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Update on the Office of Radiological Security Alternative Technology Program

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

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U.S. Political Foundation

National Academy of Sciences Recommendation (2008)

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

Task Force on Radiation Source Protection and Security (2010, 2014, 2018)

- Independent experts from 14 Federal Agencies, and one State organization
- Chaired by the NRC
- 2010, 2014, & 2018 report recommendations: U.S. Government (a) incentivize alternatives and (b) lead by example

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ORS Reduce Strategy

The ORS **REDUCE** Strategy:

- Supports the adoption and development of non-radioisotopic devices to achieve **permanent risk reduction** by reducing the footprint of risk-significant radiological materials
- Alternative technologies are commercially available for most applications of high-activity radioactive sources

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What are "Alternative Technologies"

Technologies which do not contain radioactive materials that perform an equivalent (or better) function as a comparable device

Alternative technologies may emit ionizing radiation, like **X-ray irradiators**, or they may not, like **UV pathogen reduction systems**

Application Examples

- Blood Irradiation
- Research Irradiation
- Sterile Insect Technique
- Food/Phytosanitary Irradiation
- Radiotherapy
- Medical Device Sterilization
- Plastic polymerization

Alternative Technology Examples

- Self-shielded X-ray Irradiators (generators)
- Industrial E-Beam & X-ray Conversion
- Linear Accelerators (LINAC)
- UV Pathogen Reduction
- Neutron Generators

New applications & technologies yet to emerge…

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ORS Device Replacements: U.S.

Cesium Irradiator Replacement Project

A voluntary initiative offering financial incentives to U.S. licensees who choose to replace Cs-137 self-shielded irradiators with alternative technologies.

Sites Receive:

- Removal of the Cs-137 device through the Off-Site Source Recovery Project (OSRP)
- A financial incentive toward the purchase price of an X-ray machine (typically 50%), paid as a reimbursement

Initiative	Irradiator Application	Irradiators to be Replaced
University of California	Blood & research	90%
New York City	Blood & Research	75%
Atlanta	Blood & Research	66%
Vitalant	Blood	100%

Progress to Date

- ~~135~~ **162** irradiators replaced
- ~~30%~~ **40%** of the U.S. inventory currently being replaced

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Research, Studies, and New Ideas

- **Collaboration with NNSA Office of Nonproliferation R&D**
  - Small Business Innovative Research (SBIR)
  - DOE Labs, universities
- **Technology research comparison studies**
  - Medical product materials sterilization
  - Biological research
  - Sterile Insect Technique
- **Policy & industry landscape studies**
  - Cost studies, Implementation feasibility
- **Technology demonstration Projects**
  - Flat panel X-ray source
  - Superconducting LINAC for industrial sterilization
  - Support for radiotherapy LINAC at the IAEA

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SBIR Example: Niowave Linac

- Superconducting linear accelerator to provide X-ray irradiation for industrial sterilization
- Completed Phase 1 and Phase 2 SBIR projects with the Office of Defense Nuclear Nonproliferation Research & Development
- ORS funded a Phase 3 SBIR in 2016 – 2017
- Concluded with a full-scale system demonstration

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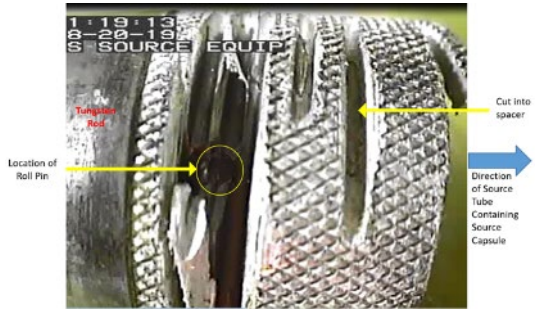
University of Washington Cs Contamination Incident

- During the removal of a Cs irradiator in May 2019 the source was accidentally breached
  - Released approximately 1 Curie of Cs
- 1 building and 13 people contaminated (11-55 millirem)
- Estimated cost for response, recovery remediation, and reconstruction: greater than $100,000,000



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Operational Phases

Phase 1 – Event Response (complete)

Phase 2 – Source Recovery (complete)

Phase 3 – Remediation (almost complete)

Phase 4 – Reconstruction (ongoing)

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Ongoing Operations (Phases 3 and 4)

- Remediation complete, with free release of the building expected in April
- Reconstruction ongoing and expected to continue through summer 2021
- Goal: reoccupation in fall 2021

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