

**The Global Threat Reduction Initiative:
Enhancing Radiological Security in the Russian Federation**

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ABSTRACT

The U.S. Department of Energy (DOE)/National Nuclear Security Administration's (NNSA) Global Threat Reduction Initiative (GTRI) supports threat reduction by securing stockpiles of weapons-usable nuclear and radiological materials located at civilian sites throughout the world. GTRI's primary approach to reducing the threat posed by vulnerable, high-activity radiological sources is to: (1) implement rapid physical security upgrades at vulnerable sites containing radiological sources; (2) locate, remove and consolidate, into secure facilities, lost or abandoned high-risk radiological sources; and (3) support the development of the infrastructure necessary to sustain enhanced security systems, including through the development of partnerships leveraging international resources. GTRI has provided security upgrades at more than 520 vulnerable radiological sites around the world containing over 8,000,000 curies – enough for approximately 8,000 dirty bombs. Over the last three years, GTRI has spent about \$33 million to remove radiological material equivalent to about 200 dirty bombs from 23 different sites in Russia to secure locations or to final disposition. Further, GTRI cooperated with the Government of the Russian Federation to remove more than 5,500 curies of Cobalt-60 and Cesium-137, enough material for at least five dirty bombs, from a highly vulnerable site in war-torn Chechnya. GTRI has made progress securing the Russian Radon facilities which store radiological sources. In partnership with Russia, Norway, France, and Canada, about 340 of 1,000 radioisotopic thermoelectric generators (RTGs) deployed throughout Russia have been removed to secure storage and/or disposed. GTRI also is developing multilateral and bilateral efforts to broaden the program's reach. This paper summarizes GTRI's objective and strategy to reduce the threat presented by unsecured high-activity radiological sources in Russia, progress to date, and new mechanisms for international support.

1. INTRODUCTION

The U.S. Department of Energy (DOE)/National Nuclear Security Administration's (NNSA) Global Threat Reduction Initiative (GTRI) and the Government of the Russian Federation are working together to identify, remove, and secure vulnerable, high-risk radiological sources distributed throughout Russia that could be exploited by terrorists to make a radiological dispersion device (RDD), or dirty bomb. The cooperative program, which began in 2002, focuses on installation of physical protection upgrades at Radon facilities, security/disposition of radioisotopic thermoelectric generators (RTGs), and disposition of orphan radiological sources. This paper summarizes the scope of these programs, the progress to date, and the opportunities for new partnerships.

2. ABOUT GTRI

GTRI's mission is to reduce and protect vulnerable nuclear and radiological material located at civilian sites worldwide. GTRI has three goals – Convert, Remove, and Protect – which together provide a comprehensive approach to achieving its mission and denying terrorists access to nuclear and radiological materials.

GTRI has undertaken substantial efforts to identify types and quantities of materials of concern, what are the likely consequences of an RDD event, where these materials are used, how well these materials are protected, and what must be done to ensure that they are not stolen. It is estimated that approximately 4,000 facilities worldwide contain radiological sources of sufficient size to present a significant risk to U.S. or international strategic interests. In response to this threat, DOE/NNSA started an initiative in 2002 to reduce the risk of theft and illicit use of these materials for terrorist purposes, which became a multifaceted program to secure these materials when GTRI was established in 2004. To date, GTRI has removed approximately 69 nuclear bombs worth of nuclear material from sites overseas, removed more than 15,000 excess U.S. and international radiological sources, and provided security upgrades to over 520 radiological sites around the world containing nearly 8,000,000 curies – enough for approximately 8,000 dirty bombs. And, 51 of 129 research reactors no longer operate on HEU fuel due to conversion activities undertaken by GTRI. Finally, GTRI also has established new mechanisms for international support to broaden the program's reach.

3. RADIOLOGICAL MATERIALS IN RUSSIA

The Russian Federation is one of the world's largest nuclear powers and possesses many radiation sources dating from nuclear weapons production and civilian activities during Soviet times. Russia has long been one of the world's largest exporters of both nuclear and long-lived radiological sources; it is the only producer of Cesium-137 for worldwide distribution and produces roughly one-half of the world's Cobalt-60¹. The number of sealed sources in Russia has been reported at more than 500,000. These are located at over 2,100 facilities licensed to have radiological materials. Radiological sources that could provide material for RDDs are located in hundreds of naval coastal technical bases, institutes, enterprises, hospitals, and other locations. As noted by the U.S. National Academy of Sciences, "...hundreds of radioisotopic thermal generators (RTGs) are located in northern reaches of the country, and the logistics to recover those that are no longer needed or could be replaced with other energy sources are formidable."

¹ Mayak Production Association (Mayak) produces over 20,000 ionizing radiation sources (IRSs) annually using Iridium-192, Cesium-137, and Cobalt-60. Other radionuclides produced include Strontium-90, Americium-241, Americium/Beryllium, Plutonium/Beryllium, Polonium-210, Neptunium-237, and Promethium-147. Mayak delivers the new IRSs and is prepared to receive spent IRSs through specialized companies, particularly the company Izotop in St. Petersburg. Amersham and its successor companies (now QSA Global) have played key roles marketing IRSs produced at Mayak in the west. The Russian company Techsnabexport handles exports for Mayak. It has handled large orders, such as the 2003 purchase of 40 kilograms of Plutonium-238 by the U.S. government.

4. GTRI COOPERATION WITH RUSSIA ON RADIOLOGICAL MATERIALS

DOE/NNSA and the Russian Federation are cooperating on security and disposition of RTGs, installation of physical security at Radon facilities, and disposition of orphan sources. In total, GTRI has spent approximately \$33 million on these activities since 2003. Of this total, \$22 million was spent in-country.

4.1 Radioisotopic Thermoelectric Generators

U.S. and Russian officials estimate that there were approximately 1,000 RTGs throughout Russia (see Table below) when efforts began to remove them to secure locations and/or dispose them. These devices present a particularly acute security risk because of their high levels of radioactivity and inadequate protection. Further, these RTGs likely represent the largest unsecured quantity of radiological material in the world. Through cooperative efforts, GTRI, Russia, Norway, France, and Canada either already have secured/disposed or are working to address about 340 of the 1,000 RTGs. Approximately 700 RTGs, representing over 2.12 million curies of radioactivity, remain unsecured; 148 of these are located in the Far East.

Table: Removals of RTGs in Russia*				
Region	Baltic	Far East	Arctic	Total
Total Estimated RTG Inventory in Russia	96	233	720	1049**
DOE-funded removals in FY 2004	0	0	63	63
DOE-funded removals in FY 2005	3	25	24	52
DOE-funded removals in FY 2006	0	17	0	17
DOE-funded removals in FY 2007 (projected)	0	51	0	51
Total DOE-funded removals to-date	3	93	87	183
DOE partner-funded RTG removals (projected)	0	0	10	10
Grand Total RTGs removed to-date	3	93	97	193
ESTIMATED remaining RTGs in Russia***	93	140	623	856

* In addition to removals of RTGs, DOE funded the installation of security systems for 24 RTGs in the Baltic region and 20 RTGs in the Far East region.

** The total number of RTGs has not been determined definitively. GTRI notes the need to press for a full and updated accounting of RTGs. All numbers in the table are only estimates because it is unclear what the initial count was, when it was effective, and how many RTGs already had been removed when we started our cooperation.

*** An additional 154 RTGs have been removed by Russia, France and Norway. The breakdown by region for these removals is not available at this time.

4.2 Radon Facilities

The 16 Radon facilities are regional storage and disposal facilities that handle a wide variety of unwanted and spent ionizing radiation sources as well as other forms of radiological materials that have been collected for disposal. The Radon facilities serve to collect and dispose unwanted radiological sources; the facilities also are responsible for radiological sources in transit and on site. DOE/NNSA has made progress securing the Russian Radon facilities which store radiological sources. To date, installation of security upgrades are completed at the five Radon facilities that store the highest level of curies; upgrades are being installed at seven additional facilities including one being funded by the United Kingdom. Work at the three remaining Radon facilities is planned in 2008 and should be completed in 2009, and GTRI is planning an assessment visit at the final Radon facility to determine what assistance is needed.

4.2 Orphan Sources

Orphan sources are radiation sources that are considered no longer needed or simply have been abandoned. There are substantial orphan source problems in many countries, including Russia. Over the past three years, GTRI and Russian agencies have cooperated to dispose of 2,400 high-activity sources (over 200 dirty bombs), mostly Cobalt-60 and Cesium-137, from at least 26 sites in Russia. More than 5,500 curies of Cobalt-60 and Cesium-137, enough material for at least five “dirty bombs,” was removed from Chechnya and now is stored safely and securely. At the site in Chechnya, the radiological materials were removed their location and packaged into two special transportation casks. The casks were loaded onto a truck and securely delivered to a facility in the Moscow region to be analyzed and stored temporarily. Once the materials were evaluated, they were transferred to the Moscow Radon facility for permanent disposal. The work was carried out by a group of Russian specialists with funding jointly provided by NNSA and Rosatom.

5. OPPORTUNITIES FOR NEW PARTNERSHIPS

Removal of Russian RTGs remains a principal concern in Russia and a key activity under GTRI. Further, the coordinated efforts to address RTGs in northwestern Russia involving Russia, Norway, France, and Canada demonstrate that international partnerships are an effective means for eliminating threats of global concern. In addition, GTRI has established a mechanism for accepting international contributions to fund RTG removals. Currently, GTRI is working with Canada. As a result of their contributions, GTRI is accelerating work and Canada is getting credit under the G8 Global Partnership. In this context, we call upon the CEG members to participate in a coordinated effort to accelerate the removal of RTGs in Russia, and particularly in the Far East.