Potent fuel at MIT reactor makes for uneasy politics

MIT's 50-year-old nuclear reactor was originally slated for fuel conversion by 2014. (Dominic Chavez/ Globe Staff/ File 2008)
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WASHINGTON - MIT's 50-year-old nuclear reactor, one of only three US research facilities not run by the Department of Energy that still use material that could also be used to make atomic bombs, will probably not be converted to use a safer fuel for at least another five years because of technical obstacles, according to a recent government report obtained by the Globe.

That means the reactor on the university's Cambridge campus, originally slated for fuel conversion by 2014, will continue to present a political liability for US officials, who are strongly urging other countries around the world - most notably Iran - to forgo the civilian use of highly enriched uranium to prevent the spread of nuclear weapons.

MIT views the delays, out lined in a November report by the Nuclear Regulatory Commission, as unfortunate, if unavoidable.

"We would like to get this particular monkey off our back because it is not helpful for public relations,'' said David Moncton, the nuclear reactor laboratory's director.

The US government has spent millions of dollars in recent years helping other nations convert their civilian reactors from using highly enriched uranium to low enriched uranium, a suitable alternative for generating nuclear power that cannot be used to make an atomic bomb. And President Obama is expected to seek further commitments next year from foreign nations to phase out highly enriched uranium from civilian reactors.

But while the Department of Energy set a goal of 2014 to switch the MIT reactor to the lower-grade fuel, that commitment is not likely to be met, according to the Nuclear Regulatory Commission, largely because the MIT facility needs a special kind of new fuel to maintain its uniquely high density core - fuel that will take years to develop and certify before it can be manufactured in sufficient quantities.

“To meet this goal will require significant effort,’’ according to the internal report. It said that the Department of Energy, which is overseeing the development of the new fuel, is “working towards establishing commercial capability, but it will not be ready by the 2014 conversion deadline.’’

A Department of Energy spokesman expressed hope that the conversion can be completed sooner, but acknowledged there is a lot of work still ahead. “The fuel must be designed and extensively tested, new fuel fabrication processes must be developed, and multiple analyses and reviews must be performed to verify the fuel and hence the reactors’ safety,’’ he said.

Yet some former government officials also partially blame MIT for the delay, citing its insistence that the new fuel must provide the same performance as the current fuel - even though other forms of low enriched uranium fuel have long been available.

“There has been a tremendous amount of foot dragging, particularly on the part of the universities,’’ said Victor Gilinsky, a former NRC commissioner who is now an energy consultant in California. He noted that the MIT reactor could be converted quickly if it were willing to give up some performance.

“We could be a lot further if there was more focus on the fuel development end by the government, but also willingness to make compromises at the user end,’’ he said. “Maybe you don’t need the same performance.’’

Moncton, who took over as director in 2004, maintains that MIT is doing everything it can to convert the reactor as quickly as possible, to demonstrate to other countries that have similar facilities that the new fuel will be able to preserve their operations as well.

Most specialists agree that the facility - along with another at the University of Missouri and a research reactor run by the Department of Commerce in Maryland - is fully secure and that the amount of nuclear material in the reactor does not pose a major terrorist threat. Still, some believe the supply of fuel at the Albany Street facility could still be a terrorist target.

“You’d get a big radiation dose, but it wouldn’t stop you from carrying it off,’’ said Matthew Bunn, a professor at Harvard’s Kennedy School of Government and author of “Securing the

Bomb,'' noting that government regulations do not require MIT to meet the same security guidelines as the plant that provides new fuel rods to the reactor several times a year.

Still, the thorniest issue is the double standard the MIT reactor presents to other countries, according to multiple specialists and government officials.

A congressional commission recently cited the conversion of such domestic reactors as a critical step to prevent the spread of nuclear weapons material worldwide, noting that other countries may refuse to convert their reactors if the US continues to use highly enriched uranium.

Arms control groups have urged the Nuclear Regulatory Commission to revoke the licenses of the US facilities if they don't meet the 2014 deadline.

The concerns come at a time when the United States and its allies are trying to persuade Iran to give up its uranium enrichment program, contending that if it only seeks civilian nuclear energy - and not weapons - as the country maintains, it should purchase low enriched uranium fuel from other countries.

The International Atomic Energy Agency has accused Iran of using a civilian nuclear effort to shield a secret bomb-making program. Ironically, a number of Iran's nuclear scientists were trained in the 1970s on the MIT reactor before the two nations cut off diplomatic ties.

The MIT reactor, which was built in 1958 when the university began its nuclear engineering department, is now used for a variety of academic research and also brings in about $1.5 million a year from commercial work, which covers about 60 percent of the annual operating costs, said Moncton, the director. He stressed MIT does not make a profit.

In addition to training nuclear engineers, one of its primary uses is medical research, including cancer therapies and studies of cell biology and blood chemistry. It is also a money-making enterprise, by radiating seeds used in prostate cancer treatments and by turning silicon into high-performance semiconductors for the hybrid car market.

But several officials with knowledge of the situation said that only recently have MIT officials been fully cooperative on the conversion plan - and only because they have been assured by the Department of Energy that they will not lose any capacity by using the new fuel.

Bunn said that when he previously served on a government panel reviewing nuclear security risks MIT "was absolutely against'' converting the reactor. "If you told them to convert to the fuels available today,'' he added, they would flatly refuse.

Alan J. Kuperman, director of the nonproliferation program at the University of Texas at Austin, said a major scientific argument against conversion had been that the reactor's "peak neutron flux'' would be diminished by 10 percent with the new fuel.

Moncton, however, said that is no longer a concern and he believes the Department of Energy, which will pay for the conversion and additional costs, is working on a new fuel that will allow the reactor to maintain its capacity.

“We will maintain our performance with this new fuel,’’ he said. “We can get basically equivalent performance. That is why we are interested in doing this.’’

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