General Information

GI-1: There is conflicting information regarding the activity and location of special nuclear materials (SNM) (Section 2) and the amount of SNMs to be in the applicant's possession. A similar conflicting statement is present in Section 8 of the application. Explain or resolve these statements.

Response: Sections have been corrected to remove conflicting information.

Rewrote Section 2 to:

At no time will SCA have in its possession Special Nuclear Material equal to or in excess of Formula Amounts (5,000 grams).

The primary location for storage of the special nuclear material will be in SCA's warehouse facility **which is concrete block structure with corrugated steel decking and 1.5 inch insulation board for the roof (2 hour fire rated)**. Facility layout and storage location are shown in Appendix A.

The warehouse area is leased from Glen Arm LLC, who is responsible for the buildings fire protection features and maintaining compliance with State and local fire codes and laws such as annual (Jan/Feb) inspections and testing of fire suppression systems, alarms and backup generators. Fire extinguishers, emergency lighting and fire alarm pulls are located throughout the facility and tested/checked annually by the landlord.

Removed conflicting statement from section 8

GI-2: Explain where and how (procedures and facilities) the materials will be handled and used at temporary work sites. Verify that storage will be limited to the Glen Arm facility when not in use. This is needed consistent with Title 10 of the *Code of Federal Regulations* (10 CFR) 70.22 (a) (7) and (8).

Added the following to Section 4.0:

Typical use scenario consist of removing the SNM from its secure storage, placing the SNM inside a sea cargo shipping container, interrogating the container with the system under test (SUT). At no time will the container leave the test site. Once the SUT results have been recorded the SNM will be removed and returned to the secure storage location.

Added the following to Section 6.1:

Precautions for material storage will be used to minimize potential for airborne radioactivity from exposure to fire hazards. Storage for the SNM when not in use and at temporary work sites will be at the SCA Glen Arm facility and away from flammable materials. All materials licensed under this application will be stored in a UL 2-hour fire labeled safe.

GI-3: The application contains, as an attachment, the Radiation Protection (RP) Program and the Radiological Emergencies procedure for the facility. Be aware that the U.S.

Nuclear Regulatory Commission (NRC) will likely issue a license condition that incorporates the application into the license, and which may result in any revision to these documents requiring an amendment. In cases similar to this, an applicant has stated in the application that they have a RP "Manual" that is maintained online and addresses program areas such as contamination control, dosimetry, as low as is reasonably achievable, etc. They would also provide the manual's electronic address or provide the manual's electronic address or provide a hard copy as supplemental information, but as an attachment. The document is important for the NRC to review, as it provides details of RP procedures at the facility. Verify that Sensor Concepts & Applications, Inc. (SCA) intends to include these documents as an attachment to the license application.

Reworded Section 7.0 to the following:

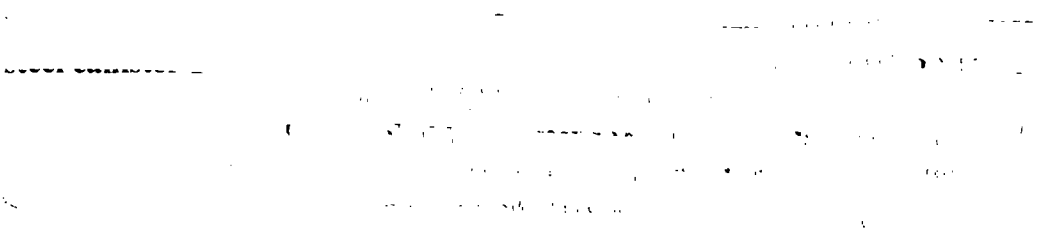
SCA has an established Radiation Protection Program that covers the safe conduct of activities with radioactive materials and radiation sources. These procedures in effect satisfy various requirements of the NRC and state licenses for radioactive materials. Procedures are reviewed and adjusted at regular intervals with updated training as required. See **supplemental information** for SCA's Radiation Protection Program.

Radiation Protection

RP-1: Explain the construction and sealing of the UO_2 and U_3O_8 canisters. Verify that the canisters cannot be opened and are airtight. This is needed consistent with 10 CFR 70.22 (a) (7).

Reworded Section 4.1 as follows:

D. Uranium Oxide



RP-2: Statements in Section 7.I.b of the application appear to conflict with statements in Section 13.1.8 of the RP Program's document in that one states an annual inventory will be performed while the other states an inventory will be performed every 6 months. SCA should resolve the conflict.

Reworded Section 7.1 part B to the following:

B. Status of special nuclear material will be verified **at least once every 6 months**.

RP-3: Statements in Section 7.1.c of the application appear to conflict with statements in Section 11.0 of the RP Program. SCA should resolve the conflict and/or explain if it is SCA's intention to treat all SNM objects as sealed sources, with respect to the materials remaining sealed/unopened and receiving routine leak tests as contamination monitoring.

Added to Section 7.1:

C. Leak test will be performed on the SNM Test Objects **at a minimum of 6 month intervals.**

1. **All SNM in SCA possession are not unsealed sources and will be treated as sealed sources and shall remain in the sealed/unopened condition.**
2. **Sealed sources (greater than 10 microcuries) that emit alpha particles will be leak tested at intervals not to exceed three months.**

SCA's Radiation Protection Plan Section 11.0 was also updated

RP-4: Section 9 of the RP Program appears to limit emergency response to source materials. SCA should clarify that this will be applicable to all licensed radioactive materials.
SCA's Radiation Protection Plan Section 9.2 was changed to: include **all licensed radioactive materials.**

RP-5: Explain SCA's experience with internal exposure monitoring and how this would occur in the event of material release and ingestion/inhalation. This is needed consistent with 10 CFR 70.22 (a)(8).
Added to Section 7.1 the following:

D. The SNM will be in containers made to sealed source standards or metallic and as a result are not in a soluble or readily dispersible form. As such, personnel are not expected to receive 10% of the applicable limit and therefore will not be routinely monitored for internal exposure. However, if there is evidence of dispersible material or suspected that an uptake has occurred, appropriate bioassay will be preformed to determine the uptake and dose.

RP-6: The listing of instruments on page 11 of the RP Program does not contain any alpha detectors. Explain how a Geiger-Mueller detector will be sensitive enough to monitor for Pu contamination, or if other instrumentation is available beyond what is listed. This is needed consistent with 10 CFR 70.22 (a)(8).

Response:
Once a SNM license is received and before delivery of the Pu source SCA will procure a Ludlum Model 43-92 Alpha Scintillator and Model 2241 Ratemeter.

Nuclear Criticality Analysis

NCA-1: Verify that no additional SNMs (other than that indicated on this application) will be present at the facility or temporary work site where this material will be used, handled, or stored. This is necessary consistent with 10 CFR 70.22(a) (4).
Added to Section 6.1 the following:

No additional SNM, other than that under SCA's NRC license, will be present at SCA's Glen Arm facility or temporary work sites.

NCA-2: Please provide the Criticality Safety Evaluations for the material being used, stored and handled; as well as the models used to determine k_{eff}. This is needed consistent with 10 CFR 70.22 (a) (8)

Response:
The MCNP modeling has been redone to reflect the addition of an additional LEU plate and elimination of the UO_2. The MCNP input decks and results are included as a supplemental information document.

NCA-3: Explain how the mass of SNMs in each object, as well as the density, was determined. This is needed consistent with 10 CFR 70.22 (a) (8).
Response:
SCA will be borrowing the SNM test objects from DNDO who has provided us with the characteristics.

NCA-4: Please provide additional information regarding the material properties of the UO_2 and U_3O_8 materials (e.g., is the material cohesive and would the material be considered dispersible in water). This is needed consistent with 10 CFR 70.22(a)(7)
Response:
This test object has yet to be manufactured,

The UO_2 has been removed from the application request.

NCA-5: Explain how the canisters containing the UO_2 and U_3O_8 materials are constructed and sealed. This is needed consistent with 10 CFR 70.22(a) (7).
Added to Section 4.1 the following:

Fire Safety

FS1. Describe how and where the sources are utilized. What physical temperatures are the sources when they are being used? Is there any combustible material present near a source when it is being used? What are the procedures in the event of a fire when the source is being used?
Added to section 4.2 the following:

> **Typical use scenario consist of removing the SNM from its secure storage, placing the SNM inside a sea cargo shipping container, interrogating the container with the system under test (SUT), at no time will the container leave the test site, once the SUT results have been recorded the SNM will be removed and returned to the storage location.**

Added to Section 6.0 the following:

> **The SNM when stored or when used in SUT testing will be maintained at ambient temperature conditions (-25° to +65° C), i.e. there will be no high temperature operations.**

Added to Section 6.1 the following:

Material storage precautions will be used to minimize potential for airborne radioactivity from exposure to fire hazards. Storage for the SNM when not in use or at temporary work sites will be at the SCA Glen Arm facility and away from flammable materials. All materials licensed under this application will be stored in a UL 2-hour fire labeled safe.

Response:

FS2. Describe each facility's building construction, fire area determination (interior-rated walls), electrical installation, emergency lighting, life safety/egress, ventilation, and lightning protection.

Added to Section 2.0 the following:

The primary location for storage of the special nuclear material will be in SCA's warehouse facility **which is concrete block structure with corrugated steel decking and 1.5 inch insulation board for the roof (2 hour fire rated)**. Facility layout and storage location are shown in Appendix A.

The warehouse area is leased from Glen Arm LLC, who is responsible for the buildings fire protection features and maintaining compliance with State and local fire codes and laws such as annual (Jan/Feb) inspections and testing of fire suppression systems, alarms and backup generators. Fire extinguishers, emergency lighting and fire alarm pull are located throughout the facility.

FS3. Is the radioactive material stored/used at multiple locations on the site? What amount(s) is/are located where? Describe any physical barriers separation the radioactive material from a single incident. Do these barriers have a fire rating?

Added new wording to Section 6.1:

A. Glen Arm Facility: The SNM 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 (alarmed), limited access concrete block warehouse.

B. Temporary Work Sites: When working at temporary work sites a survey will be conducted to determine **a secure location for the fireproof safe used to store the SNM**. At a minimum this location will have limited access and a security system.

Response:

Barrier is the previously cited fireproof safe. Features: UL 2-hour fire label, furnace-tested to 1850°F for 2 hours. Interior temperature of safe was less than 350°F during manufactures test and cool down.

FS4. Describe each facility's fire protection features (suppression, alarm, detection, fire-rated walls/opening protection). Are smoke/heat detection and/or alarm systems monitored offsite?

FS5. Describe any inspection, testing and maintenance of fire protection systems at each facility.

Added to Section 2.0 the following:

The warehouse area is leased from Glen Arm LLC, who is responsible for the buildings fire protection features and maintaining compliance with State and local fire codes and laws such as annual (Jan/Feb) inspections and testing of fire suppression systems, alarms and backup generators. Fire extinguishers, emergency lighting and fire alarm pulls are located throughout the facility and tested/checked annually by the landlord.

FS6. Describe, for each facility, any potential combustible loading, possible fire scenarios, potential consequences, and any mitigative controls. What consideration has been given to the impact from external events that could cause a fire (earthquake, tornado, airplane crash, fuel leak, etc.)?

The Following words were added to Section 7.3

There is no appreciable combustible loading within area for SNM storage. Any movement of combustible materials into the radioactive materials area is strictly controlled, with storage prohibited. There are currently no combustible materials in the radioactive materials area.

FS7. Are there any hazardous chemicals or processes which may contribute to the fire hazards in areas the sources are stored or utilized?

The Following words were added to Section 6.1

Precautions for material storage will be used to minimize potential for airborne radioactivity from exposure to fire hazards. **Storage for the SNM when not in use and at temporary work sites will be at the SCA Glen Arm facility and away from flammable materials.** All materials licensed under this application will be stored in a UL 2-hour fire labeled safe.

The Following words were added to Section 7.3

There are no hazardous chemicals or processes which may contribute to a fire hazard in the SNM storage area. For temporary work site there will be no hazardous chemicals or processes permitted that may contribute to a fire hazard.

FS8. Is the facility compliant with National Fire Protection Association (NFPA) 45, Standard for Fire Protection in Laboratory Facilities, and/or NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials?

Response:

NFPA 45 does not apply since the radioactive active materials storage area will not contain flammable or combustible liquids equal or greater than 4 liters nor contain greater than 2.2 standard square meters of flammable gas. The radioactive materials storage area complies with applicable sections of NFPA 801.

FS9. Describe the frequency and scope of any training for facility workers in response to a fire (fire extinguisher, safe shutdown, evacuation, etc.)?

The Following words were added to Section 7.3

New personnel are briefed on SCA's emergency evacuation procedure which is posted throughout our facility. At temporary work sites personnel will follow established procedures of the host facility.

FS10. Where is the responding fire department located? Describe the fire department's qualifications and training for dealing with a fire involving radioactive materials. Describe any pr-fire plan coordination with the fire department (fire drills, preparation for hazardous materials response, etc.).
Added Section 7.4:

7.4 Emergency Responders

The Long Green Volunteer Fire Company is located 3 miles from the Glen Arm facility and is aware of our possessing licensed radioactive materials. They have conducted a site visit with the Baltimore County Fire Department (Station 10).

Nearby hospitals (8 miles from Great Baltimore Medical Center & Saint Josephs Medical Center) are fully equipped and staffed to handle radiological emergences.

FS11. Will the sources ever be transported offsite? If so, what fire protection measures are in place for safe transportation of the sources?
The following words were added to Section 6.1

The SNM will be placed in Type B package for shipping between the Glen Arm facility and any temporary work sites.