by the then Director of the NRI, Academician Pasechnik. Furthermore, articles written jointly by Votinova and others associated with the Kurchatov Institute of Atomic Energy and persons on the staff of the Atomic Reactors Institute in Melekess also mention the specification number of this steel. They were published in 1971 or 1972 in the magazine *Atomnaya Energiya* (Atomic Energy).

These facts, however, are deliberately ignored by the KGB.

V. S. Kislik has been officially informed that the steel he mentions in the article he published abroad is on the secret list, and that consequently in publishing an article about it in the open press, he compromised a state secret, and thus, committed an act qualifying as "treason" in the USSR. He was then shown the results of the expert examination made of his article by the Kurchatov Institute of Atomic Energy and the NRI. The conclusion in both cases was that "a state secret was compromised in the article of V. S. Kislik."

It is obvious that his case has been fabricated by the KGB with the object of punishing Dr. Kislik for his fight on behalf of the emigration of Jews from the USSR, and for the fact that for a number of years, he has not been afraid to stand in clear opposition to the Soviet regime.

Dr. Kislik's situation is extremely dangerous. The fact that the case against him is a malicious invention will not keep the KGB from wreaking its vengence on him.

He himself, his acquaintances, his mail and his telephone are all under constant surveillance.

During his last session with the KGB, which took place in May of this year, Dr. Kislik was warned that if he persisted in his fight and continued to demonstrate his disloyalty, he would be prosecuted and convicted. If he changed his position, however, he would be allowed to leave the USSR as an emigrant before the beginning of the Olympic Games.

But he should neither bow to blackmail nor believe the promises of the KGB.

The sentence meted out in such cases in the USSR is a *minimum* of eight years at hard labor, which, in the conditions prevailing the camps, is tantamount to a sentence of death.

I beg you to use your influence to help V. S. Kislik.

Dr. Kislik showed me the letter in which you write that your University is doing work jointly with the Nuclear Research Institute of the Academy of Sciences and go on to ask Dr. Kislik's opinion of Prof. Nemets, the Director of the Institute.

Neither I nor Dr. Kislik would like to judge the human and professional qualities of this man without substantiation. But you will be able to judge for yourself what sort of person Academician Nemets is from reading my letter. You will, perhaps, be interested to learn that the document setting forth the conclusions of the expert commission, which examined V. S. Kislik's article, was signed by Academician Nemets. This document falsely stated that the article "contained state secrets" and was one of the "proofs" of his guilt. Other examples of Academician Nemets' probity could be adduced.

It is both Dr. Kislik's opinion and my own that, however contradictory it may seem, considering Nemets' turnabout it may be possible for Dr. Kislik to leave the USSR.

Very truly yours,

Yakov Borodowsky (signed)

I am myself a physicist and have worked on the study of electrically active defects in high-purity semiconductors and on the nature of charge losses in semiconductor detectors of nuclear radiation. I worked in the NRI from 1970 to 1978. The last time I saw V. S. Kislik was two days before my emigration from the USSR on the 13th of June of this year.

The cited article is "The Kinetics of Helium Release for Irradiated Samples of Austenitic Steels," published in the *Journal of Nuclear Materials*, Vol. 66, 1978. The irony of the situation is that Kislik is being placed in the precarious position of being accused of anti-Soviet activity, *ex post facto*. A possible charge of treason confronts him.

As was so clearly stated in the letter, Kislik has been subjected to public rebuke and prevented from pursuing his research since 1973, when he first sought to leave the USSR. In spite of the official harassment and scientific isolation, he had remained determined to exercise his right to continue scientific work wherever he chooses, as guaranteed by the US Declaration of Human Rights and the Helsinki Final Act. Moreover Kislik's wife and child have already left the country in the hope that he would be granted the right to join them under the "reunification of families" provisions of the aforementioned documents. The prolonged anguish to which he has been subjected has aggravated his serious cardio-vascular problems.

We appeal to you to intercede for Kislik by writing to:

Academician Oleg Nemets
Nuclear Research Institute of The Ukrainian Academy of Sciences
Kiev, Ukrainian SSR
USSR

Academician B. E. Paton, President
Ukrainian Academy of Sciences
Vladimirskaya 54
Kiev 252030 Ukrainian SSR
USSR

Minister Golovoshchenkov
Ministry of the Interior
15 Korolenko St.
Kiev, Ukrainian SSR
USSR

Words of encouragement to Kislik at Rusanovsky Bulvar 10/122, Kiev, Ukrainian SSR, USSR, would help him to maintain his morale as he continues efforts to be reunited with his family and resume his scientific career. We would like to be able to thank you for your help; please send copies of your correspondence to our headquarters, Committee of Concerned Scientists, 9 East 40th Street, New York, N.Y. 10016.

MAX GOTTESMAN
MARK KAC
JAMES LANGER
Committee of Concerned Scientists
New York, New York

Recovering indirect costs

The subject of indirect costs on research grants and contracts is a constant source of irritation to most university principal investigators and researchers. It is also a subject that is badly misunderstood by these same people. In a recent letter (June, page 13) Harold Zirin managed to put in a single communication almost all of the popularly believed, *but incorrect*, suppositions concerning indirect costs.

Several years ago I held notions similar to Zirin's. At that time I and some of my colleagues watched with concern our indirect-cost rate increase markedly year after year.

Our concern was so great that we did a survey of most of the other major research universities and discovered that our rate was the highest of them. We wrote a report to the administration of our university complaining about this. As a result, I was appointed by one of our vice-presidents to an *ad hoc* committee to study this subject. This is what I found:

- The total cost of a project consists of the sum of direct costs and indirect costs. The costs of any particular activity can be assigned to one or the other, but not both. The assignment is usually made on the basis of minimizing total costs.
- Direct costs are easy to understand. A research group needs a voltmeter; it is purchased and charged directly to the grant or contract.
- Indirect costs, or more accurately pooled costs, on the other hand are a little more difficult to understand, but not much. These are real costs that are incurred by the university related to the support of many different activities si-

multaneously. The operation and maintenance expenses of a building in which both teaching and sponsored research are done concurrently is one example of indirect costs. In principle, these could be made into direct costs by metering in every room the electricity, gas, heat, janitorial service, painting, and so forth, and charging directly to each activity its measured share of all these various costs. The absurdity of doing this should be apparent. What is done instead is that these costs for the building are assigned to various activities according to some (government-approved) formula. In this case it is done on the basis of weighted costs of square feet of floor space resulting in $X being assigned to teaching, and $Y being assigned to sponsored research.

There are eight government-approved indirect-cost categories, of which the operations and maintenance example above is one. For each, the portion associated with sponsored research is determined by a government-approved formula. (Here and below "government" means "federal government.") These indirect costs of sponsored research are then totaled, and they represent the expenses that the university paid to support sponsored research during the financial period and for which it seeks reimbursement.

If these expenses are allowed by federal policy and federal-government accountants, then the university can be reimbursed. (There are in fact many expenses which are disallowed.) A common method of recovery is by means of a "surcharge" on all grants and contracts awarded during the next fiscal period. Again it is impossible to assign to each research effort its exact share of indirect costs without metering everything. The surcharge is usually a certain percentage of total (modified) direct costs applied uniformly to all grants and contracts. This percentage is determined by dividing the indirect costs incurred by the total of expected grants and contracts. Negotiation with and approval of the government is required on the exact value. This rate can be lowered by decreasing indirect costs or by increasing grants and contracts.

Under a single-formula system applied uniformly to all grants and contracts over a heterogenous university it is bound to happen that some research projects will pay more in indirect costs than they receive indirectly in services from the university—and the difference may be large. It is this fact that is most often voiced by some aggrieved investigators along with the assertion that the administration of the university is siphoning off grant funds for some other purpose. Alas, the "villain" *is not* the university administration. According to the laws of arithmetic applied to this case, if some group is paying more than it receives then some other group is receiving more than it pays. The villain is simply the inequities of the averaging principle. There is no completely fair method of recovering indirect costs that is not excessively cumbersome and expensive.

The answer to the original question of why the indirect costs were increasing at a very fast rate at Rochester was:

- cost of utilities
- inflation
- the higher costs of new buildings
- the large amount of government paperwork generated by such regulations as affirmative action, health and safety, protection of human subjects involved in research, and funding accountability.

A major reason why Rochester's rate was high compared with others was that other institutions had failed to realize the extent to which they had not been reimbursed for indirect costs of sponsored research (this is still true).

A number of additional comments are in order.

The indirect cost rate by itself is not a particularly meaningful statistic. What is important is the total cost of a project. For example, suppose a university sets up a facility (such as a computing center or a machine shop). The costs can be recovered either directly or indirectly. If recovered directly one pays for the services as they are used and the indirect cost rate is unaffected. If recovered indirectly one receives the services "free" and pays for them later through a higher indirect-cost rate. The total cost, however, could be the same by either method of recovery. The total costs could also be different because of the nature of the university or the facility. If this were the case then the sensible choice between the two methods of recovery of costs would be the one with lower total costs.

A university can at most be reimbursed by the government for that portion of the indirect cost associated with federally sponsored research and must pay indirect costs associated with teaching and other activities from their own resources. (For example the indirect costs associated with research sponsored by foundations usually cannot be recovered from the foundations). This ensures a powerful incentive for the administration of any university to hold indirect costs down.

Nowhere in this procedure is the university allowed to "make a profit." All of the procedures have been mandated by the government and are subject to government audit and negotiation. In fact two government auditors are in permanent residence at the University of Rochester and have the authority to look at any financial entry in any book at any time. In addition, the General Accounting Office from the congressional branch of the federal government may descend at any time and stay for as long as they desire and perform an independent checking of the books. (This happened last year. Three auditors came and stayed three months. They found only a few minor violations of federal procedures from among hundreds of grants and contracts, which of course were corrected.)

Inasmuch as there is no profit, then there are of course no funds that are diverted for purposes other than scientific research. In fact, it is just the opposite. The government in most cases *mandates* cost sharing. It requires that the University pay some portion of the expenses. This amounts to about 5%. Also some indirect costs are disallowed (interest, public relations and fund raising) and are not collected into the cost pool.

The disallowances here at Rochester are estimated to exceed 6%. In addition, the indirect cost rate negotiated with the government is almost always less than the rate calculated by the university. At Rochester this was 4% last year. Thus the University of Rochester is probably subsidizing federal research at the 15% level. It is possibly true that this 15% subsidy is among the lowest of any university. (This remark is based upon the fact that our accountants are continually consulted by other research universities for advice on recovery of indirect costs.) Also the indirect costs of nonfederal research done by researchers is disallowed. Thus the subsidy to all of research at Rochester is probably higher than 15%.

The failure of universities to recover the full costs of research seems to me to be an extremely unhealthy situation. Considering the large dollar volume of research and the quite obvious finite resources of most universities, one wonders how the universities can cope with a financial situation in which they are sure to lose. A major component of the solution would be for the federal government to pay the full costs of doing federal research. This is not a preposterous idea. No industrial or commercial laboratory would consider accepting grants and contracts under similar terms. Also the National Laboratories cannot and do not operate for only a partial cost of the research. All ask for full cost reimbursement, and their indirect-cost rates are considerably higher than that of a university as a consequence. *It is only the universities that are expected to subsidize research!* It also follows that researchers should make every attempt to recover for the university the full costs of their research efforts (that is, defending their university in negotiations with federal and foundation program directors). An argument that is frequently made by federal program directors and university scientists alike is that scientific research is essential to graduate education and that the universities ought to pay some part of it, say 15%.

Twenty or thirty years ago this would have been a relatively harmless policy because the number of scientists and re-

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search programs at a university was small and funding levels were measured in tens of thousands of dollars. Now, a typical research university has a large number of scientists and a large number of research programs and sometimes an institute devoted to national goals and the funding levels are measured in tens of millions of dollars. A small fraction of a large number of dollars may still be a large number of dollars and may represent a significant demand on the resources of the university.

In the event that the federal government and others desirous of the fruits of university research do not respond to this serious situation, what will the universities do? It appears to me that the dollar shortfalls can be made up from university funds only for a finite period of time. Then the deficits will be (are being) eliminated by reducing that which causes them—scientists and their research programs. The private universities will be hit first (and presently are) including those with large resources such as Zirin's California Institute of Technology. The public universities can tolerate this situation a little longer, because they have access to state treasuries. However, I doubt that the various state legislatures will continue to subsidize non-state research programs once they find out what is going on.

I urge every university scientist and every science program director to make some attempt to understand this problem. The financial health of our profession and our universities depend on it.

D. H. DOUGLASS
University of Rochester

THE AUTHOR COMMENTS: D. H. Douglass misunderstands the point of my letter, as do university administrators. I was simply trying to point out that a decrease in overhead charges would not hurt university research programs, because most overhead charges come right out of a fixed grant amount; in fact, the decrease would help by putting the money directly into science.

One can argue back and forth over whether overhead rates are fair. Donors give buildings, and the capital cost of these is depreciated and charged to overhead. I could (but won't) give examples of how overhead can be exaggerated by pooling sponsored and non-sponsored activities. But one cannot argue the fact that overhead comes out of a fixed grant budget in most cases. There may be some universities that have a high-overhead rate because they really track the costs. But I feel that in many cases high overhead means just that—they are spending too much money on wasteful indirect charges that should go into science.

I am not familiar with the Rochester situation, but logic tells us that continuously increasing overhead rates mean money is dissipated in ways which do not contribute directly to research. Big, unnecessary computing centers, overstaffed purchasing and building and grounds staffs, are typical items in this drain. As Douglass correctly points out, the university administration will itself gain if these costs are reduced. Such efforts can be successful. In response to vigorous faculty protests and its own budget difficulties, the Caltech administration made great economies and succeeded in keeping the overhead rate nearly constant for the last ten years. Each time they cut the staff of a department, it became more productive. Every functionary they laid off made life that much easier for the principal investigators. Hopefully Harold Brown is doing the same thing to the Pentagon.

If one examines the budgets of the national centers, one finds the same result: Despite the relatively lavish way they are run, the overhead costs appear to be lower than at universities. Because they don't need to exaggerate it.

Moral: If we scream and holler, the universities can and will set their house in order and we will get more science for a buck. Such increased productivity will lead to more grants, increased overhead, and more science.

HAROLD ZIRIN
California Institute of Technology
Pasadena, Calif.

Three-Mile Island complaint

I found your explanation of "What went wrong with the Three Mile Island reactor?" (June, page 77) to be very obscure, primarily because reactor components are mentioned which are never explained or identified in the accompanying diagram. The article failed to take into account that your ordinary PhD physicist is not familiar with steam-heat technical jargon or plumbing diagrams. For example, the diagram should have especially identified the *primary loop*, the *secondary loop*, the *primary circulation pumps* (are these the reactor coolant pumps?), and the *decay-heat removal system*. The demineralizer, its *secondary flow*, and the ruptured *seal* location might also have been shown.

How can we physicists educate the general public about technical matters when our own publications do not explain these matters to us? I think my local newspaper gave a better technical explanation of the accident.

The article should also have told us the ultimate fate of this reactor. Can it ever again generate electricity?

VICTOR J. SLABINSKI
8/1/79 *Arlington, Virginia*

We regret that our article did not help this reader arrive at a better understanding of