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Isotope Companies, Nonproliferation Advocates Oppose New HEU Export License

Staff Reports

By John Stang

Nonproliferation advocates and medical isotopes companies hope to persuade the U.S. Nuclear Regulatory Commission that a Belgian company should not receive additional highly enriched uranium from the United States to make its own isotopes.

The regulator has received at least four petitions for intervention in its review of an export application from the Department of Energy for 4.772 kilograms of uranium enriched up to 93.35% at the Y-12 National Security Complex in Tennessee. Their case is centered on a 2012 law that bans the export of domestic highly enriched uranium as of Jan. 2, 2020, because it can be used to power nuclear weapons.

“The proposed export is inconsistent with decades of U.S. efforts to reduce global stocks of HEU and eliminate its use for peaceful purposes,” the Washington, D.C.-based nongovernmental Nuclear Threat Initiative said in a Sept. 11 petition. “The timing of the Application further appears to be an attempt to circumvent the January 2, 2020 HEU U.S. export licensing sunset found in the American Medical Isotopes Production Act of 2012 (“AMIPA”) —a deadline which represents the culmination of decades of U.S. government non-proliferation efforts.”

Similar petitions were submitted in September by London-based nuclear medicine multinational Curium; Beloit, Wis.-based isotope manufacturer NorthStar Medical Radioisotopes; and University of Texas Nuclear Proliferation Prevention Project founding coordinator Alan Kuperman.

Congress passed the American Medical Isotopes Production Act in 2012 due to concerns regarding terrorists stealing exported highly enriched uranium. The law took effect in 2013.

The Fleurus-based Institute for Radioelements (IRE) wants the HEU for target production and irradiation at four European research reactors for production of medical isotopes including molybdenum-99 (Mo-99).

On July 31, DOE’s semiautonomous National Nuclear Security Administration (NNSA) submitted the export license application to the NRC. That application was superseded by a Sept. 3 document.

In a Sept. 26 letter to NRC Chairman Kristine Svinicki, IRE Chief Executive Officer Erich Kollegger said this would be the last tranche of highly enriched uranium shipped to his company as it completes its conversion to using low-enriched uranium in isotope production.

"IRE does not contribute at all to nuclear proliferation and always shows its strong effort to LEU conversion, carefully balanced ... against ensuring reliability of supply to the medical community and more particularly to the US market," Kollegger wrote.

The NRC review could last several months, but the agency cannot predict how long or the potential outcome.

From 2014 to through 2018, the NRC received 21 license applications to export highly enriched uranium, approving 20 of them. Of those approvals, eight were for radiation detection devices containing highly enriched uranium, 10 were for production of medical isotopes, and two were for HEU fuel for research reactors, the NRC said. The 10 medical isotope license approvals totaled 54.2 kilograms of HEU, with six applications for IRE for a total of 32.9 kilograms. An HEU applicant is not required to accept all any or all of the HEU covered in an individual license, according to the NRC.

As part of its nuclear nonproliferation mission, the NNSA in recent years has funneled tens of millions of dollars to U.S. companies that are re-establishing domestic production of Mo-99 without using highly enriched uranium. The isotope decays into technetium-99m, which is used widely in medical imaging. In the meantime, IRE has been supplying up to 40% of the U.S. market for Mo-99, according to Kollegger.

Entities approved by the Nuclear Regulatory Commission to intervene in the review will be able to make their cases in an adjudicatory hearing on the license application.

The petitions broadly emphasize the nuclear proliferation and nuclear terrorism risks associated with the circulation of HEU in commerce, along with the harm done to companies that use proliferation-resistant low-enriched uranium or other technologies in their isotope production.

Kuperman noted that IRE is the only medical isotopes producer that still requests permission to export highly enriched uranium from the United States.

Four organizations comprise 98 percent of global production of Mo-99, according to Curium's filing. These are: Curium, IRE, NTP Radioisotopes SOC of South Africa, and the Australian Nuclear Science and Technology Organization (ANSTO). Of the four, three have converted to using American low-enriched uranium for the targets in the reactors used to generate Mo-99. IRE is in the process of conversion.

Using low-enriched uranium produces more wastes for disposal, decreases the efficiency of producing the medical isotopes, and increases reactor operating costs, Curium said. Competing with another company using highly enriched uranium would cost Curium "millions of dollars per year" in business lost to IRE's cheaper prices, according to its filing.

The company further noted that the NNSA's export license for highly enriched uranium going to IRE expires on Oct. 31, but it did not apply for a new one until July 31.

Kuperman and Curium said 4.8 kilograms is more than IRE should need. At least 4 kilograms of highly enriched uranium that would be left over after IRE produces its Mo-99 in 2020, they said.

It would take roughly 5 kilograms of LEU to make the same amount of Mo-99 as 1 kilogram of HEU could, Kuperman wrote. Low-enriched uranium cannot be used to make a nuclear weapon, while 12 to 100 kilograms of HEU would be needed for a nuclear bomb, depending on the sophistication of the design, he added.

Writing to Svinicki, Kollegger said all the participants in IRE's supply chain have "very high" security standards, with fissile materials kept under close watch.

Kuperman wrote that IRE stated In July it expects to convert its processes to use low-enriched uranium reactor targets in the third quarter of 2020 for Mo-99 and in 2021 for iodine-131. He said IRE already has enough highly enriched uranium stockpiled to produce the isotopes through the fourth quarter of 2020. Kuperman calculated that IRE would need only 225 to 250 grams of highly enriched uranium to create I-131 from the fourth quarter of 2020 to the fourth quarter of 2021.

"(IRE) might prefer, for financial convenience, to continue producing Mo-99 using HEU targets, even after it is able to produce Mo-99 using LEU targets, since it wants to continue producing I-131 with HEU targets. … in light of the fact that medical isotope production is less expensive with HEU than LEU, if the Commission were to approve export of HEU in excess of the minimum amount required by (IRE), the Commission would effectively provide the end-user a subsidy that would enable (IRE)to undercut its competitors who have complied with U.S. nonproliferation law and international nonproliferation norms – meaning that the Commission would be undermining U.S. nonproliferation policy," according to the UT academic.

In an email, an IRE spokeswoman said the corporation must convert three different manufacturing processes for molybdenum-99 and two other isotopes, which requires extensive re-engineering beyond merely adjusting for using a different grade of uranium for the reactor targets. The conversions "may take a long time," she wrote. Citing corporate confidentiality, IRE declined to comment on the arguments made by Curium and Kuperman.

The Belgian firm did find support for the export license from Lantheus Medical Imaging, of North Billerica, Mass. The company backs conversion to low-enriched uranium in the isotope industry, including by IRE, which is one of its Mo-99 suppliers, President and CEO Mary Anne Heino wrote in a Sept. 6 letter to Svinicki.

But she also noted ongoing production issues at ANSTO and NTP that have challenged global supplies of Mo-99.

"We believe that your approval of the referenced expo1t license is a necessary and prudent step, especially in light of ANSTO and NTP's production challenges," Heino write. "An approved export license will permit the Department of Energy to provide additional HEU to IRE as needed so that IRE can continue to be a key supplier of critical medical isotopes for U.S. patients."