



NNSA
National Nuclear Security Administration
Defense Nuclear Nonproliferation

Global Threat Reduction Initiative
Reducing the Threat of Nuclear & Radiological Terrorism

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Reducing the Threat of Nuclear or Radiological Terrorism (Scenario 1)



An Act of Nuclear or Radiological Terror has two components:

- **Enemies of the State willing to carry out such an attack**
- **The technical means to produce a weapon**
 - Purchase a weapon from an existing nuclear power
 - Develop a weapon using nuclear or radiological material

To reduce the threat of nuclear or radiological terror, we can address either or both of these components, by:

- Eliminating those enemies willing to employ these devices
- Preventing the enemy's acquisition and employment of nuclear and/or radiological weapons/materials



Preventing the Enemy from Acquiring Nuclear/Radiological Materials



The US Government has many organizations that play a key role in preventing the enemy from acquiring nuclear and/or radiological materials. Some of these major players include:

- **Department of Energy - National Nuclear Security Administration's Office of Defense Nuclear Nonproliferation**
- **Department of Defense – Defense Threat Reduction Agency, the geographical Combatant Commanders, USSOCOM**
- **Department of State – Bureau for International Security and Nonproliferation, Bureau for Verification, Compliance, and Implementation, others**
- **Department of Homeland Security – Domestic Nuclear Detection Office, Transportation Security Administration, Customs and Border Protection, Coast Guard**
- **Federal Bureau of Investigation**
- **Central Intelligence Agency**
- **Nuclear Regulatory Commission**



Preventing the Enemy from Acquiring Nuclear/Radiological Materials



These government agencies have developed a broad range of programs to deter, detect, defeat, or respond to the nuclear/radiological threat at home and abroad. These programs focus on the full spectrum of prevention and response, including:

- **Weapons/material elimination or secure disposal**
 - **Facility/Site Security (deter theft)**
 - **Facility/Site Monitoring (detect theft)**
 - **Local Security Response (defeat and recover)**
 - **Detect movement of weapons/material abroad**
 - **Interdict shipment abroad**
 - **Detect entry into US (Border/Ports)**
 - **Interdict weapon prior to employment**
 - **Consequence management after attack**
 - **Forensic analysis & response**
- GTRI**

Given the lack of an overall architecture to direct and coordinate these programs, it is essential to have good interagency communications to ensure that programs are complementary rather than duplicative.



GTRI Mission



The Global Threat Reduction Initiative was created in May 2004 to:

- Consolidate existing DOE nuclear material removal and radiological material security efforts *into a single NNSA office* to maximize synergy of mission and effectively leverage technical expertise and resources**
 - Russian Research Reactor Fuel Return Program (RRRFR)
 - Reduced Enrichment for Research and Test Reactors Program (RERTR)
 - Foreign Research Reactor Spent Nuclear Fuel (FRRSNF) Acceptance Program
 - BN-350 Spent Fuel Disposition Project
 - Radiological Threat Reduction Program
- Accelerate nuclear material removal and security timelines, in some cases by as much as 50%, identify the highest risk materials as immediate priority recoveries, and develop combined diplomatic and operational action plans to carry out these efforts**
- Expand existing efforts to address other nuclear and radiological materials not yet covered under existing threat reduction efforts**



Global Threat Reduction Initiative (GTRI) Focus



GTRI focuses on the large quantities of nuclear and radiological materials that are not adequately secured and pose an immediate and urgent proliferation and terrorist threat

High-Risk Civilian Nuclear Materials Worldwide

- **Over 140 research reactors around the world still operating with highly enriched uranium**
- **Over 300 shut-down research reactors and associated facilities have large quantities of spent fuel**
- **Approximately 4 metric tons of Russian-origin fresh and spent fuel at more than 20 research reactors in 17 countries**
- **Approximately 20 metric tons of U.S.-origin research reactor spent fuel in more than 40 countries**

High-Risk Radiological Materials Worldwide

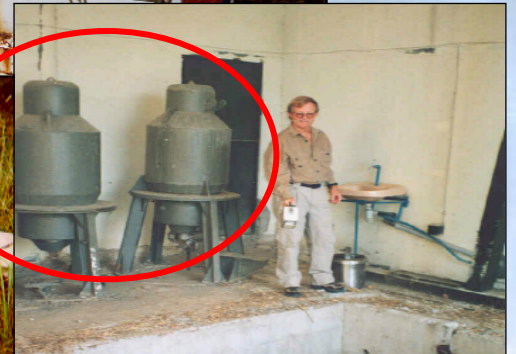
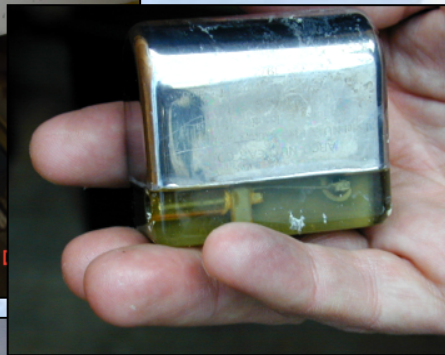
- **High-risk radiological materials exist in virtually every country**
- **Thousands of high-risk radiological sources exist across the U.S.**
- **Many of these sources are not longer in use, some have been abandoned**



At-Risk Materials



- The threat can come in a variety of forms and sizes, ranging from person portable (in a pocket) to truck-size





Basic Principles of Material Security (Eliminate, Detect, Delay, Respond)



- **Elimination: The less material there is, the easier/cheaper it is to secure**
 - Elimination of Weapons Grade Nuclear Material
 - Recovery and secure disposal of disused radiological sources
- **Detection: It is easier/cheaper to secure material at its source, than to re-secure it after it has gone missing**
 - Intrusion detection is relatively inexpensive
 - Detection/monitoring systems deter insider participation
- **Delay: The longer it takes to remove the material, the greater the chance of stopping the theft**
 - Locks, barriers, equipment dispersal can add to delay time
 - On-site response force provides additional delay
- **Response: The sooner we know that material has been stolen, the greater the likelihood of interdiction and recovery**
 - Real time monitoring and alarms to offsite responders
 - Dedicated off-site response force enhances effective response
 - The faster the response, the smaller the footprint of search



***The Office of Global Radiological
Threat Reduction***

(NA-211)



U.S. Radiological Threat Reduction Program (US RTR)



Mission

Identify, recover, secure and store on an interim basis radiological materials in the United States that could be effectively used as a radiological dispersal device (RDD) or “dirty bomb.” This includes identifying, recovering, securing and storing on an interim basis Greater than Class C radiological sealed sources that are voluntarily declared unwanted and unused and other radiological materials considered at-risk.





The Threat Within the U.S. - Vulnerable Radiological Sources



- Abandoned Well-logging Sources (Americium/Beryllium and Cesium-137 sources).



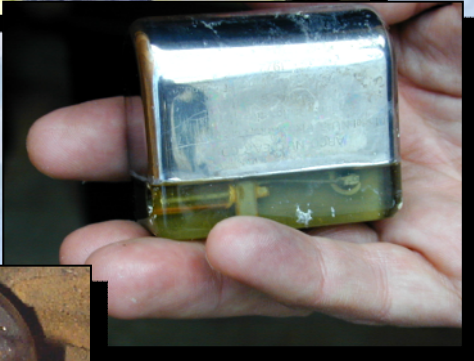
- Well-logging sources declared excess and unwanted by a licensee.



The Threat Within the U.S. - Vulnerable Radiological Sources



**Large and Small $^{241}\text{AmBe}$ Neutron Sources;
Pure ^{241}Am sources; Small ^{241}Am Gauge
and Calibration Sources**



**^{238}Pu Neutron Sources, Heat Sources and
Medical Pacemakers**



**$^{239}\text{PuBe}$ Neutron Sources, DOE-owned
Under Old Loan-lease Programs**



**^{90}Sr Radioisotope Thermoelectric
Generators**



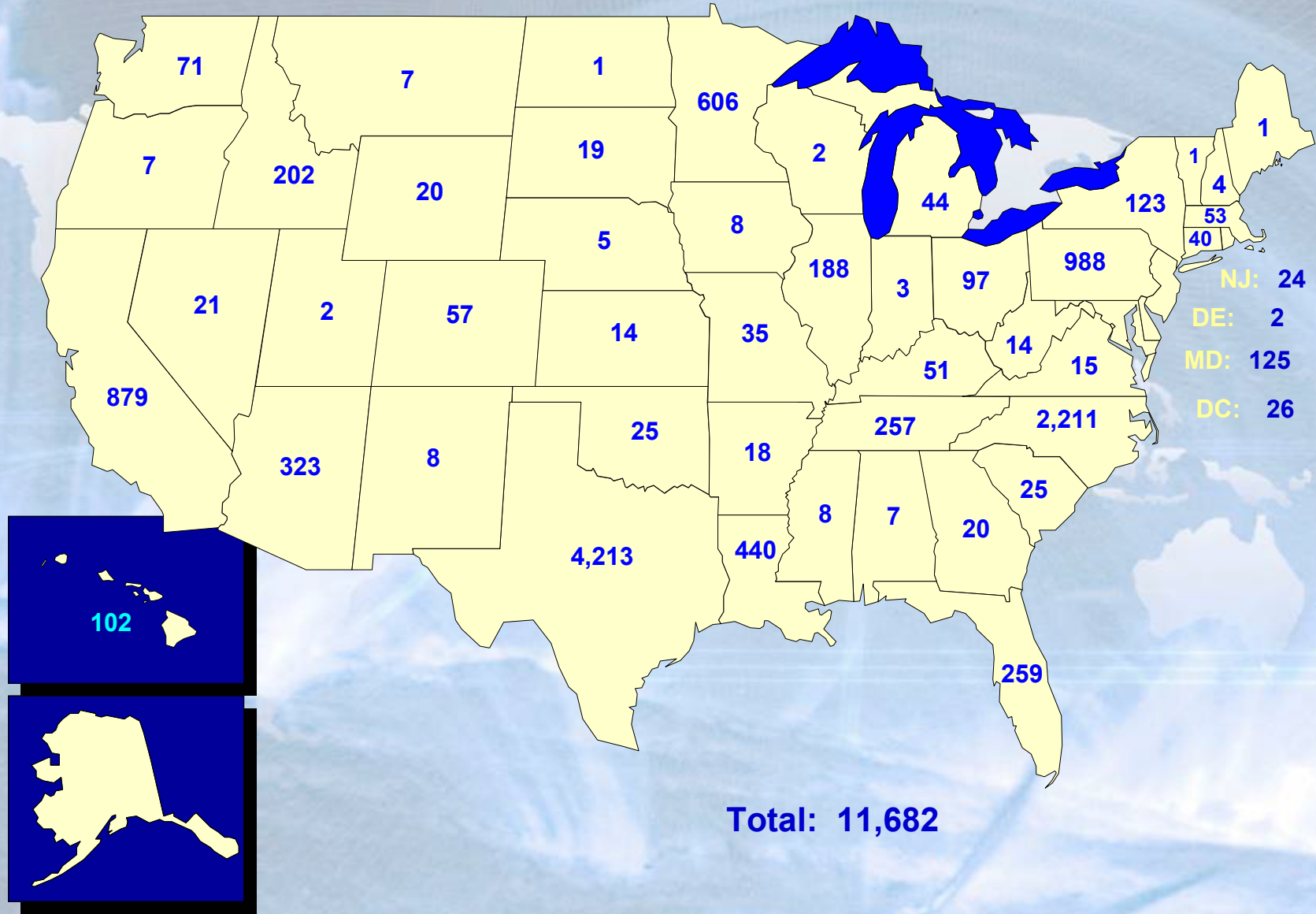
US RTR Accomplishments and Current Activities



- **More Than 11,000 Sealed Sources Recovered Since 1993 (101,180 curies)**
- **Exceeded Congressional Goal**
 - **5,529 Sources Recovered Oct. 2002 - March 2004**
- **Interagency Coordination**
 - **Recovered Orphan Sources From New York, Boston, and Houston Area Prior to National Security Events**
 - **Responded to an Emergency Request From NRC to Recover Nearly 500 Sources From a Bankrupt Licensee in Pennsylvania**
 - **Provided Technical Support to IAEA**
- **Radiological Pilot Project**
 - **Supporting DHS and Working with NRC and Others**
 - **Security Enhancement Surveys for Medical Facilities in New York**
 - **Security Training for Radiation Professionals**
 - **Radiological Security Training for Law Enforcement**



USRTR Recoveries by State





International Radiological Threat Reduction



Mission

Reduce on a global basis the threat posed by high-risk radiological materials by identifying, recovering, securing and disposing of such materials on an accelerated basis, as well as facilitating long-term sustainability that provides for effective controls.



The Threat Abroad – Industrial, Research, and Medical Radiological Sources



Cs-137 Seed Irradiators Stored in an Open Field.

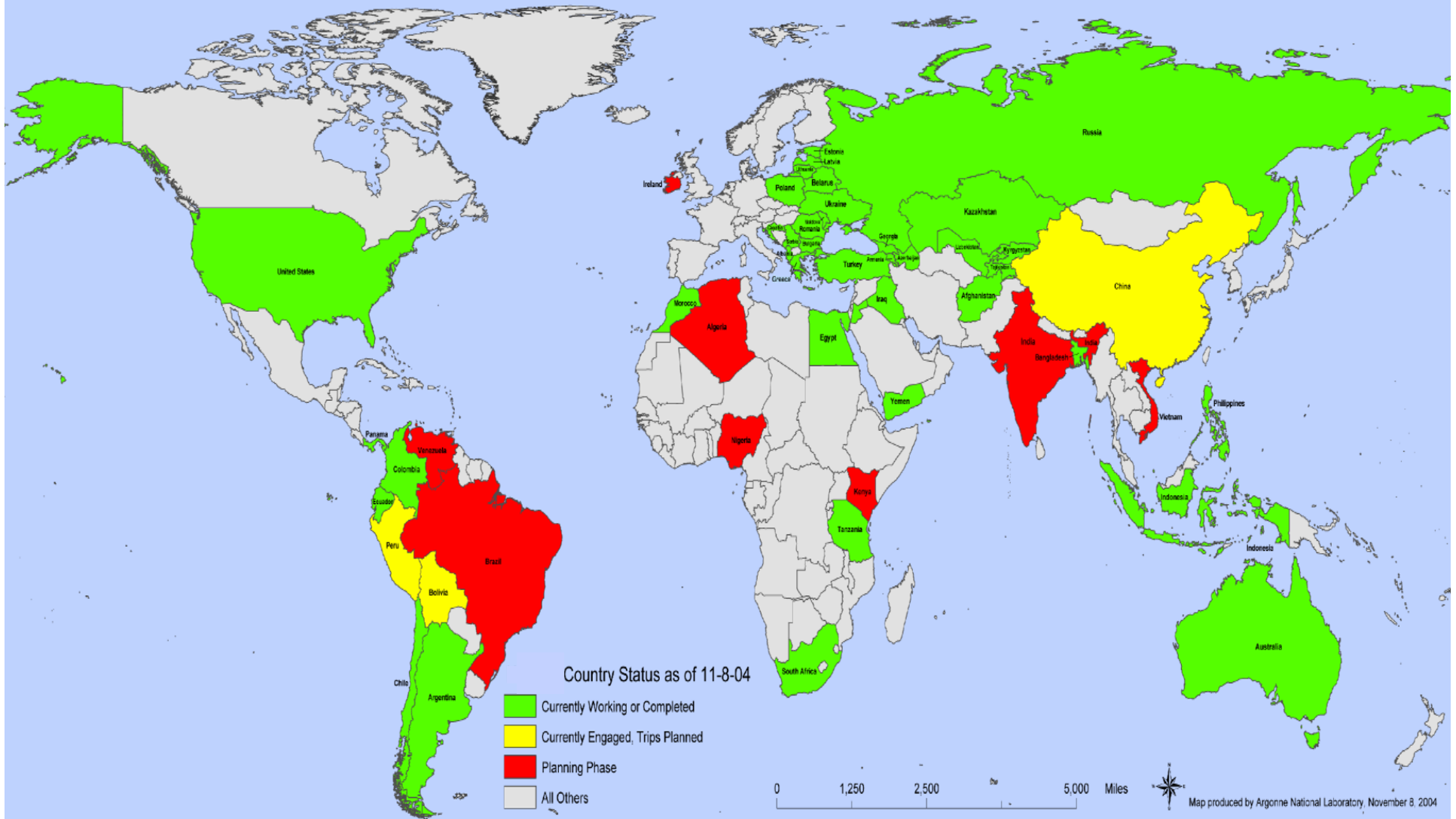


Recovered RTGs

**Abandoned Radio-isotopic Thermal-electric
Generators (RTGs) in the FSU**



Global RTR Efforts





IRTR Activities & Accomplishments

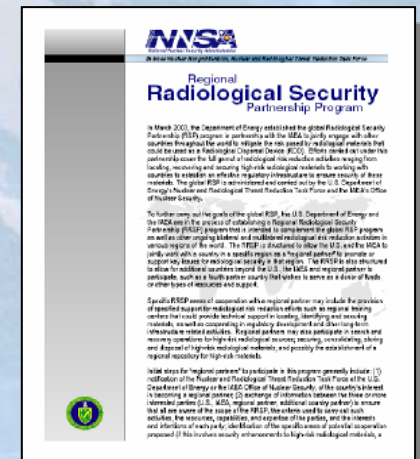


Bi-lateral and multi-lateral projects in over 40 countries:

- 72 RTGs recovered
- 7 RTG recoveries in progress
- Security Upgrades completed at 165 facilities/sites (as of end of FY05)
- Security Upgrades in progress at 234 facilities/sites (as of end of FY05)

Partnerships and Specialized Programs

- IAEA Cooperation
 - Global Radiological Security Partnership
 - Radiological Regional Security Partnership Program
 - Significant funding support to other radiological security activities via the Nuclear Security Fund (NSF), including support to IAEA radiological missions (e.g., INSServ, RaSIA), regulatory systems (RAIS), and overall support of the Code of Conduct.



- Radiological hand-held detection equipment and training for first-responders (CRITr)
- Radiological search and secure equipment and training
- Interpol Cooperation - Radiological hand-held detection equipment transfers and training





***Office of Global Nuclear Materials
Threat Reduction***

(NA-212)



Scope of the Nuclear Materials Threat



- **Over 160 research reactors around the world are still operating on highly enriched uranium – 134 of these are civilian**
- **Approximately 4,000 kilograms of Russian-origin fresh and spent HEU fuel at over 20 sites in 17 countries**
- **Approximately 20,000 kg of eligible U.S.-origin spent nuclear research reactor fuel and targets in 41 countries**
 - ~5,000 kg of HEU
 - ~15,000 kg of LEU
- **In addition, there are approximately 3,000 kg of high-risk, weapons-grade uranium and plutonium that are not covered under existing programs and would be candidates for securing and/or removing**

IAEA Nuclear Bomb Equivalents: 25 kg HEU / 8 kg PU



GNMTR Programs



Six programs work in concert to secure and/or eliminate high-risk, vulnerable nuclear materials at civilian nuclear facilities worldwide with the goal of preventing terrorists from acquiring weapons-usable nuclear material:

- **Reduced Enrichment for Research and Test Reactors (RERTR)** - Convert research reactors and medical isotope production processes to the use of LEU
- **Global Research Reactor Security (GRRS)** – provides security upgrades to research reactors and related sites outside of the United States and the FSU
- **Russian Research Reactor Fuel Return (RRRFR)** – repatriates fresh and irradiated Russian-origin research reactor fuel back to Russia
- **Foreign Research Reactor Spent Nuclear Fuel (FRR SNF) Acceptance** – repatriates US origin spent nuclear fuel back to the US
- **BN-350 Spent Fuel Disposition (BN-350)** – provides safe and secure long-term storage for 3000Kg of plutonium bearing spent nuclear fuel from the BN-350 fast breeder reactor in Kazakstan
- **Emerging Threats and Gap Materials (ET)** – addresses high-risk, vulnerable nuclear materials not covered in the existing programs



GNMTR Activities & Accomplishments



Global Research Reactor Security Program:

Secured approximately 13,000 kg of irradiated HEU, 2,500 kg of fresh HEU, and 3,000 kg of plutonium at 18 high-priority sites

Reduced Enrichment for Research and Test Reactors:

**40 civilian research reactors converted to LEU in place of HEU
Accelerated development of new high-density LEU fuel to allow additional conversions**

Russian-Origin Fuel Return Program:

122 kg of Russian-origin fresh HEU repatriated to Russia

Foreign Research Reactor Spent Nuclear Fuel Return:

Over 1,200 kg of US-origin HEU returned from 27 countries

BN-350 project:

3,000 kg of plutonium in Kazakhstan placed under IAEA safeguards



Global Threat Reduction Initiative International Partners' Conference



More than 590 representatives from 100 countries attended the Global Threat Reduction Initiative International Partners' Conference in Vienna, Austria from September 18-19, 2004

Conference Findings were adopted which included the following:

- ***Acknowledged*** all states share the objectives of GTRI
- ***Recognized*** that some states may require assistance in addressing activities under GTRI
- ***Supported*** acceleration and expansion of current threat reduction programs
- ***Supported*** conversion of research reactors from highly enriched uranium (HEU) to low enriched uranium (LEU) fuel, *where feasible*
- ***Encouraged*** all states to participate where possible
- ***Recommended*** all Member States work together with the IAEA to coordinate a mechanism to address opportunities for implementing GTRI projects and programs



Conclusion



- **Significant quantities of vulnerable nuclear and radiological materials exist worldwide that pose a proliferation and terrorist threat**
- **In close cooperation with our international partners, the Global Threat Reduction Initiative is working to address these materials**
- **GTRI is an integral part of the interagency approach to reducing the threat of nuclear and radiological terrorism**
- **Interagency communication and cooperation is essential in preventing an attack by nuclear or radiological weapons in the US**