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ELIMINATING THE RISK FROM SPENT NUCLEAR FUEL

Tom Randall says that there is virtually no limit to the energy that fast reactors with reprocessing of spent fuel can supply ["Nuclear waste a nearly limitless source of electricity," Business commentary, Dec. 8]. He's right. Edwin Lyman says Randall's scheme won't work [Letters, December 16, 2005]. He's wrong. Not only would it work, it would greatly lessen the safety and security risks posed by spent fuel.

Dr. Lyman makes the weird assertion that "Even the 'pyroprocessing' technology that Randall touts was evaluated in the 1970s and rejected as too proliferation-prone." It's weird because, far from being rejected, the Department of Energy's program to develop modern fast reactors with pyroprocessing was starting to be ramped up at the end of the 1970s.

Dr. Lyman makes the misleading statement that "All spent fuel contains plutonium that can be used to make nuclear weapons." While literally true, two very important qualifications are missing. First, pure plutonium would have to be extracted from the fuel, which pyroprocessing

does not do. Second, even when purified, plutonium from spent fuel is so hard to work with that easier routes to weapons are always available.

Moreover, the spent fuel in Randall's scheme is especially obnoxious. In 1994, a study by Lawrence Livermore Laboratory found that plutonium extracted from fast-reactor spent fuel by pyroprocessing would be exceedingly difficult, if not impossible, to use in a nuclear weapon (Lawrence Livermore is one of the nation's two laboratories that design nuclear weapons). No nation would waste its time trying to do it, and no terrorist group would have a prayer of getting anywhere.

France, Great Britain, and Japan all recycle some of their spent fuel using a process that, unlike pyroprocessing, does separate plutonium. Nonetheless, this has not led to the increased proliferation of nuclear weapons. The years since 1977, when the U.S. first decided to forgo reprocessing, have shown that there is essentially no connection between commercial reprocessing by an advanced nuclear state and proliferation.

Any type of reactor can be subverted to produce weapons quality plutonium, which is why international safeguards are important. Fast reactors can be an important part of a system that lessens the risk.

Dr. Lyman is wrong about the economics. He observes that "A 1999 study by the Energy Department found that a scheme similar to Randall's would cost \$316 billion (in 2004 dollars)." Not really. That was the estimated cost of a procedure known as ATW (accelerator-driven transmutation of waste), a very expensive alternative to fast reactors that has been investigated but is not now being considered for deployment.

Dr. Lyman says "pyroprocessing doesn't work," but in fact it has been shown to work very well for its primary purpose, namely recycling spent fast-reactor fuel. The example he cites was an investigation of pyroprocessing for separating plutonium from a mixture that was almost entirely uranium. The resulting plutonium was too impure to be useful even for fast-reactor fuel.

Yes, reprocessing spent nuclear fuel in fast reactors can

indeed solve the "waste problem." It will allow more than 99% of the energy in uranium to be used -- unlike today's reactors, which utilize less than 1%. We must wean ourselves away from the current, profligate approach that Lyman would like to see continue.

Gerald E. Marsh and George S. Stanford

Gerald E. Marsh is a physicist, retired from Argonne National Laboratory, who has worked and published widely in the areas of science, nuclear power, and foreign affairs. He was a consultant to the Department of Defense on strategic nuclear technology and policy in the Reagan, Bush, and Clinton administrations, and served with the U.S. START (arms control) delegation in Geneva. He is a Fellow of the American Physical Society. His most recent book is: "The Phantom Defense: America's Pursuit of the Star Wars Illusion" (Praeger Press).

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