

This article must be deleted to meet the essential objective of publishing and disseminating research results.

Article 64 provides for a tacit consent regime. The Text requires 4 months of advance notification to the coastal state. The research may proceed with a research project unless, within 2 months of the original notification, the coastal state has communicated to the state or organization conducting the research:

1) the withholding of consent because the proposed research program bears substantially upon the exploration and exploitation of the living and non-living resources;

2) a statement to the effect that "the information provided regarding the nature or objective of the research project is inaccurate and does not conform to the manifestly evident facts"; or

3) a request for supplementary information "relevant to determining more precisely the nature and objectives of the research project."

Although the theory of tacit consent could be useful, the qualifications placed in this article on the theory render it virtually meaningless; for example, a coastal state may continuously request additional information. Only by revising this article can we maximize acceptable predictability in the response of the coastal state so that the planning and conduct of research are facilitated.

Article 65 authorizes a coastal state to stop a research project already under way. It says in effect that if the coastal state has reason to believe that the work of the researching state is different from what the researching state said it was going to do in its original notification, the coastal state can stop the program. Furthermore, the coastal state can also stop the program if it decides that the researching

state has not fulfilled obligations from a prior project. (For example, not providing reports and results of previous research programs in the area.) This draft article must be sharply modified so that the conditions under which cessation of research can be required are clarified and so that it provides acceptable predictability and secure protection for the researching state against unreasonable restrictions.

Oceanographers are pessimistic about how the Revised Single Negotiating Text will be interpreted and its potential effect on the conduct of marine scientific research. The following four scenarios exemplify the regime now proposed in the Revised Single Negotiating Text.

*Example 1.* The researching state sends notification to a coastal state about a proposed fundamental study on the dynamics of upwelling which it is planning in the coastal state's economic zone. Under paragraph 2, Article 60, the researching state assumes the coastal state cannot refuse consent. The coastal state replies with a statement that says in effect, come ahead, but in our view this research bears substantially on the exploration and exploitation of our living resources, and, therefore, does require our consent. Furthermore, we insist on clearing your publication after you have completed the research (Article 61). Such an action would effectively halt that research program.

*Example 2.* Same program, different coastal state; the coastal state continues to ask for more information under Article 64 until the upwelling season is passed. Such action effectively stops that research program.

*Example 3.* Same program, different coastal state; there is a major fishery in the upwelling area, and the coastal state responds to the no-

tification with a message which says in effect, we think the research program will disturb our fishing effort. Thus, consent is denied under Article 60, paragraph 2 (c) since the program will "unduly interfere with the economic activities performed by the coastal State."

*Example 4.* Same program, different coastal state; no problems are raised, and the program gets under way. However, as the ship pulls into the local port it suddenly finds that the program cannot continue until the researching state does more work in helping the coastal state in assessing the results of a different program done the previous year.

These four scenarios offer only a slight indication of the problem that could face the scientists. An international regime must be established that serves the world community interests in the oceans and its resources. The legal regime proposed in the Revised Single Negotiating Text, which enables coastal states to forbid, to control, or to halt marine scientific research in 37 percent of the ocean, is contrary to this interest (1).

#### Notes

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#### NEWS AND COMMENT

## NSF Science Education: Basic Issues Still Unresolved

The recently embarrassed and embattled science education directorate of the National Science Foundation (NSF) is getting a new head. The yet unannounced choice for assistant director for science education is reportedly F. James Rutherford, professor of science education and head of the division of education in the School of Education of New York University. The NSF post is a presidential appointment which requires Senate confirmation; the nomination is said to be in the works and is expected to be made public soon.

Rutherford's appointment seems unlikely to incite bitter opposition. He is regarded as something of a compromise candidate since he has solid credentials

as an educator, which will please that constituency, but is not identified as a member of the curriculum development clique, which might displease critics in Congress and out.

Rutherford in more ways than one has his work cut out for him. He will take over the science education job at an interesting time, since President Carter is expected to do something about his campaign pledge to create a Department of Education.

Rutherford will succeed Harvey Averch, who is moving into another assistant director's job as head of the directorate for scientific and technical affairs (STIA). The appointments are part of a series of moves by new NSF director

Richard C. Atkinson to fill top management jobs in the Foundation. Averch was shifted to the education directorate in 1975 at a time when NSF science education programs were under attack in Congress and Averch was perceived to be filling a troubleshooter's role.

The trouble was precipitated by former Arizona Congressman John B. Conlan, who began by criticizing an elementary school behavioral science course developed with NSF support (*Science*, 2 May 1975) and moved on to a general condemnation of NSF's pre-college curriculum programs and peer-review practices.

During his tenure, Averch engineered a major review of precollege programs, a revision of management procedures for curriculum development projects, and a reorganization of the directorate.

Science education programs are currently having a considerably quieter passage through the authorization process in Congress than they have had for the past 2 years. This may be attributable in part to Conlan's no longer being in Congress; he resigned his seat to run for the Senate

## GAO Decision on NSF Claim Favors Curriculum Study Group

A \$1.2 million claim by the National Science Foundation (NSF) against the Biological Sciences Curriculum Study (BSCS) has been decided in a way that lifts the threat of financial disaster from BSCS, developer of best-selling high school biology textbooks (*Science*, 1 October 1976). A decision by the General Accounting Office (GAO) should also dispel the implication of wrongdoing which BSCS officials vigorously denied and bitterly resented.

GAO disallowed the major item in the claim, a bid by NSF to recover about \$800,000 in "publishers' grants" received by BSCS. On four smaller items, GAO decided one in favor of BSCS and the other three in NSF's favor. The largest of these in money terms, however, was deemed negotiable.

Since the matter of the publishers' grants was the main issue, the GAO decision appears to provide the basis for settlement of the dispute. BSCS has indicated a readiness to come to terms on the remaining items, and the GAO decision on the big publishers' grants item is binding on NSF. If the NSF claim had been found valid on the \$800,000 item, BSCS could have initiated court action.

The dispute originated with a 1974 NSF audit of income received by BSCS under a grant for development of the biology curriculum. After protracted, fruitless negotiations the matter was turned over to GAO by NSF in April last year. Escalation of the disagreement followed a course which was unusual, perhaps unprecedented in NSF's relations with its grantees. During the course of the affair, the House Science and Technology Committee was drawn in and even imposed an embargo on funds for a BSCS project. The embargo was intended to last until the claim dispute was resolved but was lifted after 3 months.

On the major item in the claim, NSF argued that the publishers' grants were de facto royalty payments for second editions of the biology textbooks developed under NSF grants. BSCS contended, in essence, that the grants were lump sum payments not dependent on second edition sales and were separate from royalties which NSF received for the edition. The grants, in fact, seem to have been made by the publishers in the expectation that BSCS, after NSF funding ended, would prepare third editions of the texts. This, in fact, BSCS did.

The GAO decision, based on a study of the voluminous documentation of the NSF-BSCS relationship extending over more than a decade, turned on the question of whether the NSF grant permitted arrangements such as those made with the publishers and whether NSF officials approved them.

The GAO concluded that NSF's action in pursuing the claim reflected disagreement by NSF officials with decisions made by foundation officials 8 years earlier. The decision also says that "the income clause did not preclude BSCS from retaining any payments made by the publishers. The basic prohibition was against BSCS retaining income or profits from the sale of NSF supported materials. Thus BSCS was free to accept compensation for services rendered without NSF support or advances against royalties to be developed without NSF support. . . ."

The other claim against BSCS which GAO rejected was for the recovery of "profit" on films developed with NSF grants. GAO said the record showed that NSF had agreed to accept a \$1 royalty on each film to which BSCS agreed NSF was entitled. NSF was seeking about \$200,000 in addition.

GAO found in NSF's favor on a claim for \$36,100 in payments from the publisher of one of the biology textbook versions. A contract between the publisher and BSCS for prepa-

ration of a second edition, for which there was no NSF support, did not make a clear distinction between royalties and grants. BSCS conceded these should be treated as royalties.

GAO also said that NSF should recover interest earned through temporary investment of NSF grant money by the University of Colorado, which was BSCS's parent organization until it became an independent nonprofit organization in 1972. NSF asked for \$23,714, but GAO noted that the amount should be adjusted according to the final determination of NSF entitlement to the various sources of funds on which the interest was earned.

The biggest claim which GAO sustained against BSCS was for unauthorized administrative expenses. Under scrutiny were "housekeeping" grants made by NSF to BSCS to finance administrative operations. NSF auditors criticized BSCS for not keeping adequate records to substantiate expenditures. Judging from the GAO decision, however, the major issue was the conflict between the BSCS view that the grants were for support of general administrative operations and NSF's contention that the funds were to be used only for expenses attributable specifically to NSF-supported activities. During the period in question, the late 1960's and early 1970's, BSCS was seeking to establish itself as an independent, nonprofit institution. NSF had an interest in seeing BSCS continue as a viable entity, but GAO found that NSF never formally granted funds for such a purpose. NSF asked for \$116,914, but GAO found the formula used by NSF auditors open to question and said, "We would encourage the parties to attempt a more realistic distribution." Informed observers estimate that the total claim may finally be settled for substantially less than the \$176,728 in the remaining claims.

The decision obviously dispels a cloud which has hung over BSCS. If GAO had found in NSF's favor on the major items, BSCS officials said that the organization could not have survived in its present form. What BSCS sees as a victory, however, does not repair the damage which may have been done.

BSCS president William V. Mayer says that the experience has been "traumatizing" for the organization. The embargo on funding delayed the project involved for at least a year and put a strain on BSCS finances generally. Uncertainty about the eventual disposition of the claim depressed morale and adversely affected hiring and retention of staff. Relations with people outside BSCS were also inevitably impaired. The allegations gave BSCS a "black eye" say its officials, and competitors did not hesitate to question, for example, whether BSCS could be trusted.

Relations with NSF, according to BSCS officials, have been a study in contrasts. Throughout the dispute, BSCS has continued on excellent terms with NSF program officials, but its dealings with contract and grant officials have tended to be stiff. There is a feeling at BSCS that "anything sent to NSF from BSCS is gone over with a fine tooth comb."

Outside observers say the NSF initiative of, in effect, suing BSCS was unusual since such disputes are ordinarily settled by negotiation. Some ascribe NSF's action to nervousness because the agency was then under fire in Congress.

Federal bureaucrats certainly have a responsibility to see that public funds are properly spent. And it does appear that BSCS was at least offhand in its handling of the housekeeping funds. But on the royalty question, if the circumstances were as clear as the GAO decision makes them appear, NSF did overreact, and it might be asked of NSF in this case if the watchdogs needed watching.—J.W.

in his home state in the 1976 election. He was defeated in a bitter primary battle. But the new assistant director for science education is faced with problems that are not simply a legacy of Conlan's crusade.

- NSF's science education budget in recent years has become the arena for a rivalry between the House and Senate committees which are NSF's jurisdictional lieges. The most conspicuous clash has occurred over funding of the Science for Citizens program, championed by the Senate, and the Comprehensive Assistance for Undergraduate Science Education (CAUSE) program favored by the House committee (*Science*, 24 June). In the conflict, the senators are generally cast in activist roles and House members as champions of more traditional programs.

- Another source of tension for the directorate is a residual resentment among its constituents, particularly among curriculum developers. Many of these clients felt that NSF actions under congressional pressure were unreasonably stern and that some of their colleagues were, so to speak, thrown to the wolves.

- Still unresolved is the fundamental question of the proper federal role in curriculum development. Conlan's criticism had the effect of bringing the issue to the forefront, but it was so encumbered with questions about particular programs and personalities that it was never squarely addressed. The experience, however, seems to have convinced many with views that differ from Conlan's, including former NSF director H. Guyford Stever, that the rationale for curriculum development programs needs to be examined and clarified.

As anyone familiar with the science education directorate would attest, its troubles did not begin with Conlan. The directorate enjoyed a brief golden age for about a decade after sputnik. During those years, a fruitful alliance was formed joining university scientists and public school educators in curriculum reform activities which had NSF as patron. The Foundation was the sponsor of new courses in biology, chemistry, and physics which literally transformed the high school curriculum and sharply raised the level of science sophistication, at least among college-bound students. NSF ingratiated itself with rank-and-file educators by funding summer institutes designed to enable teachers to handle the new science courses.

Toward the end of the 1960's, the momentum of the curriculum revision movement began to wane. Many of the major projects had been completed, and the pioneering luminaries were retiring

Barbara J. Culliton is succeeding John Walsh as editor of News and Comment. John, who has rendered distinguished service, has wanted to be free to devote full time to in-depth reporting. I am confident that Barbara will provide innovative leadership.—P.H.A.

from the field. Emphasis had to some extent shifted to the social and behavioral sciences, and the chances of controversy consequently increased. By the early 1970's, the general pressures on science funding were being felt in the science education budget.

During the Nixon Administration, leverage was applied, principally through the Office of Management and Budget, to adopt a new basic policy. The view was that future demand for scientific manpower was likely to be much lower than forecast since the growth rate of the science budget was leveling off. The most dramatic consequence was the cutoff of trainee grants, which, at their high point were funded to the tune of \$40 million a year. In the same spirit, the Administration sought to reduce funds for teacher-training institutes. Critics argued that the institutes had become something of a pork barrel, providing stipends for teachers during summer vacation and business for colleges to keep their faculty and classrooms occupied. The institutes had their loyal defenders and became the issue in a perennial battle between Congress and Administration.

As for funding, the science education budget reached a high point in the middle 1960's of about \$124 million a year, representing about 20 percent of the total NSF budget. In 1973, it reached a low of \$62 million and since then has rebounded to about \$80 million, now representing about 9 percent of the total NSF budget.

An unquantifiable but nonetheless important factor in the decline was the aging of the science education bureaucracy at NSF. Many of the directorate's officials had served through the buildup of the program, and, in later years, for reasons which were by no means all their own fault, had seemed to lose initiative.

The attention of NSF's top leaders was elsewhere, notably on efforts to maintain funding of basic research and the activities that led to the emergence of the RANN (Research Applied to National Needs) program. The science education directorate was treated a bit like a poor relation—for example, the direc-

torate was moved out of the main agency headquarters in downtown Washington and installed in rented space in an office building near the District of Columbia's northwest boundary. The explanation was that the unit just happened to be the right size, but the action was interpreted otherwise.

The directorate became something of a quiet backwater. It is solidly in NSF tradition to involve experts from outside the agency as consultants and advisers on programs. The impression grew, however, that science education officials were deferring to outsiders to the point of delegating decisions on policy to them. On top of that, prescribed procedures for dealing with grants and grantees were apparently not being rigorously followed in every case.

When Conlan launched his attack, the directorate proved vulnerable to his allegations that NSF was not following its own regulations faithfully. Stever stonewalled politely in Congress on behalf of the directorate, but he gave the impression of a man uncomfortable at the task.

Stever subsequently has been saying that science education policy for NSF had not been looked at seriously for 20 years. This, of course, implies that the NSF's top officials and the National Science Board, the policy-making body for the Foundation, had not exactly been on their toes.

The immediate question facing the Foundation, however, was how to deal with Conlan's criticism. This was of two main sorts. First, Conlan charged that the content of some of the courses was unsuitable for children. His second major theme was that the use of federal funds for development of curriculum and especially for programs of "implementation" for NSF-sponsored courses constituted unfair and undesirable competition against commercial publishers.

Averch took over the directorate 2 years ago, when it was the cynosure of a number of inside and outside studies. The study that set the curriculum development community aflutter, however, was one launched by Averch and aimed at evaluating the 19 precollege curriculum programs then in progress (*Science*, 26 March 1976). It is remembered by the science education constituency because a number of projects were earmarked to be curtailed or dropped. There was considerable grouching on grounds that NSF actions were not entirely in accord with the assessments of the outside reviewers. But directorate officials had warned in advance that they would be guided by budget factors and other considerations and promised only to be rational and reasonable. In fact, later negotiations re-

sulted in modification of the stiffer sentences and the mutterings have been muted.

Averch's critics among the curriculum developers tend to regard him as a "management expert" sent in to clean up the procedural mess in the directorate by knocking heads and redrawing flow charts. They say that Averch is not, after all, an educator and that he slighted the substance of the programs.

Averch is, in fact, an economist by training. There is some *prima facie* evidence of systems analysis conditioning. His experience at NSF before moving to the science education directorate was in the RANN program, and he came to NSF from the Rand Corporation. But his work has been mainly on education and urban problems.

Averch's partisans argue that the overhaul of directorate organization and review of curriculum projects he directed provided a sort of firebreak against the blaze set by Conlan. And they note that the precollege program survived substantially intact, whereas many observers felt that, under the circumstances, it might be decimated or even completely dismantled.

While reorganizing the directorate and tightening up of its operating procedures are his most visible contributions as its chief. Averch, in departing, says he thinks that more important was the effort he made to clarify the basic question of what NSF should be doing to carry out its mandate to foster science education.

His valedictory on the subject is to be found in an NSF program report titled "Models and programs in science education, 1959-1976" published in June 1977. The report is couched to some extent in systemspeak, stressing strategies, models, and options. It does, however, provide a clear interpretation of the science education policies followed in the Foundation for the past two decades and some suggestions for a "scenario" for the 1980's.

In brief, what the report calls the "1959 Model" was based on the view that NSF's proper role in education was to sponsor the training of highly talented manpower to man the research system. The 1971 Model was characterized by the attempt to deal with an excess total supply of scientific manpower while at the same time meeting criticisms about the quality and variety of available sci-

entists and engineers. More attention was also given to meeting national needs by applying various kinds of leverage to the R & D system.

The immediate future calls for devising measures to cope with a "steady state" situation by divising policies which will assist institutions and individuals through what is proving to be a painful transition. The final section of the report is less a blueprint than an admonition to NSF and the Congress to think more clearly about the problems.

Congress is not through with the education directorate. Several of the programs seriously disputed in House-Senate negotiations over NSF legislation are in the education bailiwick, and the issue of the proper function of the federal government curriculum development is ripe for review. So Rutherford can expect to be busy as an "outside" man representing the directorate.

Inside NSF, Rutherford will be dealing with programs with a proven capacity to cause controversy. For as Averch says, "Unless someone continues to pay attention to the problems, both conceptual and procedural, they'll get into trouble again."—JOHN WALSH

## NAS and Justice Panels Pan Federal Crime Research Effort

The Law Enforcement Assistance Administration (LEAA), the hastily legislated product of the late 1960's era of fear on the streets, is widely reputed to be one of the most inefficient and ill-thought-out agencies ever to have graced the federal government. Its research arm, the National Institute of Law Enforcement and Criminal Justice (NILECJ), has also been criticized for not knowing what it was doing, and, whatever it was, doing it badly.

The dilemma of NILECJ is the subject of a forthcoming report from the National Academy of Sciences, whose central recommendation is that NILECJ be totally severed from LEAA and established as an autonomous agency within the Justice Department. In a 23 June report, a Department study group calls for a strengthened, centralized criminal research program but does not recommend it be split from LEAA.

The research arm of any mission agen-

cy always has a difficult time trying to justify its activities while at the same time holding itself aloof from the day-to-day needs and political currents driving its parent agency. This circumstance has been especially stressful for the Institute, which was supposed to build a research structure in a field—the causes and prevention of criminal behavior—where the intellectual foundations were weak, and where, as its former director Gerald Caplan has said, precious little usable knowledge has been accumulated over the past few thousand years.

In its report, the Academy's Committee on Research on Law Enforcement and Criminal Justice lays out the problems besetting the Institute, which it depicts as unhappily straddling divergent and sometimes irreconcilable goals.

According to the committee, which was headed by Samuel Krislov of the University of Minnesota, "the projects funded by the Institute have been pre-

dominantly mediocre." It would be almost impossible for the Institute to produce good research, says the committee, given the administrative structure and political environment in which it must operate. Its money (\$150 million since 1969) has been put into a welter of projects, ranging from the development of new items of hardware for police use, to assessments of innovative programs to deal with offenders; very little emphasis has been placed on basic investigations into criminal behavior.

So distressed was the committee with the quality of the Institute's work that it gave some thought to proposing that it be put out of business altogether. It concluded, however, that a central national research effort on crime is desirable. The committee considered the effects of putting the Institute in the National Science Foundation or the National Institute of Mental Health, but decided that it should remain in the Justice Department if it is to retain its visibility and its ties with the rest of the criminal justice system. The severing of its relationship with its parent agency would free it from the tyranny of LEAA which, the report notes, "should be a primary constituent of the Institute rather than its administrator."

The report paints a sorry history of NILECJ which, it says, "has never had