Radiological Security in the Medical Sector

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National Nuclear Security Administration

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Enhance global security by preventing high-activity radioactive materials from use in acts of terrorism.

PROTECT

Protect radioactive sources used for vital medical, research, and commercial purposes.

REMOVE

Remove and dispose of disused radioactive sources.

REDUCE

Reduce the global reliance on high-activity radioactive sources by promoting the adoption and development of non-radioisotopic alternative technologies.

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The Risk of Malicious Use of Radioactive Material Requires Action

ORS works with partners to enhance global security by preventing high-activity radioactive materials from being used in acts of terrorism.

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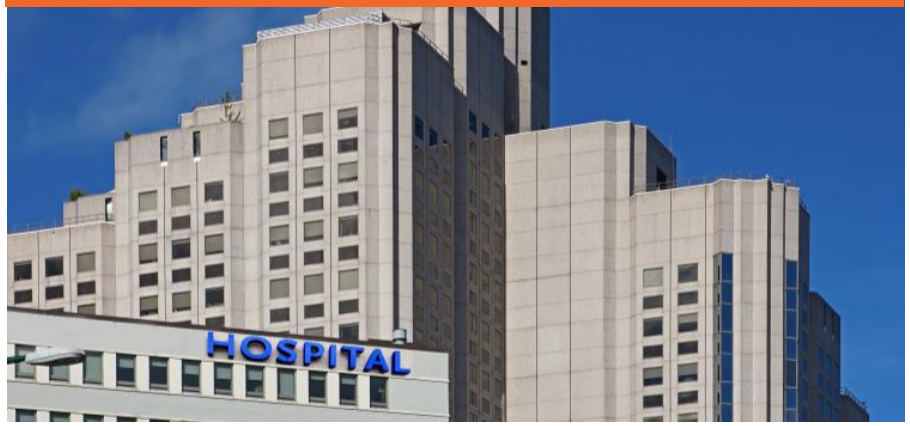
Availability of Radioactive Sources

Hospitals



Commercial Irradiation Facilities

Universities

Materials in Transit

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High-Activity Sources

Cancer Treatment
Industrial Sterilization

- Co-60
- 1,000 – 1,000,000+ Ci Normal Device Activity

Blood/Medical Research Irradiators
Dosimeter and Detector Calibrators

- Cs-137
- 1,000 – 50,000 Ci Normal Device Activity

Industrial Radiography

- Ir-192
- 10-100 Ci Normal Device Activity

Oil Well Logging

- Am-241
- 8-20 Ci Normal Device Activity

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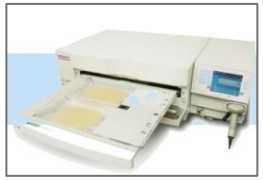
What are “Alternative Technologies”?

- Technologies which **do not contain radioactive materials** and which perform **an equivalent or better** function as a comparable device.

- Alternative technologies may use electricity to emit ionizing radiation (**machine-based technologies**, like **X-ray irradiators**). Some alternative technologies, like UV pathogen reduction systems, may not emit ionizing radiation.

Blood/Research Irradiation

X-ray

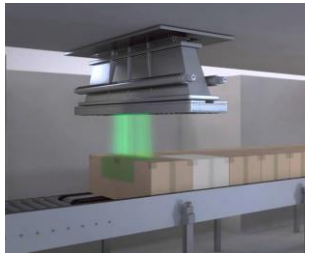


UV Pathogen Reduction

Cancer Treatment

Linear Accelerator (LINAC)

Industrial Sterilization



Industrial eBeam

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Support U.S. Government Policy

National Security Strategic Guidance:

"We will continue to lead the world in coordinated efforts to lock down nuclear and radiological materials and prevent terrorist acquisition."

National Security Memorandum 19:

"Reducing, eliminating, and securing radioactive and nuclear materials are the most effective means to prevent their acquisition and use…"

NNSA Strategic Vision:

"We must detect possible proliferation activities as early as possible and minimize pathways to attaining nuclear or radiological devices."

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Reduce Radiological Risks with Alternative Technologies

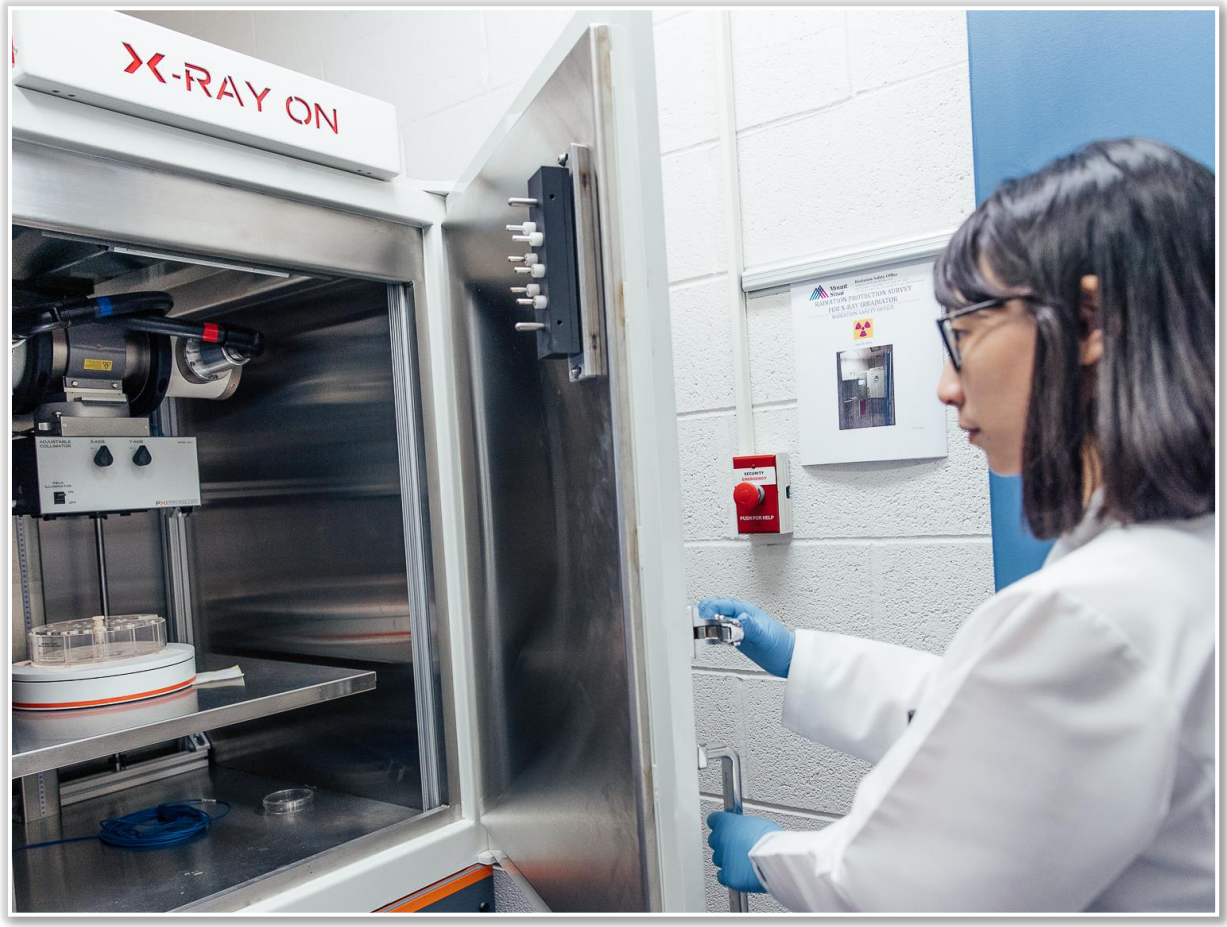
Strategies to Promote Alternative Technologies

Policy

Outreach & Education

Device Replacements

Research



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Outreach and Education

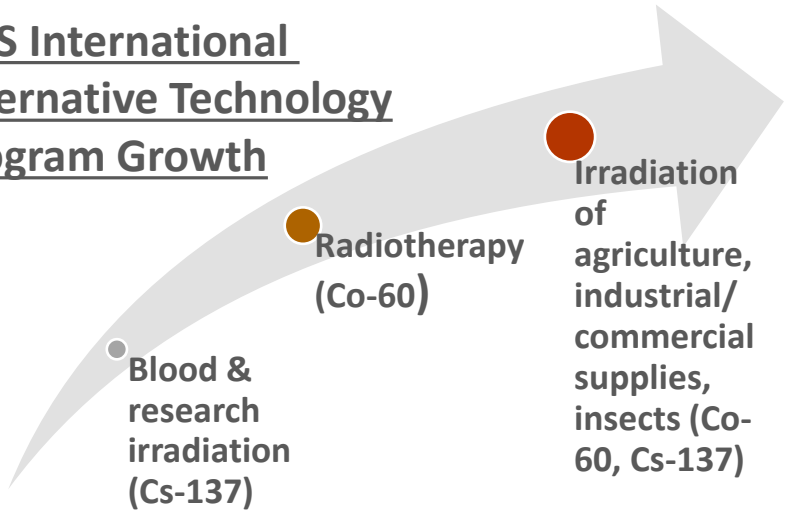
Activity	Examples
Organize targeted U.S. and international **workshops** to increase awareness of technology options and their benefits	• Co-chaired 8 meetings of the Ad Hoc Alt Tech Working Group with Germany and France (alttechwg.org) • National-level workshops with government and technology user communities • Workshops with NGO partners
Provide **educational materials** via media engagements, websites, handouts	• Brochures, fact sheets, and videos • Publication search engine (in development)
Present **papers or exhibit booths** at industry conferences	• IAEA • International Meeting on Radiation Processing • Institute for Nuclear Material Management
Meet directly with source users to discuss source security and technology options, including source alternatives	• Bilateral meetings to understand needs and challenges • SME consultations, via technical exchanges and report writing

International Project Implementation

Objectives:

- Achieve **permanent risk reduction** by implementing projects to replace existing radioactive sources with alternative technologies.
- Support transitions to alternative technologies by providing **non-device incentives,** when device acquisition is not feasible
- Encourage **positive exponential effects** by leveraging replacements to build awareness, familiarize end user communities with the technologies, and incentivize capacity building for current and future adoption.

ORS International Alternative Technology Program Growth



Accomplishments

- **Over 50 source removals** that were replaced with alternative technologies, including Cs-137 for blood and research irradiation and Co-60 for radiotherapy.

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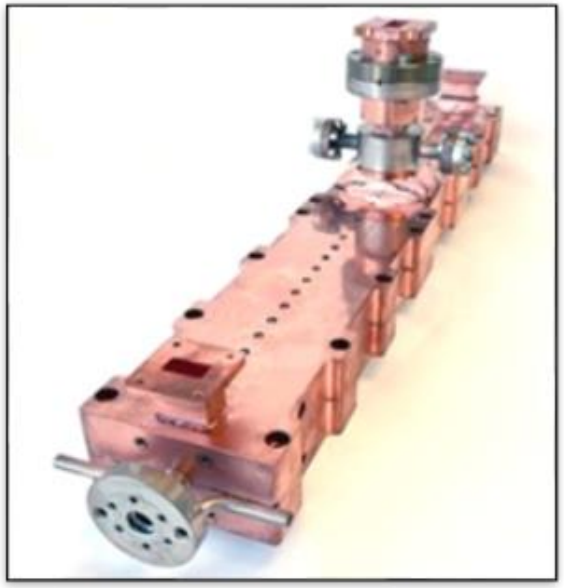
Research, Studies, and New Ideas

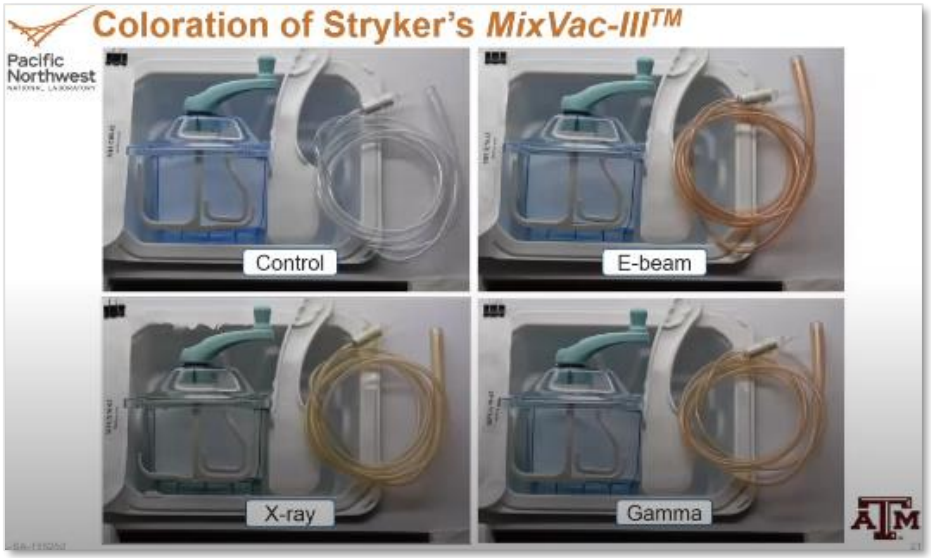
- **ORS collaborates with external subject matter experts and other R&D offices** within the U.S. Government to support projects aimed at developing **new and affordable accelerator-based technologies**.

Small Business Innovation Research Projects (SBIR)



Pictured: Tibaray concept

Comparison/Demonstration Studies

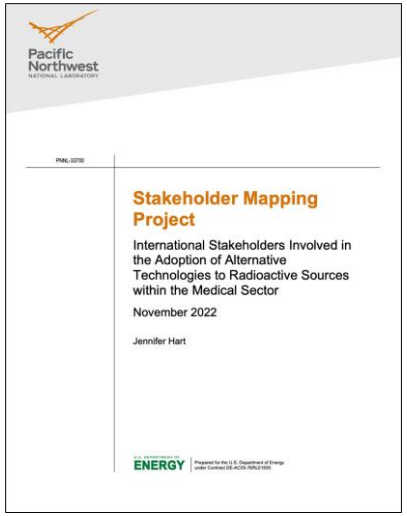


ORS International Collaboration on Radiotherapy

- **International Atomic Energy Agency**
  - ORS provided financial contribution to support **Siebersdorf LINAC** in 2019
  - ORS provided more than **$29 million in financial contributions** to the IAEA's **Programme for Action on Cancer Therapy (PACT)** and the **Rays of Hope program**
    - Funds were used to support LINAC procurements and training

- **International Partners**
  - Supported the International Cancer Expert Corps' **Access to Radiotherapy (ART) study** in Central Asian countries
  - Supported WINS' **Stakeholder Mapping Report** for Radiotherapy
  - Hosted a **workshop on overcoming barriers to LINAC access in Africa** in conjunction with the U.K. and Senegal

Donated LINAC at IAEA, 2019



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