

LETTERS

Nuclear Accident 'Scenarios' $\neq$ 'Risks'

The scenarios described in your special report "Severe Accident Scenarios at Issue in DOE Plan to Restart Reactor" (November, page 78) are important to study, and as the report clearly states, *they have been studied!* But "risk" is a product of consequences and probability. It is hardly defensible to portray the ability to identify worst-case scenarios as the same as real risks that should govern decisions about design and operation of facilities.

The point is that without fuel melting, there is zero probability of any significant release of radioactivity. The way the special report deals with this basic reality typifies the tone problem: "As long as the fuel does not melt, the thinking goes, the issues of cladding-coolant or fuel-coolant interactions, hydrogen generation and recriticality or prompt criticality never arise." There isn't much of a story left!

The special report mentions that each of these scenarios is highly unlikely, and even tells why. But the tone implies that the Conway committee, the Meserve group, and Argonne and Sandia National Laboratories were all afraid of restarting any Savannah River reactors. To the contrary, after extensive study, the conclusions were that the probability of those scenarios is so low that the risks are acceptable. That is the real message about the safety of the heavy-water-moderated reactors with aluminum-clad fuel that operate at low temperature and low pressure for a specific purpose.

A. DAVID ROSSIN

12/91

Los Altos Hills, California

'Surplusing' Aging Industrial Physicists

James Scott (September, page 11) appears to argue in his letter that just as qualified Russians who entered physics as students aged 18 or 22 were until recently assured of a career (for what it was worth) in science, so too are American physics PhDs, provided

they succeed in securing appropriate employment at age 27 or 30.

To a great many veteran physicists and other science "professionals" engaged in industrial R&D, this view would seem visionary. Very commonly, at age 50 or so, such longtime corporate employees find their hitherto stable careers poised on the edge of a slippery slope. As never before, their project proposals bog down in bureaucratic ooze; scientific publication, always difficult at best, becomes impossible or impolitic; invitations to participate in technical symposiums have to be declined for the simple reason that they cannot with impunity be disclosed to management; even self-financed attendance at scientific meetings is strictly taboo. These unfortunates are counseled to forget creativity, which smacks of unseemly ego gratification, and concentrate on "productivity"—which, translated roughly, means solicitude, in all things, to the boss and the boss's image as purveyed to his superiors. As often as not, however, adopting the prescribed low profile still is not enough to permit escape from what is tactfully called early retirement, or, in personnel managers' parlance, "surplusing." Either way it means loss of occupation.

F. Scott Fitzgerald claimed that in American lives there are no second acts, that is to say, no development of the human potential revealed in act 1. Happily, this is seldom the case for scientific workers in American industry. But having performed with due panache in act 2, they then discover that come act 3, where a satisfactory denouement is arranged for everyone else, they've been written out of the script.

A. C. HALL
Dallas, Texas

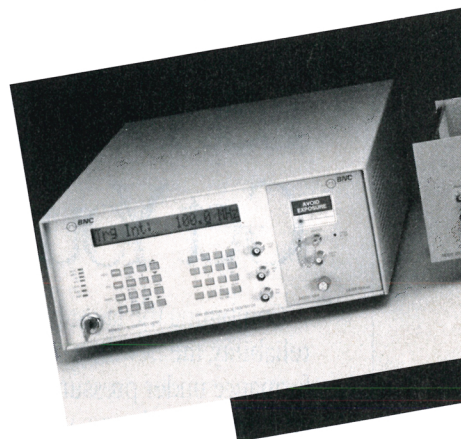
10/91

Is Space Station Getting a Fair Hearing?

NASA's Space Station Freedom is becoming a political football between Congress and the Administration. In May 1991, the House Appropriations Subcommittee on the Veterans Administration, Housing and Urban De-

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velopment and Independent Agencies (including NASA) held a hearing prior to voting against it. Nicolaas Bloembergen, G. Brent Dalrymple, Louis Lanzerotti and John Pike criticized the science that will be done on the space station as "unsuited," "better done unmanned," "not meriting the investment" or "oversold" at the hearing, according to press reports. The press also claimed these men represented The American Physical Society, American Geophysical Union, National Research Council and the Federation of American Scientists, respectively. But none of the researchers who have suggested science experiments on the space station were invited to testify.

Space Station Freedom will support many endeavors. These may include research on long-term human operations in space, life science (for example, plant and cell growth, plant and animal physiology, and retinal imaging) and materials science (for example, protein crystal growth for identification of the molecular structure of pharmaceuticals, chemical separations and growth of larger crystals with fewer defects). Many of these experiments require human labor or use the reduction of sedimentation, buoyancy, hydrostatic pressure and convective driving forces in low gravity. The space station also will be important to the study of environmental practices with closed-loop systems, to motivating youth to study science and mathematics, to cooperation in foreign relations, to national pride and prestige, and to the future of commercial activities in space. Other nations are ready to take the lead in these areas if we are not.

Were the gentlemen mentioned above really expressing the official positions of their societies based on polls of the members, as the press implied, or were they speaking for themselves? Have they applied the same cost-benefit analysis to other big projects, which will surely be next on Congress's agenda to cut funding? Were these gentlemen and their organizations the proper source to judge the value of life science research? Would they mind a researcher from the American Medical Association judging the value of high-energy particle physics at a Congressional hearing?

Apparently this was an attempt to divide the scientific communities into criticizing one another. Some Congressmen have stated that they would rather use the space station funds for welfare purposes. How should we defend the cost effectiveness of science and technology versus

welfare programs?

The full ten-year development cost of the space station, about \$30 billion, is often unfairly compared with the annual cost of other programs. Also, how do we value the benefits and assign the costs to each of the above-listed SSF endeavors? Low-gravity science is only a small fraction of the total.

Those members of our scientific and technical societies whose research is dependent on support from Space Station Freedom or other government projects deserve a hearing also. Let us use the names of our societies only after fair and balanced hearings of the members and avoid getting involved in political football games.

EUGENE C. MCKANNAN
Huntsville, Alabama

7/91

BLOEMBERGEN REPLIES: As president of The American Physical Society I testified on 8 May 1991 at a hearing of the Government Activities and Transportation Subcommittee of the House Committee on Government Operations. I read the resolution on the manned space station adopted by the APS council at its meeting in January 1991. The resolution was the result of extensive discussions in the Physics Planning Committee and the Panel on Public Affairs of our society, and I summarized those deliberations for the subcommittee. Furthermore, I consulted privately with APS members recognized as experts in such fields as materials science.

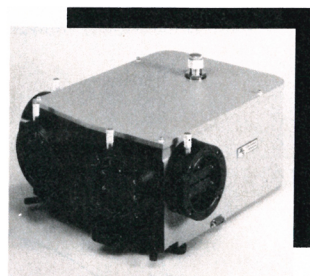
The APS has conducted similar cost-benefit analyses of the Superconducting Super Collider. The APS council also adopted a resolution regarding that project. I testified on the SSC at the hearing of a Senate Subcommittee on Energy Research and Development on 16 April 1991, and the SSC issue remains a matter of ongoing concern for The American Physical Society.

The APS resolution on the manned space station refrained from making any reference to programs in the life sciences. Comments on these programs were, however, included in a statement adopted by the Committee of Scientific Society Presidents, a substantial number of whose members preside over societies concerned with research in the life sciences.

The viewpoint of potential users of the manned space station for materials research was well represented at the hearing on 8 May 1991. Robert J. Bayuzick, chairman of the Space Station Science and Applications Advisory Subcommittee, was one of the witnesses. This year's hearings on the manned space station have been

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fair and balanced.

The detrimental results of the Congressional decision to proceed with the manned space station at the expense of all kinds of unmanned scientific explorations, especially within NASA, have already become evident. In this decade, a focal point for discussions on the formulation of science policy will continue to be the balance between broad-based, smaller-scale individual research projects and large-scale megaprojects dominated by considerations of national prestige and vested industrial interests.

NICOLAAS BLOEMBERGEN
American Physical Society
New York, New York

11/91

DALRYMPLE REPLIES: My 1 May 1991 testimony was to the Government Activities and Transportation Subcommittee of the House Committee on Government Operations, not to the subcommittee named by Eugene McKannan. My comments were based on an official position of the American Geophysical Union—namely that in view of the limited usefulness and extraordinary cost of Space Station Freedom, AGU has reservations about the wisdom of proceeding with its construction. The AGU council adopted this position in 1989 after a poll of a random sample of our membership and extensive deliberations by a panel of experts. At each step of the process the membership was informed and invited to comment. AGU has testified five times so far on Space Station Freedom, and the membership has been informed of the nature of the testimony each time. Based on the information received, it is clear that an overwhelming majority of the 28 000 members agree with the AGU position on the space station.

My testimony was restricted to those areas in which AGU has expertise, namely geophysics, space science and education. Contrary to McKannan's assertions, I did not comment on particulars of life science research.

As for the composition of the panel, I refer McKannan to the chair of the subcommittee, Barbara Boxer, and her staff, who issued the invitations.

Finally, McKannan perpetuates the myth that the cost of Space Station Freedom will be \$30 billion. The Government Accounting Office estimated the true cost of the space station to be \$118 billion over its 30-year projected lifetime, but GAO did not include all of the costs. The AGU estimate, which I presented to the subcommittee, is a minimum of \$180 billion. When one compares the very

limited research for which the space station is essential with the research that could be done in terrestrial laboratories and by unmanned spacecraft for a lesser sum, it seems highly unlikely that construction and utilization of Space Station Freedom can be justified.

G. BRENT DALRYMPLE
American Geophysical Union
Washington, DC

11/91

Atom Interferometry's Prior Patent

The Search and Discovery story entitled "Atoms Are the New Wave in Interferometry," by Barbara Goss Levi (July 1991, page 17), describes a fascinating application of quantum mechanics. Atom interferometers demonstrate that a composite structure like an atom can be made to move coherently in two separate directions and then recombined to interfere with itself. But we are disappointed that Levi was not informed that this atom interferometer concept is not new. Nearly two decades ago, when we were at TRW, we originated it in a 1973 US patent (3761721) entitled "Matter Wave Interferometric Apparatus." This patent discusses several potential applications in considerable detail, namely rotation rate sensors and gravity sensors, as well as magnetometers using ions instead of atoms. It also suggests the application to atomic wave holography.

SAUL ALTSHULER
LEE M. FRANTZ

Physical Science Interests
Manhattan Beach, California

9/91

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