

Questions about future of HEU had role in Maple's end, AECL says

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The recent decision by Atomic Energy of Canada Ltd. to scrap its troubled Maple reactor project was in part due to uncertainty about the continued commercial viability of producing medical isotopes from high-enriched uranium, a spokesman for the crown corporation said May 22.

Observers also said AECL's decision, announced May 16, was likely to accelerate the worldwide phase-out of HEU for medical-isotope production.

The two Maple reactors were to replace the National Research Universal, or NRU, reactor, which started operating in 1957. Under licenses issued by NRC, the US supplies HEU for the Maple and NRU reactors, all of which are located at AECL's Chalk River site in Ontario.

In a press release, AECL said it was abandoning work on the project, launched more than a decade ago, on the basis of a review that included "the costs of further development, as well as the time frame and risks involved."

AECL spokesman Dale Coffin said a main factor was the units' inability to operate with a negative power coefficient of reactivity. Reactivity coefficients indicate the degree to which reactivity will change in response to a particular parameter. In a 2003 analysis, the Canadian Nuclear Safety Commission said a positive coefficient is "contrary to the core design characteristic analyzed in the Final Safety Analysis Report and could have a negative impact on safety" (INRC, 22 Sept. '03, 10).

The latest tests of the reactivity coefficient earlier this year were "not favorable," Coffin said. At that point, it was clear that AECL would not have Maple-1 in commercial production by October of this year — the goal stated in the latest version of the timetable for the much-delayed project — and there was "no indication" of when the problem would be resolved, he said.

The second key factor, Coffin said, was an apparent "movement" by other isotope producers toward low-enriched uranium targets for production of molybdenum-99. Questions about both the economics of conversion and the "technology risk" — that is, whether AECL could maintain isotope production with LEU at the same levels that it has with HEU — were factors, he said.

Isotope production using LEU has been demonstrated on a relatively small scale, but the larger producers have said scaling up might not be straightforward. However, at a meeting of reactor operators last December, the Netherlands' Nuclear Research and Consultancy Group said it was studying the feasibility of LEU isotope production and could be producing Mo-99 from LEU on a large scale within a decade (NuclearFuel, 17 Dec. '07, 1).

In the US, the National Academy of Sciences is conducting a congressionally commissioned study on the feasibility of producing isotopes with LEU, and there are proposals for two reactors, using different designs, to produce LEU-generated Mo-99 (Nucleonics Week, 14 Feb., 3). The Natural Resources Defense Council, an environmental and nonproliferation advocacy group, has submitted a petition for rulemaking to NRC calling on the agency to set a date after which it would no longer license or otherwise support the use of HEU for civilian purposes (INRC, 31 March, 3).

Neeraj Monga, the director of research for Canada's Veritas Investment Research Corp., said in a May 21 interview that if AECL did not convert to LEU, AECL — and MDS Nordion, which markets the isotopes that AECL produces — would have to confront two significant uncertainties. The companies, he said, would have to be concerned not only about continued HEU supply from the US, but also about maintaining dominant market share in the US if there was competition from one or more producers that had the dual advantage of being US-based and using LEU.

Alan Kuperman, an assistant professor of public affairs at the University of Texas at Austin and a long-time advocate of eliminating HEU-based isotope production, said the AECL announcement helps support that goal. Even though the NRU also uses HEU, its remaining lifespan will be much shorter than the Maple reactors' would have been, he said.

But he said an issue that needs to be addressed is the fate of the 45 kilograms of HEU that AECL already has imported to Chalk River under its NRC license. NRC limited the amount of HEU it permitted AECL to receive from the US because the regulators wanted to avoid the proliferation risk of excess quantities of weapons-usable material, he said. With the abandonment of the Maple project all the material is now surplus and should be "returned immediately," he said.

NRC spokesman David McIntyre said May 22 that the agency already had contacted AECL about disposition of the HEU. He said one option being explored is to use the material at the NRU, which receives its HEU under a separate NRC license. If that is not possible, the material should be returned to the US, he said.