

Letters

Accelerator Production of Tritium

Some remarks of mine are quoted by Mark Crawford in his article about the use of accelerators to produce tritium for nuclear weapons, (News & Comment, 27 Jan., p. 469). My comments related to the position of the Department of Energy's (DOE's) Energy Research Advisory Board (ERAB) on the subject. This letter is to further clarify the views of ERAB.

The accelerator concept to produce tritium is not new and has attractive features. The capital costs are less than those required to build a nuclear reactor to produce tritium, and there are safety advantages. Moreover, the state of the art in accelerator technology has improved over the years so that accelerator performance is getting ever closer to that required for this application. Nevertheless, ERAB stated in its report that the technology is "not mature enough to provide new production capacity in the next ten to twelve years."

The position of ERAB was based on an assessment by an ERAB panel, which I chaired. The panel evaluation identified a need for further development of the engineering and technology and was not an objection to the concept itself. There are two areas where additional development is needed. The first is the performance of the accelerator. Accelerators that can operate at near steady state with beam energies of 1 to 2 billion electron volts and at beam currents of 200 to 300 milliamperes have not been built. Some demonstration of this level of performance is needed before a production facility could be initiated on the basis of this technology.

The second area that needs development is the target system technology. The suggested use of lead or tungsten rods to generate neutrons from the accelerator beams and the use of tritium targets developed for application with the low-temperature, heavy-water Savannah River production reactor are unproved and would require testing in an existing linear accelerator. The proton damage rates and component lifetimes, the neutron and tritium production rates, and the induced radioactivity of the facility need to be determined. The needed development is probably not a major problem, but does need to be accomplished before commitment to the facility.

The Accelerator-Tritium Producer requires approximately 800 megawatts of steady electrical power, and the associated high operating cost affects the overall economic

evaluation of the concept. The economic aspect was not an important part of ERAB's deliberations but, of course, would be important to DOE in its evaluation.

The ERAB discussions of the accelerator approach took place in February 1988 when Los Alamos and Brookhaven scientists presented the concept at an ERAB panel meeting. The ERAB panel requested the presentations so that they could be informed of any recent improvements in accelerator performance. ERAB had not been asked by DOE to assess the approach, but ERAB believed it important that they be aware of all possibilities for tritium production. I believe that, despite further design work, the conclusions of ERAB on the need for more development are still correct and that the accelerator approach would not be feasible in the time frame under consideration.

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The letter of Harold M. Agnew on "Tritium production" (17 Mar., p. 1419) misses the mark. At least two attempts at gas-cooled power reactors have been made in the United States, both of which have met with technical and economic failure: Fort St. Vrain in Colorado was recently shut down, and Peachbottom in Pennsylvania was shut down a long time ago. The so-called German programs on high-temperature gas-cooled reactors (HTGRs) have been either scaled down or discontinued, and there are no commercial HTGR power producers in the world anywhere. Thus, gas-cooled reactors are not a proven technology. The overriding agenda for the production of tritium is the security of the United States, not whether economical nuclear power can also be produced in addition to tritium. A stand-alone reliable tritium source is the only overriding security need for the country. The heavy-water reactor (HWR) at Savannah River, South Carolina, has had this responsibility for 40 years. By this criteria, the HWR is the only proven technology for tritium production. The problem is whether, under present political conditions, the country is willing to take the risk of connecting weapons production with civilian nuclear power production. If that were the case we could produce tritium in every light-water reactor in the country today and more cheaply than any new or old production reactor could. The Accelerator-Tritium Producer (ATP) offers production of tritium with no involvement of nuclear fission, fis-

sion products, or nuclear power production. It is the most benign technology for tritium production, and it is the consensus among accelerator physicists and engineers that the technology is practical today.

If the HTGR is such a clean, efficient, and economical source of electricity and process heat, why does it need tritium to prove it?

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Biotechnology Regulation

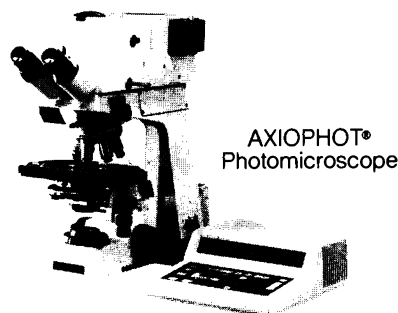
The article "Biotechnology rules wither in OMB" by Mark Crawford (News & Comment, 3 Feb., p. 602) might lead some readers to believe that "environmentalists" actually favored the substance of the rules sent to the Office of Management and Budget by the Environmental Protection Agency for regulating the release of genetically engineered microorganisms into the environment. The reality is quite different.

Most environmental organizations I know of, including the Council for Responsible Genetics (on whose Board I sit), have been pushing to have the regulation published in the *Federal Register* in order to give citizens, public interest groups, labor unions, and other interested parties an opportunity to express their comments, consistent with our long-standing positions favoring democratic participation in agency decision-making. Readers should be aware that the regulations developed by EPA and sent on to the Office of Management and Budget resulted from interactions primarily between EPA and representatives of the biotechnology industry.

The substance of the rules that EPA has drafted is wholly inadequate to protect the legitimate interests of the citizens (1). The most egregious problem with them is that regulatory authority would be delegated to committees dominated—if not fully controlled—by the industries proposing the actual releases. Although this structure is ostensibly modeled on the National Institutes of Health system of institutional biosafety committees established under the recombinant DNA guidelines at all institutions receiving federal support for recombinant research, studies of those committees indicate substantial reasons for concern about how they are functioning (2). Any problems that exist with the adequacy of regulation provided by the NIH system of committees, the overwhelming majority of which are housed at academic institutions where there is at

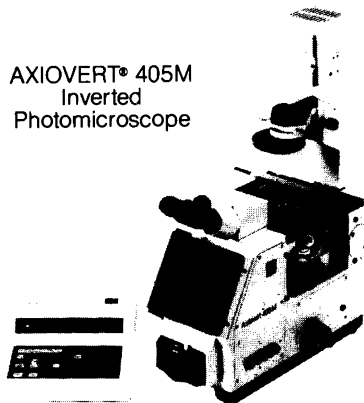
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least a tradition of altruism, would be greatly exacerbated in committees formed under the auspices of the very entities which they are supposed to be regulating.

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2. *Sci. Technol. Hum. Values* 9, 16 (Fall 1984).

Documents recently made public by the Environmental Protection Agency (EPA) indicate that the Office of Management and Budget is refusing to release the EPA rules—in part, because of “fundamental scientific concerns” raised by the White House’s Biotechnology Science Coordinating Committee (BSCC). According to the EPA documents, the BSCC maintains that the “proposed rules do not use scientifically determined likelihood of risk bases for categories of regulated microorganisms” (1).

A new report (2) from the Ecological Society of America (ESA) discredits this BSCC argument against the rules. The ESA report, while supporting the principle of

regulation scaled according to risk, concludes that risk-based categories of transgenic organisms should be developed *after*, not *before*, experience is gained from field experiments and risk assessment research. In other words, it is too soon to develop risk-based categories.

The report also provides well-documented positions and ecological perspectives on other controversial matters that are central not only to the EPA rules but to other federal regulation of biotechnology. For example, it concludes that (i) small-scale releases deserve oversight; (ii) a safe record in traditional agricultural breeding should not exempt from review transgenic organisms that the traditional methods could not have produced; and (iii) techniques other than recombinant DNA produce transgenic organisms that should be subject to federal oversight.

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2. J. M. Tiedje *et al.*, *Ecology* 70, 298 (1989).

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