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Loophole in Senate Bill May Create Nuclear Risks

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Experts say the legislation may inadvertently encourage production of highly-enriched uranium

In the post 9/11 world, the threat of a nuclear bomb being fabricated and used by terrorists is real. Now a group of nuclear experts has told Congress that a loophole in a bill meant to limit the use of bomb-grade uranium in medical isotopes could undo years of work to curb the risk of such material being diverted to such a bomb.

Signed by over a dozen experts in the medical and nuclear non-proliferation fields, the letter raises concerns about the **American Medical Isotopes Production Act of 2011,** passed by the Senate in November. The bill, currently awaiting a House vote, is aimed at reducing the use of **highly-enriched uranium (HEU)** in developing the **medical isotope Molybdenum-99** — a key ingredient in the medical diagnosis of millions of American patients a year.

Highly-enriched uranium is also a key ingredient in nuclear weapons, and experts say its continuing production for civilian use poses many security risks. The letter, submitted by the Nuclear Proliferation Prevention Project (NPPP), argues that the bill might unintentionally promote the heightened production of HEU by Russia, in particular.

The bill authorizes the US government to begin paying U.S. producers of isotopes to develop low enriched uranium isotopes while simultaneously phasing out U.S. exports of HEU to foreign producers. The two-pronged plan is part of a longstanding U.S. effort to pressure the producers to move towards using uranium with lower enrichment, a more costly process that would nonetheless limit the flow of nuclear bomb material throughout the world.

But the bill does not contain “preferential procurement” language favoring subsidies to companies that develop these isotopes with low-enriched uranium. The NPPP group is concerned that this will cause companies to look to Russia for cheaper HEU-created isotopes.

The Senate bill passed with unanimous consent in November, while the House version is still awaiting a vote. Thomas D’Agostino, the administrator for the National Nuclear Security Administration, has signaled his support for preferential procurement rules. “We need to work together to develop industry-wide incentives for the medical community to preferentially procure non-HEU-based Mo-99 as it becomes available,” he wrote in a letter to Congressmen Jeff Fortenberry (R-

Ne.) and Ed Markey (D-Mass.), who raised this issue with him earlier that year.

The process of developing a medical isotope involves several steps, most of which take place outside the United States. Mostly commonly, a “target” of uranium is placed inside a reactor and fission event begins. A week later, the uranium is removed from the reactor, now loaded with Molybdenum isotopes. This uranium is sent to a processing factory the separates the isotopes out. From there, the isotopes are sent to drug manufacturers in the United States, where they are placed in a radioisotope generator used to create pills or liquids; these are then injected into or consumed by millions of Americans so their bodies can be scanned for medical diagnosis.

The use of bomb grade, or highly-enriched uranium, in making medical isotopes is “an absolutely unnecessary and irresponsible increase of the risk for no net benefit,” says Alan J. Kuperman of the University of Texas. Kuperman, who heads NPPP and was the lead author on the letter, has been working since the late 1980’s to stop the flow of HEU around the world.

He says the danger of not fixing the Senate bill is twofold. First, it undercuts the movement towards using **low-enriched uranium (LEU),** a conversion already begun by most isotope producers. And secondly, it would encourage Russian firms to begin production of the medical isotopes themselves, increasing the movement of material that could be used in a bomb.

While the isotopes themselves are not dangerous, “the danger is from the HEU in the production process,” according to Kuperman. “And the danger from HEU is not a dirty bomb that could kill 10 people, but a Hiroshima-type bomb that could kill tens of thousands.”

The use of HEU is “trending downward,” according to David Albright of the Institute for Science and International Security. That’s been helped by active consolidation of HEU from sources around the world into states where the level of security is higher. But at the same time, the amount of fissile material used around the globe continues to grow at a steady pace. The continued use of HEU for making medical isotopes is a source of frustration to people who seek to reduce nuclear stocks around the world.

Russia has always been willing to use and sell highly enriched uranium, regardless of risk, Albright said. “They just see a way to make money,” he says.

A recent report by the International Panel on Fissile Materials says that over a hundred research reactors worldwide still use HEU.

Concerns about supply

The U.S. consumes around sixty percent the world’s supply of isotopes from Molybdenum-99 each year — around 16 million procedures, primarily diagnostic. But no Molybdenum-99 has been produced in the United States since 1990. Instead, the isotope has come from a plant in Canada as well as producers in South Africa, Australia, Belgium and the Netherlands. A decision by the Canadian government to shutter the Canadian facility by 2016 will leave the only remaining sources overseas.

That’s given medical officials the same incentive as proliferation experts to bolster a domestic U.S. supply. One reason for concern is that roughly a quarter of every Molybdenum-99 shipment from overseas decays over 24 hours. This problem is exacerbated when it’s coming from Australia or South Africa rather than more closely located generators in Canada or Europe. Also, in 2010, serious delays were caused when shipments of the isotope were grounded in Europe following the explosion

of the Eyjafjalla volcano in Iceland.

”It’s an ongoing challenge for us to get the source of supply from that far away” says Dr. Robert Atcher of the Society of Nuclear Medicine.

Some isotopes, moreover, are used in are scans for life-threatening conditions. About 50 percent of the scans are related to cardiac disease and 20 percent relate to cancer, according to Atcher. When there have been isotope shortages, doctors have shown a reluctance to perform tests or surgeries that might otherwise be routine.

But Atcher also worries that the guidelines sought by the non-proliferation community could lead to potentially dangerous shortages, unless the government ensures that domestic production can match what is now imported.

He notes that the switch from HEU to LEU has not been as easy or inexpensive as initially hoped, because HEU targets produce more isotopes than LEU targets. And there are additional testing and technical challenges to using the LEU in this process that drives the price further up.

Kuperman argues that the extra effort is worth it, in order to limit the use of the HEU, and points to studies that say the extra costs to consumers of using more LEU would be only one percent. The producers still “prefer to use bomb grade. That’s why the US has to get tough with the producers,” he said.

Kuperman remains confident that supply won’t be an issue. “Our letter is crystal clear that the top priority is ensuring the supply of medical isotopes,” he says. He supports easing any restrictions on the importation of HEU-based isotopes when there is an inadequate supply of LEU-based isotopes.

> ”Everyone agrees this is an issue to be addressed, and we should reduce the utilization of HEU,” says Atcher. “We’ve agreed and been supportive as long as this program does not put… the ability of us to diagnose or treat the patients at risk.”

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