

Global Threat Reduction Initiative



The Current Status of Gap and U.S.-Origin Nuclear Fuel Removals 2011

Jeff Galan, Deputy Project Manager
U.S.-Origin Nuclear Remove Program
National Nuclear Security Administration

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

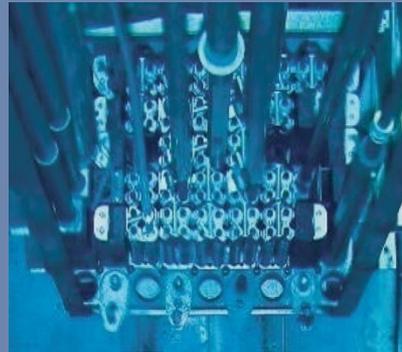
GTRI MISSION

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.”*

❑ Obama-Medvedev Moscow Joint Statement – July 6, 2009

❑ Both sides committed themselves to:

- *Repatriation of spent highly-enriched uranium (HEU) fuel*
- *Elimination of excess stocks of proliferation-sensitive nuclear materials worldwide*
- *Development of new types of low-enriched uranium (LEU) fuel for possible conversion of research reactor cores*



Context

- ❑ UN Security Council Resolution 1887 – September 24, 2009
- ❑ Calls upon Member States to:
 - *Aim to secure all vulnerable nuclear material from such risks within four years*
 - *Minimize to the greatest extent that is technically and economically feasible the use of highly enriched uranium for civilian purposes*
- ❑ Nuclear Security Summit – April 12 & 13, 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.”*



Removal Activities

Status: 4,722 kilograms to be removed by 2016 via Three Removal Programs; 3,086 completed (65%)

- Russian-origin: 2,420 kilograms by 2015; 1590 completed (66%)
 - GTRI has expanded its ability to ship HEU spent fuel to Russia and can now ship spent fuel by rail, sea, and air
- US-origin: 1,364 kilograms by 2014; 1,244 completed (91%)
- Gap-material: 938 kilograms by 2016; 252 completed (27%)
- All HEU material has been removed from 18 countries:
 - Brazil, Bulgaria, **Chile**, Colombia, Denmark, Greece, Latvia, **Libya**, Philippines, Portugal, **Romania**, Slovenia, South Korea, Spain, Sweden, **Taiwan**, Thailand, and **Turkey**
- All HEU has been removed from **5 countries in the past year** (since the President's April 5, 2009 Prague speech)
 - Romania (June 2009), Taiwan (September 2009), Libya (December 2009), Turkey (January 2010) and Chile (March 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 Remove 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.

U.S.-Origin HEU Removal

Scope: Repatriate U.S.-origin HEU and LEU spent nuclear fuel

- Program Environmental Impact Statement permits return of TRIGA fuel and MTR fuel
 - Agreement to convert reactor to LEU fuel required for facility eligibility
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- **In 2004, DOE approved a ten-year extension of this program. Currently the United States will accept eligible spent fuel that is irradiated by May 2016 and returned to the United States by May 2019**
 - **Responsibility for fuel return transferred to NNSA in 2004**



U.S.-Origin Fuel Removal from Japan

Gap Removal

Scope: Facilitate the disposition of high risk, vulnerable nuclear material not covered by other removal efforts if the required conditions are met. The materials could include:

- U.S.-origin spent nuclear fuel not covered by the existing U.S.-origin fuel return program
- HEU material of non-U.S.-origin and non-Russian-origin
- U.S.-origin HEU fresh research reactor fuel
- Separated plutonium

Accomplishments:

Since the program began in 2006, approximately 252 kilograms of HEU and plutonium have been removed from Belgium, Canada, Chile, Italy, the Netherlands and other countries

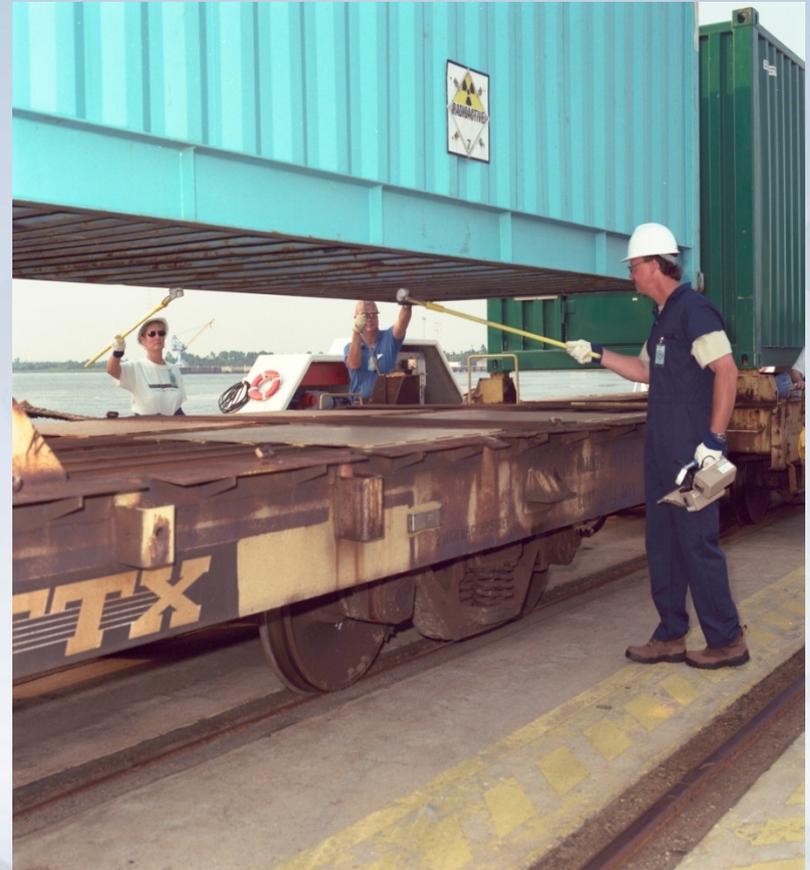


Gap Removal

- **Revised Record of Decision** approved by NNSA Administrator in January 2009 allows GTRI “to transport up to 1 metric ton of spent nuclear fuel (Gap Material SNF) from foreign research reactor locations to the United States and safely store this Gap Material at a DOE site pending disposition.”
- **According to the Revised Record of Decision, material must also meet the following 4 conditions:**
 - 1) Pose a threat to national security,
 - 2) Be susceptible to use in an improvised nuclear device,
 - 3) Present a high risk of terrorist threat, and
 - 4) Have no other reasonable pathway to assure security from theft or diversion
- **First priority is to find a commercial disposition pathway**
 - Approximately 100 kilograms have been sent to commercial companies for disposition, working on dispositioning additional plutonium and HEU materials
- **The material must also meet Savannah River Site acceptance criteria**

U.S.-Origin and Gap Remove Program Shipments

- **55 shipments to the U.S. completed (3 Gap)**
- **44 via Ocean to East Coast**
- **9,304 spent fuel assemblies, from 29 countries**
- **8 cross-country shipments completed including one west coast shipment**
- **226 casks/7,884 assemblies to SRS;
19 casks/1,383 rods to INL
15 casks/37 assemblies to Y-12**
- **1256 kgs of HEU returned**
- **3611 kgs of LEU returned**



SHIPMENTS TO DATE (5/5/11)



**Shipment to Y-12
at Oak Ridge, TN**

1. Argentina
2. South Korea
3. Chile (GAP)

**Shipment to INL
at Idaho Falls, ID**

1. South Korea
2. Romania (2)
3. Slovenia
4. Italy
5. Germany (2)

6. United Kingdom
7. Japan (2)
8. Indonesia

**Shipment to SRS
at Aiken, SC**

1. Sweden (10)
2. Switzerland (2)
3. Germany (14)
4. Colombia (1)
5. Chile (3)

6. Canada (4)
7. Spain (3)
8. Italy (3)
9. Japan (12)
10. Denmark (5)

11. Greece (2)
12. Australia (3)
13. Venezuela (2)
14. Uruguay (1)
15. Thailand (1)

16. Philippines (1)
17. Indonesia (3)
18. Taiwan (2)
19. Portugal (2)
20. Brazil (2)

21. Argentina (2)
22. Austria (2)
23. Netherlands (3)
24. Turkey (1)
25. Israel (1)

Recent Shipments of Note

- All remaining HEU from Chile removed – South America is effectively 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 Shipments of Note

- 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 change in route and port of embarkation



Source Recovery

- Capability to transport sources jointly with U.S.-Origin or Gap Remove and Off-Site Source Recovery Program
 - Particularly PuBe sources which can not be transported by air
 - To learn more and/or register online, please visit:
<http://osrp.lanl.gov>
- GTRI highly encourages partner countries and reactor operators to work with neighbouring countries interested in disposing of sources to share the dedicated vessel to be used in the spent fuel shipment
 - Provides an opportunity for overall cost savings when compared to two separate shipments
 - Allows for international cooperation in securing nuclear and radiological materials



Conclusion

- **Recent years have been the busiest for GTRI removal programs**
- **GTRI's removal programs need the cooperation of our partners to complete the mission**