

LETTERS

Overenergetic Oversight at DOE

In "What's Wrong with These Reviews?" (August, page 9) David Mermin finds it distressing that a fundable research proposal should spell out in lengthy and explicit detail what will be accomplished over the next three years, preferably in a new direction. He may find it even more distressing to hear that soon the principal investigator may be asked at the end of the three years to prove that he or she did exactly what was proposed to the satisfaction of a non-technical auditor. Moreover, it is now conceivable that we will see the day when a scientist may be punished for not reaching all his or her milestones or even for discovering something not properly proposed.

Ridiculous, you say? Too much of this has already happened in some areas of the Department of Energy. In a project to remain unnamed, multiple tiers of detailed planning documents must be prepared, reviewed by largely nontechnical people, revised and accepted prior to commencing any work. By that time, of course, the program direction has been changed and the budget altered to the extent that the process needs to start over. Researchers become trapped in endless planning loops. Planning on network charts is done on a minute scale for periods as long as a decade, and allocated funds are disbursed only as planned results are produced on the appropriate schedule. If one accidentally discovers something unexpected and not planned for *a priori*, one is required to renew the planning cycle, issue "change orders" and so on. Although some parts of this project do need to be done under procedures that will "stand up in court," the same planning and operational procedures have been applied indiscriminately to all aspects.

We are now in a stage of virulent expansion of this mentality. In the name of accountability, one operations office of DOE issued the following policy statement on 15 February

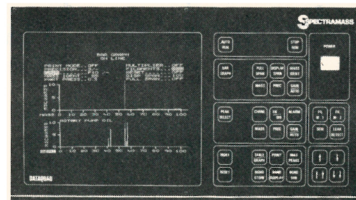
1990: "It is the policy of the Department of Energy... to establish, implement, and maintain a Quality Assurance Program which will provide confidence that *all activities* including *research*, development, design, production, construction, procurement, installation, test, operation, maintenance, modification, deactivation, and decommissioning activities are conducted in a safe, reliable, and *predictable manner*" (italics added).

This statement by itself seems innocuous. In practice, however, we are seeing a flood of new bureaucratic procedures that, for example, stopped a research project in bioremediation for four months while a construction order to add a partition and air conditioner to a lab awaited DOE approval. That research is "conducted in a... predictable manner" is consistent with the mentality that bureaucratic tidiness, not scientific or engineering progress, is the ultimate indicator that all is well. However, research progress is often unpredictable—not only as far as the specific discoveries are concerned but also as regards the time and manner of their discovery.

This letter should not in any way be construed to condone unethical or illegal activities by scientists. Furthermore, as a leader of an applied research project, I am not impressed by the attitude "I'm so smart, the public owes me the resources to pursue my interests unfettered." On the other hand, I understand from my own experience that flexibility toward new ideas is crucial in both pure and applied research.

I do not think the bureaucracy has evil intentions—the contrary is true. The problem is that the lawyers and accountants who are becoming increasingly responsible for decisions affecting the progress of science and engineering don't seem to understand either science or engineering. Pushed in inappropriate directions by an increasingly paranoid and scientifically illiterate public, they could unintentionally stifle all technical progress in this country while trying to address legitimate public concerns.

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LETTERS

Who will be to blame if in ten years the public asks us what it is getting for its tax dollar, and we can only point to a file cabinet full of accountability forms? If we don't stand up and speak out, it will be us.

ALAN K. BURNHAM
*Lawrence Livermore Laboratory
Livermore, California*
10/90

MERMIN REPLIES: I applaud Alan Burnham's plea for sanity in the support of research. I wish, though, that we could all agree that virtually nobody believes that "I'm so smart, the public owes me the resources..." and stop issuing disclaimers or accusations. Anybody who takes that line as homeless people fill our cities, our schools deteriorate, our bridges fall down, our dumps overflow—you name it—isn't so smart after all. The real issue is, if in its wisdom (or folly) the nation wishes to continue to subsidize science and the training of scientists in the age of no (or at least not nearly enough) new taxes, how this is best done. There aren't easy answers, but Burnham is eloquent on how not to do it.

N. DAVID MERMIN
*Cornell University
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12/90

A History Lesson for NASA Management

I have just read with great interest and mounting frustration your account of the Hubble Space Telescope fiasco (August, page 17). Your reporter states that there is great mystification as to how such a blunder could have been allowed to occur.

The problem, I suggest, is that NASA in recent years has taken to running its projects by bureaucratic committee. No one demanded the necessary tests simply because it was no one's clear responsibility to do so—or more precisely, to *decide* whether or not such a thing should be done. The fact that an investigation has to be mounted to find out who was supposed to be responsible is enough in itself to prove my point.

I think it is obvious that NASA's projects must be managed—or perhaps commanded is a better word—like any genuinely well-run military operation, construction project, surgical operation or deep-sea voyage. There must be a clearly defined chain of command, with one and only one person in charge at each level of activity. Each manager at each level must have complete authority within his or her sphere of responsibility; in

turn, he or she must be held completely accountable for failure in that area. Long experience has proven that this is by far the most effective way to carry out any endeavor that demands a very high level of performance and cooperation from many people.

We should recall that Roman generals in Republican times were required to suicide if they lost a battle. This seems barbaric to us, but it reflects the early Romans' awareness of how high the stakes in life really are. I do not suggest that we require NASA project managers literally to fall on their swords if they fail significantly. But until NASA streamlines its command system it will continue to be plagued by embarrassing, costly and occasionally tragic disasters.

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9/90

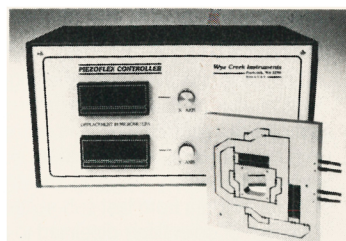
Nonlinearity at the Naval Research Office

Peter Carruthers has written (October, page 96) concerning nonlinearity and complexity that "unfortunately there does not yet exist a Federal patron to sponsor this burgeoning and promising field of research." In fact, in 1984, the physics division at the Office of Naval Research initiated a core program on nonlinear dynamics, which has enjoyed monotonically increasing support for topics including chaos, fractals and complexity. An Accelerated Research Initiative on nonlinear phenomena, which was devoted to experimental research, spanned the years 1986–90, and a portion of an ARI (1988–92) on clusters is devoted to fractal aspects of materials. A joint physics and oceanography five-year ARI on the nonlinear dynamics of ocean surface waves will begin in fiscal year 1992. The ONR physics division has also managed Small Business Innovative Research programs on nonlinear iterated function systems for image compression, and large DARPA University Research Initiatives devoted to nonlinear dynamical approaches to fluid mechanics. Programs, such as neural networks, supported jointly by several other ONR divisions would also fall within Carruthers's topic of complexity. These programs have consistently received strong support from the ONR management, especially during our internal program competitions. The Navy has focused on and been an early and strong supporter of the rich and promising fields championed by

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