Isotope costs may rise during supply gap

Canadian isotope-processing company Nordion will not be ready to replace the supply of molybdenum-99 (Mo-99) when the National Research Universal (NRU) reactor at Chalk River, Ontario, ceases production on Oct. 31. But it plans to be fully back in business using its new source, the University of Missouri Research Reactor (MURR), early in 2018, said Phil Larabie, Nordion's general manager of medical isotopes. And it will be ready to process isotopes "at a moment's notice" during the supply gap if Natural Resources Canada decides to restart the NRU in the event of a serious global shortage.

Recent international reports indicate that global supplies of Mo-99 should be able to meet demand when the NRU stops production, barring outages at other world reactors, said Larabie and Dr. Andrew Ross, president of the Canadian Association of Nuclear Medicine (CANM).

But Ross worries that isotope costs, which have recently increased 5%–10%, will rise further, as supply tightens and Canada goes from being a net exporter of isotopes to a net importer. At the same time, nuclear medicine budgets are being constrained across Canada. "How does that work? It just doesn't," said Ross, "That becomes a really significant issue for access to care."

CANM is working on "a pan-Canadian medical isotope business model," says Ross. It will ask the federal government to set up a transition fund to help the Canadian health care system manage costs. Ross reasons that the federal government long subsidized the supply side of the isotope equation by operating the NRU reactor and could shift those resources to the demand side.

With Nordion temporarily out of the picture, Ross is also concerned there may not be enough processing capacity. "The area where things are lean is not getting the raw molybdenum-99 out of reactors, but turning it into a useable substance."

Over its 60 years of operation under various names, Nordion has been one of the world's highest-volume isotope processors. It purifies the "rough" first-stage-processed isotope, then supplies the Mo-99 to manufacturers of technetium-99 (Tc-99) generators, which are used in myocardial perfusion imaging, bone and renal scans and other imaging. Mo-99 accounts for about 80% of medical isotope usage. Nordion will continue to process several other medical isotopes from the NRU until March 2018, when the reactor will be completely shut down. The federal government decided to decommission the NRU, the world's oldest operating reactor, because of costly outages and escalating maintenance costs.

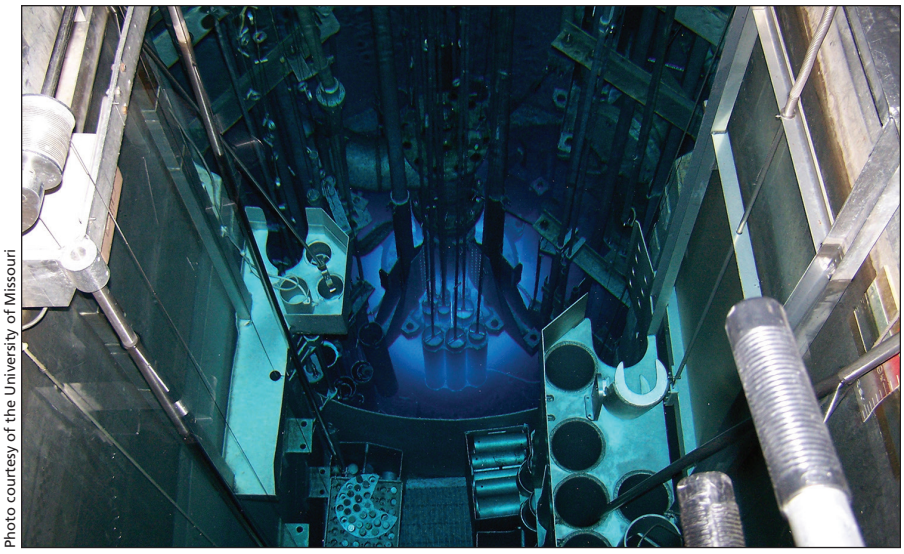

Photo courtesy of the University of Missouri

The University of Missouri Research Reactor will begin supplying molybdenum-99 to Nordion in early 2018.

Nordion's new source of Mo-99 uses a novel technology called "selective gas extraction" patented by General Atomics. In this process, Mo-99 is produced from a uranium target using nuclear fission, then drawn off the uranium using a gas, which is collected; the isotopes are deposited onto a collection apparatus. The process does not use acids or liquids, and creates less nuclear waste, said Larabie.

"It's really pioneering work," said Larabie. "This is the first time it is being used on a routine basis." The process will be used at MURR in Columbia, Missouri. "We're working with General Atomics to determine the best methods to get it to full scale," MURR spokesperson Christian Basi explained. "We have had several experiments to date that have yielded some promising results." MURR produces commercial products, including medical isotopes for customers NorthStar and Northwest Medical, as well as a product called Therasphere with Nordion.

Larabie said MURR has several advantages over other novel Mo-99/Tc-99 sources. For starters, it will use existing infrastructure, including MURR and the Ottawa-based Nordion facility. "The incoming material will be a slightly different chemical form than what we currently get from our current supplier at Chalk River, but we are intending to use our exact same process and production facility." Nordion's customers must qualify the isotopes for use in their processes, but no clinical trials for regulatory approval are required.

Under the terms from the US National Nuclear Safety Administration, production capacity will be 3000 six-day curies per week, compared with Nordion's previous capacity of 4680 six-day curies per week, according to a 2014 report by the Nuclear Energy Agency of the OECD. Larabie said final production will be determined by demand, but is expected to ramp up as customers gain confidence in the new Mo-99 product.
— Carolyn Brown, Ottawa, Ont.

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