



Volume 1, No.1 JANUARY 2000

Highly Enriched Uranium (HEU) Transparency Program

Converting megatons of highly enriched uranium (HEU) from dismantled Russian nuclear weapons into megawatts of power in the form of commercial-sector fuel is the primary goal of the HEU Transparency Program. By the end of the 20-year contract between the Russian Federation and the United States, 500 metric tons (1.1 million pounds) of HEU from dismantled Russian nuclear weapons will have been downblended to low-enriched uranium (LEU). This amount of HEU would be enough to make about 20,000 nuclear explosive devices.

In Russia, the HEU is being diluted to LEU, which is then delivered to the United States for use in the manufacturing of fuel for commercial nuclear reactors. Under the purchase contract, Russia is expected to receive about \$12 billion for the LEU. The fuel derived from the HEU weapons material eventually will generate an amount of electricity equal to that used by the entire world for almost three years. The weapons-grade HEU is converted into

Second Russian International Conference on Nuclear Material Protection, Control, and Accounting

May 22 - 26, 2000

Obninsk, Russia

<http://mpca.ippe.obninsk.ru>

Abstracts Due - March 1, 2000

Conference objective is to discuss the issues of nuclear material physical protection, control, and accounting (MPC&A) and tasks associated with activities for upgrading the MPC&A technologies.

LEU by a process that includes the following steps: The HEU metal component is removed from nuclear weapons. The component is machined into metal shavings. The metal

shavings are heated and converted to an oxide. Contaminants are chemically removed from the HEU oxide, when necessary. The HEU oxide is converted, by chemical means, into uranium hexafluoride gas. The HEU-hexafluoride gas is diluted with a much lower enrichment level uranium hexafluoride gas, thus producing an LEU hexafluoride gas suitable for nuclear fuel fabrication. The LEU hexafluoride gas is loaded into shipping cylinders. The filled cylinders are shipped to the United States Enrichment Corporation (USEC) in the United States. USEC ships the cylinders of LEU hexafluoride to its customers—

nuclear fuel manufacturers—to make fuel for commercial nuclear power plants.

The United States and Russia agreed to “transparency rights.” For the United States, transparency helps provide confidence that the LEU being delivered under the contract with USEC is not being newly produced in Russia’s enrichment plants but is indeed derived from HEU. Reciprocal transparency rights also were provided to the Russian government to ensure that LEU being delivered to USEC will not be used in U.S. enrichment plants to produce weapons-grade uranium. For the United States, transparency measures consist of on-site document reviews and monitoring process operations at four Russian nuclear facilities—the Siberian Chemical Enterprise (SChE) at Seversk; the Electrochemical Plant (ECP) at Zelenogorsk; the Ural Electrochemical Integrated Plant (UEIP) at Novouralsk; and the Mayak Production Association (MPA) at Ozersk—by U. S. technical experts. Portable



nondestructive assay instruments are used to measure the uranium enrichment, or determine the absence of HEU material, in closed containers at various stages of the conversion process. A continuous, automated system (the Blend Down Monitoring System, jointly developed by Los Alamos National Laboratory and Oak Ridge National Laboratory) monitors the down blending of the HEU to LEU uranium hexafluoride gas at UEIP. Similar equipment also will be installed at ECP and SChE. For the

Russians, transparency measures consist of on-site document reviews and monitoring at five American fuel fabricators, thereby providing information that the LEU is being used only for peaceful purposes as nuclear reactor fuel.

The benefits of the HEU Transparency Program are far-reaching and include removing 500 metric tons of weapons-grade HEU from global supplies, reducing the number of nuclear weapons stockpiled in the Russian Federation, reducing the availability of HEU materials to

potentially dangerous nations and terrorists, stimulating commercial development and economic diversity in the four cities of the Russian Nuclear Weapons Complex, and converting former weapons-grade nuclear material to a peaceful purpose. Converting megatons to



megawatts is an arrangement in which both governments and the world are winners.

Director's Note

These are truly exciting and interesting times. The world has changed dramatically in the last few years, with tremendous shifts in the political structures. Since the end of the Cold War, the world has less to fear from global confrontations involving superpowers in a nuclear holocaust or biological and/or chemical warfare; however, the threat posed to national security from weapons of mass destruction is greater than ever. These weapons pose both strategic and terrorist threats to the United States.

To address these concerns, the Center for International Threat Reduction (CITR) was established in Oak Ridge, Tennessee, in 1999. Oak Ridge has been actively involved in several programs to reduce the proliferation threat. Our programs cover the spectrum from weapon dismantlement to business development, all with a proliferation prevention goal. CITR's main objectives are to open channels of communication between different organizational structures and to coordinate and focus efforts to enhance Oak Ridge's role in the nonproliferation and threat reduction arenas. CITR develops, coordinates, and assists in implementing domestic and international programs aimed at reducing threats (both internal and external) to the United States from weapons of mass destruction. Our primary focus is reducing the threat of nuclear weapons.

This is just a brief introduction to our Center and an explanation of why it was established. We want to share more about CITR on a regular basis, and we'll be using this newsletter to do that on a quarterly basis. We plan to feature major programs and report on current topics of interest related to our business, and we hope it'll be valuable to you.

Thanks for your interest in CITR. We look forward to being in contact with you.

—Larry Satkowiak

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