Russian Research Reactor Fuel Return Program starts shipping fuel to Russia

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Abstract

For almost four years the United States (U.S), the Russian Federation (R.F.), and the International Atomic Energy Agency (IAEA) have been discussing an initiative to return Soviet/Russian-origin research reactor fuel to the Russian Federation. In a series of bilateral and trilateral meetings in Vienna and Moscow, considerable progress has been made toward defining the Russian Research Reactor Fuel Return Program as well as obtaining the necessary technical data to facilitate the return. More than 20 research reactors in 17 countries that have Soviet- or Russian-supplied fuel have identified. Most of these reactors have stocks of both fresh and irradiated HEU fuel that must be carefully stored and managed for many years to come. On September 21, 2003 the Russian Research Reactor Fuel Return program shipped 14 kg of fresh Russian-origin HEU fuel from Romania to the nuclear fuel fabrication facility in Russia, which represented the beginning of the practical implementation of the program.

Background and History

Beginning December 1999, and continuing to the present, representatives from the United States, the Russian Federation, and the International Atomic Energy Agency (IAEA) have been discussing a program to return to Russia Soviet- or Russian-supplied HEU fuel currently stored at foreign research reactors. The primary goal of this Russian Research Reactor Fuel Return (RRRFR) Program is to advance nuclear nonproliferation objectives by eliminating stockpiles of high-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 aid reactor operators with the analyses required to optimize performance of LEU fuels, and to convert to LEU fuels. Russia has its own RERTR Program, under which it has significantly reduced enrichments on exported research reactor fuel and is working in cooperation with the US program to develop new LEU fuels suitable for use in Russian-designed research reactors.

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.-supplied spent and unused fresh fuel for management and disposition in the United States, on the condition that operators agree to convert their reactors to LEU as soon as practicable, and, in any event, to not use HEU fuel in the reactor after the program's scheduled end in 2006.

Research Reactor Fuel Return Program

Based on the success of the FRRSNF program, the US Department of Energy, supported by the Department of State, is working to bring about a similar effort in Russia. Trilateral discussions among the United States, Russia, and the IAEA in Vienna have identified more than 20 research reactors in 17 countries that have Soviet- or Russian-supplied fuel.[1] Most of these reactors use at least some HEU fuel, and many 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) is to assist the Russian Federation to 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) and the IAEA on this issue, with the IAEA providing both technical and organizational support to the initiative.

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

President Bush has committed his Administration to strong, effective cooperation with Russia and the other states of the FSU to reduce weapons of mass destruction and prevent their proliferation. To ensure that the promise of these programs is fully realized, the Administration has undertaken a detailed review of U.S. nonproliferation and threat reduction assistance to the Russian Federation. One conclusion of this review was the endorsement of the RRRFR Program as an important nonproliferation initiative that should continue.

The RRRFR Program is an important aspect of the Administration's commitment to cooperate with the other nations to prevent the proliferation of nuclear weapons and weapons-usable/proliferation-attractive nuclear materials.

The United States provides funding to the RRRFR 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 either (1) 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 (2) 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 INFCIRC/225/REV.4 and INFCIRC/153 (corrected), and subsequent revisions thereto**.**

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.

Last summer US DOE tabled with MinAtom of Russia the Government-to-Government Agreement between the Governments of the United State and the Russian Federation concerning the return of Russian research reactor nuclear fuel to the Russian Federation. This Agreement defines the terms and conditions of the importation of the Russian-designed research reactor fuel to Russia and provides the legal framework for the RRRFR program. The Agreement is in the last stages of approval, having been under Russian interagency review since February 2003. We are most anxious to conclude the Agreement and expeditiously implement the RRRFR program. However, despite the absence of a signed formalized framework agreement, we have made some progress to date.

Fresh HEU Fuel Shipment from Romania

On Sunday, September 21, 14 kilograms of fresh Russian-origin highly enriched uranium (HEU) were returned from Romania to the Russian Federation. It was the first shipment of Russian-origin research reactor fuel under the RRRFR program. The HEU was airlifted from Bucharest, Romania to Novosibirsk, Russia where it will be down-blended and used in nuclear power plant.

The shipment was a joint effort of U.S. DOE, the Russian Federation, and the IAEA. The IAEA played an instrumental role in arranging the shipment from Romania and providing the contractual vehicle that made the shipment possible. The United States is deeply grateful to the IAEA for its role in this process.

The highly enriched nuclear fuel assemblies were originally supplied to Romania by the former Soviet Union for the Russian-designed 2 MW research reactor, located near the Romanian capital, Bucharest. The reactor was shutdown in December 1997, and is being decommissioned. The fresh nuclear fuel was loaded in 8 fresh fuel transportation canisters provided by the Russian Federation. IAEA safeguards inspectors and U.S. DOE technical experts monitored the process of loading the fuel in the canisters. An IL-76 Russian cargo plane was used to complete the air shipment of the HEU fuel from Romania. We are still awaiting completion of all the legal documentation necessary before we carry out the first shipment of spent fuel under the RRRFR.

Pilot Shipment

The first candidate for the pilot shipment of spent fuel to Russia is Uzbekistan, whose government has expressed a strong interest in participation in the RRRFR program. 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. Personnel who participated in the early shipments are still at the facility, so experience has been maintained. The facility has 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. Similar nonproliferation, physical security, and safety concerns apply to other research reactors.

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 Russian-supplied nuclear fuel to Russia. Last summer the DOE and the Institute of Nuclear Physics of Uzbekistan completed the facility preparation for the spent fuel shipment to Russia. Facility personnel have completed the training necessary to carry out the shipment. However, according to the new Russian environmental law, an ecological expertise needs to be conducted before importation of spent nuclear fuel to the Russian Federation. INP, Uzbekistan has signed a contract with the Mayak facility in Russia to provide an ecological expertise. An optimistic prognosis is that it will be completed November 2003. Simultaneously with the ecological expertise, TENEX of Russia is working with KATEP in Kazakhstan on preparation of all necessary approvals for spent fuel transit through Kazakhstan. We are hopeful that this first spent fuel shipment will move before the end of the year and that this will provide the impetus to begin regular shipments that will allow us to totally eliminate the stores of HEU at these sites over the next decade or so.