

Panels urge DOE become more sensitive to academic problems

In two reports released in December on its working relations with university scientists, the Department of Energy got only mixed grades. One report card showed that DOE has made little progress in dealing with the academic community amid the complex of policies and programs in energy R&D since an earlier review of the situation in 1977. The other, based on a review of all high-energy physics supported at universities by the department, found that although relations were somewhat better, there was still room for improvement. The trouble is that DOE is not as consistent, understanding and generous as universities want it to be.

Both reports require readers to know the sums. While its funding of university research has fluctuated in recent years, DOE provided \$316.8 million in direct payments to academic science last year, three-fourths of this coming from the Office of Energy Research alone, and about \$220 million in indirect payments through the national laboratories. Such outlays put DOE in fourth place, behind the National Institutes of Health, National Science Foundation and Department of Defense, as a source of support for science research in academe. In high-energy physics, DOE put up 60% of the university funding in fiscal 1983—some \$44 million directly for experimental studies and \$10 million for theoretical research. Both figures are sharply down from the late 1960s, even without reckoning for inflation. Money, however, is only one of many problems in DOE-academic relations.

The first report, "An Assessment of the Relationships Between the Department of Energy and Universities and Colleges," was prepared between January and August last year by a 16-member panel headed by Ivan L. Bennett, professor of medicine at New York University Medical School. In this study the panel looked at the full range of relations and programs, including direct DOE support to campus research and indirect, but substantial, funding of university faculty and students through national laboratories. The panel solicited comments on DOE



BENNETT

policies and practices bearing on academic research and received 173 responses from a wide assortment of university presidents, heads of professional societies, deans of engineering schools, directors of national laboratories, as well as individual scientists and engineers. They are listed by name in an attachment to the report, though when they are quoted in the text they are anonymous.

"The responses," says the Bennett report, "indicate a high degree of dissatisfaction with the department's energy R&D programs." The report speaks plainly to "a variety of troublesome aspects of DOE's working relationships with the university community that, *unless dealt with decisively*, can erode a historic relationship"—one that has its origins in the wartime Manhattan Project and the old Atomic Energy Commission.

Heavy baggage. Indeed, much of DOE's current troubles with academe came in its bureaucratic baggage. A conglomerate of the AEC, Office of Coal Research at the Department of the Interior, solar energy groups of the National Science Foundation and other government units, DOE is compartmented, with its several parts pursuing

their own interests, practicing their own procedures and protecting their own turf. These problems were identified in 1977, shortly after DOE was established, when a group under the chairmanship of Solomon J. Buchsbaum of Bell Laboratories was asked by Frank Press, then President Carter's science adviser, to review the scope and quality of the new department's basic research programs. The Buchsbaum panel called for more money for university support, less red tape in handling proposal reviews, and better balance for research among DOE labs, industry and universities. "These recommendations," says the Bennett report caustically, "despite some efforts to do so, were not implemented effectively; had they been adopted, the present report would probably have been unnecessary."

At fault, the Bennett panel finds, are the policy shifts and changing emphases at DOE that make for "the constant sense of instability" in planning and conduct of energy programs. The decentralized, disjointed nature of DOE, which was once considered a strength, now is a weakness, according to the panel, because it is obvious that university researchers do not see one department but many autonomous R&D programs, field offices, contractor-operated research facilities and other operations. By contrast, the view from academic groves is that other Federal agencies, especially the National Science Foundation and various R&D elements of the Department of Defense, NASA, and National Institutes of Health have more successful ways of dealing with university research. "These agencies are seen to have an agency-wide and uniform appreciation of the roles and importance of universities in their respective programs and the ability to communicate their research interests and priorities in a timely fashion," argues the report.

One recurrent criticism is that DOE tends to imbue university research contracts with administrative overmanagement and reporting complexity—the "hassle factor," as one respondent terms this. The report notes that

in contrast to the DOE approach, NSF has recently taken steps to reduce significantly the administrative burden on its university researchers by giving academic institutions considerable leeway in administering grants, even to extending contract expiration dates up to six months. As the Bennett panel puts it: "Scientists, whether in universities or in other organizations, need the freedom and flexibility to carry out research in an open and supportive administrative environment. Nobody wants to have creative people spend most of their time continually justifying or rejustifying what has already been agreed to at the outset of the project between the government's technical sponsor and the university. Yet, this seems to be what has happened too often in DOE-sponsored university research."

Repeated refrains. A widespread perception among academics is that DOE often wants only "quick fix" R&D programs, according to the panel, "rather than a balanced research program involving long-range, fundamental research, as well as applied research and exploratory development." A persistent theme in most of the responses is that university scientists and research groups are excluded from DOE planning for R&D agendas. This conclusion is held not only by academics, the panel observes. At DOE, the Energy Research Advisory Board has expressed concern over the need for more comprehensive and consistent long-range R&D planning, urging that scientists from universities and corporations be brought into the department's deliberations.

Another widespread perception—indeed "the most intense comments"—came from university scientists and administrators on the issue of unfair advantage that DOE national labs appear to enjoy in receiving department funds. One panelist described the problem as "corrosive." Among academics, the belief prevails that DOE also hastens the procedures and eases the criteria in reviewing proposals for laboratory research, while proposals submitted by university scientists are subjected to extensive in-house and peer review, the panel states. Some academics attribute this to the long-standing working-level familiarity that laboratory scientists have with DOE managers, which gives them an "inside track," says the panel.

In the closing days of the panel's work, one member, D. Allan Bromley of Yale, raised a related point. As the missions of the multiprogram national labs became fuzzier over the years, many of the most talented senior scientists at those places turned to their own pet research interests, often in direct competition with leading scientists in



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universities—frequently to the disadvantage of the academics. For not only did the lab workers have more direct access to DOE corridors of power, Bromley claimed, they had wider access to engineering and technical facilities as well as secretarial and computing support at the labs. In consequence, academic scientists find themselves at a disadvantage.

In addition, the panel finds that DOE's recent cutback of support for graduate traineeships and fellowships has hobbled efforts by faculty to recruit bright undergraduates into advanced energy research. A related issue is the "start-stop" flow of DOE funding that has sometimes left graduate students "high and dry" when research projects are abruptly ended. The panel is concerned that DOE does not seem to maintain the same sense of responsibility for training and development of talented students as other Federal agencies—notably, NIH, NASA and even DOD.

"To summarize," says the report, "the panel believes that the capabilities of universities and institutions devoted to advanced research and manpower development and of university scientists as individuals have, in general, not been full recognized by or capitalized on by the department in relation to the department's needs."

Proposed changes. So what's to be done? For each of the flaws described in DOE's policies and practices, the panel offers recommendations. The most significant include: DOE, at the level of its secretary, should provide a clear policy statement affirming the importance of university involvement in all appropriate department programs. In this connection, the panel has drafted a DOE policy statement that calls for close cooperation in research and education between universities and the department. To this end, the proposed statement says, DOE will

"solicit and incorporate the advice of university scientists and engineers, either as individuals or through established advisory groups or professional associations, in the planning and execution of energy research and technology development programs; recognize the educational impact and benefits of advanced research by encouraging and providing support for the participation of students in all appropriate department-sponsored university projects; encourage university researchers to show independence and creativity in their advanced research, including, where appropriate, the preparation and submission of multidisciplinary, cross-programmatic research proposals, subject to periodic peer and program evaluation; encourage interaction and collaboration in energy research among universities and industry, the national laboratories and the Energy Technology Centers, including consideration of . . . joint research projects."

One element in the proposed policy document requires DOE to conduct its affairs with universities "in a manner that reflects concern and understanding for the special role of universities in research and education and avoids imposition of burdensome administrative requirements not suited to a university research department."

In addition, the panel proposes that DOE should undertake a review of university proposal procedures used by each major DOE program, with the objective of devising a consistent policy. DOE should also seek to provide grants and contracts for two or three years to ensure stability and continuity in university funding. Moreover, research proposals submitted to DOE should be subjected to comparable standards of external peer review regardless of whether the source is a university or national lab.

As one last recommendation, the Bennett panel urges DOE to improve its communications channels with the academic community by establishing a forum of university presidents and senior leaders to meet periodically with senior department staff, including the secretary, on a range of issues related to scientific research. The DOE-university forum could use as its model, says the panel, the DOD-university forum, which has reportedly reached a stalemate on the sensitive matter of unrestrained scientific communication of unclassified research in an era of increased government fears that scientific and technological information may have military significance for adversaries abroad.

The second report was completed by the Technical Assessment Committee on University Programs, which uses the acronym TACUP. The committee, headed by Harold K. Ticho of the

University of California at San Diego, examined the quality of 82 DOE contracts, comprising 171 separately funded projects in high-energy physics—107 experimental projects and 64 in theory. Its main conclusion is that the DOE-funded program of university research in high-energy physics "continues to be of very high quality and well focused on central issues of present-day particle physics." Even so, TACUP found that corrective actions are indicated for about 15% of the projects.

Sensitive reviews. The TACUP study happens to be the first full-fledged post-research evaluation of scientific projects. In the past, whenever a Federal agency has sought to conduct a peer review of research in progress or recently completed, it has run into objections by scientists. Thus, when NSF, at the direction of the Senate Committee on Appropriations, employed the National Academy of Sciences a few years ago to explore ways of judging the outcomes of research, the scientists concluded that postperformance evaluation was best done in the course of peer reviews of proposals to renew research grants and should not be done in any other way. Among the many difficulties inherent in assessing ongoing research, the group wrote in its 1982 report, "The Quality of Research in Science," is that "the quality and significance of scientific work cannot always or even usually be estimated with certainty right away"—especially for so-called "off-beat" or "long-shot" projects "that do not fit accepted paradigms in the field."

Sensitive to the problem, TACUP members decided nonetheless to perform the review. It was clear that a review of 171 activities could not be done by a single group; so eight panels were appointed—five to cover experimental work and three for theoretical projects. Each panelist rated the quality of the approach and results, the competence of the principal investigator and research team and the cost-effectiveness of the effort. The panels then reviewed the findings of the members and this, in turn, was reexamined by the panoply of experimental or theoretical panels to apply a uniformity of standards and avoid significant disparities.

The good news, claims TACUP, is that given the funds available for high-energy physics, "the apportionment... to the various program elements appears to us to be reasonable. At least, we do not believe that a different distribution would predictably produce more physics.... The DOE funding policies encourage a research program which arises from the perceptions of physicists active in the field. The funding of the program components thus adjusts itself through

the 'marketplace of ideas.'"

The bad news in the field, says the report, is that many of the physicists interviewed have some doubt that the particle-physics facilities scheduled to come on line in the late 1980s can long sustain a vigorous US program. "The number of 'spigots' where front-rank experiments can be deployed has been decreasing steadily," the committee warns. With only three collider interaction regions in development—two at Fermilab's Tevatron I and the other at Stanford's SLC—more US physicists plan their experiments in Western Europe. "Many university scientists are concerned that the shrinking research opportunities foreseen in the 1990s will discourage young scientists from committing their research careers to the field," says the Ticho committee. Accordingly, the committee urges DOE to develop "frontier facilities" in the US for the 1990s, though in a letter accompanying the report Ticho observes that the committee's recommendations were adopted before DOE's HEPAP issued its report supporting R&D on a Superconducting Super Collider, which, if all goes well, could be operating by the mid-1990s.

Another concern centers on overall funding of university research in high-

energy physics, which has decreased in constant dollars since the early 1970s. In the meantime, overhead costs and the complexity of research have increased. "On the theory side, funding shortages impede the training of students and postdoctorals and restrict travel and visitor exchanges," says the TACUP report. "On the experimental side, the infrastructure at universities has deteriorated; very few universities can maintain a stable group of engineers and technicians, and much of the apparatus is no longer up to date. These trends should be reversed." Accordingly, TACUP recommends a significant increase in theory funding over the next few years as well as more funds for equipment modernization and support of R&D projects not directly tied to approved experiments by university groups.

Finally, TACUP calls for DOE to organize panels to study the needs of high-energy theory groups for advanced computers and to evaluate various approaches to a national computer network for the high-energy community. "DOE should plan at least one VAX computer (or its equivalent) per medium-size research team, plus one located at the experiment and shared by the collaborators," states the panel. —IG

NAS studies major materials facilities

At the request of George A. Keyworth II, President Reagan's science adviser, the National Research Council of the National Academy of Sciences has formed a committee to review existing government-supported facilities available for materials research and set priorities for establishing major new centers and instruments costing more than \$5 million. Keyworth is keen on getting advice from a wide range of materials scientists ever since his proposal early last year to create a National Center for Advanced Materials at Lawrence Berkeley Laboratory received a hostile reception (PHYSICS TODAY, June, page 17). Before the uproar subsided, the Department of Energy had appointed two committees to examine the technical and programmatic aspects of NCAM and evaluate the need for an advanced light source that was intended to cover the energy range from 0.1 to 5000 eV—from infrared to soft x rays. Both committees pooh-poohed the light source, leading DOE to scale back the NCAM concept. It is now called the Center for Advanced Materials, reflecting its more modest operation.

Interestingly, the new Research Council committee has several outspoken critics of NCAM among its 22 members. Some of them raised embar-

assing questions about DOE's priorities for materials science in letters and testimony last spring to the House Science and Technology Committee, which is responsible for authorizing the department's R&D budget. One of the persistent complaints, expressed best by William Brinkman of Bell Laboratories, who is not on the Research Council study, concerned the ease of funding "big science" in Washington to the

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