“Radioactive Sources: Applications and Alternative Technologies”

Kickoff Meeting

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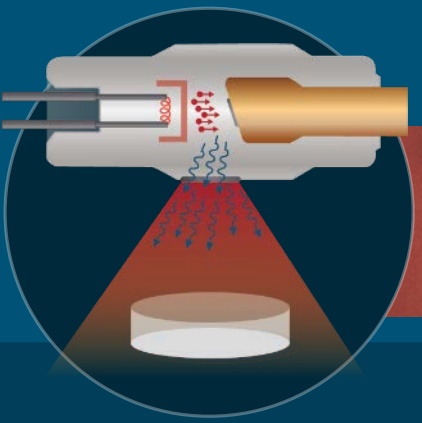

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Role of Sandia

Sandia National Laboratories is one of U.S. Department of Energy's National Nuclear Security Administration national laboratories

Over 12,000 employees, mostly in Albuquerque, New Mexico and Livermore, California

Goal of NNSA's Office of Radiological Security (ORS): Enhance global security by preventing high-activity radioactive materials from being used in acts of terrorism.

- **SNL Supports the ORS <u>Protect</u> Mission:** by installing security systems at sites, in the U.S. and internationally, that use high-activity radiological sources
- **SNL also Supports the ORS <u>Reduce</u> Mission:** by incentivizing sites to replace high-activity radioactive sources with alternative (non-radioisotopic) technologies

Why Now and What Next?

There has been much progress, both domestically and internationally, since the publication of the 2008 NAS study.

Given its role in ORS and other similar programs, SNL was commissioned to provide a new study which would:

- **Update** the 2008 Consensus NAS Study to reflect the current state of applications using high-risk (IAEA Cat 1-3) by sector (e.g. industrial, research, medical, and other commercial applications);
- **Update** the current state of existing technologies on the market that are or could be used to replace radioisotopic technologies in those application as well as to evaluate next-generation and/or emerging technologies and which may come on the market in the next 10 years.
- **Assess** the applications for which alternate technologies do not currently exist, but which could significantly mitigate the risk associated with current technologies using high-risk radionuclides.
- **Review, update and expand** the recommendations from the 2008 baseline study.

The **"Radioactive Sources: Applications and Alternative Technologies"** study will be used to inform existing and future activities being undertaken throughout the U.S. government in risk reduction activities.

Sandia's Monitoring of Progress

We understand that the work of the Study Committee is bound by the longstanding practices utilized by the National Academies.

We also understand that the Statement of Work (SOW) agreed upon by Sandia and the National Academies will serve as a guide for the work of the Committee.

We are at the disposal of the Committee to provide any needed information, expertise and support during the course of the study. As such, we hope to attend all pubic meetings being convened by the Study Committee with the intent of informing their work

In addition, we look forward to any and all information produced by the Committee which can be made available to us under the terms of the SOW.

Finally, we welcome open communication between Sandia, the Committee and the National Academies throughout the course of the study as appropriate.

What are Alternative Technologies and Why are They Important?

Alternative technologies **are**:

- Technologies that do not use radioactive materials
- That perform an equivalent (or better) function as a comparable device
- Used in applications such as blood irradiation, radiotherapy, research irradiation, and industrial sterilization
- Commercially available and increasing in global use and distribution

Alternative technologies **can**:

- Eliminate the risk of radiological terrorism that may be posed by the widespread use of radioactive material in civilian applications
- Provide a sustainable option to lower or manage the burden of disused source management
- Maintain users' ability to execute important work
- Benefit technological advancement and access to innovative technologies
- Greatly reduce security procedures, requirements and costs

What are Alternative Technologies – cont'd

Examples of alternative technologies include:

- X-ray irradiation
- UV pathogen reduction
- Linear accelerators (LINAC)
- Industrial E-Beam

Policy Foundation for Current Activities

- 2008 National Academy of Sciences study

  "the U.S. Government should adopt policies that provide incentives (market, regulatory, or certification) to facilitate the introduction of replacements"

- Establishment of interagency Task Force on Radiation Source Protection and Security

  Independent experts from 14 Federal agencies and one State organization

  Chaired by the NRC

  2010, 2014 and 2018 reports that recommended the U.S. government incentivize alternatives and lead by example in the consideration of and transition to alternative technologies that meet technical operational and cost requirements

H.R. 5515 – John S. McCain National Defense Authorization Act for Fiscal Year 2019

Subtitle D, Sec. 3141: **Eliminate** the use of blood irradiation devices in the United States that rely on cesium chloride by **December 31, 2027** through a **voluntary program** (Cesium Irradiator Replacement Project) that:

- ✓ Is voluntary for owners of blood irradiation devices
- ✓ Allows for the U.S., subject to the review of the Administrator, to pay up to 50 percent of the per-device cost of replacing blood irradiation devices covered by the programs
- ✓ Allows for the U.S. to pay up to 100 percent of the cost of removing and disposing of cesium sources retired from service by the programs
- ✓ Replaces such devices with X-ray irradiation devices or other devices approved by the Food and Drug Administration that provide significant threat reduction as compared to cesium chloride irradiators

Global Political/Policy Foundation

2016 Nuclear Security Summit Joint Statement on Strengthening the Security of High Activity Sealed Sources (HASS) – December 20, 2016

Transmitted to the IAEA as Information Circular/910 - January 20, 2017

IAEA Nuclear Security Series No. 14

IAEA Code of Conduct on the Safety and Security of Radioactive Sources

Federation of American Scientists Nuclear Security Summit letter on Radiological Security
Signed by 35 Nobel Laureates

NGO/Think Tank Reports from:

- Nuclear Threat Initiative
- Center for Nonproliferation Studies
- World Institute for Nuclear Security
- Stanley Center for Peace and Security (formerly the Stanley Foundation)

Progress Since the 2008 Study - Domestic

- Since the 2014 inception of the NNSA/ORS Cesium Irradiator Replacement Project (CIRP), more than 135 irradiators have been replaced by X-ray technology.
- Four X-ray based blood irradiators approved for use in the U.S.
- State of California informally asks organizations asking for a new license for a large source to investigate if an alternative tech device will meet their needs.
- A number of contract irradiation companies have adopted X-ray and/or eBeam for sterilization of medical devices, food products and cosmetics.

Progress Since the 2008 Study - International

- Several countries have completely or mostly eliminated the use of cesium-based blood irradiators.
- In 2018, ORS launched an international effort to replace blood and research irradiators in countries where ORS has had an active physical protection program.
- Seven X-ray based blood irradiators, from six different countries, approved for use around the world.
- The number of Co-60 teletherapy machines has decreased in middle income countries and are being replaced with LINACS. LINACS are also being introduced more frequently in lower income countries.
- eBeam technology is also gaining acceptance as an alternative technology, although the cost inhibits wider adoption.

Areas of Concern

Expansion of risk reduction activities has, in some cases, been limited by the availability of proven technologies for applications other than blood and research irradiation. Cost has also been a factor.

To address some of these limitations, the U.S. government has funded, among other activities, research and demonstration projects, domestically and internationally, that focus on various irradiation applications to identify barriers to adoption.

For example, ORS is assisting in the development of next generation irradiation technologies

- These activities could, however, benefit from an exploration of other, up-and-coming, non-radioisotopic technologies that could replace gamma irradiation in a range of applications. Examination of the costs associated with these technologies would also be useful.

Another challenge in risk reduction activities is the need to correct misconceptions about non-radioisotopic technologies

- It would be beneficial if the Study Committee could provide some "sanity checks" on the efficacy, use, cost and availability of existing technologies – i.e. X-ray and eBeam –on applications currently using gamma irradiation.

Advice to the Committee

Sandia is very pleased to be a part of this important effort and looks forward to the work of the Committee.

It would be helpful if the Committee, in its report

- Addresses changes in industry & trends over the last 10 years
- Reach out to industry and other stakeholders to get specific perspectives
- Participate in some international & technical/professional society meetings in order to maximize on opportunities to collect data
- It would also be helpful if the Committee examines factors that might impact successful implementation of future risk reduction activities and to make recommendations that could assist in addressing them – i.e. cost, perception, technical feasibility, policy, regulations, legal infrastructure, existing incentives.

Sources of Information Useful to the Committee

- Industry users of contract irradiation
- In-house sterilizers (e.g. J&J, BD)
- Industry trade organizations (for irradiation technologies, irradiated products)
- Contract irradiator companies
- Regulatory agencies
- Those agencies that establish policies that could influence the use or adoption of alternative technologies (e.g. USDA/APHIS, FDA) and their equivalents overseas
- Alt tech vendors
- Those funding research projects – e.g. agricultural organizations, medical device manufacturers
- NGOs
- Attendance at large conferences (AABB annual meeting, Chapman Phytosanitary)
- Ad hoc working group for Alternative Technologies

This is by no means a complete list but should assist the Study Committee in getting started.

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