



Nuclear Materials Management

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Savannah River Site Information Pods

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What do we mean by nuclear materials?

- **Radioactive isotopes**
 - Occur naturally and can be produced artificially (in a nuclear reactor)
- **Fissile materials**
 - Isotopes of plutonium and uranium, capable of a self-sustaining nuclear chain reaction
- **Tritium**
 - Isotope of hydrogen used in nuclear weapons
- **Used nuclear fuel**
 - Fuel that has been withdrawn from a nuclear reactor following irradiation



Commercial nuclear power plant

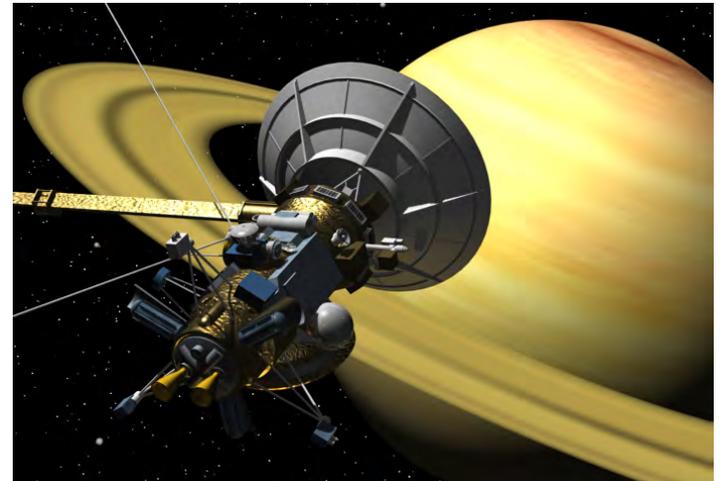


Used nuclear fuel at SRS

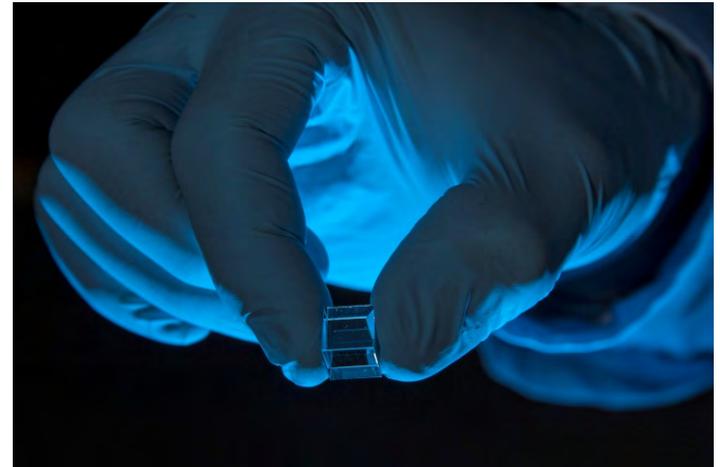


How are nuclear materials used?

- Agriculture (insect control, food preservation)
- Archaeology (age measurements)
- Consumer products (smoke detectors, nonstick pans)
- Energy (20% of U.S. electricity)
- Industry (tracers, radiography)
- Medicine (diagnostics and treatment)
- Science (research)
- Security (detection of concealed material)
- Space exploration (energy source for spacecraft)
- Weapons (nuclear deterrent)



Powered with SRS plutonium-238



Radiation detector crystal



Nuclear Materials Management: Challenges and the SRS Role

Challenges of Nuclear Materials Management

SRS Role in Nuclear Materials Management

Reliable
nuclear
deterrent

Tritium gas, used in nuclear weapons, must be periodically replenished due to decay

SRS prepares the nation's only tritium supply for the U.S. nuclear weapons program

Legacy
nuclear
materials

Cold War production left behind nuclear materials and waste products at SRS and across the country

SRS processes nuclear materials into valuable assets and stable waste forms

At SRS, SRNL develops and deploys highly innovative approaches to address nuclear materials challenges

Global
Nonproliferation

Proliferant nuclear materials exist worldwide under varying safety and security conditions

SRS secures nuclear materials to prevent international terrorism and proliferation

Commercial
applications

Increasing dependence on foreign sources of radioactive isotopes

SRS produces valuable isotopes and fuel for commerce



Nuclear Deterrent: SRS is sole provider of tritium for national defense

- Operates nation's only full-scale tritium processing facilities
- Recycles and purifies tritium from dismantled weapons
- Extracts new tritium from irradiated target rods
- Replenishes tritium reservoirs for use in existing weapons
- Ships to Department of Defense
- Supplies helium-3 gas, used in radiation detectors
- Performs reliability testing on gas transfer systems
- SRNL recognized as world leader in tritium science /technology



Tritium Facilities at SRS



Legacy Nuclear Materials: SRS provides interim storage and processing

- **Savannah River Site role**
 - Material receipts and secure interim storage in robust hardened facilities
 - *Surplus plutonium*
 - *Defense Used Nuclear Fuel (UNF)*
 - Operation of nation's only large scale radiochemical processing and waste facilities
 - *Prepare surplus Pu for disposition*
 - *Dissolve UNF, recover uranium and blend down for commercial fuel*
 - SRNL provides innovative approaches for processing legacy materials and high-level waste



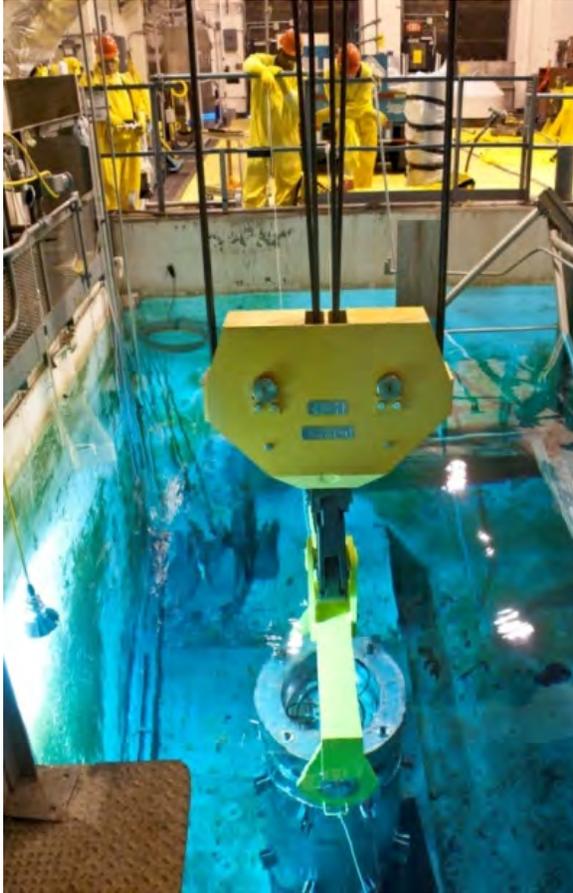
Interim used fuel storage



Stable waste form

SRS maintains unique assets to manage legacy nuclear materials

Unique large scale secure interim storage facilities



L Basin



K Area



ARP/MCU



SRS maintains unique assets to manage legacy nuclear materials

Nation's only large-scale
nuclear materials separations facilities:
H Canyon and HB Line



H Canyon



HB Line



U.S. DEPARTMENT OF
ENERGY

SRS maintains unique assets to manage legacy nuclear materials

Nation's only large-scale
waste vitrification facility:
Defense Waste Processing Facility



DWPF canisters



DWPF



U.S. DEPARTMENT OF
ENERGY

Global Nonproliferation: SRS secures international nuclear materials

- Operation of unique large scale secure interim storage facilities
- Secure vulnerable materials worldwide
- Deploy response teams to quickly recover nuclear materials
- SRNL provides nuclear forensics, detection and collections capabilities



Radiological Evidence Examination Facility

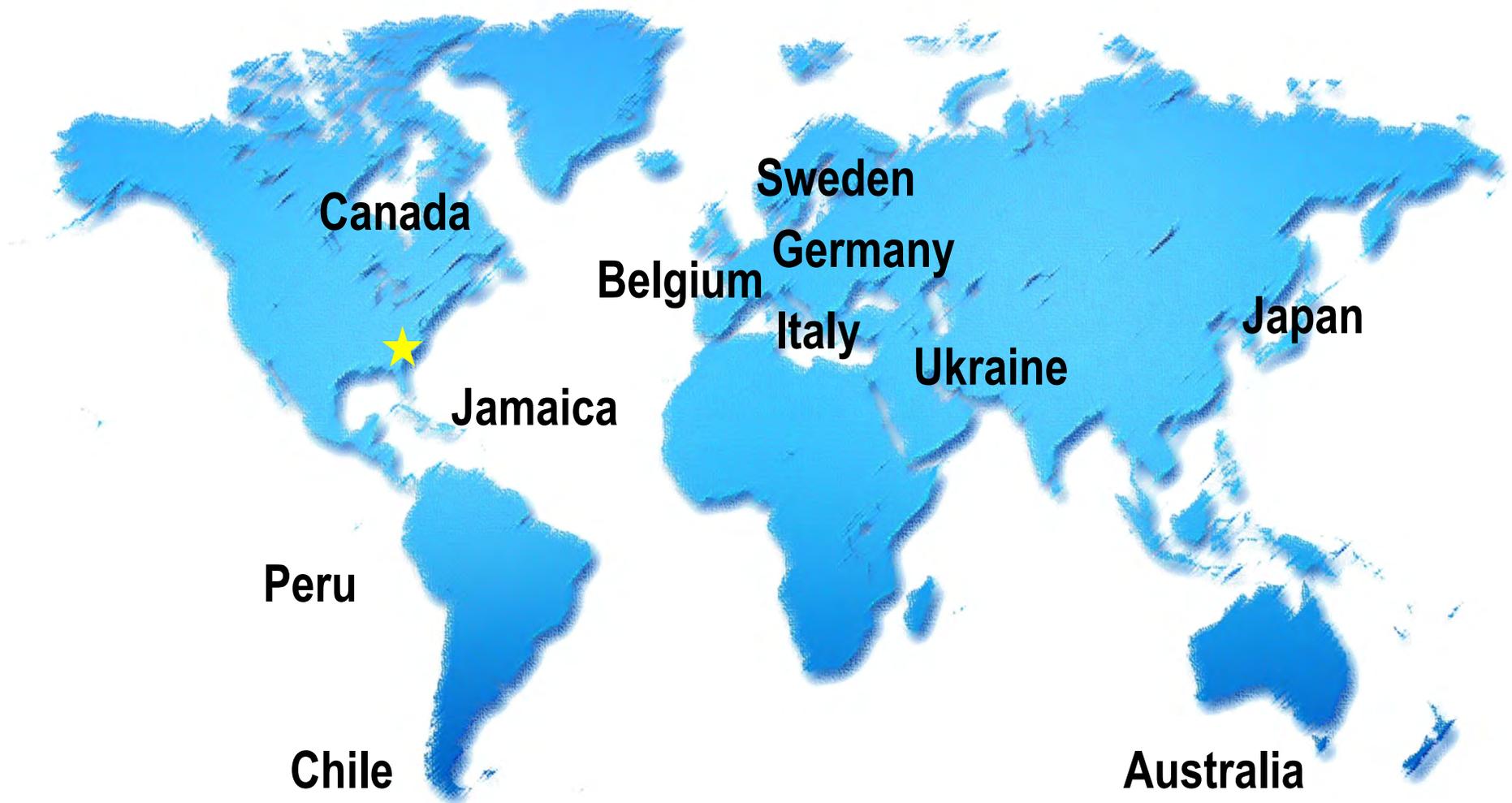


Russian fuel return



SRS Mobile Plutonium Facility

Providing international support for U. S. nonproliferation objectives



Commercial Applications: SRS produces valuable isotopes and fuel for commerce

- Interim storage of legacy nuclear materials capable of producing rare isotopes
- Transformation of surplus weapons material into clean fuel for commercial power generation
- SRNL provides expertise in isotope production, clean energy storage and fuel cycle R&D



Medical isotope production

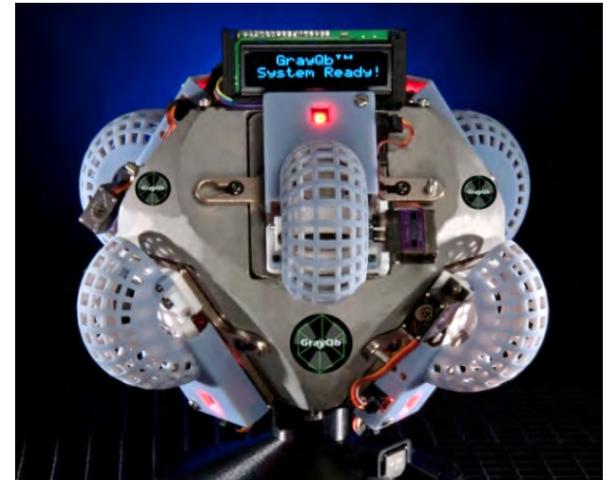


Hydrogen and natural gas storage, based on tritium technologies



Savannah River National Laboratory: Providing nuclear materials innovation

- DOE's National Laboratory for complex-wide environmental management
- Provides innovative approaches for processing legacy materials and high-level waste
- Recognized as world leader in tritium science and technology
- Provides nuclear forensics, detection and collections capabilities
- Provides expertise in isotope production, clean energy storage and fuel cycle R&D
- Supports customers at SRS, throughout DOE, at other federal agencies, across the country and the world



GrayQb™ nuclear materials mapping technology



Natural gas storage based on tritium technologies

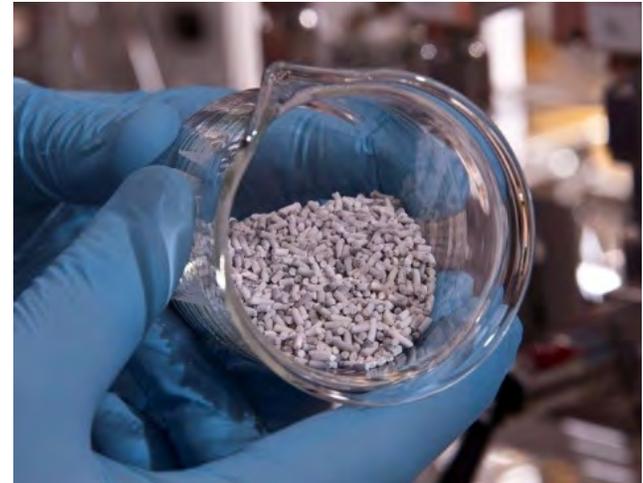
Safety at SRS is our highest priority

- Protection of workers, public and environment is our objective
- Employ world's premier nuclear safety experts
- One of safest industrial complexes in the world (top 5 percent)
- Safest site in the DOE Complex
- Most secure site in the country



What is effective nuclear materials management?

- Ensuring materials are safely handled and securely stored
- Providing robust interim storage under all credible scenarios
- Advancing disposition and risk reduction of unwanted materials
- Developing new technologies to reduce costs, accelerate risk reduction
- Securing vulnerable materials
- Ensuring a reliable supply of materials to meet national needs



Metal hydride based technologies



Safe/secure materials packaging and transportation

