
ML12255A378

Safety Evaluation Report for the
Special Nuclear Material License Application
Rapiscan Laboratories, Inc.
Sunnyvale, California

Docket No. 70-7021

Manuscript Completed: September 2012

Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001



TABLE OF CONTENTS

I. INTRODUCTION.....	3
II. DISCUSSION.....	4
1.0 GENERAL INFORMATION.....	4
2.0 APPLICANT'S QUALIFICATIONS.....	5
3.0 INTEGRATED SAFETY ANALYSIS.....	6
4.0 RADIATION PROTECTION.....	6
5.0 NUCLEAR CRITICALITY SAFETY.....	10
6.0 FIRE PROTECTION.....	12
7.0 EMERGENCY MANAGEMENT.....	13
8.0 DECOMMISSIONING.....	13
9.0 ENVIRONMENTAL PROTECTION.....	13
10.0 PHYSICAL PROTECTION AND PHYSICAL SECURITY.....	15
11.0 MATERIAL CONTROL AND ACCOUNTING.....	15
III. CONCLUSION.....	16
IV. PRINCIPAL CONTRIBUTORS.....	16
V. REFERENCES.....	16

I. INTRODUCTION

By letter dated October 22, 2010 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML110970045), Rapiscan Laboratories, Inc. (Rapiscan), submitted an application to the U.S. Nuclear Regulatory Commission (NRC) requesting a Special Nuclear Material (SNM) License. The NRC staff accepted the application for review by letter dated March 10, 2011 (ML110680479). Rapiscan's request was made pursuant to the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70, "Domestic Licensing of Special Nuclear Material." Rapiscan requests that it be licensed to possess and use SNM to conduct a research program to develop new technologies to detect SNM in cargo containers as described in its license application. Rapiscan supplemented its application with a Request for Exemption from a Criticality Monitoring System dated February 11, 2011 (ADAMS Accession No. ML110890345). Rapiscan revised its application and submitted additional information dated February 9, 2011; March 10, 2011; April 7, 2011; and June 30, 2011. Rapiscan also responded to NRC's Requests for Additional Information in a letter dated July 27, 2011 (ADAMS Accession No. ML11215A031), and in a revision submitted on October 13, 2011 (ADAMS Accession No. ML11293A053). Rapiscan submitted a final revision to their application on April 30, 2012 (ADAMS Accession No. ML12129A280). This revision changed the technical dimensions of the sources to be licensed. In accordance with Part 70, the term of Rapiscan's license, if granted, would be 10 years.

The NRC staff conducted its safety and safeguards review in accordance with 10 CFR as follows:

- Part 2, Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders;
- Part 19, Notices, Instructions and Reports to Workers: Inspection and Investigations;
- Part 20, Standards for Protection against Radiation;
- Part 21, Reporting of Defects and Noncompliance;
- Part 50, Domestic Licensing of Production and Utilization Facilities;
- Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions;
- Part 70, Domestic Licensing of Special Nuclear Material;
- Part 73, Physical Protection of Plants and Materials; and
- Part 74, Material Control and Accounting of Special Nuclear Material.

The NRC staff used various guidance documents listed in Section 15, REFERENCES, herein, to conduct its safety review.

Rapiscan has a California Radioactive Materials License No. 2484-43 for source and byproduct materials. Rapiscan's California License was reviewed by NRC staff to determine whether it included quantities of SNM that would impact this application's review. The NRC staff determined that Rapiscan's license with the State of California did authorize the possession of U-235 SNM not to exceed 350 grams. Rapiscan has included this material in its application for an SNM license, and it will be removed from the California State License once the NRC license is granted. Rapiscan has no other license. To ensure that this action is taken, the following license condition will be added in the license.

15. The licensee will provide to the NRC a copy of the California License (No. 2484-43) showing the removal of SNM materials on that license prior to receipt of SNM identified under this license.

A Notice of Opportunity to Request a Hearing on the license application (LA) was published in the *Federal Register* on October 11, 2011 (76 FR 26172). No requests were received.

II. DISCUSSION

This Safety Evaluation Report documents NRC’s review and findings with regard to Rapiscan’s Part 70 LA.

1.0 General Information

Rapiscan has been contracted by the Department of Homeland Security (DHS) to conduct a research program for the development of new technologies that are capable of detecting SNM. DHS’s development program includes testing that utilizes SNM placed inside of fully loaded cargo containers and other concealments during testing of the equipment built by Rapiscan. During testing, the contents of the cargo containers will include a variety of typical cargo materials seen in U.S. ports of entry. DHS will test Rapiscan’s equipment to determine if it can locate SNM sources placed inside the containers when they are surrounded by the cargo.

The SNM sources shall be authorized for use at Rapiscan’s facilities located in Sunnyvale; Pittsburg, California; and at a temporary site located at Moffet Federal Air Field in California (CA). Rapiscan stated that the sources licensed for use by Rapiscan are owned by the Department of Energy (DOE) who will retain ownership. Rapiscan will store the licensed sources at its facilities. Qualified DOE personnel will be responsible for removing and shipping the SNM sources owned by DOE from the Rapiscan facilities. Transportation of all SNM materials between the Rapiscan sites will be performed using a contractor and consistent with U.S. Department of Transportation regulations.

The LA described the characteristics and composition of the SNM to be used in the testing program. It also included drawings illustrating source containers, the facility location and floor plan where the proposed activities would take place, and where the sources would be stored.

Rapiscan is requesting approval to use the SNM listed in the table below for its research and development programs. The quantity of SNM is greater than a critical mass as defined in 10 CFR 70.4, and the quantity of SNM is within the limits of SNM of low strategic significance as defined in 10 CFR 73.2.

MATERIAL	FORM	QUANTITY	MAXIMUM QUANTITY	AUTHORIZED USE(S)
Uranium oxide enriched to [REDACTED] U-235	U ₃ O ₈ in sealed stainless steel canisters	[REDACTED] grams U-235 per disc	[REDACTED] discs [REDACTED] grams U-235 total	Research and development programs at Rapiscan
Uranium enriched to [REDACTED] U-235	Nickel plated enriched uranium	[REDACTED] grams U-235 per disc	[REDACTED] discs [REDACTED] grams U-235 total	Research and development programs at Rapiscan

Uranium enriched to [redacted] U-235	Enriched uranium in sealed titanium containers	[redacted] grams U-235 per disc	[redacted] discs grams U-235 total	Research and development programs at Rapiscan
Uranium oxide enriched to [redacted] U-235	U ₃ O ₈ in sealed stainless steel canister	[redacted] grams U-235	[redacted] canister grams U-235 total	Research and development programs at Rapiscan*

*Quantities already possessed by Rapiscan

In accordance with the requirements of 10 CFR 70.22, which describes the information that must be included in a Part 70 LA, the NRC staff determined that Rapiscan's LA is complete. With this information provided in the LA, NRC staff conducted a detailed technical evaluation and documented its findings in this SER.

2.0 APPLICANT QUALIFICATIONS

2.1 Regulatory Requirements

The regulatory basis for the review of Rapiscan's qualifications is contained in 10 CFR 70.23(a)(2), which requires the applicant to be qualified by reason of training and experience to use the SNM.

2.2 Staff Review and Analysis

The Radiation Safety Officer (RSO) oversees the radiation protection (RP) program at Rapiscan. An Alternate RSO (ARSO) is also part of the radiation safety team. The LA (and Radiation Protection Manual) describes the responsibilities and qualifications of the individuals in these positions, including educational background and professional experience. The LA also provided a description of the responsibilities of the radiation safety personnel at Rapiscan.

The RSO is responsible for managing the radiation safety program and for defining policies and practices regarding the safe use of radioisotopes and radiation sources at Rapiscan's facilities. The RSO has expertise in the principles and practices of the control of hazards from the use of radioisotopes and radiation detection equipment. Rapiscan stated that the RSO will administer the SNM license and is responsible for licensing and regulatory compliance, including liaison with the NRC.

Rapiscan provided a description of the RP program used at the facility, including personnel monitoring and training practices, commitments for leak-testing sources, commitments for maintaining doses as low as is reasonably achievable (ALARA), and waste disposal. The LA also discussed the roles and responsibilities of the different individuals implementing the RP program.

The administration of the RP program in support of activities at Rapiscan is the responsibility of the RSO. The RSO has the primary responsibility for implementing the RP program on a daily basis. The ARSO may perform any of the duties of the RSO (as stated in this application) at any time. The technical qualifications of the RSO and ARSO at Rapiscan with responsibilities

under the RP program are defined in the LA. According to Rapiscan, these individuals work together to ensure a complete RP program that complies with internal procedures and regulatory requirements.

2.3 Evaluation Findings

After reviewing the application, the NRC staff concludes that those using SNM at Rapiscan are trained and experienced in using SNM based on the description of the RSO and the implementation and procedures of Rapiscan's RP program. Therefore, the NRC staff concludes that the information provided by Rapiscan meets the requirements in 10 CFR 70.23(a)(2) and is, therefore, acceptable.

3.0 INTEGRATED SAFETY ANALYSIS

The NRC staff reviewed the LA to determine whether Rapiscan was required to provide Integrated Safety Analysis (ISA) Summary information, pursuant to the provisions in 10 CFR Part 70, Subpart H, "Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material." The proposed activities for which the SNM would be used do not meet the criteria in 10 CFR 70.60. Rapiscan will be authorized to possess SNM in an amount greater than critical mass, but an ISA summary is not necessary under 70.60 because Rapiscan will not be engaged in enriched uranium processing, fabrication of uranium fuel or fuel assemblies, uranium enrichment, enriched uranium hexafluoride conversion, plutonium processing, fabrication of mixed-oxide fuel or fuel assemblies, scrap recovery of SNM or any other activity that the Commission determines could significantly affect public health and safety. Additionally, Rapiscan's proposed action will not significantly affect public health and safety as discussed more thoroughly herein. Therefore, 10 CFR Part 70, Subpart, H is not applicable to the LA. As a result, the NRC staff concludes that Rapiscan is not required to submit an ISA Summary in support of its LA.

4.0 RADIATION PROTECTION

4.1 Regulatory Requirements

The regulatory basis for this review of RP is contained in 10 CFR 70.23(a)(1)-(4); 10 CFR 19.12, "Instruction to Workers;" 10 CFR 19.13, "Notifications and reports to individuals;" and 10 CFR 20, "Standards for Protection Against Radiation."

4.2 Staff Review and Analysis

4.2.1 Radiation Protection Program Overview

Rapiscan is requesting a license to possess 18 encapsulated SNM test objects of various forms and enrichments of uranium materials. One additional object containing enriched uranium (U_3O_8) will be transferred from Rapiscan's existing State license to the anticipated SNM license. The high-enriched uranium containers were fabricated at Y-12 out of titanium discs and continuously welded to seal them. The new U_3O_8 containers will be continuously welded stainless steel meeting ANSI/HPS N43.6-2007, "Sealed Radioactive Sources—Classification," testing requirements for Class 2 sealed sources. The existing U_3O_8 container is a stainless steel tube with welded caps that is approximately 1/4" thick. The low-enriched uranium plates

are blocks of uranium metal with 3 to 5 mils nickel plating. Because the sources are effectively encapsulated and generally pose little external hazard, the radiological hazards are considered minimal.

Rapiscan anticipates utilizing the sources at three different locations: the Rapiscan Accelerator Facility in Pittsburg, CA; the Rapiscan Laboratories Facility in Sunnyvale, CA; and a temporary job site at Moffett Federal Air Field. Transportation of the materials between the sites will be performed using a contractor and consistent with U.S. Department of Transportation regulations.

The test objects containing SNM will be stored in a safe located in a secured room, and access to this safe is limited to only authorized users defined on the LA. There are several radiological concerns expected, including loss of encapsulation with subsequent contamination/internal exposures—as well as source handling after neutron irradiation at the accelerator facility. To address these concerns, Rapiscan will perform leak tests of the sources every 6 months or if contamination monitoring determines evidence of contamination. If there is evidence of dispersible material from the swipes or a suspected uptake, appropriate bioassays will be performed and evaluated to determine the uptake and dose.

After irradiation with neutrons and/or a high-energy bremsstrahlung x-ray beam, the sources may temporarily emit a radiation field with a dose rate of less than 40 mrem/hr, as well as being thermally hot. Rapiscan will utilize thermo luminescent detectors that are processed by a national voluntary laboratory accreditation program accredited contract service and are exchanged according to their established procedures to assess external exposures. In addition, anyone who enters the linac area at the Pittsburg site will be issued an electronic dosimeter with an audible alarm setting at 100 mrem/hr. Survey meters will also be used to verify dose rates before handling irradiated sources.

There is no waste or effluents anticipated from these operations. The materials will be returned to the DOE or to another Domestic Nuclear Detection Office (DNDO) contractor that is licensed by the NRC to possess SNM when testing at the Rapiscan facilities has been completed.

Rapiscan has an established Radiation Protection Program under its California Radioactive Material License (No. 2484-43). Rapiscan's "Radiation Safety Manual, Rev. 1," for the Pittsburg site, was reviewed and found to be generally applicable for the operations proposed under this license as it provides direction for: Surveys, Training, Sealed Sources, and Records. Similarly, staff reviewed "Rapiscan Laboratories, Inc., Radiation Protection Plan," dated January 13, 2011, and it was found to be generally applicable for the proposed operations. This plan will be in effect at all Rapiscan sites, including the temporary site, and addresses Training, ALARA, Surveys, Records, Emergency Response, and Sealed Source Leak Testing and Accountability. Handling of the test objects containing SNM will be consistent with the CA state license procedures previously mentioned.

Mershad A. Shahabidin is Rapiscan's Radiation Safety Officer for the Pittsburg and Sunnyvale, CA, facilities and will also oversee radiological operations at the temporary site. Mr. Shahabidin has been the alternate RSO on the State license since 2008 and was the RSO at another facility from 2006-2008.

4.2.2 As Low As Reasonably Achievable

Rapiscan stated that it has established a program to minimize radiation doses ALARA in accordance with 10 CFR 20.1101(b) and (d), which require procedures and engineering controls to achieve doses that are as low as reasonably achievable by constraining air emissions of radioactive material to the environment. Rapiscan stated that reviews of radiation doses of employees are performed at least quarterly. Rapiscan also states that its RP Program is consistent with the ALARA principle because it establishes procedures and policies designated to mitigate any exposures well below ALARA limits. Rapiscan must review the content and implementation of its RP Programs at least once per year to ensure compliance with the requirements in 10 CFR 20.1101(c), and to ensure the terms and conditions of the license; occupational doses and doses to members of the public are ALARA; and records of audits and other reviews of program content are maintained.

Based on the NRC staff's review of Rapiscan's LA, the staff concludes that Rapiscan's ALARA program meets the applicable requirements in 10 CFR 20.1101(b) and (d) and is, therefore, acceptable.

4.2.3 Written Procedures

Title 10, 70.23(a)(4) requires the applicant to establish adequate procedures to protect health and to minimize danger to life or property. Rapiscan stated that it maintains written procedures that are used to establish safe conduct of activities while working with radiation sources. Procedures are reviewed by employees during initial radiation safety training.

Rapiscan's Radiation Protection Manual states that written procedures are used for monitoring and operating the radioactive sources and for emergency response activities. Rapiscan stated that its Radiation Protection Manual includes procedures for the safe receipt and inspection of sources and for radiation surveys of the sources. Rapiscan stated that written procedures provide for radiation postings in both permanent and temporary areas of source use and storage. Rapiscan's written procedures also require that procedures for the control of the sources and operating procedures for use of the sources are available in the areas of source use and storage. Additionally, Rapiscan's written procedures limit access to restricted areas and require personal dosimetry. Rapiscan's internal procedures provide that sources must be leak tested on a 6-month cycle at the same time as a physical inventory is performed in accordance with internal procedures.

Rapiscan's written procedures with respect to radiation safety are adequate to protect health and minimize danger to life and property because its procedures establish safe conduct of activities dealing with radioactive sources, provide procedures for monitoring and handling sources and for emergency response. Therefore, Rapiscan'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 requires all individuals who in the course of employment are likely to receive in a year an occupational dose in excess of 100 mrem to be instructed in radiological protection, reporting requirements and incident response. Rapiscan's LA states that all individuals who work in or frequent restricted areas will be trained in radiation safety training courses provided by the RSO or ARSO. This training program is specifically focused on the radioactive materials

used at the facility. Rapiscan stated that the radiation initial and refresher training is mandatory for all personnel involved in the testing program. 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 Rapiscan's LA and Radiation Protection Manual, the NRC staff concludes that the program to train staff, maintain the training content, and employ qualified staff described in the LA meets the requirements of 10 CFR 19.12(a), and is, therefore, acceptable.

4.2.5 Radiation Surveys and Monitoring Programs

The regulations in 10 CFR 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. Rapiscan stated in its Radiation Protection Manual that use of the SNM will be limited to the research, development and testing of non-destructive methods for the detection of SNM.

Rapiscan 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.

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 Rapiscan's LA meet the requirements of 10 CFR Part 20, Subpart F, and is, therefore, acceptable.

4.2.6 Contamination Control and Waste Handling

Title 10, 20.1406(a) requires that certain applicants for licenses, 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. Since the sources Rapiscan proposes to use are sealed, there is minimal risk of airborne or external contamination. Rapiscan has written procedures to collect and dispose of low-level waste material if such waste were created.

Based on its review of Rapiscan's LA, the NRC staff concludes Rapiscan's operational use of sealed sources will minimize contamination, facilitate decommissioning, and minimize the generation of radioactive waste. Additionally, the procedures Rapiscan described to collect and dispose of low-level material in the unlikely event that some were to be released into the environment meets the regulatory requirements in 10 CFR Part 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 Radiation Protection Program described in the LA and procedures will be sufficient to assure compliance with the radiological protection requirements of 10 CFR 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 Rapiscan's Radiation Protection Program.

While the procedures and LA are considered generally acceptable, the staff noted that guidelines for contamination levels or specific reporting requirements were not explicitly stated in these documents, even though this is potentially the largest radiological concern. Because of this, staff recommends the following license conditions:

12. Contamination guidelines shall be established for unrestricted release of contaminated material and equipment that are no greater than the those identified in branch technical position, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," April 1993.
13. 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."

5.0 NUCLEAR CRITICALITY SAFETY

5.1 Regulatory Requirements

The regulatory basis for this review of nuclear criticality safety (NCS) is contained in 10 CFR 70.23(a)(3-4). This section also contains a discussion of the applicant's requested exemption from the criticality monitoring requirements of 10 CFR 70.24(a).

5.2 Staff Review and Analysis

Rapiscan has submitted an LA to possess 18 SNM test objects containing various forms and enrichments of uranium material. In addition to these 18 test objects, one existing stainless steel canister of [REDACTED] enriched U_3O_8 will be transferred from the State license to the requested SNM license once a license has been granted. In total, the mass of U-235 is approximately [REDACTED] grams. The uranium is primarily [REDACTED] enriched although almost [REDACTED] grams is [REDACTED] enriched. The purpose of the material is as test objects for the research, development and evaluation of Non-Intrusive Inspection Systems being evaluated by the Transformational and Applied Research Directorate division of the DNDO, which is part of the Department of Homeland Security. The SNM will either be encapsulated consistent with sealed source requirements or plated in 3 to 5 millimeters of nickel and is not dispersible or soluble. The applicant will only use the material consistent with handling or storage of sealed sources and no processes are anticipated which could result in the material being in a form or geometry other than presented as test objects. Because of this, the applicant has identified no credible criticality accidents that could occur with the materials.

The applicant used Monte Carlo N-Particle to evaluate the k_{eff} of all SNM materials, including Plutonium that may be requested in the future, for a "worst-case" accident sphere containing the total of the SNM materials and surrounded by water. The SNM materials were determined to have a k_{eff} of 0.649. 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 plutonium in a sphere with spherical layers of the remaining SNM surrounding it then surrounded by a layer of Beryllium and a 1-meter radius water sphere. Beryllium was added 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 essentially put the most

reactive material in a sphere surrounded by the remaining reactive material in layers from the most to the least reactive materials and fully reflected by the Beryllium and water. The k_{eff} determined by staff for that configuration was essentially the same as determined by the applicant (i.e., <0.649). The k_{eff} determined from these evaluations is sufficiently below unity (i.e., sufficiently subcritical) that staff considers this adequate to offset any bias that may be present and assure the objects remain subcritical.

The information submitted in the application was sufficient for staff to evaluate the NCS concerns consistent with 10 CFR 70.23(a)(3) and (4), which require that an applicant's proposed equipment, facilities and procedures are adequate to protect health and minimize danger to life or property.

Because the form and use of the material assure there will be no credible upsets resulting in a criticality, the applicant has requested an exemption from the monitoring requirements of 10 CFR 70.24(a). Given that 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, a criticality accident is not a credible scenario and a criticality monitoring system would serve no purpose. The staff agrees that the handling, storage, and use of the test objects do not pose a credible nuclear criticality concern and exemption from this regulation is a reasonable request.

5.3 Evaluation Findings

The staff reviewed the information submitted by the applicant and 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.

The applicant requested an exemption from the criticality monitoring requirements of 10 CFR 70.24(a) for the handling, use, and storage of the test objects containing SNM. 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 interest. The NRC staff evaluated the exemption request and determined that such exemption is not prohibited by law. The staff also determined that the installation of a criticality accident alarm system 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 approach will not endanger life or property or the common defense and security. Because the proposed approach will reduce both the applicant's expenses by not installing the system and regulatory costs for the time evaluating and inspecting the installation, the staff has determined that the proposed approach will be in the public's interest by reducing unnecessary costs. Therefore, the staff grants the requested exemption as requested in correspondence dated February 11, 2011, and in the applicant's response to requested additional information dated July 27, 2011. The following license condition will be imposed in the license to address the applicant's proposed exemption from the criticality monitoring regulatory requirements:

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

6.0 FIRE PROTECTION

6.1 Regulatory Requirements

The regulatory basis for the fire safety review includes the requirements for the content of the application, found in 10 CFR 70.23(a)(3 and 4). Pursuant to these requirements, an applicant for a license will be approved if the applicant's proposed equipment, facilities, and procedures to protect health and to minimize danger to life or property are adequate.

6.2 Staff Review and Analysis

Rapiscan stated that its facilities complied with the applicable building code regulations at the time of construction (State of California Building Code). Rapiscan stated that licensed material will be stored in a safe having a fire resistance rating of not less than 2 hours. Rapiscan stated that the licensed material would be constantly attended when not in storage. Rapiscan stated that the building is wired and grounded in accordance with the California Electrical Code, which references National Fire Protection Association Standard (NFPA) 70, "National Electrical Code." Building renovations and operations are reviewed by Rapiscan's Radiation Safety Officer and/or the ARSO to ensure that the safety of the licensed material is maintained.

Rapiscan stated that the fire protection systems installed at its Sunnyvale facility includes a sprinkler system, smoke/heat detection, and an offsite-monitored fire alarm system. Rapiscan stated that the fire protection systems installed at their Pittsburg facility and at the Moffet Field temporary job site include smoke/heat detection and an offsite-monitored fire alarm system. Fire loading at Rapiscan's facilities is low. Rapiscan stated that portable fire extinguishers are deployed within the facilities and employees maintain annual extinguisher training. Fire hydrants are located throughout the areas surrounding each facility.

Rapiscan stated that it has contacted the first line fire departments at each of its facilities, and will develop appropriate written pre-fire plans, conforming to NFPA 1620, "Standard for Pre-Incident Planning." The pre-fire plans will be reviewed periodically with each fire department and updated as necessary. Copies will be kept available at each site, with additional copies provided to emergency responders.

Based on statements made by Rapiscan about its fire prevention, inspection, testing, and maintenance of fire protection systems and the qualification, drills, and training of facility personnel, NRC staff determined that each is consistent with those provided by NFPA codes and standards.

The NRC staff's review determined that the applicant has met the 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 Rapiscan would be highly unlikely, since the material at risk is contained in a hard metal alloy that is unlikely to volatilize or otherwise readily disperse as a result of a fire. The staff has further determined that given the low risk to public health and safety of the materials covered by the proposed license, a formal fire hazards analysis is not required. The staff's conclusions were based on the information presented in following Rapiscan documents:

- October 22, 2010, letter, "New Special Nuclear Materials License Application;"

- March 10, 2011, letter, “Supplemental Information for License Application;” and
- July 27, 2011, letter, “Additional Information Regarding New Part 70 License Application.”

These documents contain security related or proprietary information and are not publicly available.

6.3 Evaluation Findings

The NRC staff has reviewed Rapiscan’s fire protection program and determined that it maintains an adequate level of fire protection at the facility to protect public health and safety. The NRC staff concludes that the applicant’s equipment, facilities, and procedures provide a reasonable level of assurance that adequate fire protection will be provided consistent with the regulatory requirements stated above.

7.0 EMERGENCY MANAGEMENT

The regulatory basis for emergency management is found in 10 CFR 70.22(i)(1), which states that “Each application to possess enriched uranium or plutonium for which a criticality accident alarm system is required, uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total, or in excess of 2 curies of plutonium in unsealed form or on foils or plated sources, must contain either ... (ii) An emergency plan for responding to the radiological hazards of an accidental release of special nuclear material and to any associated chemical hazards directly incident thereto.” Rapiscan does not possess any uranium hexafluoride in any quantity, will be exempted from the requirement to possess a criticality alarm, and does not possess in excess of 2 curies of plutonium in unsealed form or on foils or plated sources. Therefore, Rapiscan is not required to have an Emergency Plan.

8.0 DECOMMISSIONING FINANCIAL ASSURANCE

The regulatory basis for financial assurance and decommissioning funding requirements are found in 10 CFR 70.22(a)(9) and 70.25. Rapiscan is requesting authorization to possess and use SNM in the form of sealed sources, which poses less risk to the health and safety of the workers and the environment than unsealed SNM. Sections 70.22(a)(9) and 70.25 require an applicant for a specific license for a uranium enrichment facility or authorizing possession and use of unsealed SNM in certain quantities to submit a Decommissioning Funding Plan or certification of financial assurance for decommissioning. As previously indicated, Rapiscan will only possess and use sealed SNM. Thus, the NRC staff concludes that the requirements in 10 CFR 70.22(a)(9) and 70.25 do not apply to the proposed activities, and that Rapiscan is not required to provide decommissioning financial assurance in support of its LA.

9.0 ENVIRONMENTAL PROTECTION

9.1 Environmental Assessment – Categorical Exclusion

9.1.1 Categorical Exclusion for the Facility

Rapiscan's licensed activities are categorically excluded from the requirement to prepare a site-specific Environmental Assessment (EA) under 10 CFR 51.22(c)(14)(v), which exempts from the requirement to prepare an EA for a materials license issued under 10 CFR Part 70 that authorizes the "[u]se of radioactive materials for research and development and for educational purposes."

Rapiscan proposes to use sealed sources of SNM for research and development of new technologies that can detect SNM in cargo containers. Rapiscan's application states that it does not propose to release to the environment radioactive materials that originated onsite, and Rapiscan states that it will be conducting only non-destructive experiments while utilizing the SNM. Therefore, consistent with 10 CFR 51.22(c)(14)(v) and the criteria in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," Section 2.2.7.5, pp. 2-9 and 2-10, this licensing action is categorically excluded from the need to prepare an EA or an Environmental Impact Statement.

9.1.2 Categorical Exclusion for Exemptions

As noted above in Section 5.0, Nuclear Criticality Safety, the staff conducted an NCS review of the research activities to be performed on the SNM sources. As a result of that review, the staff found that there was no accident scenario, even a worse-case accident scenario, under which a criticality would occur. Because the proposed activities under this license cannot result in a criticality event or include gamma or neutron radiation associated with such an event, Rapiscan also requested an exemption from 10 CFR 70.24 criticality monitoring, surveillance, and associated recordkeeping and reporting requirements.

For an exemption to qualify for a categorical exclusion, the exempted regulatory activity must meet one of the criteria identified in 10 CFR 51.22(c). An exemption that involves inspection or surveillance requirements, as well as any related recordkeeping and reporting requirements, are categorically excluded under 10 CFR 51.22(c)(25)(vi)(A)-(C) provided that (i) there are no significant hazards consideration; (ii) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; (iii) there is no significant increase in individual or cumulative public or occupational radiation exposure; (iv) there is no significant construction impact; and (v) there is no significant increase in the potential for or consequences from radiological accidents; and (vi) the requirements from which an exemption is sought involve inspection or surveillance requirements. As discussed in more detail above in Section 5.0 - Nuclear Criticality Safety Review, an exemption from 10 CFR 70.24 under this proposed license would not significantly change or increase the types or amounts of effluents released offsite; the individual, cumulative public or occupational radiation exposure; construction impacts; or the potential for or consequences from radiological accidents; nor would it introduce a significant hazards consideration because there will be no criticality or criticality-related gamma or neutron radiation to detect resulting from the research activities using SNM sources as described above. These research activities will not individually or cumulatively have a significant effect on the human environment.

A criticality accident alarm system (CAAS) provides continuous monitoring and surveillance for criticality events. The CAAS provides an alarm in case of a criticality event, and also provides continuous recordkeeping as output from the CAAS. Title 10, 51.22(c)(25)(iv)(A-C) states that the requirements from which an exemption is sought involve: (A) recordkeeping; (B) Reporting requirements; (C) Inspection or surveillance requirements. The exemption sought by the applicant from the requirement to have a CAAS satisfies each of these criteria when performing its function.

Therefore, because the requirements under 10 CFR 51.22(c)(14)(v) have been met, the staff finds that Rapiscan's licensed activities are categorically excluded from the requirement to prepare a site-specific EA. In addition, because an exemption from the regulatory requirements of 10 CFR 70.24(a) meets the provisions identified in 10 CFR 50.22(c)(25), the staff also finds that the exemption from those regulatory requirements are categorically excluded from the requirement to prepare a site-specific EA.

10.0 PHYSICAL PROTECTION AND PHYSICAL SECURITY

The regulatory basis for the review of Rapiscan's physical protection and security management is in 10 CFR 73.67(a)(1) and (2). As provided above in Section 1.1, the quantity of SNM Rapiscan would possess is of low strategic significance as defined in 10 CFR 73.2.

The general performance objectives in 10 CFR 73.67(a) specify that facilities with SNM of low strategic significance must minimize the possibilities for unauthorized removal of SNM and facilitate the location and recovery of missing SNM. To achieve these objectives, Rapiscan's physical protection and security management program shall provide for:

(1) early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing SNM, (2) early detection of removal of SNM by an external adversary from a controlled access area, (3) assure proper placement and transfer of custody of SNM, and (4) 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.

Rapiscan stated in the LA that its program provides for early reporting of missing materials under its material control and accounting procedures and that it provides for proper handling and transfer through management controlled access.

Based on this information, the NRC staff concludes that Rapiscan's physical security procedures meet the general performance objectives of 10 CFR 73.67(a) because Rapiscan's procedures will allow it to detect unauthorized access and activities within a controlled area, detect, respond to, and report the removal of SNM from a controlled area and assure proper placement and transfer of custody of SNM. Rapiscan's procedures are, therefore, acceptable.

11.0 MATERIAL CONTROL AND ACCOUNTING

Title 10, 70.22(b) does not require Rapiscan to submit a Fundamental Nuclear Material Control Plan because 70.22(b) exempts applications for use of SNM in the form of sealed sources from submitting the document. Since the licensed material for Rapiscan is in the form of sealed

sources, the NRC staff concludes that the requirements in 10 CFR 70.22(b) do not apply to Rapiscan's proposed operations. As a result, Rapiscan is not required to submit a Fundamental Nuclear Material Control Plan in support of its LA.

Rapiscan is required, however, to maintain SNM inventory and reporting requirements in accordance with 10 CFR 74.11, 10 CFR 74.13, 74.15 and 74.19. Section 74.11 requires the licensee to notify the NRC Operations Center in the event of any lost, stolen, or unlawfully diverted SNM, including attempts, within one hour of discovery. Section 74.13 requires licensees to prepare Material Balance Reports concerning SNM that the licensee has received, produced, possessed, transferred, consumed, disposed or lost. Section 74.15 requires a licensee who transfers or receives SNM in certain quantities or who adjusts its inventory of SNM to submit a Nuclear Material Transaction Report. Section 74.19 requires a licensee to maintain records of the receipt, inventory, acquisition, transfer and disposal of all SNM. This section details the procedures the licensee must implement in order to maintain records.

In its Radiation Protection Manual, Rapiscan commits to notifying the NRC in the event of any lost, stolen, or improperly diverted SNM. Rapiscan also commits to maintaining an SNM inventory and reporting program consistent with the requirements in 74.13. Rapiscan also commits to conducting physical inventories of its SNM and maintaining the required records in accordance with the requirements of 74.19. Finally, Rapiscan will report the transfer and receipt of SNM consistent with the requirements in 74.15.

The NRC staff reviewed the information and commitments provided by Rapiscan in the LA. Based on Rapiscan's commitments, the staff concludes that Rapiscan will maintain SNM inventory and reporting requirements in accordance with 10 CFR 74.11, 10 CFR 74.13, 74.15 and 74.19 and that its procedures are, therefore, acceptable.

III. CONCLUSION

The NRC staff concludes that the information and regulatory commitments provided by Rapiscan in their LA provide reasonable assurance of adequate safety of the proposed operations. The staff concludes that the proposed operations at Rapiscan will not have an adverse impact on the public health and safety, the common defense and security, or the environment; and meet the applicable requirements in 10 CFR Parts 19, 20, 51, 70, 73, and 74.

Therefore, the staff recommends granting the special nuclear materials license for a 10-year period in accordance with the license application and subject to the recommended license conditions herein and incorporated in the license. It is also recommended that the exemption requested by Rapiscan from the requirements for a criticality accident alarm system be granted.

IV. PRINCIPAL CONTRIBUTORS

Marilyn Diaz
James Downs
Greg Chapman
Richard Thompson
Linda Allen

V. REFERENCES

(NRC, 1983) U.S. Nuclear Regulatory Commission, Regulatory Guide 5.59, "Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance," February 1983.

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

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

(NRC, 2010) U.S. Nuclear Regulatory Commission, NUREG-1556, "Consolidated Guidance About Materials Licenses," Volume 17, "Program-Specific Guidance About Licenses for Special Nuclear Material of Less than Critical Mass." December 2011.

(NRC, 1993) Branch Technical Position, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," April 1993.

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

(NFPA, 2009) NFPA 101, "Life Safety Code."

(NFPA, 2008) NFPA 70, "National Electrical Code."

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