made to work in animals, the judgment to go to humans was certain to be questioned. Cline and Salser argue that since there are no suitable animal models in which to study thalassemia, man is the best subject. Their colleagues take direct issue with this contention, saying that mice with alpha-thalassemia have been developed at Bar Harbor and Oak Ridge. Debate about the experiment was inevitable, and the UCLA team's hope that they could complete it in secrecy does not seem particularly realistic. A few more animal experiments obviously would have established a warmer reception for the novel therapy.

The report on the affair now being prepared by UCLA for the NIH may resolve some of the issues. Whatever its verdict, it is clear that Cline and Salser took something of a gamble, skating close to the edge of what was scientifically reasonable and publicly acceptable. But there is no evidence as yet that they transgressed either boundary, although they may have given spectators something of a fright.—NICHOLAS WADE

Study Group Agrees to Voluntary Restraints

The National Security Agency has persuaded a group of researchers to submit papers for review prior to publication

A voluntary system of prior restraints on research publications in cryptography was approved this month by the Public Cryptography Study Group, most of whose nine members represent professional societies in mathematics and computer science. The system will be tried for 2 years, reports Daniel Schwartz, the general counsel of the National Security Agency (NSA). If, after that time, the process is not found to be "useful and efficient," the NSA may decide to seek legislative authority for mandatory restraints.

The study group was formed last year by the American Council on Education (ACE), a group representing university administrators, in response to a request by NSA director Bobby Inman for a dialogue between the NSA and the academic community. The agency was concerned because mathematicians and computer scientists are beginning to publish papers on cryptography—an area that previously was the near-exclusive domain of the NSA. Academic and industrial scientists are becoming so interested in cryptography because there has been a growing demand by business and industry for secure codes to protect computer messages and information stored in computers. With the advent of electronic fund transfers and electronic mail, the need for codes has become especially pressing.

The problem confronting the NSA and the academic community is to balance the NSA's worries that open research in cryptography might imperil national security against researchers' rights to publish their work and some scientists' and industries' claim that national security is also imperiled if new developments in cryptography are kept from the private sector. Since computers are so easily tapped, it would be possible for foreign powers to wage economic warfare, for example, by intercepting corporate messages carried by electronic mail.

In a previous meeting, the study group voted to consider prior restraints on cryptography research (*Science*, 27 June, p. 1442). The meeting this month was held to discuss a paper, largely written by NSA general counsel Schwartz, detailing how such a system of restraints might operate. Although the meeting was scheduled to last two whole days, 6 and 7 October, the group quickly agreed to the restraints and the meeting adjourned at 3 p.m. on 6 October. Cochairman Ira Michael Heyman, a constitutional lawyer and chancellor-elect at the University of California at Berkeley, did not even call for a vote. Instead, he said that since everyone evidently agreed to the system of restraints, it would be written up in final form, mailed to the members for approval, and then it would become the study group's recommendations to the NSA director, to professional organiza-

Policy on Cryptography Proposals

Just 2 months ago, Leonard Adleman, a computer scientist with appointments at the University of Southern California and the Massachusetts Institute of Technology, got a disturbing call from the National Science Foundation (NSF). He was told that part of his NSF grant proposal in cryptography would not be funded by that agency; the National Security Agency (NSA) wanted to fund it instead (*Science*, 29 August, p. 995).

Adleman, concerned by this turn of events, said he did not want to accept NSA funds because he worried about what terms the NSA might extract. The NSA said that if it funded Adleman, it might try to persuade him to have part of his work classified.

In part as a result of the publicity surrounding the NSA's offer to fund Adleman's work, the directors and representatives of the NSF and the NSA held a meeting on 9 October in the office of White House science adviser Frank Press to clarify how the two agencies will handle cryptography proposals. One result of the meeting is that Adleman has been informed that he has the option of accepting NSA funds or having his proposal reviewed and, presumably, funded by the NSF. Adleman says he will choose the NSF.

It was decided at the meeting that both the NSF and the NSA will fund cryptography research. For the time being, all cryptography proposals will be sent to the NSF, who will then send them to the NSA for technical review. If the NSA wants to fund a proposal, it will inform the NSF, which will offer the researcher the choice of accepting NSA or NSF funds. In the future, the NSA plans to have its own office to handle cryptography proposals, so researchers can submit their proposals directly to the NSA if they want NSA funds.—G.B.K.

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tions, and to the President's science adviser.

The group agreed that individual researchers and editors of technical journals will voluntarily submit papers on cryptography to the NSA for review. If the NSA wants to prevent publication of all or part of a paper, it will consult with an advisory group, most of whose members will come from outside the government, but all of whom will have top security clearance. The advisory group will recommend to the NSA director whether publication should be enjoined. The NSA director, however, is not bound by the advisory group's recommendations.

For 2 years the system will be purely voluntary. But if the voluntary system does not work, the NSA may seek legislative authority to prevent publication of papers and to seize papers that are not voluntarily submitted to it.

Why did the study group members so quickly concede so much to the NSA? One reason may be that they thought the NSA already has the legislative authority it threatens to seek and so actually they were conceding very little. Cochairman Werner Baum, who is dean of the College of Arts and Sciences at Florida State University, says he had this impression. And Todd Furniss of the ACE, who kept the minutes of the meeting, wrote that the group agreed to "the last-resort use of court orders" to enforce restraints on publications.

What does NSA have up its sleeve?

The study group members were aided in their confusion by the paper they received detailing how the prior restraints would work. The paper said, "The government, on behalf of the NSA, would be authorized to seek an order from a court to enjoin publication." It also said, "the NSA would have the authority to obtain for review either through a voluntary request, or, if necessary, through a court-enforceable Civil Investigative Demand, copies of any articles or other publications about which the Agency hears but which have not been submitted voluntarily." Nowhere did the paper say that the NSA does not have the authority to restrain publication and that Civil Investigative Demands apply only to the Justice Department and the Federal Trade Commission in antitrust suits.

Science asked some members of the study group whether they thought the NSA might have been deliberately deceptive, in light of the confusing paper on prior restraints and in light of the rapid adjournment of the meeting. Baum replied, "In the absence of any evidence to that effect, I would not accuse the NSA of trying to deceive anybody." But one member, who wishes not to be identified, said, "I would have disagreed completely [that NSA was deceptive] until about 3 o'clock that afternoon [of 6 October]. I walked off with a funny feeling that may be completely irrational. I kept thinking, What the hell do they [the NSA] have up their sleeve?"

With one very vocal exception, the study group members expressed little concern about the implications of prior restraints. Most are not directly involved in cryptography research and so would not be personally affected by the restraints. But Martin Hellman of Stanford University, who observed the meeting and who will be one of the researchers affected by the restraints, is willing to go along with them—as long as they are voluntary. "Given the outward signs of reasonableness at the NSA, I'm willing to show I'm reasonable, too. The alternative is to refuse to cooperate on a voluntary basis. That would force the NSA either to back down or to seek legislation," he says.

The group's lone dissenter is George Davida of the Georgia Institute of Technology. Acting like a gadfly, he continuously and vociferously objected to even voluntary restraints, noting that the NSA has never explained in any detail why it is more in the national interest to have restraints than not to have them. Schwartz replies that the NSA cannot fully explain because its reasons are classified. "It is very difficult for me to discuss the NSA's point of view without clearing everyone," Schwartz says.

One observer who has a great deal of experience in dealing with the NSA shares Davida's concerns. Timothy H. Ingram, staff director of the House Subcommittee on Government Information and Individual Rights, is especially interested in the conclusions of the Public Cryptography Study Group because his subcommittee has held hearings on public cryptography and has heard Inman testify in favor of voluntary prior restraints. Ingram is wary of the effects of the restraints the study group is recommending. He says, "The questions are, what is the statutory authority for this censorship and what do these researchers get in exchange for what they are giving up? It's hard to see, other than a cage."—GINA BARI KOLATA

Public Scores Low on Environmental Test

Nuclear power plants can explode, causing a mushroom cloud like the one at Hiroshima. Most chemicals cause cancer in rats when supplied in high enough doses. The United States produces enough oil to supply its own needs. These, at least, are the beliefs of a substantial portion of the American public, according to a recent poll sponsored by the White House Council on Environmental Quality (CEQ).

The polltaker, Resources for the Future, found continuing support for environmental protection, but widespread ignorance of the facts surrounding some important environmental disputes. A majority of the respondents answered six of the nine factual questions incorrectly, expressing the thoughts listed above and displaying great uncertainty about other issues. Apparently only a quarter of the public knows what acid rain is, and a smaller proportion knows what happened last year at Love Canal, New York.

As is wont to happen in an election year, Gus Speth, the chairman of CEQ, took the opportunity of a press conference announcing the poll results to point out that environmental ignorance spread beyond the common man. It spreads, he said pointedly, to the candidate for president of the opposing party, Ronald Reagan.

Reagan waded in hot water recently by announcing that air pollution is substantially controlled. His timing seemed unfortunate, since Los Angeles was then in the midst of a bad episode of smog. He also said, according to press reports, that "I'm not a scientist and I don't know the figures, but I just have a suspicion that the mountain [Mt. St. Helens], in these last several months, has probably released more sulfur dioxide into the atmosphere of the world than has been released in the last 10 years of automobile driving or things of that kind that people are so concerned about." Reagan said he reached this conclusion after flying over the volcano twice. A man who has studied the issue a bit more carefully, Douglas Costle, administrator of the Environmental Protection Agency, was quick to point out

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