



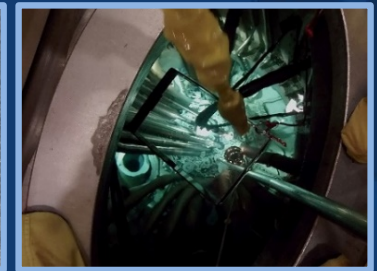
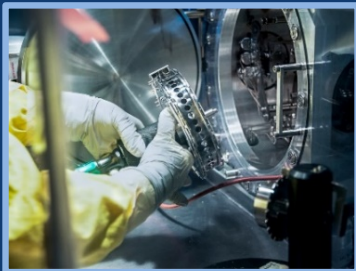
U.S. DEPARTMENT OF ENERGY
NATIONAL NUCLEAR SECURITY ADMINISTRATION
OFFICE OF DEFENSE NUCLEAR NONPROLIFERATION

Office of Defense Nuclear Nonproliferation

NNSA's Alternative Technology Research and Development Projects

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Research and Development



An organization that is innovative, adaptive, and anticipatory as it responds to current and evolving global nuclear risks.



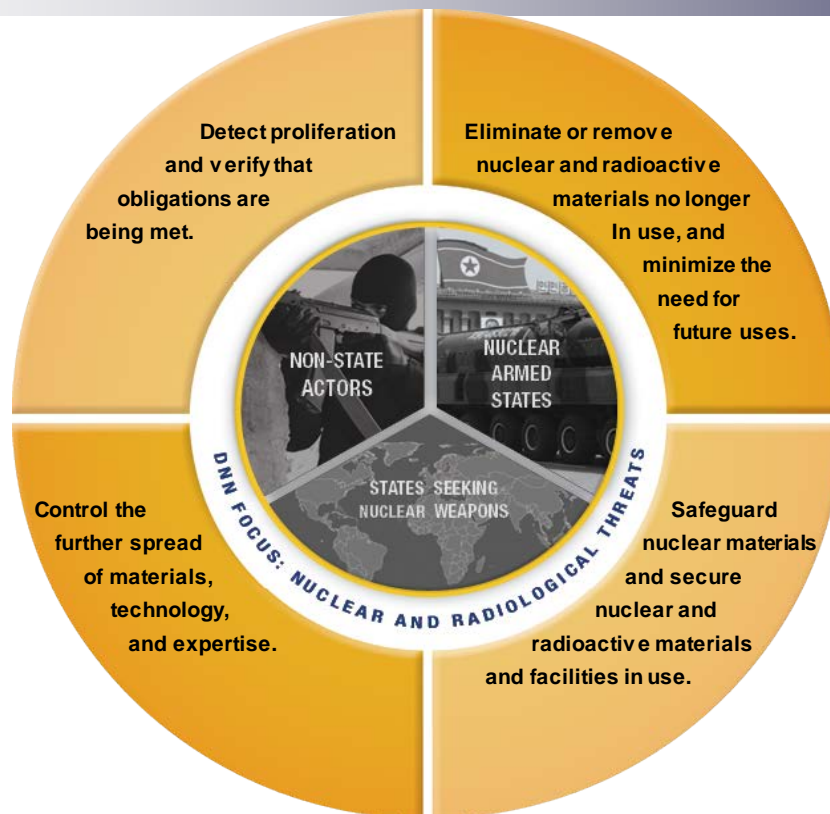
FOCUS AND CAPABILITIES

OUR VISION

An organization that is innovative, adaptive, and anticipatory as it responds to current and evolving global nuclear risks.

OUR MISSION

Develop and implement policy and technical solutions to eliminate proliferation-sensitive materials and limit or prevent the spread of materials, technology, and expertise related to nuclear and radiological weapons and programs around the world.



OUR STRATEGIC PRIORITIES



Strengthen global nuclear nonproliferation norms



Harness opportunities and combat risks posed by technology advancement



Provide world-leading technical expertise



Prepare for unanticipated challenges and events

CONTACT US:

The National Nuclear Security Administration
Office of Defense Nuclear Nonproliferation

(202) 586-0645

www.energy.gov/nnsa/missions/nonproliferation



OFFICE OF Defense Nuclear Nonproliferation



Achieve permanent threat reduction by minimizing and, when possible, eliminating weapons-usable nuclear material from civilian use around the world.

Global
Material
Security



Build sustainable capacity to secure nuclear and radioactive materials and interdict and investigate the trafficking of those materials.

OFFICE OF
**NONPROLIFERATION AND
ARMS CONTROL (NPAC)**

Strengthen nonproliferation and arms control regimes to prevent proliferation, ensure peaceful nuclear uses, and enable verifiable nuclear reductions.

OFFICE OF
**DNN RESEARCH
& DEVELOPMENT**

Reduce the threat to national security by advancing U.S. capabilities to detect and monitor foreign nuclear fuel cycle and weapons development activities, special nuclear material movement or diversion, and nuclear explosions.



Convert

Modify/convert facilities to eliminate the need for weapons-usable nuclear materials in civilian applications.



Office of International Nuclear Security

Strengthen partner capacity and commitment to secure nuclear weapons and weapons-usable material.



International Nuclear Safeguards

Build capacity of the International Atomic Energy Agency and partner countries to implement international safeguards obligations.



Office of Proliferation Detection

Develop U.S. technical capabilities to detect, prevent, counter, and respond to nuclear security threats.



Remove

Remove or confirm the disposition of weapons-usable nuclear material at civilian sites worldwide, while maintaining the capability to rapidly respond to support material removal from countries of concern.



Office of Radiological Security

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



Nuclear Export Controls

Build domestic and international capacity to implement export control obligations.



Office of Nuclear Detonation Detection

Improve the technical means to identify, locate, and characterize nuclear tests or explosions.



Dispose

Downblend weapons-usable HEU and Pu that is excess to national defense in the United States or returned to the United States by M3's Remove Program.



Office of Nuclear Smuggling Detection and Deterrence

Improve nuclear and radiological security by strengthening partner capabilities to deter, detect, and investigate the smuggling of nuclear and radioactive material.



Nuclear Verification

Support negotiation of and implement agreements and associated monitoring regimes to verifiably reduce nuclear weapons and nuclear programs and ensure the peaceful uses of American exports.



Nonproliferation Policy

Develop policies, programs, and strategies to address emerging nonproliferation and arms control challenges and opportunities.

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



Policy Engagement



Device Replacements



Outreach & Education



Research

ORS Reduce (Alternative Technology) Strategy

ORS Reduce Research Activities

Collaboration with R&D offices

- NNSA Defense Nuclear Nonproliferation R&D
- DOE Office of Science
- IAEA

Technology 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 (SBIR)
- Superconducting LINAC for industrial sterilization (SBIR)
- Support for radiotherapy LINAC at the IAEA

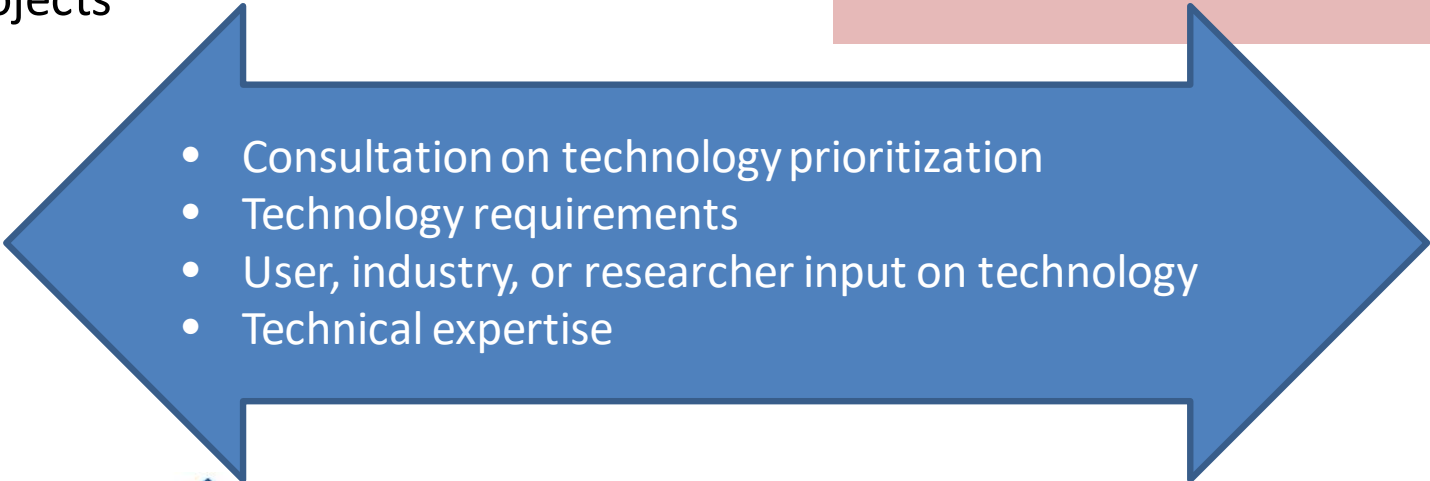
DNN R&D – ORS Collaboration

DNN R&D

- Technology landscape or comparison studies
- Small Business Innovative Research Projects (SBIR Phase I & II)
- National Lab and university R&D projects

ORS

- Industry landscape or technology comparison studies
- Small Business Innovative Research Projects (SBIR Phase III)

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- Consultation on technology prioritization
 - Technology requirements
 - User, industry, or researcher input on technology
 - Technical expertise



DNN Research & Development



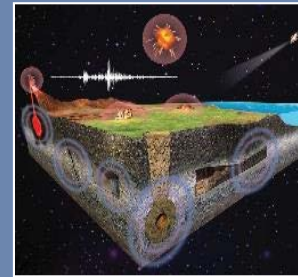
Advance U.S. nuclear security capabilities, in close coordination with mission Partners, using DOE National Laboratories, Universities, & Industry



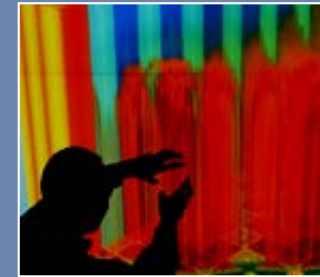
Detect Foreign Weapons Activities



Increase Nuclear Security



Detect Nuclear Explosions



Sustain Nonproliferation Capabilities

Develop timely early proliferation detection capabilities

Develop high-confidence verification and monitoring capabilities

- Capabilities to detect, locate & characterize foreign nuclear weapons development activities

- Capabilities to detect presence, movement & diversion of SNM, including for interdiction, emergency response, safeguards

- Capabilities for detecting & monitoring ground-, atmospheric-, and space-based nuclear detonations

- Enabling infrastructure, science & technology, and expert workforce to meet future nonproliferation challenges



DNN R&D SBIR Program



- **Congressionally mandated programs**
 - Small Business Innovation Research (SBIR)
 - Small Business Technology Transfer (STTR)
 - Encourage domestic small businesses to engage in Federal R&D with the potential for commercialization
- **R&D funds allocated**
 - SBIR 3.2%
 - STTR 0.45%
- **Administered through DOE Office of Science**
- **Current awards**
 - 15 Phase I
 - 15 Phase II
- **Current priorities are [Alternative Technologies for Radioactive Sources](#), radiation detection, space-based sensors, and remote detection**



ORS and DNN R&D Coordination on Radiological Source Alternative Technology



Small Business Innovative Research

- Input on priorities provided by ORS
- Discussion and joint consideration of new SBIR Topics on Radiological Source Alternative Technologies
- Maintain several active grants for Phase 1 and ongoing Phase 2 SBIRs
- Joint ORS and DNN R&D proposal review and funding decisions

DOE National Laboratories

- Similar coordination with ORS to determine topics at DOE Labs
- Small investment in research targeting Alternative Technologies



DNN R&D Radiological Source Alternative Technology



- **Prior to 2018**

- 28 total Radiological Source Alternative Technology SBIRs
- 11 of 28 grants progressed Phase 2
- Several past DOE lab efforts (2 current efforts at SLAC and FNAL)

- **Recent Topics**

- Medical and Industrial Sterilization (includes Blood Irradiation)
- Accelerators for medical care
- Sterile Insect Technique
- Oilwell Borehole logging & AmBe replacement

- **Current and Future Efforts –**

- 50% target for progression from Phase 1 to Phase 2 SBIRs
- Phase 1 – 5 existing grants on radiological source alternative technology
- Phase 2/2b – 5 existing grants
- DOE SBIR Release 2, Phase 1 topic on X-ray technology.
 - New Phase 1 grants in Spring 2021