.

The staff concluded that (1) there are currently no chemical hazards under NRC's regulatory jurisdiction for the planned activities involving licensed material and (2) SCA has a process for identifying, analyzing, and controlling chemical hazards if there are changes in the activities authorized under this license. These conclusions are based on the staff assessment of the activities described in the application and the SCA commitment to consider chemical hazards in the evaluation of each planned test and storage operations involving material under this license.

11.3 Evaluation Findings

The staff finds that the SCA LRA provided descriptions of the equipment and facilities as well as proposed procedures to protect health and minimize danger to life and property with sufficient detail to evaluate chemical safety issues related to its licensed activities, as required under 10 CFR 70.22. The staff reviewed this information against requirements of 10 CFR 70.23, "Requirements for the approval of applications," with a focus on chemical safety issues. The specific sections of § 70.22 and § 70.23 that were considered in the review and evaluation are cited in section 11.2 above. The staff concludes that SCA personnel are qualified to identify and manage chemical hazards that might arise in its use of SNM. The staff further concludes that the applicant's processes for evaluating all test and storage operations are adequate to protect health and minimize danger to life or property from chemical hazards that are under NRC's regulatory jurisdiction.

12.0 Emergency Management

12.1 Purpose of Review

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

12.2 Staff Review and Analysis

SCA does not possess any uranium hexafluoride, is currently exempted from the requirement to utilize a criticality alarm and does not possess more than 2 curies of Pu in unsealed form or on foils or plated sources. Therefore, 10 CFR 70.22(i)(1) does not require SCA's application to include an emergency plan.

12.3 Evaluation Findings

The NRC staff confirmed that SCA does not possess uranium hexafluoride in any quantity, is exempt from the requirement to utilize a criticality alarm system and does not possess more

than 2 curies of Pu in unsealed form or on foils or plated sources. Therefore, this requirement is not applicable.

13.0 Environmental Review

13.1 Purpose of Review

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

13.2 Staff Review and Analysis

In its LRA, SCA proposed to use sealed sources of SNM for research and development for government organizations. There are no liquid or gaseous effluents anticipated to be created from the renewal of the licensed activity. SCA has written procedures to collect and dispose of low-level waste material if such waste were created (See SER sections 4.0 and 9.0). The activities will be performed within the confines of the SCA facility or temporary work locations by trained personnel.

13.3 Evaluation Findings

The SNM to be possessed and used by SCA under the SNM-2017 license is in the form of sealed sources. As discussed in section 4.2.1 of this SER, the only physical mechanism for contamination to occur during SCA's licensed activities is in the unlikely event that there is a loss of encapsulation of the sealed source. These sealed sources are tested every 6 months so any leak will be promptly detected before any significant contamination can occur, therefore there is only a small chance that contamination could occur, and any potential contamination would be minor from operations involving SCA's usage of these SNM sealed sources. However, in the unlikely event that any contamination is found, this will be decontaminated. In addition, the activities conducted by SCA under the SNM-2017 license have a low potential for accidents and any anticipated consequences from such accidents that may occur are minimal. The NRC staff concluded, in section 4.0 of this SER, that there is reasonable assurance that during the renewed license term the applicant's RPP will meet the applicable radiation protection requirements of 10 CFR parts 19, 20, and 70. Because there is minimal risk of contamination, and because SCA has radiation protection procedures to cover potential events if they occur, SCA meets the requirements for environmental protection.

14.0 Physical Security

14.1 Purpose of Review

SCA's license currently allows it to possess a Category III quantity of SNM. The purpose of this review is to determine whether the SCA LRA and supplemental information meets the requirements for the physical protection of Category III SNM set forth in 10 CFR 73.67(a) and (f). In conducting its review, the NRC staff used the guidance in Regulatory Guide 5.59 "Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance."

14.2 Staff Review and Analysis

The NRC staff reviewed the revised SCA LRA in accordance with 10 CFR 73.67(a), (f) and (g).

14.2.1 10 CFR 73.67(a)

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 SNM consistent with the potential consequences of such actions; and (2) facilitate the location and recovery of missing SNM. To achieve these objectives, the physical protection system shall provide: (i) early detection and assessment of unauthorized access or activities by an external adversary within the CAA containing SNM; (ii) early detection of removal of SNM by an external adversary from a CAA; (iii) assure proper placement and transfer of the custody of SNM; and (iv) respond to indications of an unauthorized removal of SNM and then notify the appropriate response forces of its removal in order to facilitate its recovery.

As described in SCA's LRA, the physical security features employed will meet the general performance measures of 10 CFR 73.67(a). SCA has employed a physical protection system that includes a combination of procedures and systems for all movement of SNM such that personnel detect and respond to unauthorized access or activities for the removal of SNM. SCA relies on a response force that includes both onsite/offsite SCA employees and offsite local law enforcement agencies (LLEA) to respond to indications of unauthorized penetration or removal of SNM to facilitate prompt recovery. Additionally, the physical protection systems and/or procedures provide early detection and assessment of unauthorized access or activities by an external adversary.

The NRC staff has reviewed SCA's LRA, as revised by its supplemental responses to the NRC staff's RAIs, and finds it meets all the performance objectives and requirements of 10 CFR 73.67(a) and is therefore acceptable.

14.2.5 10 CFR 73.67(f)

The provisions of 10 CFR 73.67(f) require licensees who possess, store, or use Category III quantities of SNM, to implement certain physical protection measures at fixed sites. Section 2 (Activity and Location for Special Nuclear Material) of the SCA LRA, as revised by its supplemental responses to the NRC staff's RAIs, notes that SCA will not transport SNM to/from its facility in Glen Arm, MD.

14.2.2 10 CFR 73.67(f)(1)

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

In the LRA, sections 4.II (Usage), 6.I (Areas of Storage and Use), 14 (Physical Protection of Materials), appendix A (Facility Layout and Storage Location), and appendix C section 7.3 (Maintaining Security), SCA describes all CAAs (permanent and temporary). The radioactive materials storage area (RMSA), a metal cage with a safe, is designated as a permanent CAA. [

] In the June 14, 2022, conference call, SCA stated and showed pictures of the enclosed room that was built to house the RMSA. Additionally, SCA described in appendix C section 7.3 (Maintaining Security) how it sets up temporary CAAs when the SNM is removed from storage and in use that includes setting up boundaries and managing the SNM by the Authorized User (AU).

The NRC staff has reviewed SCA’s descriptions of CAAs in sections 4.II, 6.I, 14, appendix A and appendix C section 7.3 of the revised SCA LRA and finds it identifies all the CAAs, as well as describes the isolation and access control features. The NRC determined that the SCA LRA meets the requirements of 10 CFR 73.67(f)(1).

14.2.6 10 CFR 73.67(f)(2)

The provisions of 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.

[]

The NRC staff has reviewed SCA’s LRA in sections 4.II, 6.I, 14 and appendix A, which added a separate intrusion device/alarm to detect unauthorized penetrations or activities in the enclosed room for the RMSA with the SNM storage safe, designated this space as a CAA, and finds it meets the requirements of 10 CFR 73.67(f)(2).

14.2.7 10 CFR 73.67(f)(3)

The provisions of 10 CFR 73.67(f)(3) require licensees to assure that a watchman or offsite response force will respond to all unauthorized penetrations or activities.

Section 6.I (Areas of Storage and Use) of the SCA LRA clarifies that a response force will respond to any unauthorized penetrations or activities involving the room with the RMSA and SNM storage safe. []

The NRC staff has reviewed section 6.I regarding the description of SCA response activities, and finds it meets the requirements of 10 CFR 73.67(f)(3).

14.2.3 10 CFR 73.67(f)(4)

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

[]

The NRC staff has reviewed SCA’s description of its response procedures for dealing with threats of thefts or thefts and unauthorized activities in section 6.I and appendix C section 7.3.2, with procedure retention practices, and finds it meets the requirements of 10 CFR 73.67(f)(4).

14.2.4 10 CFR 73.67(g)

The provisions of 10 CFR 73.67(g) require the licensee to provide in-transit physical protection system for Category III SNM of low strategic significance.

In sections 4.1 (Description of SNM Test Objects) and 13 (Material Control and Accountability) of the LRA, SCA states that all SNM test objects are U.S. Government owned and provided under a loan agreement. Furthermore, SCA shall perform no shipping of SNM to/from its facility. Responsibility of shipping SNM to/from SCA shall only be performed by U.S. Department of Energy approved shippers.

The NRC staff has reviewed sections 4.1 and 13 setting forth U.S. Department of Energy responsibility for shipping SNM to and from SCA in Glen Arm, MD. Given this responsibility, the NRC staff has determined that SCA is not required to address in-transit physical protection requirements for Category III SNM in accordance with 10 CFR 73.67(g) in its LRA because they have no responsibility for such shipments.

14.3 Evaluation Findings

The NRC staff reviewed SCA's LRA to determine if the information satisfies the requirements of 10 CFR 73.67(a) and (f). For the reasons set forth above, the NRC finds that SCA's LRA meets the requirements within 10 CFR 73.67(a) and (f). Therefore, the NRC staff finds that SCA's LRA provides reasonable assurance that the requirements for the physical protection of Category III SNM will be met at its facility in Glen Arm, MD.

15.0 Material Control and Accounting

15.1 Purpose of Review

Applicants requesting a license to possess SNM must submit a full description of their program for the control and accounting of SNM in their application. The purpose of this review is to determine if SCA's material control and accounting (MC&A) practices meet the applicable regulatory requirements in 10 CFR part 74, "Material Control and Accounting of Special Nuclear Material" and are therefore adequate to detect and protect against the loss, theft, or diversion of SNM that the licensee possesses, stores, and uses at its facility.

15.2 Staff Review and Analysis

In section 4, "Description of Special Nuclear Material," of the LRA, the licensee indicates that it will possess greater than 350 grams U-235 but less than one effective kilogram (as defined by 10 CFR 74.4, "Definitions"). Further, in section 2, "Activity and Location for Special Nuclear Material," the licensee states that the licensed materials are to be used as test objects for concept demonstrations, training activities, and testing. In section 4 the licensee also states that each SNM test object will be used in conjunction with research, training, development, and testing. The licensee states that all usage will be non-destructive and that the SNM test objects will be used for research and development only.

Consistent with 10 CFR 70.22(b), licensees possessing a quantity of SNM exceeding one effective kilogram are required to demonstrate compliance with §§ 74.31, 74.33, 74.41, or 74.51. Furthermore, the language in § 70.22 (b) excepts applicants and licensees possessing SNM in the form of sealed sources from demonstrating compliance with these requirements. SCA will not possess SNM exceeding one effective kilogram. Additionally, SCA will only possess SNM in the form of sealed sources. Accordingly, SCA is not required to demonstrate compliance with the requirements in §§ 74.31, 74.33, 74.41, or 74.51.

Licensees who possess or transfer SNM in a quantity of one gram or more of contained U-235, U-233, or Pu are subject to the general reporting and recordkeeping requirements in 10 CFR part 74, subpart B, "General Reporting and Recordkeeping Requirements." SCA meets the appropriate possession requirements and is therefore subject to the general reporting and recordkeeping requirements in 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 NRC staff's evaluation as to whether the information provided in the SCA LRA meets the requirement.

15.2.1 Reports of loss or theft or attempted theft (10 CFR 74.11)

The requirement in 10 CFR 74.11 states that each licensee who possesses one gram or more of contained U-235, U-233, or Pu is to notify the NRC Operations Center within one hour of discovery of any loss or theft or other unlawful diversion of SNM which the licensee is licensed to possess, or any incident in which an attempt has been made to commit a theft or unlawful diversion of SNM.

In section 5, "Technical Qualifications of Applicant," of the LRA, the licensee states that the RSO will administer the SNM license. In section 9, "Operating Procedures," the licensee states that all uses of the SNM test objects will be under the supervision of an AU or the RSO. In

section 13, “Material Control and Accountability,” the licensee states that a report shall be made to the NRC within one hour of the discovery of a loss or theft or attempted theft of SNM in accordance with 10 CFR 74.11. In section 7.3, “Maintaining Security,” of the licensee’s RPP (appendix C), the licensee describes its program for accountability of SNM and procedures for theft or loss. For attempted theft of SNM, the licensee states that the RSO is notified and an immediate inventory of all SNM is conducted. For loss or theft, the RSO or Assistant RSO is notified immediately, and the NRC is notified as described in section 13 of the LRA. Unlawful diversion is not explicitly included in the licensee’s discussion of this topic; however, since the SNM is in the form of sealed sources, diversion and theft are similar enough that the NRC staff considers the two to be equivalent for the purpose of this review.

The NRC staff reviewed the licensee’s description for notifying the NRC of loss, theft, or diversion of SNM. The licensee affirms that activities are performed to ensure any indicator of loss or theft (or diversion), or attempted theft (or diversion) of SNM is responded to in a timely manner. Based on the review, the NRC staff has determined that the licensee’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, or attempted theft or diversion of SNM. Therefore, the NRC staff finds that the licensee meets the requirement of 10 CFR 74.11.

15.2.2 Material Status Reports (10 CFR 74.13)

The requirement in 10 CFR 74.13(a) states that each licensee possessing SNM in a quantity totaling one gram or more of contained U-235, U-233, or Pu 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. The reports shall be prepared in accordance with NUREG/BR-0007, “Instructions for the Preparation and Distribution of Material Status Reports (DOE/NRC Forms 742 and 742C).”

In section 13, “Material Control and Accountability,” of the LRA, the licensee states that it will submit electronic copies of the physical inventory listing and the material balance report for every calendar year in which SNM was received, possessed, and/or transferred in accordance with NUREG/BR-0007. The licensee will not produce, consume, or dispose of SNM.

The NRC reviewed the licensee’s description of preparing and submitting material status reports. The licensee affirms that material status reports will be submitted at the required frequency. Based on the review, the NRC staff has determined that the licensee’s 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 the licensee meets the requirement of 10 CFR 74.13(a).

15.2.3 Nuclear Material Transaction Reports (10 CFR 74.15)

The requirement in 10 CFR 74.15 states that each licensee who transfers or receives SNM in a quantity of one gram or more of contained U-235, U-233, or Pu 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. These reports shall be completed in accordance with NUREG/BR-0006,

“Instructions for Completing Nuclear Material Transaction Reports (DOE/NRC Forms 741 and 740M).” 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.

In section 13, “Material Control and Accountability,” and appendix D, “Nuclear Material Control Plan,” of the LRA, the licensee describes the procedure for control of SNM, including receipt, use, and shipment. The license states that an electronic copy of a receipt transaction shall be submitted within the required 10 days in accordance with NUREG/BR-0006. The licensee states that transfers from SCA will be documented, and a transaction report will be submitted no later than the close of business the following working day.

The NRC staff reviewed the licensee’s description of completing and submitting nuclear material transaction reports. The licensee affirms that material transaction reports will be submitted at the required frequencies. Based on the review, the NRC staff determined that the licensee’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 the licensee meets the requirement of 10 CFR 74.15.

15.2.4 Recordkeeping (10 CFR 74.19(a))

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 5, “Technical Qualifications of Applicant,” of the LRA, the licensee states that the RSO will administer the SNM license, with responsibilities to include records management. In section 13 of the LRA and section 4.6 of the Radiation Protection Plan the licensee states the record retention period for MC&A records. In section 1.2.3, “Radiation Safety Officer,” of the RPP, states that the RSO completes monthly reports documenting activities conducted during the month involving the use of radioactive materials. In section 7.2 of the RPP, the licensee states that for each licensed SNM item a record is kept of when the material was received using the SNM Receipt Report. In section 7.3.1, “Accountability of SNM,” the licensee states that a record shall be kept of the state of the SNM prior to and after use, using the SNM check-in & check-out report. In the Nuclear Material Control Plan, the licensee states that, upon receipt of SNM, the RSO or Assistant RSO completes the SNM shipment receipt report. The Nuclear Material Control Plan also states that to use SNM, a record shall be kept of the state of the SNM prior to and after use using the SNM check-in & check-out report form. For shipments, the licensee uses the request for shipment of SNM form.

The NRC staff reviewed the licensee’s description of MC&A records. The licensee affirms that records are generated for receipt, inventory, use, and shipment of all SNM. The licensee affirms that the RSO has primary responsibility for ensuring license and regulatory requirements for the

SNM license and responsibility for records management. Based on the review, the NRC staff has determined that the licensee's MC&A measures include adequate procedures to ensure MC&A records are completed and maintained. Therefore, the NRC staff finds that the licensee meets the requirement of 10 CFR 74.19(a).

15.2.5 Physical Inventory (10 CFR 74.19(c))

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 U-235, U-233, or Pu, 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 8, "Monitoring Procedures," of the LRA, the licensee states that the status of SNM will be verified by an annual inventory. The licensee states in section 13 of the LRA that the inventory results are reported by submitting a Physical Inventory Listing and Material Balance Report. Section 13 also states that inventory records will be retained for the length of the license.

The NRC staff reviewed the licensee's description of physical inventory. The licensee affirms that an annual inventory will be performed as required by 10 CFR 74.19(c). Based on the review, the NRC staff has determined that the licensee'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 the licensee meets the requirement of 10 CFR 74.19(c).

15.3 Evaluation Findings

Based on the review of the LRA, the NRC staff finds that the licensee's MC&A practices as described provides assurance that the licensee 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 the licensee's MC&A practices are acceptable.

III. NATIONAL ENVIRONMENTAL POLICY ACT REVIEW

The National Environmental Policy Act of 1969 was created 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. The regulations in 10 CFR 51.22 list 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 environmental impact statement (EIS), after first finding that the proposed action does not individually or cumulatively have a significant effect on the human environment. In its LRA, SCA stated that it intends to use sealed sources of SNM for research and development programs for government organizations.

In accordance with 10 CFR 51.22(a), licensing, regulatory, and administrative actions eligible for categorical exclusion are those actions that belong to a category of actions which the Commission, by rule or regulation, has declared to be a categorical exclusion, after first finding that the category of actions does not individually or cumulatively have a significant effect on the human environment. Paragraph 51.22(c)(14)(v) of 10 CFR provides a categorical exclusion for use of radioactive materials for research and development and for educational purposes such as this LAR. Therefore, an EA or EIS for this action, the renewal of SNM-2017, is not required since this action is categorically excluded under 10 CFR 51.22(c)(14)(v).

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

As discussed above, SCA requested an exemption from the § 70.24(a) requirement for a CAAS. The Commission has found that exemptions meeting the requirements of 10 CFR 51.22(c)(25)(i)-(vi) are categorically excluded. Specifically, 10 CFR 51.22(c)(25) states that an exemption is categorically excluded provided that: "(i) [t]here is no significant hazards consideration; (ii) [t]here is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; (iii) [t]here is no significant increase in individual or cumulative public or occupational radiation exposure; (iv) [t]here is no significant construction impact; (v) [t]here is no significant increase in the potential for or consequences from radiological accidents; and (vi) [t]he requirements from which the exemption is sought involve installation of a CAAS which would provide continuous monitoring and surveillance for criticality events and provide continuous recordkeeping.

As discussed in section II.5, there will be no criticality or criticality-related gamma or neutron radiation resulting from the research activities using SNM sources and, therefore, will not increase the chances of a radiological release or exposure. Accordingly, there is no significant hazards consideration; no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; no significant increase in individual or cumulative public or occupational radiation exposure; and no significant increase in the potential for or

consequences from radiological accidents. There is also no significant construction impact. Also, the exemption involves the types of activities enumerated in 10 CFR 51.22(c)(25)(vi). Specifically, in accordance with 10 CFR 51.22(c)(25)(vi)(A), (B), and (C), this exemption pertains to inspection or surveillance requirements as well as the related recordkeeping and reporting requirements. The regulations in 10 CFR 70.24 require installation of a CAAS which would provide continuous monitoring and surveillance for criticality events, and the CAAS provides continuous recordkeeping. Accordingly, the requirements in 10 CFR 51.22(c)(25)(i)-(vi) are met.

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

IV CONCLUSION

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

The NRC finds that the license for SCA should be renewed for a 10 year term in accordance with the statements, representations, and conditions in the LRA dated November 29, 2021, as supplemented by changes identified herein, subject to any identified license conditions detailed in this SER. The NRC approves the SCA request to renew the SNM license for a 10 year period, in accordance with the commitments and subject to the license conditions specified in this SER. SCA agreed to and the NRC staff will incorporate these commitments and conditions in the renewed license.

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