

Health and Safety Considerations for U.S. Monitors in the Russian Transparency Program¹

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Background

In 1993 the United States and the Russian Federation signed an agreement allowing the United States to purchase highly enriched uranium (HEU) from Russia over a 20-year period. This Highly Enriched Uranium Purchase Agreement permits the purchase of 500 metric tons of HEU from dismantled Russian nuclear weapons in the form of low-enriched uranium (LEU) for use as power reactor fuel in the United States.

Under the HEU Agreement, the United States and Russia are cooperating in a "Transparency Program" to ensure that arms control and nonproliferation objectives are being met. The Transparency Program measures, which are a departure from traditional, intrusive measures of verification, include sending individuals from the United States to Russia to monitor the processing of the HEU.

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Russian HEU Processing Operations

The Russian processing of the HEU material begins with the shipment of weapons components in sealed transport containers to one of two plants, the Siberian Chemical Enterprise (SChE) in Tomsk or the Mayak Production Association (Mayak) in Ozersk, Russia. The HEU components are first machined to HEU metal shavings. These shavings are then burned to an HEU oxide and chemically purified. From Mayak, the HEU oxide is shipped to the ElectroChemical Plant (ECP) in Zelenogorsk, Russia, where it is reacted with fluorine to produce highly enriched uranium hexafluoride (HEUF₆). At the SChE, the HEU oxide is fluorinated, and a portion of the resulting HEUF₆ is shipped to the Ural Electrochemical Integrated Plant (UEIP) in Novouralsk, Russia.

At three facilities, SChE, ECP, and UEIP, the HEUF₆ is down blended with LEU feedstock to produce a LEU product. This LEUF₆ product is then transported to St. Petersburg by rail for shipment to the Portsmouth Gaseous Diffusion Plant in Piketon, Ohio, before it is sent to U.S. fuel fabricators for processing into commercial reactor fuel.

Nonproliferation Objectives and the Transparency Program

The HEU Agreement has four nonproliferation objectives. The first is to provide confidence that the HEU comes from nuclear weapons. The second objective is to ensure that the LEU is derived from this Russian HEU. The third objective is to provide confidence that this LEU is

then delivered to the United States. The fourth objective is to provide confidence that the LEU that is delivered to the United States is then fabricated into fuel for commercial reactors.

To meet the first three objectives, the United States has implemented measures to monitor the activities at the Russian facilities. A list of 100 United States monitors has been drafted by the United States and approved by the Russian Ministry of Atomic Energy (MINATOM). Two types of monitoring activities are conducted at the four Russian facilities. Under terms of the Purchase Agreement, six special monitoring visits (SMV) can be made to each of the four plants per year. During these visits, U.S. monitors observe specific activities that are covered in the Agreement.

The U.S. monitors are from a number of federal agencies, including the Departments of Energy and State; national laboratories, including Argonne, Brookhaven, Livermore, Los Alamos, Oak Ridge, Pacific Northwest, and Sandia; and private contractors, including Bechtel Nevada and Science Applications International Corporation.

Health and Safety Aspects of the Monitoring Program

Individuals applying to be monitors are required to provide a "Fitness for Duty" form that encompasses physical fitness, as well as immunizations, and the ability to use a respirator.

Monitors must also complete RadWorker Level 1 training before their visit. A health and safety program that has been established for all Transparency Program monitors is administered by

Lawrence Livermore National Laboratory (LLNL). Monitors are required to provide a baseline bioassay sample before departing the United States and a post-trip sample upon return.

While conducting their duties in Russia, the monitors follow the safety requirements specified in the Health and Safety Plan for the Transparency Program and are also required to comply with all Russian safety practices and precautions. Both U.S. and Russian dosimeters are worn by monitors. Two U.S. thermoluminescent detectors, which include a nuclear accident dosimeter, and at least one Russian dosimeter are worn at all times in the plant. In addition, a set of eight U.S. control dosimeters is also taken to Russia.

When a monitor returns to the United States, half the dosimeters (one that is worn and four controls) are left with the Russian facility for up to 90 days for arbitration purposes; the other half are returned to LLNL for processing. Within 60 days, LLNL dosimetry readings are provided to the Russian facility. If there is no discrepancy between the U.S. and Russian dosimetry readings, the other five LLNL dosimeters are returned to the United States by the next returning monitor. Any positive bioassays or doses will be reported to the individual and his or her home organization. To date, there have been no positive readings for bioassay and no reportable doses for any of the monitors.

At the UEIP facility, U.S. staff currently monitor operations in three plant facilities—the Fluorination Facility storage area, the Blend Point Facility, and the Transfer Facility. While in these facilities, the U.S. monitors wear Russian protective clothing and equipment. The

primary method for controlling contamination at the Russian facilities is the constant cleaning of all surfaces. This method applies to work areas, equipment, and personnel.

In summary, the Transparency Program monitors feel that the health physics programs at the Russian facilities are good, and a great deal of care has been taken to ensure the safety of both U.S. monitors and Russian workers.