

Preventing Nuclear Terrorism

A Project of the Union of Concerned Scientists

If a terrorist group exploded just one nuclear weapon, hundreds of thousands of people could die. Because there is no effective protection against nuclear terrorism, the only solution is to prevent terrorists from obtaining nuclear weapons, and the fissile materials needed to make them, in the first place.

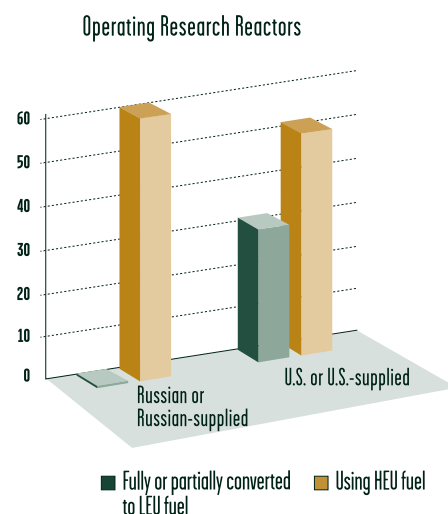
Problem: Research Reactors Fueled by Highly Enriched Uranium (HEU)

HEU is attractive to terrorist groups because it can be used directly to make a simple nuclear weapon. Many countries possess small nuclear “research” reactors that are used for professional training, scientific research, and medical radioisotope production. More than 100 operating research reactors worldwide are fueled with HEU. Others, though shut down, continue to store spent fuel, which still contains HEU but in many cases is not radioactive enough to deter theft. Many of these facilities are in academic or industrial settings with inadequate security—attractive targets for terrorists seeking nuclear weapons.

Solution: Global Cleanout and Conversion

These reactors and their fuel were largely supplied by either the United States or Soviet Union. For reactors that are or will soon be shut down, the solution is to remove the HEU and return it to the country of origin for secure storage and disposition. Reactors that continue to operate should convert to using alternative fuels made with low-enriched uranium (LEU), which cannot be used directly to make nuclear weapons. The United States and Russia both have programs to facilitate such conversion and to retrieve HEU fuel that they supplied to foreign reactors, but these programs have not yet achieved their goal. Congress should:

- Provide adequate funding to ensure that HEU cleanout is implemented as quickly as practical. The FY05 budget requests \$9.866 million for a Department of Energy (DOE) program to facilitate repatriation to Russia of HEU from Russian-supplied research reactors. This is not enough. Funding levels of at least \$40 million in both FY05 and FY06 are needed to remove HEU from the two-dozen most vulnerable sites by the end of 2005, a goal set by both the United States and Russia.
- Support the FY05 funding request of \$9.965 million for rapid U.S. development of alternative LEU fuels for five large U.S. research reactors and 19 large Russian-supplied reactors, among others.
- Extend the U.S. deadline for retrieval of U.S. HEU from foreign reactors on a case-by-case basis. (The current fuel take-back program expires in 2006.)
- Appropriate DOE funds to assess the costs and benefits of continued operation of HEU-fueled research reactors at U.S. universities, and either shut down these reactors or pay for expedited LEU conversion. In the interim, require that physical protection at these reactors be significantly upgraded.



More details:

Under Eisenhower's "Atoms for Peace" program, the United States exported research reactors and reactor fuel to more than 40 countries. Most utilized highly enriched uranium (HEU) fuel, which was typically supplied along with the reactor and returned to the United States after irradiation. The Soviet Union had a similar export program. Although these reactors were covered by "peaceful use" agreements or international safeguards, the United States and Russia came to recognize that widespread use of HEU for research and commercial purposes poses significant risks of theft and proliferation.

U.S. HEU Conversion and Fuel Return Programs

In 1978, the United States established the Reduced Enrichment for Research and Test Reactors program to develop low-enriched uranium (LEU) fuels that could be used without loss of performance. Different types of reactors require different types of fuel, and LEU fuel has now been developed for most types of U.S.-origin reactors. The U.S. program has helped dozens of research reactors worldwide to convert and the United States has taken back 20 percent of the HEU fuel it has supplied worldwide.

Of the approximately 135 research reactors worldwide that continue to operate using HEU fuel, about fifty are either in the United States, of U.S. origin, or using U.S.-supplied fuel. Several of these are committed to converting to LEU by 2006. Two-dozen or so could convert but have not done so for reasons of cost or convenience, and more than a dozen others are unable to convert because the appropriate LEU fuel has not yet been fully developed. Moreover, if the U.S. take-back program is allowed to expire in 2006, some U.S.-origin HEU fuel will remain in other countries.

Russian HEU Conversion and Fuel Return Programs

The Soviet Union began a similar conversion program for Soviet-supplied reactors in 1978. However, it did not develop LEU fuel, but HEU fuel of a lower enrichment (HEU has 20 percent or more of the isotope uranium-235; Russia reduced its fuel enrichment from 90 percent to 36 percent). Unfortunately, HEU can still be used to make nuclear weapons even at this lower enrichment. The United States and Russia have been cooperating since 1994 to develop LEU fuel for these reactors, but progress has been slow and no spent HEU fuel has yet been returned to Russia under the conversion program. Some 60 HEU-fueled reactors continue to operate in the former Soviet Union and in Eastern Europe.

Joint Initiatives

Over the past two years, the United States, Russia, and the International Atomic Energy Agency (IAEA) have worked together to remove HEU from vulnerable sites in Yugoslavia, Romania, and Bulgaria. In November 2003, the DOE and Russia's Ministry for Atomic Energy signed a statement pledging cooperation to remove all Russian-supplied HEU fuel from research reactors in 17 other countries and develop LEU fuel for those reactors that will continue operating. Along with the IAEA, the two countries have developed a plan to return all unused Soviet-origin HEU fuel to Russia by the end of 2005. While this effort will remove neither HEU fuel in operating reactors nor spent HEU fuel, it is a substantial step toward keeping fissile materials out of the hands of terrorists.

The Union of Concerned Scientists' Preventing Nuclear Terrorism Project seeks to prevent terrorists from acquiring nuclear weapons and the fissile materials—plutonium or highly enriched uranium (HEU)—needed to make them. This fact sheet series covers specific problems relating to nuclear terrorism and the steps the United States and other countries should take to address them.

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