

Global Threat Reduction Initiative Russian Nuclear Material Removal Progress

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Abstract

In December 1999 representatives from the United States, the Russian Federation, and the International Atomic Energy Agency (IAEA) started discussing a program to return to Russia Soviet- or Russian-supplied highly enriched uranium (HEU) fuel stored at the Russian-designed research reactors outside Russia. Trilateral discussions among the United States, Russian Federation, and the International Atomic Energy Agency (IAEA) have identified more than 20 research reactors in 17 countries that have Soviet- or Russian-supplied HEU fuel. The Global Threat Reduction Initiative's Russian Research Reactor Fuel Return Program is an important aspect of the U.S. Government's commitment to cooperate with the other nations to prevent the proliferation of nuclear weapons and weapons-usable proliferation-attractive nuclear materials. To date, 496 kilograms of Russian-origin HEU have been shipped to Russia from Serbia, Latvia, Libya, Uzbekistan, Romania, Bulgaria, Poland, Germany, and the Czech Republic. The pilot spent fuel shipment from Uzbekistan to Russia was completed in April 2006.

Background and History

The primary goal of the Global Threat Reduction Initiative's Russian Research Reactor Fuel Return (RRRFR) Program is to advance U.S. and Russian nuclear nonproliferation objectives by eliminating stockpiles of highly enriched uranium (HEU) and encouraging eligible countries to convert their research reactors from HEU to low-enriched uranium (LEU) fuel upon availability, qualification, and licensing of suitable LEU fuel.

The goal of minimizing international commerce in HEU has been a pillar of U.S. nonproliferation policy since 1978. In that year, the Reduced Enrichment for Research and Test Reactors (RERTR) program was initiated to develop and qualify new LEU fuels that could replace HEU used in reactors of U.S. design. To complement the RERTR program, the Department of Energy (DOE) established the Foreign Research Reactor Spent Nuclear Fuel (FRRSNF) Acceptance Program in 1996. Under this program, the United States accepts specified types of U.S.-origin spent and unused fresh fuel for management and disposition in the United States. In May 2004, DOE consolidated the reactor conversion work with the U.S. and Russian fuel return efforts under the new Global Threat Reduction Initiative (GTRI).

Research Reactor Fuel Return Program

Based on the success of the FRRSNF program, the U.S. Department of Energy, supported by the Department of State, has been working to bring about a similar effort in Russia. Trilateral discussions among the United States, Russian Federation, and the International Atomic Energy Agency (IAEA) started in December 1999. During these discussions, representatives began to develop a program to return to Russia Soviet- or Russian-supplied HEU fuel currently stored at more than 20 Soviet- or Russian-supplied research reactors in 17 countries.¹ Most of these reactors use at least some HEU fuel, and most have stocks of both fresh and irradiated fuel that must be carefully stored and managed for many years to come. The goal of DOE's/National Nuclear Security Administration (DOE/NNSA) has been to help the Russian Federation develop a broad-based HEU minimization policy under which it would accept the return of spent and fresh HEU fuel from Soviet- or Russian-supplied foreign research reactors and develop new fuels that will allow conversion of such reactors to LEU. DOE/NNSA officials have led discussions with representatives from Russia's Ministry of Atomic Energy (MinAtom/Rosatom) and the IAEA on this issue, with the IAEA agreeing to provide technical and organizational support.

Recognizing their common interest in strengthening nonproliferation and combating nuclear terrorism, Presidents Bush and Putin, in their Joint Declaration signed at the February 2005 Meeting in Bratislava, Slovak Republic, declared that the United States and Russia bear a special responsibility for the security of nuclear weapons and fissile material, in order to ensure that there is no possibility such weapons or materials would fall into terrorist hands. They established a bilateral Senior Interagency Group chaired by U.S. Secretary of Energy, Samuel

¹ Belarus, Bulgaria, China, Czech Republic, DPRK, Egypt, Germany, Hungary, Kazakhstan, Latvia, Libya, Poland, Romania, Ukraine, Uzbekistan, Vietnam, and Yugoslavia.

Bodman, and Russian Federation Federal Atomic Energy Agency (Rosatom) Director Kiryenko, for cooperation on nuclear security to oversee implementation of these expanded cooperative efforts.

The United States and Russia agreed on a prioritized schedule for all remaining Russian-origin fresh fuel shipments and agreed they would be completed in 2006. With regard to Russian-origin spent fuel shipments, the United States and Russia agreed that the first spent fuel shipment would be the shipment of Russian-origin spent HEU fuel from Uzbekistan and all reasonable efforts would be undertaken to expedite the necessary preparations so that shipment from Uzbekistan could commence at the end of 2005. All remaining shipments of spent fuel would be completed in 2010.

In May 2004, the United States and the Russian Federation signed a Government -to-Government Agreement concerning cooperation for the transfer of Russian-produced research reactor fuel to the Russian Federation. This agreement established the legal framework necessary for cooperation between the United States and the Russian Federation for the return of Russian-supplied research/test reactor fuel from eligible countries.

According to this agreement the United States provides funding to the program based on the following criteria:

- The fuel return program will include only existing FSU- or Russian Federation research/test reactors in eligible countries that possess nuclear fuel supplied by the FSU or the Russian Federation.
- any country desiring to return fuel to the Russian Federation must agree to (a) convert its operating research/test reactor(s) using Soviet- or Russian-supplied nuclear fuel to LEU as soon as (i) suitable LEU, licensed by the country's national regulatory authority, is available, and (ii) the reactor's existing inventory of HEU is exhausted; or (b) permanently shut down the reactor(s).
- whenever possible, all available HEU must be made available for return to the Russian Federation before any LEU is returned.
- all nuclear fuel to be delivered to the Russian Federation under the Program must be handled in accordance with IAEA documents INFCIRC/225/REV.4 and INFCIRC/153 (corrected), and subsequent revisions thereto.

The Russian Federation agrees that it will accept nuclear fuel from eligible countries if the following conditions are met:

- The eligible country has expressed an interest in transferring nuclear fuel to Russia;
- The transfer of nuclear fuel will take place taking into account the laws of the

Russian Federation related to nuclear safety and environmental protection;

- Program costs are paid by the eligible country, the United States, or a third country.

The Russian Federation also agreed that:

- Nuclear fuel received in Russia under the Program shall not be used for any nuclear explosive device or for research on, or development of, any nuclear explosive device, or for any other military purpose.
- Nuclear fuel received in Russia under the Program and any nuclear material derived therefrom shall not be exported, or transferred from the jurisdiction of Russia without prior written U.S. consent.

The U.S. and Russian Governments and the IAEA will seek to encourage financial support from other IAEA Member States, where required, for the fuel return program to supplement any U.S. Government financial contributions.

Fresh Fuel Shipments

To date, the program has shipped 434 kg of Russian-origin HEU fresh fuel from seven countries: Serbia, Romania, Bulgaria, Libya, Czech Republic, Uzbekistan, Poland, Germany, and Latvia. The last shipment of Russian-origin HEU fresh fuel was from the VKTA facility near Dresden, Germany. This shipment of 268 kilograms (over 590 pounds) of highly enriched uranium (HEU) is the largest shipment of Soviet-origin HEU ever conducted under the Global Threat Reduction Initiative (GTRI), since the inception of GTRI two-and-a-half years ago.

The five-day operation was completed in close cooperation with Germany, the Russian Federation, and the International Atomic Energy Agency (IAEA). The HEU fresh fuel was loaded into 18 Russian TK-S16 specialized transportation containers at Rossendorf site with NNSA technical experts and IAEA safeguards inspectors monitoring the fuel loading process. The canisters were transported under heavy guard and then airlifted from Dresden Airport to a secure facility in Russia.

In August 2006 41 kg of fresh HEU was removed from the Maria research reactor at the Institute of Atomic Energy located in Otwock near Warsaw, the capital of Poland. At the Institute of Atomic Energy, the HEU was loaded into five Russian TK-S15 specialized transportation containers. The canisters were airlifted under guard from an airport near Warsaw to a secure facility in Russia.

In September 2005 14 kg of fresh HEU was removed from the Czech Technical University in Prague, Czech Republic. The Czech Technical University VR-1 research reactor is a low-power university training reactor that had been operating on HEU fuel core for many years. On September 26, 2005, the HEU fresh fuel from VR-1 reactor was packaged in Russian TK-16

containers and on the next day, the HEU fuel was airlifted to the Russian Federation. Ten days later, the replacement LEU IRT-4M fuel was delivered to the Czech Technical University and the VR-1 Sparrow research reactor went critical with LEU fuel soon thereafter.

All shipments of fresh HEU fuel have been conducted in a close cooperation with the IAEA and Rosatom. IAEA inspectors measured all HEU fuel before it was loaded into transportation casks. In the Russian Federation, the repatriated HEU material will be down blended below 20% under another NNSA non-proliferation program – Material Consolidation and Conversion.

Pilot Spent Fuel Shipment

The first pilot shipment of spent fuel to Russia took place in 2006 from Uzbekistan. Uzbekistan possesses a VVR-SM research reactor at the Institute of Nuclear Physics, Uzbekistan Academy of Sciences, located in Ulugbek, about thirty kilometers northeast of Tashkent. It is a heavily used 10 Megawatt reactor of Soviet design that carries out an active program of research and isotope production. From its first criticality in 1959, it used 90 percent enriched HEU fuel, but was converted to 36 percent fuel in 1989. Over its lifetime, the reactor has generated a large amount of spent fuel and made a number of spent fuel shipments to the reprocessing facility at Mayak between 1973 and 1992. Personnel who participated in the early shipments are still at the facility, so experience was maintained. The facility also had the necessary room and hardware to accommodate the transportation cask.

DOE has provided assistance to improve the physical protection system of the VVR-SM reactor, but it is located in a politically volatile region of Central Asia. All parties agree that the spent HEU and any remaining fresh HEU should be relocated to a more secure environment, thus removing it as a potential proliferation risk.

On March 12, 2002, DOE and Uzbekistan's Ministry of Foreign Affairs signed an Agreement to facilitate cooperation between the parties for the return of Uzbekistan's Soviet- or Russian-supplied nuclear fuel to Russia. This Agreement also addresses conversion of the VVR-SM reactor from use of HEU to use of LEU; safety upgrades of the VVR-SM reactor control system as part of its HEU-to-LEU conversion; security enhancement of the VVR-SM reactor site and nuclear materials stored at the site; and the safe and secure storage of Uzbekistan's nuclear materials, including improving methods of physical protection, control, and accountability of nuclear materials to reduce the risk of theft or possible diversion.

Preparation for the first shipment of spent HEU fuel from Tashkent reactor was completed in December 2005. The Russian state ecological expertise of the Unified project was completed in October 2005; the necessary documents for spent fuel transit through Kazakhstan was developed and approved in November 2005. Mayak facility completed the preparation of sixteen TK-19 casks, which were transported to Uzbekistan in two TUK-5 railroad cars, in December 2005. Necessary regulatory approvals were obtained in Uzbekistan. The first shipment of spent HEU fuel from Uzbekistan to Russia was completed in January 2006. The fourth shipment from Uzbekistan to Russia was completed in April 2006. During four shipments 262 spent fuel assemblies were transported to Russia.

Preparations for spent fuel shipment have already started in Romania, Bulgaria, Czech Republic, Latvia, Hungary, Ukraine, and Kazakhstan. By the end of this year RRRFR program plans to complete one more shipment of the spent HEU fuel using the VPVR/M spent fuel cask fabricated by the Czech company Scoda.