

The program is vulnerable to a number of criticisms despite the smooth operation. Initially, EPA barred the most unusual trade-off—between smokestack or plant emissions and windblown dust. The argument was that industrial processes emit smaller, more concentrated particles that stay in the air longer and lodge more deeply in the lungs. The agency reversed its position under pressure from the steel industry, largely because the existing particulate standard permits insufficient legal distinction between particulates of different size. Because there seems to be a consensus among scientists that small particulates are indeed more harmful, this amounts to a bad policy chasing an inappropriate standard. Environmentalists have expressed concern that under such trade-offs, toxic pollutants might be permitted while benign ones are controlled. Michael Levin, of EPA, notes that pollutants designated as hazardous by the agency cannot be offset by reductions in nonhazardous pollutants, while many others remain unlabeled, and thus are available for potentially unequal trading. These would include substances such as formaldehyde, ethylene dibromide, and various polycyclic aromatic hydrocarbons.

Industry initially had several complaints of its own about the program, although much of its discontent has now evaporated. Companies had complained that the bubble program requires excessive computer modeling of industrial air quality, that it requires too much time for official approval, and that it grants too little discretion to the state agencies that administer the Clean Air Act. In January, EPA streamlined its review process and created the first of a series of generic rules for implementing the bubble program at the state level. The rule will permit about 100 chemical companies in New Jersey to more easily obtain permission for bubbles that limit hydrocarbon emissions.

Many of the firms that use the program find that resultant pollution is less than what the law allows, a circumstance that grants them a credit toward added pollution in future. As credits proliferate, EPA plans to establish a brokerage network for selling the credits from one firm to another. Such transfers would facilitate new growth in an area under stringent pollution limits and would permit compensation—at whatever the market will pay—for voluntary efforts to lower pollution.

Brokerage systems have been established through local governments in three cities—Louisville, San Francisco,

## Prior Restraints Recommended

On 7 February, the Public Cryptography Study Group, whose nine members come primarily from the academic community, voted to recommend a purely voluntary system of prior restraints on the publication of research in cryptography. Although it considered a statutory system of prior restraints, possibly to go into effect if a voluntary system failed, the group rejected this approach.

Under the voluntary system, researchers will be asked to submit papers related to cryptography to the National Security Agency (NSA) prior to publication. The NSA will then determine whether any portions of the papers might, if published, threaten national security. If so, the agency will ask the researchers to withhold those portions of their papers. Researchers will be able to appeal to a five-member review board, two of whose members will be appointed by the director of the NSA and three by the president of the National Academy of Sciences. The researchers will be free, however, to reject the advice of the NSA and of the review board.

The Public Cryptography Study Group was established a year ago by the American Council on Education in response to a request by Vice Admiral Bobby Inman, the former director of the NSA, for a dialogue between academic researchers and the NSA. The NSA claims that open publication of research in cryptography might threaten the national interest by interfering with its intelligence-gathering and intelligence-protecting missions. But it is also in the national interest for academic scientists to pursue research in cryptography, which often bears on fundamental problems in mathematics, computer science, and engineering. In addition, there is a growing need for secure codes to protect private and commercial information that is stored in computers or electronically transmitted.

Advocates of a purely voluntary system of prior restraints repeatedly stressed that it is to the NSA's advantage to behave reasonably if it expects researchers to cooperate. In addition, said study group member Martin Hellman of Stanford University, who represented the Institute of Electrical and Electronics Engineers (IEEE), "The NSA has recently been more open than in the past. I would like to encourage this openness and I think we have to meet the agency halfway."

Some who have had dealings with the NSA expressed doubts that the agency would be easy to deal with. Cipher Deavours of Kean College of New Jersey, an editor of *Cryptologia*, says his journal routinely submits articles to the NSA prior to publication, but when the NSA asks that an article not be published it never explains why. Yet, he remarks, even when he is given a "no comment" answer to his questions, he cannot bring himself to publish articles that the NSA intimates may harm national security.

Other study group members and observers had some reservations about the very idea of prior restraints—even voluntary ones. George Davida of the Georgia Institute of Technology, who represented the Computer Society of the IEEE and who was the only study group member to vote against the voluntary system of prior restraints, argued that the national interests of privacy protection and secure telecommunications that would be served by open cryptography research outweigh the risks, if any, to national security.

David Kahn of Great Neck, Long Island, who has written extensively on cryptography, urged the study group to vote against the voluntary restraints because, he said, "This proposal suits Soviet Russia better than it does the United States. This is not an American idea. The whole purpose of this country is freedom and this idea chips away at that freedom."

Nevertheless, most of the critics of prior restraints felt they could go along with the voluntary system on a trial basis. For example, Jonathan Knight, associate secretary of the American Association of University Professors, who says he is philosophically against any sort of prior restraints, stated, "I think that what is being proposed is a modest, useful step forward. For the first time, an intelligence agency has entered into an open dialogue with the academic community. We're truly in virgin territory."—GINA BARI KOLATA