U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration
Defense Nuclear Nonproliferation

Global Threat Reduction Initiative

U.S.-Origin Nuclear Fuel Removals

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GTRI Mission and Goals

DOE STRATEGIC GOAL 2.2

Prevent the acquisition of nuclear and radiological materials for use in weapons of mass destruction and other acts of terrorism

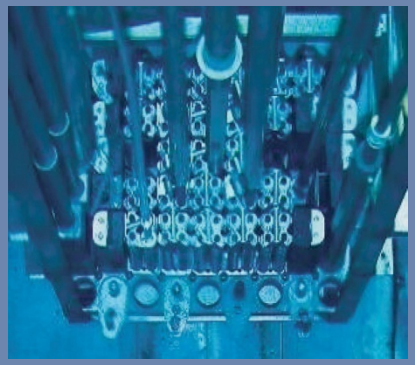
GTRI MISSION

Reduce and protect vulnerable nuclear and radiological material located at civilian sites worldwide.

GTRI is:

- A part of President Obama's comprehensive strategy to prevent nuclear terrorism; and
- The key organization responsible for implementing the U.S. HEU minimization policy.

Convert



Convert research reactors and isotope production facilities from the use of highly enriched uranium (HEU) to low enriched uranium (LEU)

These efforts result in permanent threat reduction by minimizing and, to the extent possible, eliminating the need for HEU in civilian applications – each reactor converted or shut down eliminates a source of bomb material.

Remove

Remove and dispose of excess nuclear and radiological materials; and

These efforts result in permanent threat reduction by eliminating bomb material at civilian sites – each kilogram or curie of this dangerous material that is removed reduces the risk of a terrorist bomb.

Protect

Protect high priority nuclear and radiological materials from theft and sabotage

These efforts result in threat reduction by improving security on the bomb material remaining at civilian sites – each vulnerable building that is protected reduces the risk until a permanent threat reduction solution can be implemented.

Context

Presidential Speech in Prague – April 5, 2009

"Today, I am announcing a new international effort to secure all vulnerable nuclear material around the world within four years. We will set new standards, expand our cooperation with Russia, and pursue new partnerships to lock down these sensitive materials."

Context

Nuclear Security Summit
April 12 & 13th, 2010

"We recognize that highly enriched uranium and separated plutonium require special precautions and agree to promote measures to secure, account for, and consolidate these materials, as appropriate; and encourage the conversion of reactors from highly enriched to low enriched uranium fuel and minimization of use of highly enriched uranium, where technically and economically feasible."

GTRI World Wide Scope

GTRI Removal Activities

Status: 4,696 kilograms to be removed by 2016;
2,735 completed (59%) (total program)

- Russian-origin: 2,421 kilograms by 2016; 1,590 completed (66%)
- US-origin (HEU only): 1,364 kilograms by 2013; 1,250 completed (91%)
- Gap-material: 911 kilograms by 2016; 252 completed (27%)
- **All HEU material has been removed from 19 countries** Brazil, Bulgaria, Chile, Colombia, Denmark, Greece, Latvia, Libya, Philippines, Portugal, Romania, Serbia, Slovenia, South Korea, Spain, Sweden, Taiwan, Thailand, and Turkey.
- **Completed clean-out of HEU from of 6 of the 18 countries since the President's April 2009 speech in Prague -** Romania (June 2009), Taiwan (September 2009), Libya (December 2009), Turkey (January 2010), Chile (March 2010) and Serbia (December 2010).

Casks of HEU spent nuclear fuel being loaded for transportation from Latvia back to Russia, May 2008

Hungarian fuel coming off the trains at the port of Koper in Slovenia, September 2008

U.S.-Origin Nuclear Removal Objective

Goal: Remove or dispose of excess WMD-usable U.S.-origin nuclear materials located at civilian sites worldwide:

- Reduce and, to the extent possible, eliminate the use of HEU from civilian nuclear applications
- Disposition LEU spent fuel as an incentive for foreign reactor operators to convert from HEU to LEU fuel
- Allow time for countries with spent fuel (both HEU and LEU) containing uranium enriched in the United States to resolve their own disposition

These efforts result in permanent threat reduction because each kilogram of this dangerous material that is secured and disposed of removes it from possible diversion for malevolent purposes.

Legal Authorities

U.S.-Origin Nuclear Remove Program – Also known as the Foreign Research Spent Nuclear Fuel Acceptance Program (FRR)

- The program began in 1996 - **Record of Decision for the Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel** issued by the Department on May 13, 1996, and published 61 FR 25092, May 17, 1996.

    a. Rev. 1 - Allows the U.S to take title to SNF from FRRs in countries with OTHI economies.
    b. Rev. 2 - Allows shipment of up to 16 casks of SNF on a single ocean-going vessel.
    c. Rev. 3 - extended the Acceptance Program for an additional 10 years, until May 12, 2019, for fuel acceptance.
    d. Rev. 4 - Allows DOE to take title to SNF and target material from FRRs located in countries with high-income economies at locations other than the port of entry into the United States on a case-by-case basis.
    e. Rev. 5 - Allows the U.S. to accept GAP material.

- **FRR program shipments are conducted within the U.S. pursuant to DOE, DOT and NRC rules and regulations.**

U.S.-Origin and Gap Remove Program Shipments

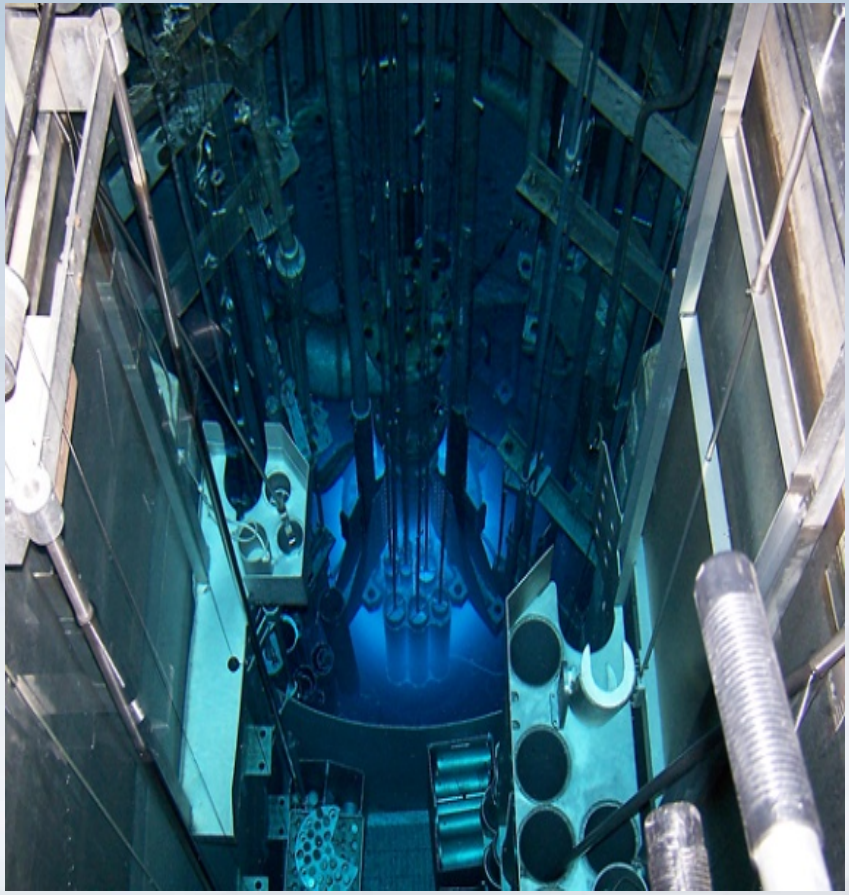
- **57 shipments completed (3 Gap)**
- **46 via Ocean to East Coast**
- **9,354 spent fuel assemblies, from 30 countries**
- **8 cross-country shipments completed including one west coast shipment**
- **229 casks/7,934 assemblies to SRS**
  19 casks/1,383 rods to INL
  15 casks/37 assemblies to Y-12

Primary Shipping Route

- Primary receiving site is Joint Base Charleston - Naval Weapons Station. Security provided by Coast Guard, JBC, DNR, local PD.

- Dedicated trucks (or trains) with no other cargo. Security provided by SLED, State Transport Police, Highway Patrol, DNR. This ensures no jurisdictional arguments.

- The Program averages ~ 2-4 shipments moving approximately 10 casks each year. These will continue to decline as the program nears its end in 2019.



Canadian Shipments

- Receiving site for Canadian material is the Savannah River Site located in Aiken, South Carolina.
- Dedicated trucks with no other cargo. Security provided by each state's Police/Highway Patrol.
- Since the FRR program began in 1996, there have been 5 shipments from Canada. The most recent was of a SLOWPOKE core in September of 2011.
- One shipment of SLOWPOKE core pins may occur in 2012.
- Next major campaign will be for NRU/NRX fuel from Chalk River Laboratories in Ontario.

Upcoming Canadian Shipments

NRU/NRX

- NRX was a research reactor that began operation in 1947 and was shut down in 1993.
- NRU is a research reactor that began operation in 1957 and continues to run today. It was the first reactor able to commercially produce medical isotopes.
- The NRU reactor supplies the vast majority of all Technetium-99 used in the U.S. for diagnostic nuclear medicine procedures as well as other medical isotopes.
- The FRR program is expecting to begin return of NRU/NRX fuel in 2013. Approximately 1000 fuel elements will be returned. This will likely result in 7-8 shipments a year lasting 3 ½ to 4 years.

NRU Reactor at Chalk River

Shipment Coordination

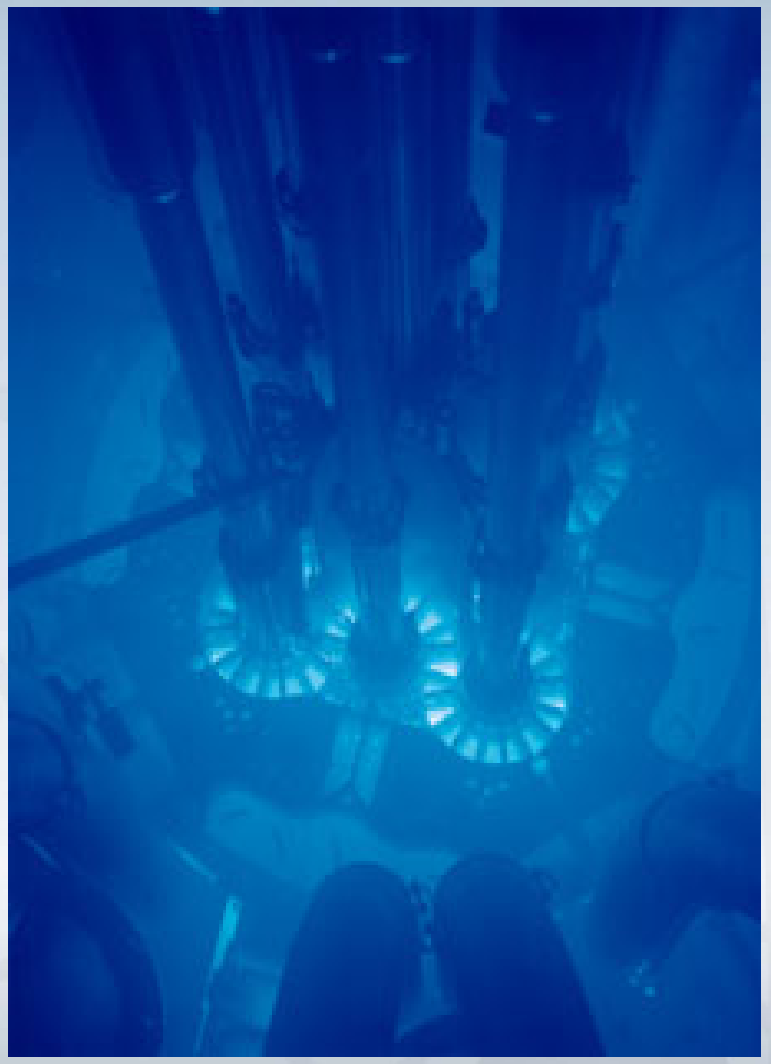
- Chris Wells, the Assistant Director for Nuclear Programs of the Southern States Energy Board - is the FRR program's primary contact for discussing shipping issues that arise in the South. Mr. Wells assists us in communicating with the correct parties within each particular state, if necessary. Mr. Wells is also the coordinator for every 30-day meeting prior to a FRR shipment arriving in Charleston, SC.
- Shipper of record is required to notify each state of a shipment prior to start.
- Generally the shipper will send official written communication to the Governor's Designee. However, the shipper often has existing relationships with state entities, such as the highway patrol, and will communicate directly with them to work out timing of the shipment and to arrange for escorts.

Shipping Route

- Currently approved NRC Route from Canada to South Carolina (traversing NY, PA, WV, VA, NC, SC) is up for renewal in 2013.
- Security escorts for several states have identified preferred alternate routes which avoid population centers and shorten transit times.
- 49 CFR § 397.101 - DOT requires that the transportation of a highway route controlled quantity of Class 7 (radioactive) shipment follow a preferred route. This is an Interstate System highway for which an alternative route has not been designated by a state routing agency.
- When the route is renewed, the FRR program has committed to work with the states to adjust the current NRC approved route to incorporate the preferred alternatives, if possible.

NRC Safeguards Information Requirements

- Safeguards Information not to be released except with "need to know"
  - Time and Schedule Information
  - Specific details about shipment
  - Security Measures (number of escorts, armament, disposition, communication systems, tracking systems)



Recent Shipment of Note

- All remaining HEU from Chile removed – **South America is essentially HEU free**
- This shipment was announced at Nuclear Security Summit last year
- The shipment from Chile was the first shipment of non-U.S.-origin HEU spent fuel to the United States
- The Chilean shipment consisted of 18.3 Kg of HEU research reactor spent fuel and 433 U.S.-origin sources packaged by LANL's OSRP

Recent Shipment

- An 8.8 earthquake struck Chile after all of the fuel had been prepared and packaged for shipment
- The HEU, casks and ISO containers were not damaged
- The transfer of the ISO containers to the port and loading onto the ocean vessels were affected
- Slight delay in the departure to the U.S. due to the change in route and port of embarkation

Robust Shipping Containers

- What kind of container are these types of materials transported in?
- What standards are they built to and how are they evaluated?

Robust Shipping Containers

- All casks conform to IAEA standards
  - NRC verifies cask design meets IAEA TS-R-1
  - Certificate of Competent Authority issued by USDOT
- Tests performed in sequence
  - 30 foot drop onto flat unyielding surface
  - 40 inch free drop onto 6 inch diameter steel rod at least 8 inches long at weakest point
  - Totally engulfed in fire 1475 degrees for 30 minutes
  - Completely submerged 3 ft. of water for 8 hours
- Separate test immersed under 50 ft. water for 8 hours

Conclusion

Thank you for inviting me to speak to you.

Questions?