Global Threat Reduction Initiative

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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

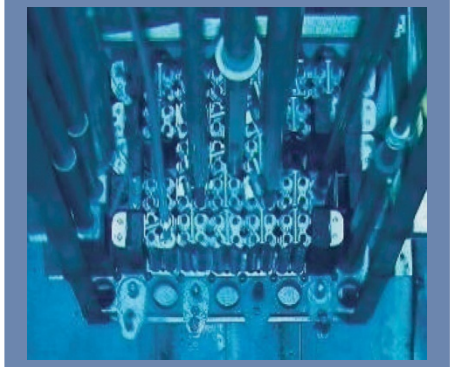
GTRI MISSION

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

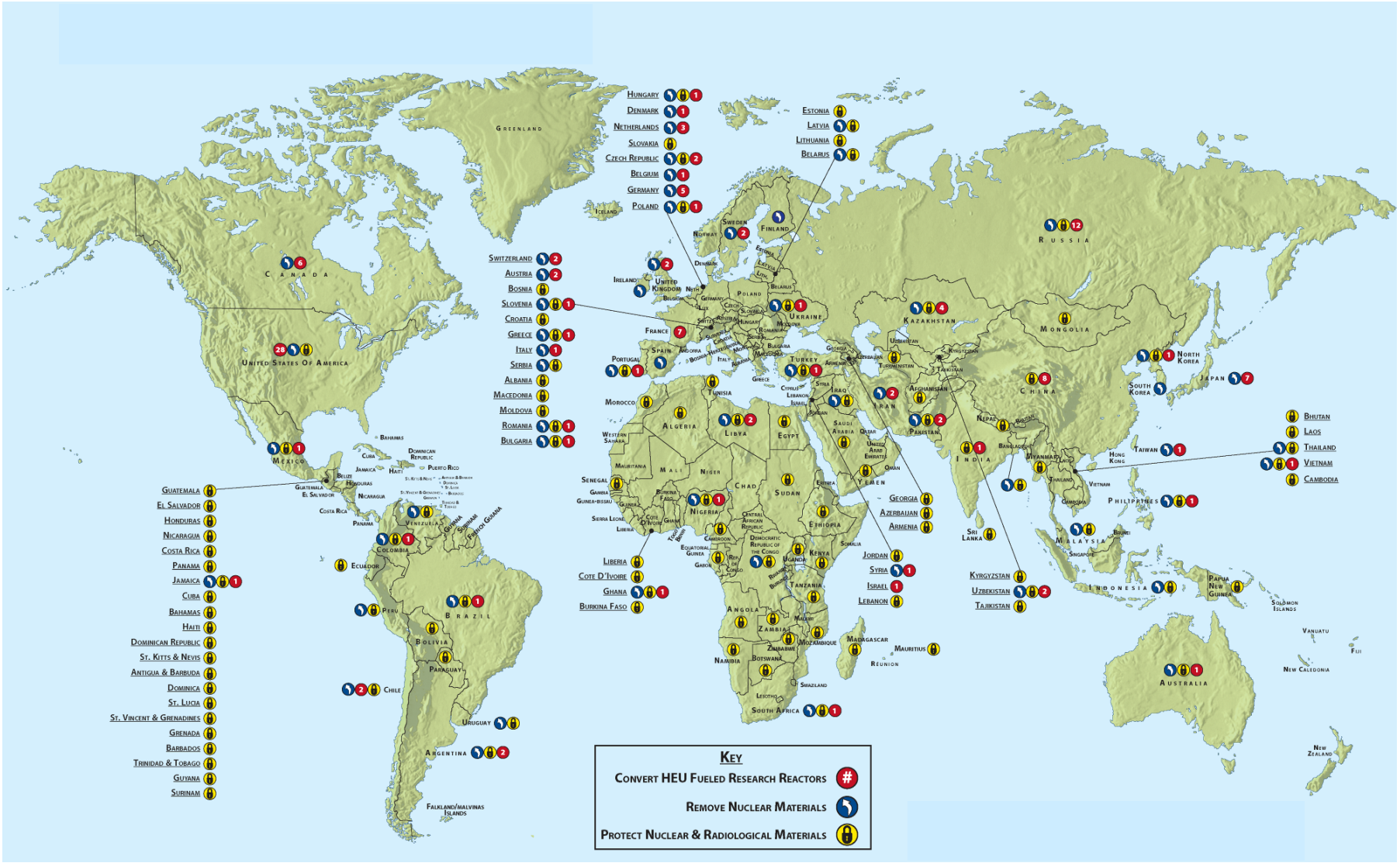
These efforts result in permanent threat reduction by eliminating bomb material at civilian sites – each kilogram or curie of this dangerous material that is removed reduces the risk of a terrorist bomb.

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.

Global Scope



GTRI Addresses International Priorities

UN Security Council Resolution 1887 – September 24, 2009

*"**Gravely concerned about the threat of nuclear terrorism**, and recognizing the need for all States to take effective measures to prevent nuclear material or technical assistance becoming available to terrorists."*

*"Calls upon Member States to share best practices with a view to improved safety standards and nuclear security practices and raise standards of nuclear security to reduce the risk of nuclear terrorism, **with the aim of securing all vulnerable nuclear material from such risks within four years**."*

*"Calls upon all States to manage responsibly and **minimize to the greatest extent that is technically and economically feasible the use of highly enriched uranium for civilian purposes**, including by working to convert research reactors and radioisotope production processes to the use of low enriched uranium fuels and targets;"*

United Nations

Security Council

SC/9746

GTRI Program Status

- **GTRI has worked in over 100 countries around the world to implement nuclear and radiological threat reduction efforts in support of this goal.**

- **GTRI has removed more than 100 nuclear bombs worth of highly enriched uranium and secured over 700 high-priority nuclear and radiological buildings around the world containing over 20 million curies, enough for thousands of dirty bombs.**

- As of the end of February 2010, GTRI has accelerated threat reduction efforts by:
  - Converting or verifying the shutdown of 67 research reactors from the use of HEU fuel to LEU fuel;
  - Removing 2,531 kilograms of HEU and plutonium, enough material to make more than 100 nuclear bombs
  - Removing 24,716 excess and unwanted radiological sources in the United States; and
  - Strengthening security at 753 nuclear and radiological buildings worldwide with vulnerable high-priority nuclear and radiological materials.

Remove Results

Status: 4,604 kilograms to be removed by 2016; 2,531 completed (55%)

- In the six years prior to the creation of GTRI, only 1,011 kilograms of HEU research reactor fuel had been removed.
- Since May 2004, GTRI has significantly increased the number of shipments to return HEU research reactor fuel resulting in 1,520 kilograms removed.
- Russian-origin: 2,351 kilograms by 2015; 1,102 completed (47%)
- US-origin: 1,362 kilograms by 2014; 1,242 completed (91%)
- Gap-material: 890 kilograms by 2016; 187 completed (21%)
- All HEU material has been removed from 17 countries
  - Brazil, Bulgaria, Colombia, Denmark, Greece, Latvia, Libya, Philippines, Portugal, Romania, Slovenia, South Korea, Spain, Sweden, Taiwan, Thailand, and Turkey
- **Complete clean-out of HEU from of 4 of the 17 countries since June 2009 (Romania in June, Taiwan in September, Libya in December and Turkey in January)**
- Clean outs in 2010 are planned for 2 more countries: Serbia and Chile

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

<u>Goal</u>: 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 immediately
- 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

<u>Scope:</u> Repatriate U.S.-origin HEU and LEU spent nuclear fuel

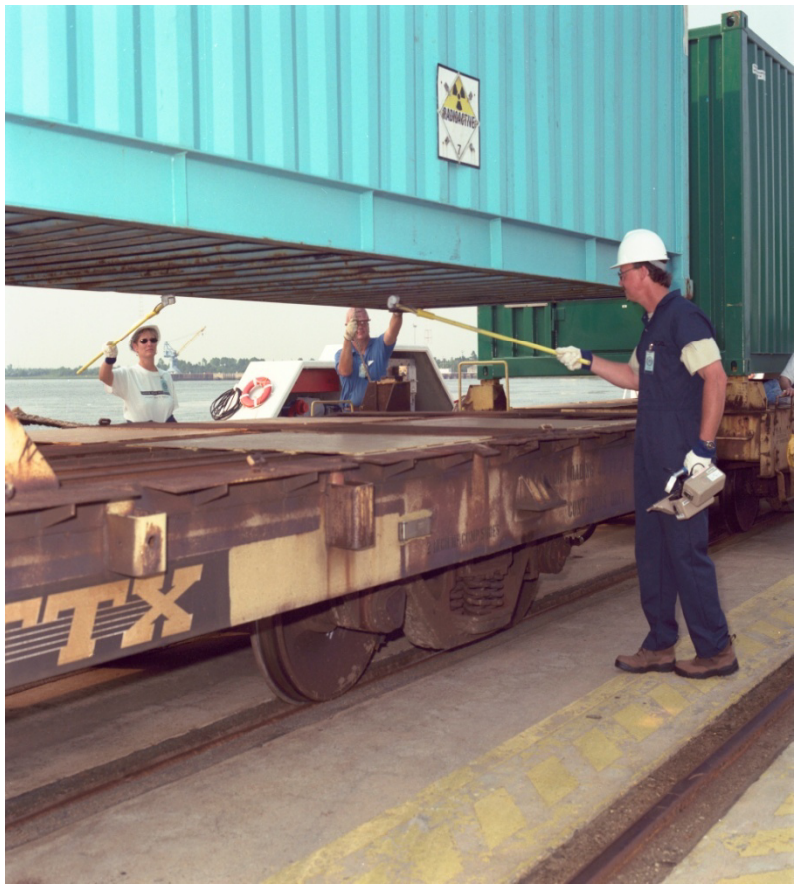
- Program Environmental Impact Statement permits return of TRIGA fuel and MTR fuel
- Agreement to convert reactor to facility eligibility

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.

U.S.-Origin Fuel Removal from Japan

U.S.-Origin Shipments

- **50 shipments completed**
- **40 via Ocean to East Coast**
- **9,175 spent fuel assemblies, from 29 countries**
- **8 cross-country shipments completed, one west coast shipment completed**
- **221 casks/7,757 assemblies to SRS**
  19 casks/1,383 rods to INL
  13 casks/35 assemblies to Y-12



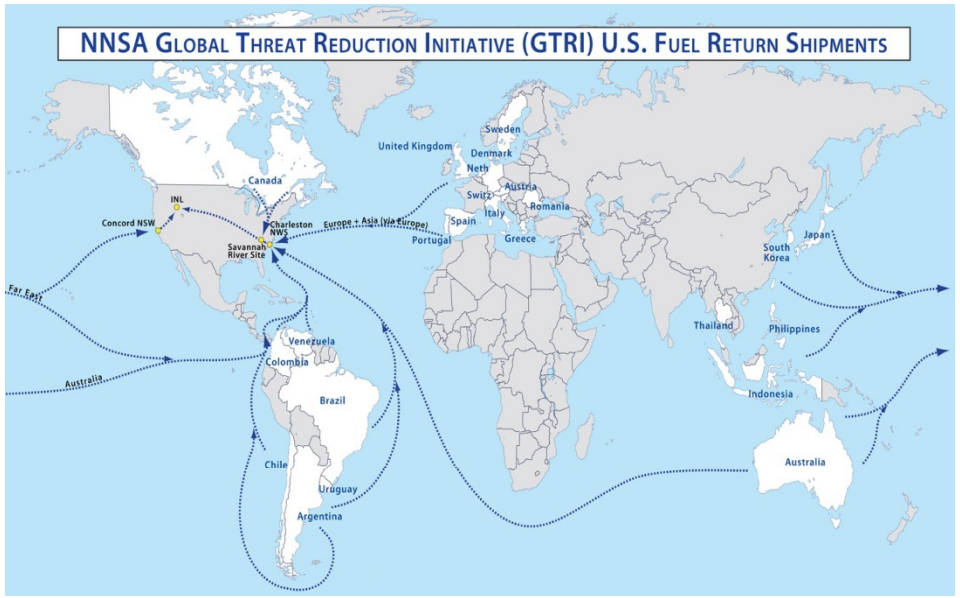
Shipments to Date

2 Shipments to Y-12

1. Argentina
2. South Korea

8 Shipments to INL

1. South Korea
2. Romania, Slovenia, Italy and Germany
3. United Kingdom
4. Germany
5. Japan
6. Indonesia
7. Japan
8. Romania



40 shipments to SRS

1. Sweden, Switzerland, Germany, Colombia, and Chile
2. Canada
3. Germany, Switzerland, Spain and Italy
4. Japan, Sweden, Germany, and Spain
5. Denmark, Italy, Germany, Sweden, and Greece
6. Australia
7. Venezuela, Uruguay, Japan, Sweden, and Spain
8. Thailand, Philippines, Indonesia, and Taiwan
9. Germany, Denmark, and Sweden
10. Portugal and Denmark
11. Japan (via Europe)
12. Brazil and Venezuela
13. Canada
14. Italy and Germany
15. Japan
16. Chile and Argentina
17. Austria, Germany, and Netherlands
18. Germany, Sweden, and Japan
19. Denmark
20. Denmark, Germany, and Sweden
21. Japan
22. Japan
23. Indonesia
24. Germany
25. Japan
26. Netherlands and Sweden
27. Austria & Greece
28. Netherlands and Germany
29. Australia
30. Japan
31. Sweden
32. Argentina and Brazil
33. Sweden, Germany and Japan
34. Portugal
35. Germany and Japan
36. Canada
37. Australia
38. Indonesia and Taiwan
39. Japan
40. Turkey and Israel

Program Changes and Updates

- Title Transfer Location
  - U.S. DOE may take title to SNF from country of any economy when beneficial to the U.S.
  - Approved process is proceduralized
    - Requires strict justification
    - Approved by administrator on case-by-case basis
  - Federal Register Vol. 73, No.165,
    August 25, 2008, pages 50004 – 50006.
- Receipt Capability/Resources
  - Capability to unload is reduced
  - Need greater flexibility and coordination
- IAEA Technical Document 1593
  - Discusses preparation for returning SNF to country of origin
  - Issued July 2008

Shipping Contract Requirements

- Appendix A data must exactly match the Fuel as delivered – Identification as well as weight, content and dimensions
- Fuel Assemblies, characteristics including canning may not be changed after Appendix A is submitted without advance permission
  - e.g. Do not crop, remove plates or change ID after submitting App A data
- Changes may delay shipment or could cause rejection of fuel
- Get GTRI involved prior to making changes

Shipping Contract Requirements

- Contract Implementation
  - Always available to help clarify requirements
  - Compliance with all articles must be maintained
  - Safeguarding information is required to ensure security of the shipment to final destination

Planning in Advance

- Scheduling
  - DOE needs to know schedules early in order to plan and coordinate
  - Reactors are encouraged to continue shipping early
- End-User Assurances
  - Provided by Department of State
- Nuclear Liability Insurance Issues
  - Reactors need to plan for insurance including potential overlapping insurance coverage if required for joint shipments
- Cask Licensing Reviews
  - Please ensure complete license applications are filed early
  - Reactors need to plan additional time for cask license reviews

Planning in Advance

- Cropping Operations
  - Beneficial to maintain an open line of communication with the Acceptance Program and the cask vendor
  - The cask vendor can provide useful insight to the reactor facility concerning cropping operations and techniques and can assist to ensure that the fuel is cropped in the appropriate and agreed upon locations as well
  - It is also necessary to communicate any difficulties in cropping. Taking pictures of any unusual condition may be helpful to the unloading personnel
    - Bent plates
    - Changes in the final cask loading as previously planned to the Acceptance Program
  - Maintaining the condition of the fuel elements allows for ease of fuel handling operations

Efforts to Improve and Accelerate

- Fee Changes
  - In order to keep participation in the Program as cost effective as possible, there have been no fee changes since the inception of the Program
- Coordination with Other Programs
  - Work in concert with other DOE programs to assist research reactors to maintain continued operations, repatriate eligible spent fuel, and assist with Convert, Gap Material Remove and Source Recovery programs

Past TRIGA Shipments

- 9 Successful TRIGA Shipments
  - 8 by sea vessel and truck to INL
  - 1 by air and truck to Y-12
- Collaboration with 8 countries
- 1,394 total TRIGA assemblies shipped
- 23 TRIGA casks shipped
- Most recently received TRIGA shipment was in 2007

Potential TRIGA Shipments

- Countries with Eligible TRIGA Fuel:
  - Austria
  - Bangladesh
  - Brazil
  - Democratic Republic of Congo
  - Finland
  - Indonesia
  - Malaysia
  - Mexico
  - Philippines
  - Taiwan
  - Thailand
  - Turkey
- Participant Countries with Eligible TRIGA Fuel:
  - Germany
  - Italy
  - Japan
  - Romania
  - Slovenia
  - South Korea
  - United Kingdom

Gap Removal

<u>Scope:</u> 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

<u>Accomplishments:</u>

Since the program began approximately 187 kilograms of HEU and plutonium have been removed from Belgium, Canada, the Netherlands, and Italy.

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

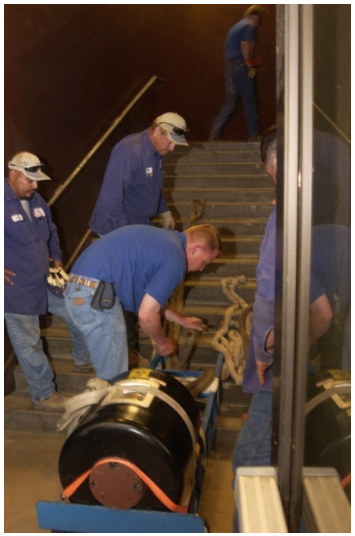
- **First priority is to find a commercial disposition pathway**
  - Approximately 100 kilograms have been sent to Areva for disposition, working on dispositioning additional plutonium and HEU materials

Material Management and Disposition

- DOE Office of Environmental Management (DOE-EM) is currently reviewing final disposition options for repatriated spent nuclear fuel
- Currently, the Acceptance Program transports aluminum-clad spent fuel to the Savannah River Site and stainless steel clad (TRIGA) spent fuel to the Idaho National Laboratory for interim storage

Source Recovery

- Capability to transport sources jointly with U.S.-Origin Remove and 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
- The Acceptance Program 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 thank their international partners for continued outstanding and successful collaboration**
- **We want your feedback, Please contact us**

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