ness" as criteria for setting research priorities, and the way research is managed at other institutions including the National Science Foundation, industrial laboratories, and foreign national research institutes.

Unknown at present is the extent to which congressional action may overtake the IOM study and whatever policy recommendations it makes. Passage of Waxman's bill, which once looked like a sure thing, is now more iffy, largely because of growing support for an opposing bill from Representatives James T. Broyhill (R–N.C.) and Edward R. Madigan (R–Ill.). The Broyhill-Madigan bill has the backing of the Reagan Administration, the AAMC, and the AMA, among others. There is speculation at present that no major new NIH legislation will pass this year, with Congress settling for a relatively simple bill to maintain the status quo—something which has happened several times in recent years. But the matter is by no means foreclosed.

—BARBARA J. CULLITON

# Mixed Marks for Berkeley Materials Center

## *A DOE panel's recommendations could threaten construction of the synchrotron light source that was to be NCAM's centerpiece*

A Department of Energy (DOE) panel set up last March to review the proposed National Center for Advanced Materials (NCAM) at the Lawrence Berkeley Laboratory has turned in its report card. NCAM's marks are decidely mixed.

The establishment of a materials center at Berkeley, said the panel, "offers exciting opportunities for significant advances in this technologically important field. Realization of the opportunities will, however, require substantial alterations of the proposal. . . ." The most significant recommendation is that an $84 million advanced synchrotron light source that was to be NCAM's centerpiece be divorced from the proposal and considered separately. DOE has established a new committee to do this.

If there ever was a fast-track project, NCAM was it. With little or no review by the research communities affected, NCAM appeared in the Reagan Administration's fiscal year (FY) 1984 budget under the sponsorship of presidential science adviser George A. Keyworth, II (*Science*, 18 February, p. 827). Construction costs were to total $139 million over 6 years. An additional $127 million was slated for R & D related to synchrotron radiation production and to research projects that could start up during the construction period (operations and equipment).

But Congress switched the NCAM express to a siding during its spring and summer budgetary deliberations. The House Science and Technology Committee found itself deluged by letters from academic and industrial materials researchers. The angriest among the 80 or so letters were from the academics. They complained about the lack of advanced consultation, questioned whether a centralized research facility was more productive than individual principal investigators, and criticized the relevance of the synchrotron light source.

In response to the criticism and to salvage as much of NCAM as possible for FY 1984, DOE's director of energy research Alvin Trivelpiece appointed the panel whose findings are now in.* In his charge to panel chairman Albert Narath of Sandia National Laboratory, Trivelpiece asked for a report by the end of August. An informal progress report was forthcoming on 10 June.

Although Narath's interim report strongly recommended that $13.4 million of the requested $25.9 million in construction funds be approved, Congress did not follow suit. On 29 June, Congress sent to President Reagan a budget bill that allowed for only $3 million for NCAM construction (*Science*, 15 July, p. 246). The bill did include the full $9.1 million asked for operations and equipment, however.

As originally proposed, NCAM consisted of three laboratories (Surface Science and Catalysis, Advanced Materials Synthesis, and Advanced Device Concepts) and the advanced synchrotron light source. Also included in the NCAM initiative was a $13.8 million upgrade of the Stanford Synchrotron Radiation Laboratory.

Narath's panel was not asked to review whether NCAM was a good idea but to make recommendations for strengthening it. In its deliberations, the panel judged the proposal according to whether it:

- was relevant to advanced materials;
- had a realistic potential for significant impact on important U.S. industries;
- had program goals whose attainment required centralized research;
- made a contribution to a new or strengthened mission for the laboratory; and
- required resources that were not excessive in relation to the value of projected accomplishments.

The panel's overall judgment was that NCAM fell short: ". . . the NCAM proposal, considered in detail, does not adequately satisfy the criteria developed above."

The most serious deficiency, according to the report, was the combination of materials research and a synchrotron light source in a single package. The light source "requires a disproportionately large share of NCAM resources. It is therefore an inappropriate centerpiece which causes an unacceptable program imbalance." The recommendation was to split NCAM into two components, a materials research center, and a synchrotron radiation facility, each of which should be judged on its own merits.

With regard to the materials research center (Berkeley Center for Advanced Materials was a name suggested as appropriate), the panel found that there was some shoring up to do. The burden of the message is that BCAM must clearly state how it is going to gear itself to industrial style, technology oriented research rather than to university style basic research. With a substantial fraction of its staff holding faculty appointments at the adjacent University of California, the Berkeley Laboratory now tilts strongly in the latter direction.

Reflecting this concern is the panel's criticism that the proposed NCAM pro-

*Members of the panel were: D. R. Davies, National Institutes of Health; J. M. Deutch, Massachusetts Institute of Technology; J. L. Doyle, Hewlett-Packard; F. R. Gamble, Jr., Exxon; K. L. Kliewer, Argonne National Laboratory; J. A. Krumhansl, Cornell University; D. W. Lynch, Iowa State University; A. Narath, Sandia National Laboratory; W. D. Nix, Stanford University; H. W. Paxton, U.S. Steel; D. A. Pistenmaa, National Institutes of Health; P. E. Seiden, IBM; and H. G. Stever, Universities Research Association.

grams represented a shopping list of interesting topics, whereas they should identify a few important problems and focus on them. Talented principal investigators following their own noses will not do the job, when the problems are of the sort that need coordinated, team-type research efforts.

Accordingly, the panel highly recommended that Berkeley appoint a director for BCAM "as soon as a strong candidate can be identified." The director should have experience managing directed research programs and should understand the needs of industry. Berkeley has been advertising for a BCAM director.

More specifically, the panel singled out the surface science and catalysis laboratory as worthy of support. It recommended funding in FY 1984 for construction of a new building to house the laboratory. As for the materials synthesis and device concepts laboratories, the panel deemed that these should be deferred until an acceptable BCAM plan is in hand. DOE officials told *Science* that Berkeley is hard at work on this.

Finally, the panel declined to recommend for or against the advanced synchrotron light source. This decision should await a review by the synchrotron radiation community. Nonetheless, the panel did strongly urge that the Stanford upgrade proceed on schedule. The productivity of the Stanford laboratory is already high, while the resources available there are limited compared to the demand for them.

As it happens, both Stanford and Brookhaven National Laboratory are hatching plans for so-called "third generation" synchrotron light sources. DOE has just established a committee headed by Peter Eisenberger of Exxon and Michael Knotek of Sandia, which will study these proposals along with that for Berkeley's light source. A report by the end of the year, in time to affect the FY 1985 budget, is expected.

—ARTHUR L. ROBINSON

# Legal Threat, Cold Delay UC Experiment

Faced with the threat of legal action, researchers at the University of California at Berkeley have decided to postpone at least until next April a controversial experiment that would have released genetically modified microorganisms into the environment. The delay represents a tactical victory for Jeremy Rifkin, director of the Foundation on Economic Trends and a vocal critic of genetic engineering, who is seeking to block the Berkeley experiment in court.

The experiment, planned by Steven Lindow and his colleagues, is an attempt to reduce frost damage to plants by spraying them with genetically altered bacteria. Plants such as potatoes sustain damage at about 30°F, in part because a bacterium called *Pseudomonas syringae* promotes the formation of ice crystals in plant tissues. Lindow has demonstrated in laboratory experiments that deletion of a region of the bacterium's genome prevents it from forming a nucleus for ice crystals so that frost damage does not occur until the temperature drops as low as 23°F. Lindow now wants to field test these modified bacteria on a potato patch in northern California.

Last April, Lindow was given the go-ahead for the field test by the National Institutes of Health's Recombinant DNA Advisory Committee (RAC) and subsequently by NIH itself. But in September, Rifkin filed suit claiming that NIH had not complied with the National Environmental Policy Act in giving its approval (*Science*, 30 September, p. 1355). Because the court has not yet ruled on the suit, Lindow is legally free to start the experiment, and he planned to begin the field tests at the beginning of October. Rifkin then threatened to go back to court to seek an injunction to halt the work.

The legal threat came at a critical point. Lindow was racing to conduct the field test during the few weeks when nighttime temperatures in northern California dip below 30°F but do not go as low as 23°F. Preparations were already running late, and any further delay caused by legal skirmishing would push the test too far into the cold weather. Lawyers on both sides attempted to negotiate a settlement on 3 October, but when it became clear that a compromise could not be reached, university officials decided to postpone the test until next spring.

According to Lindow, there is no scientific advantage in carrying out the test in the autumn rather than in the spring. There could, however, be a political advantage in delaying. If the experiment were conducted while Rifkin's original suit was still pending, it would have appeared that the researchers were trying to get in under the wire. Now, the suit may be disposed of before the test begins.

Meanwhile, Rifkin is collecting scientific support for his case. He scored a major coup in getting Peter Raven, a noted plant ecologist who is director of the Missouri Botanical Garden, to file an affidavit in support of the threatened injunction against Lindow's experiment. Raven argued that there has been insufficient testing to determine the potential hazards and noted that "the ecological literature is replete with examples of organisms that have been released into the environment with disastrous effects, costing millions, and in some cases billions, of dollars." Raven also faulted RAC for not having an ecologist among its members when it approved the field test.

The chief concern raised by Raven and others is that the modified organisms will displace their natural rivals and establish an ecological niche for themselves. This could have ecological consequences by improving the frost tolerance of the plants with which they become associated—including, perhaps, weed species.

Lindow argues, however, that such concerns are far-fetched. He has already field tested bacteria that have been modified chemically to suppress their ice-nucleation genes and found that the altered organisms do not migrate significantly beyond the test area and that they are quickly outcompeted by their natural rivals. (Such experiments, which do not involve gene splicing, do not require NIH approval.) Moreover, Lindow points out, simply deleting some genes is unlikely to confer a selective advantage on a bacterial strain.

The legal battle over the Berkeley experiment will be watched closely by other researchers who are gearing up to take their experiments from the laboratory into the environment. Already, RAC has considered two other applications for field tests, and there are believed to be many more waiting in the wings.—COLIN NORMAN