# Fusion Power

## The Other Nuclear Illusion

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On December 11, 1993 *The New York Times* heralded that scientists at Princeton University had "plunged across a new physics frontier…with a series of experiments that may eventually lead to an inexhaustible source of energy." After decades of effort, Princeton's Plasma Physics Laboratory (PPL) had produced a short, controlled burst of fusion energy.

The *Times* went on to say nuclear fusion reaction "produces virtually no dangerous waste and…quenches itself automatically and instantly if anything goes wrong." Thus, the latest iteration of a refrain we have been hearing since the explosion of the first hydrogen bomb—a tiresome song-and-dance about the promise of abundant and clean electrical power from controlled nuclear fusion. An energy source which will be "bigger and better," we are told, than the current dirty and dangerous fission-based technology.

"Bigger" is true. A single facility capable of controlling and harnessing a fusion reaction (the same process that drives the sun) might have to be ten times larger than an equivalent fission reactor. Construction and operation would require multi-billion dollar investments, thus centralizing control of energy sources in the hands of governments, utilities and multinational corporations no different than its nuclear fission cousin.

Lawrence Lidsky, a professor of nuclear engineering at MIT's Plasma Fusion Center and editor of the journal *Fusion Energy*, has warned: "Fusion reactors will be much more complex devices than fission reactors. In addition to heat-transfer and control systems, they will utilize magnetic fields, high power heating systems, complex vacuum systems, and other mechanisms that have no counterpart in fission reactors. Furthermore, they will be subject to higher stresses than fission machines because of the greater neutron damage and higher temperature gradients.

In 1973, 20 years into the nation's fusion energy research program, the American Association for the Advancement of Science (AAAS) raised a series of concerns about fusion energy, concerns that are still valid today: "The hazard of an accident to the magnetic system would be considerable, because the total energy stored in the magnetic field would be…about the energy of an average lighting bolt" [100 billion joules, equivalent to roughly 45 tons of TNT]. "But the greatest hazard of a fusion reactor…would undoubtedly be the release of tritium, the volatile and radioactive fuel, into the environment."

Tritium is radioactive hydrogen gas; it is a tiny atom, very difficult to contain. (It can escape from some metal containers by slipping right through the metal.) Furthermore, tritium is a form of hydrogen, which can become incorporated into water, making the water itself weakly radioactive. Since most living things, including humans, are made mostly of water, radioactive water is hazardous to all life forms. Tritium has a half-life of 12.4 years, so it remains hazardous for about 125 years after it is created. The AAAS estimated in 1973 that each fusion reactor would release one to 60 Curies of tritium each day of operation through routine leaks, even assuming the best containment systems. An accident, of course, could release much more because at any given moment there would be 100 million Curies of tritium inside the machine, a large inventory indeed.

There would be too much radioactivity inside a fusion reactor to allow maintenance workers inside the machine. Repairs will not be possible by normal procedures. This alone will make fusion plants unattractive to electric utilities.

And Prof. Lidsky has pointed out, "One of the best ways to produce material for atomic weapons would be to put common uranium or thorium in the blanket of a fusion reactor, where the fusion neutrons would soon transform it to weapons-grade material. Tritium, an unavoidable product of the reactor, is used in some hydrogen bombs. In the early years, research on fusion was classified precisely because it would provide a ready source of material for weapons. Such a reactor would only abet the proliferation of nuclear weapons and could hardly be considered a wise power source to export to unstable governments."

In order to counter PPL's propaganda about this latest techno-fix, members of the N.J. Public Interest Research Group, the Raritan-Brunswick Greens, and the N.J. Environmental Federation demonstrated in Princeton against additional funding for the PPL project in Dec. 1993. We pointed out that, to date, the U.S. alone has sunk over $9 billion into fusion research and is presently spending about $500 million per year. Meanwhile, fusion advocates predict it will take another 40 years (!) before it can build a single commercial machine to generate electricity.

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