EPA Data Base in Turmoil

EPA officials are pondering the future of a unique chemical information system; critics contend the agency is destroying it

During the past few months, a dispute has erupted over the future of a unique chemical data base operated by the Environmental Protection Agency (EPA). Agency officials contend that the data base, known as the chemical information system (CIS), has been badly mismanaged and are contemplating turning it over to the private sector. CIS's defenders claim, however, that EPA itself has damaged the system through chronic underfunding and abrupt policy and personnel changes, and they claim that a move to the private sector may be tantamount to killing it.

Some key members of Congress have also gotten into the dispute. There has been a sharp exchange of letters between EPA and Capitol Hill and an informal investigation has been conducted by Senator Dave Durenberger (R–Minn.), chairman of the subcommittee on toxic substances and environmental oversight, and Senator Max S. Baucus (D–Mont.), the subcommittee's ranking minority member. They have urged EPA to preserve and improve the system.

This hubbub is being raised over a modest-sized, although ambitious, federal program, which costs the government about $1 million to $2 million per year and has cost perhaps $35 million over its lifetime. CIS consists of about 20 computerized data base systems containing a uniquely wide variety of physical and regulatory data on some 350,000 chemicals. Most other chemical information systems provide either references or a small fraction of the data available on CIS. The system is accessible around the clock, and thus, for example, it finds use during environmental emergencies.

Because CIS originated at the National Institutes of Health (NIH), its formal name is the NIH-EPA Chemical Information System. It was transferred to EPA in 1973, but throughout its lifetime CIS has been jointly sponsored by additional federal agencies, including the National Bureau of Standards, the National Institute for Occupational Safety and Health, the Consumer Product Safety Commission, and the Food and Drug Administration (FDA). It also has been jointly managed since 1982 by an interagency board, whose role has been limited to advising EPA.

Although the slant of the system is to provide information useful for assessing environmental mishaps involving chemicals, the system's applicability is much broader. FDA, for example, recently began using CIS to check packaged orange juice, having found that it is the only data system capable of analyzing the complex chemical fingerprint of the juice. This is but one novel application of the system. "CIS is invaluable," says FDA's Laurence Dusold, who has served on the CIS interagency management board. "To wipe it out would affect more than 50 users at FDA nationwide. It would be expensive and difficult to replace." Perhaps 40 percent of CIS use is by various federal agencies, and the remainder by industry (mainly chemical companies), universities, and other government agencies around the world. Altogether there are more than 600 subscribers.

> EPA's blue-ribbon panel says the information system has "considerable inherent value."

In 1983, CIS began to come under increasing fire within EPA. Friction began to develop between staff members within EPA and also between EPA and its prime contractor for running CIS, Fein-Marquart Associates. Control over contract money weakened, leading in December to a 4-day shutdown of the system because funds were lacking—an incident that aroused many complaints from users and attracted attention on Capitol Hill. Meanwhile, other efforts to streamline the program were abruptly halted, and it was put on a "bare-bones" operating budget.

By the beginning of 1984, a new management team for CIS was put in place by EPA, and one of its first efforts was to call for new studies of the system. Several studies of the program already had been completed in 1982 and in 1983, giving it mixed reviews. Early this year, two special panels were convened to reevaluate CIS for EPA. The first, which EPA refers to as a blue-ribbon panel, is drawn from chemical companies and other users; the second draws its members from various government agencies that contribute to and use the system.

Neither of the two panels has completed its report. A draft of the blue-ribbon panel report, which was obtained by *Science*, states that CIS has "considerable inherent value. With itemized improvements, [it] could serve the significant need for a high quality, integrated, scientific and technical chemical information system . . . but existing capabilities . . . are inadequate." The draft report lays out several options but recommends that EPA continue to manage the program.

Last March, however, EPA solicited proposals from the private sector for revamping and possibly taking over CIS. These were discussed at the final scheduled meeting of the second (government) panel on 12 July. Although *Science* was given tentative permission to send an observer to the meeting, approval was revoked at the last minute. "We don't want to hide anything," EPA deputy director of information resources management, Sarah Kadec, said. "But I can't give you a sense of the meeting."

Underlying these studies is a good deal of turmoil within EPA. The turmoil is most evident in the clash between Kadec, an information specialist who was put in charge of evaluating CIS at the end of last year, and Stephen Heller, a physical scientist who moved with the system from NIH to EPA and shepherded its development during the past 12 years.

EPA recently reassigned Heller, and he declined to comment on the system because he is "no longer involved." However, copies of memorandums he sent to agency officials during the past 18 months indicate his growing fear that the system was being allowed to run wild, making its management problems look worse than they really were. Though he acknowledged the program's real administrative problems, he expressed the fear that installing new project leaders who did not know the system would lead to losses in productivity among the staff and to damage of the system. Associates who know Heller and his commitment to the system speculate that his recent removal was a major step toward getting rid of it.

Uranium Shortage Turns to Glut

Paris. A new shadow has been cast over the medium-term commercial prospects for both fast breeder reactors and nuclear fuel reprocessing in Europe. This time it comes from the recent decision of the Australian Labour Party to drop its preelection commitment to tough restrictions on the export of uranium. Since Australia possesses the largest proven reserves in the non-Communist world, this could lead to yet further oversupply in the world's uranium market.

In addition, the Paris-based Nuclear Energy Agency (NEA) of the Organisation for Economic Cooperation and Development (OECD) last month drastically revised its forecasts of uranium supply and demand. NEA now estimates that supplies of uranium from known resources are likely to keep up with world demand "for several years beyond the end of the century." This contrasts sharply with a report released only at the end of last year by the agency, which suggested that the crossover point might occur by the end of the 1980's.

The figures reflect sharp upward assessments of known uranium reserves, including those of Australia. In March, the Australian Bureau of Mines placed the country's "reasonably assured resources," which could be processed for less than $80 per kilogram, at 474,000 tonnes; only a year previously, the official figure had been 314,000 tonnes. The other major increase has come from Niger, where estimated reserves have been increased from 213,000 tonnes to 454,000 tonnes.

The new figures also reflect a steep drop in projections of future installed capacity for nuclear power. In 1982, the agency predicted, based on official government figures, that by the year 2000 member countries of the OECD would be producing 489 gigawatts (GW) of electricity by nuclear power; the agency's current official estimate for this date is 392 GW and members of the secretariat feel that the true figure could be as low as 320 GW (the level predicted 2 years ago for 1990).

Based on these new figures, NEA estimates that uranium production capability from existing and committed centers will be 54,000 tonnes a year by 1994, almost exactly the same as anticipated demand from nuclear reactors. If planned and prospective centers were included in the calculation, production could be as high as 72,000 tonnes by the year 2000, still considerably above predicted reactor requirements.

"The exploration push of the late 1970's means that the uranium reserve situation has improved considerably, both in absolute terms and relative to projected demand," says Pekka Silvennoinen, head of the NEA's nuclear development division. However, he adds that with the current depressed state of the uranium market—where the price of uranium oxide has fallen from about $70 per kilogram in 1980 to less than $40 today—mining companies might put off their long-term plans, so that future estimates of production capability could prove to be too high.

Even so, the revised uranium supply figures will undercut the economic argument in favor of the rapid development of fast breeder reactors, and thus by implication the reprocessing of spent fuel from power reactors. They have also taken on a particular significance in the light of the growing conflict between the governments of Australia and France over French testing of nuclear weapons at the South Pacific test site of Mururoa.

Australian Prime Minister Bob Hawke, having persuaded the Labour Party to accept his plans for expanded uranium mining, has also announced that the government will fulfill the party's commitment to ban the shipment of uranium to France as long as the tests are continued. Such a move would cut off a trade worth more than $300 million in 1982.

Although the nuclear industry in France currently depends on Australia for one-third of its uranium needs, with the depressed state of the market it expects little difficulty in finding the uranium elsewhere. Hawke's action has, however, been strongly criticized by French Defense Minister Charles Hernu, who has complained that it represents "interference" in the country's internal affairs.—**DAVID DICKSON**

Kadec has certainly been frankly critical of the program. In a recent interview, she referred to it as a "management nightmare" and said that it is "too broad-based" to fit with EPA's mission. In a memorandum to her boss last January, she stated her views more emphatically: "I consider the CIS and its management over the past few years as an affront to the American people. . . . I am in no way supportive of the decision to prolong the life of this system, through further investment of time or money, study or any other action designed to cover past mistakes."

Asked for specific examples of problems, however, Kadec said only that the system is "not well defined," and that "files are uneven." But, she adds, "There's no question that [some] files within the system are extremely valuable." She notes that the system is undergoing a complete audit and that the agency's inspector general also is conducting an investigation, but will not elaborate.

There clearly have been serious management problems. For example, no one kept very good track of money flowing in and out of CIS. It never was an easy task because the billings and expenditures were not handled centrally. Besides, users were often agencies that also were providing some of the data bases and thus transactions were muddled on that level as well.

Yet another complication for CIS has been its frequently changing relationships with contractors and subcontractors. The recent handling of this has been sharply criticized by several members of Congress. For example, Fein-Marquart, which has held the major CIS contract for developing software and maintaining the data bases during the past 9 years, switched its subcontractor for computer services in May, even though its own contract runs only 5 months longer. Senator Durenberger and Senator Baucus tried to prevent this move, arguing that it "has the potential for causing additional disruptions in service that will further damage the system." (EPA documents indicate that this change of computers brought forth a rash of complaints from users this spring.)

In referring to "additional disruptions," the senators were alluding to an incident late in 1983 when CIS was shut down for several days due to lack of funds. These incidents and cuts in CIS funding recently led Representatives James H. Scheuer (D–N.Y.), Henry A. Waxman (D–Calif.), and James J. Florio (D–N.J.) to send a strongly worded letter to EPA Administrator William D. Ruck-

elshaus admonishing him about the importance of CIS, concluding: "[O]ur concern is that the recent management of the program may be so seriously degrading the system as to amount to a de facto decision to close CIS down."

The private sector panel expressed a similar concern by clearly recommending against scrapping CIS. "We felt that EPA should not get out, but should get its management act together," one panelist told *Science*. The panel recommended that the system continue to be managed by EPA but implemented by another federal agency, such as the National Library of Medicine, or by a professional society or a private vendor. This would entail continuing to make policy decisions within EPA, but moving the daily operating decisions elsewhere.

The panel also strongly recommended against fragmenting the system and said that the government must continue to make chemical data publicly available, despite the unlikelihood of the system becoming wholly self-supporting. Doubts about whether CIS could survive in the private sector to serve its intended purpose there were voiced by the panel and are shared by others familiar with the system. The panel noted that some data bases, despite their intellectual value, could not survive without subsidy.

The prevailing sentiment at EPA, where a decision about the future of CIS is promised soon, seems to be that users ought to pay the full price for the system and that the private sector will provide the best candidate for running it. However, there is widespread concern that this solution may not square with what the system's users want and need. Some observers are dismayed to see a government scientist's entrepreneurial brainchild come to such an end.—**JEFFREY L. FOX**

Mathematicians Waking Up to Reality

For more than 13 years hard times in mathematics went unremarked, but now the situation is changing

A committee established by the National Research Council to look at the state of mathematics funding recently unearthed what it termed "startling facts." Over the past 15 years, the committee said, mathematics has been grossly underfunded and resulting problems are now "near boiling point" (*Science*, 15 June, p. 1189). But the most surprising fact of all is that during the years that math funds were nearly cut off few complaints were heard. How is it that serious funding problems in a major field like mathematics could have gone unremarked for so long? The answer seems to have as much to do with the peculiarities of mathematics research as it does with the political naïveté of mathematicians.

The problems the committee enunciated are beyond dispute. In 1983, there were as many mathematicians as physicists and chemists in academic institutions, but only 60 mathematicians were receiving federal support. In contrast, 1200 physics students and 2500 chemistry postdoctoral students were supported by government funds. Only 20 percent of academic mathematicians who list research as their primary or secondary activity have federal support whereas 50 percent of chemists and 70 percent of physicists do. The amount of funds devoted to math research is only two-thirds of the level in 1968, measured in constant dollars, but the number of research mathematicians has doubled.

In its report, the committee wrote, "We are seriously concerned. Morale at many of the major mathematical science departments is low, and promising young persons considering mathematical careers are put off." Surprisingly, however, the committee members do not think that mathematics research has yet deteriorated. The reasons for this are not entirely clear. Some say there is a long delay time—that mathematics research is riding on the abilities of senior investigators and that the bad effects of more than a decade of neglect will eventually show up. Isadore Singer, a mathematician and committee member from the University of California at Berkeley, disagrees, saying that mathematicians are still being trained and are still doing research but they are spending disproportionate amounts of time teaching. Somehow, they still manage to do research but, Singer says, "On balance, things aren't too good when that happens."

The committee was established several years ago through the efforts of Singer and of mathematician Kenneth Hoffman of the Massachusetts Institute of Technology who saw the direction things were going. The two approached the National Research Council and requested that a committee, made up mostly of nonmathematicians, look into the matter. "We felt it was in the national good to have people outside of mathematics look at the situation," Singer explains. The council set up a committee under the chairmanship of Edward E. David, Jr., president of Exxon Research and Engineering Company.

The problems with mathematics funding began in the mid-1960's, the committee reports, when the Defense Department began cutting off research support for projects that had no immediate applications—which included nearly all of pure mathematics. In 1971, the federal government drastically reduced the numbers of fellowships available to support graduate students and postdoctoral fellows. This reduction could only be made up by funds from the National Science Foundation (NSF). But NSF steadily decreased the amount of money it supplied to mathematicians.

The sharp decline in mathematics funding did not show up in federal budget reports, however, because mathematics was subsumed under the classification "mathematics and computer science" until 1976. In the Defense Department budgets, mathematics and computer science are still lumped together and together they had the greatest increase in funds in the period from 1973 to 1983. Yet mathematics funding as distinct from computer science declined. In addition, applications of mathematics to other fields of science were often labeled "mathematics research" in federal support data, thereby disguising the fact that support for pure mathematics research had slowed to a trickle.

At first, the universities stepped in to help pay for mathematics research. But in the mid-1970's, the universities themselves began having financial difficulties and could no longer continue this arrangement. It was then that the financial