A Second Look at Virginia's Accelerator

Questions from the Senate stall construction of a $225-million machine and prompt a second review of its scientific merits

In response to cost-conscious queries from the Senate, the White House announced on 27 July that it wants nuclear physicists to consider very carefully whether they want a new machine that has been on the drawing board for more than 2 years. The President's science adviser wants to know if a continuous-beam electron accelerator to be built in Newport News, Virginia, is "still the most promising new research tool for nuclear physics."

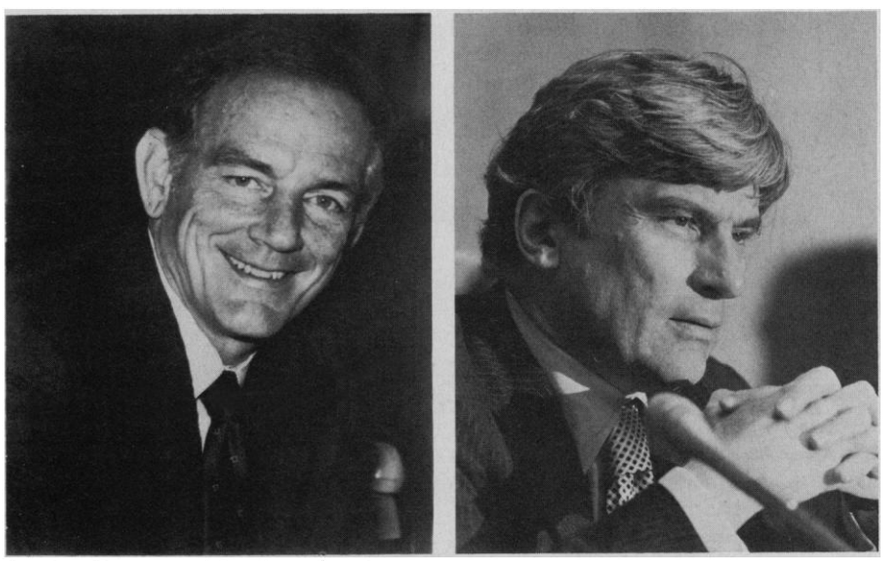
The question was considered once before, in 1982, by a special advisory panel to the Department of Energy (DOE) chaired by Yale physicist D. Allan Bromley. That panel endorsed the Newport News accelerator, proposed by 23 universities known as the Southeastern Universities Research Association (SURA), which is led by the University of Virginia and aided by Senator John Warner (R–Va.). Since then, the machine, called the "Warnertron" by some congressional aides, has been delayed by political and institutional troubles.

Some congressmen worry about construction costs on large projects like this, and one senator on the appropriations committee was annoyed by the sharp maneuverings of sponsors trying to steer the accelerator through the Washington maze. Now the Administration is making SURA run through the course again to prove its validity.

There is no major accelerator in the South, and SURA offered much for the privilege of building one: strong financing, enthusiasm, and political support. The plan beat four competitors because it promised low cost ($150 million), a high energy level for novel experiments, and many tenured faculty positions. But after SURA's plan was accepted by the Bromley group and DOE, it ran into problems. The major one was opposition from one of the losing competitors—the Argonne National Laboratory—whose director argued that SURA, which is essentially a paper organization put together to bid on the accelerator, lacked the expertise and support staff needed to manage a complex undertaking such as this. Although Argonne's bid was turned down, the fracas raised questions about SURA's ability to manage the project.

The doubts persisted this spring, for SURA still has no permanent director and lacks a detailed design that could be used for reliable cost estimating. In light of the uncertainties, the Senate asked that the scientific justification be reexamined. The White House Office of Science and Technology Policy responded by having a subpanel of the Nuclear Science Advisory Committee write a new analysis.

The subpanel, which meets in private, is headed by Erich Vogt of the University of British Columbia. A SURA official says he has heard that a consensus that developed in July came apart in August, and parts of the statement must be rewritten for final delivery by September.



Quarks, Gluons, and Southern Senators

Virginia's John Warner (R), right, told the appropriations subcommittee that his state should house the new accelerator, while Louisiana's Bennett Johnston (D), left, spoke about atomic structure and questioned the project's value for physics research.

At issue are the need for and feasibility of producing the relatively powerful beam SURA has promised (4 GeV), and the question of whether the beam will be adequate to explore the physics of a quark-gluon plasma, as SURA once claimed. Some think SURA promised more than it can deliver, and that the investigation of this new area, referred to as "an entirely new phase of nuclear matter," is properly the assignment of the next machine on the nuclear physicists' list, the relativistic heavy ion collider.

At the moment, the Brookhaven National Laboratory is a leading contender to build a new heavy ion collider. Conflict arises from the fact that building SURA's accelerator may mean postponing future projects and restricting funds for traditional nuclear research. One of the older centers likely to feel the pinch is the Bates accelerator at the Massachusetts Institute of Technology, a loser in the 1982 competition.

SURA got in trouble this year in part because Senator Bennett Johnston (D–La.) found its sponsors a little too adept at negotiating the halls of Congress. Often scientists are perceived as being naïve about politics, but not in this case. Johnston is the ranking Democrat and an 11-year veteran on the Senate appropriations subcommittee for energy and water. He is known for his interest in oil and gas legislation, but recently he has been learning about accelerators. Wolfgang Panofsky, retiring director of the Stanford Linear Accelerator, gave Johnston a short course in particle physics 2 years ago and says the senator should not be underestimated.

When the physicists turned on the charm, Johnston turned on the physics. Senate aides report that Virginia Governor Charles Robb came by Johnston's office to make a quick pitch for SURA. He came out much later, after hearing about quarks and gluons, "his eyes rolling in opposite directions," a staffer

says. Robb was prepared to explain why it would be great to build an accelerator in Virginia, not to discuss the machine on its merits. Similarly, Senator Warner was invited to speak before the appropriations subcommittee, which he did, stressing the importance of siting the project in Newport News. Johnston spoke about the structure of the atom. It was no surprise to those present that the vote went heavily in Johnston's favor, deleting SURA's construction funds from the 1985 budget.

Johnston's interest was aroused early this year when DOE tried to get the accelerator launched as a line item in the budget through a "reprogramming" request. DOE submitted a letter in February asking that $2 million be shifted from one area in last year's budget to a new account for construction of the SURA project. Such requests do not go before the full committee, and it is very unusual for a major construction project to be started this way. At the same time, the President's 1985 budget officially sought another $7 million, and "SURA people came in here to tell us the budget request was woefully inadequate," says subcommittee staffer Proctor Jones. They wanted $20 million. "They did come on a little strong at first."

Normally projects like this have some congressional history, but, in this case, the proposal had not even appeared in DOE briefings on future construction. "This one is going to cost $250 million at least, with annual operating costs of $20 to $25 million. . . . The more questions we asked, the more funny answers we got," Jones says. "It had a lot of rough edges." So Johnston and appropriations committee chairman Mark Hatfield (R–Ore.) cut the reprogramming request in half to $1 million and insisted that it be used for planning, not construction. DOE and SURA signed the contract on 3 August. In the 1985 budget passed in June, Congress allowed no money for SURA construction work but gave another $3.5 million for further R&D to define the project's scope and cost. And, at Johnston's request, DOE will come up with a new long-range plan showing how the project will fit into the 1986 budget and research agenda.

Two weaknesses have hindered SURA: its lack of institutional clout and the apparent lack of unanimity in the physics community that its project would be the most exciting new machine to construct. Because SURA has no full-time technical staff of the kind a national laboratory can deploy, it has not been able to push the design work on the accelerator as far along as older institutions might have. This is a sensitive point, for SURA has been criticized from the outset for its inexperience.

The group has been trying to recruit a director with experience in building accelerators and was angling earlier this year to hire Paul Reardon of the Brookhaven National Laboratory. Reardon participated in or directed construction of the Bates accelerator at Massachusetts Institute of Technology, Fermilab, and the Princeton tokamak fusion device known as TFTR. His most recent assignment was to bring order out of chaos in the construction of the colliding beam machine at Brookhaven, formerly known as Isabelle ("Wasabelle," some call it). He succeeded, but then the $100 million project was canceled in 1983, essentially because it had become outdated. (Senator Johnston had Isabelle in mind when he asked questions about SURA.) Reardon reportedly declined SURA's offer of a directorship after construction funds failed to materialize. He was not available for comment. In any case, SURA must still find a director and a staff that will make Congress feel the millions of dollars to be spent will be spent carefully.

SURA's more fundamental challenge will be to win an enthusiastic endorsement from the nuclear physics community. Senate staffers did not fail to notice that the Nuclear Science Advisory Committee's "Long Range Plan for Nuclear Science" (December 1983) gave much more attention to the ion collider than to SURA's electron accelerator. The collider is described in bold italic as "the highest priority new scientific opportunity within the purview of our science." The same chapter notes in less excited type that the SURA accelerator "will be an ideal instrument for exploring [quantum chromodynamics] and it is eagerly awaited by the nuclear physics community." The reason the accelerator was not praised more, according to one member of the drafting group, was that when the long range planning began in 1982, "we were told to regard the accelerator as given and proceed from there." This approach left the group's commitment to the machine untested and thus slightly cloudy.

The queries from the Senate and the new charge from the White House now make it necessary for the fundamental issues as well as the budget to be reconsidered. The objective, as Senator Johnston has indicated, is to get unequivocal answers to the questions: What is the best machine to build next? and How much does the community want it?

—ELIOT MARSHALL

Looking at the Debits on R&D Tax Credits

A House Ways and Means subcommittee pondering the future of legislation providing tax credits to industry for R&D expenditures got a less than clear lead from government experts appearing at hearings on the subject.

While industry investment in R&D appears to have risen since the tax credit provision was enacted in 1981, the witnesses were dubious that the tax credit provided the impetus for such investment. The most skeptical comment came from representatives of two of Congress's support agencies, Rudolph G. Penner, director of the Congressional Budget Office (CBO) and Jimmy C. Finch of the General Accounting Office (GAO).

According to Finch, factors other than the tax credit could account for the increase in R&D spending. Economic conditions have improved substantially since the legislation was passed in 1981, presumably giving managers greater incentives to invest in R&D. Finch said that recent studies also suggest that the tax credit may not be large enough to persuade a manager to invest in R&D rather than use the funds for other purposes.

As for the size of the increase, inflation distorts the picture, because more dollars are required now to finance R&D work at the same level as in the past. And some companies may have stretched classifications to qualify for the credits.

CBO director Penner observed that the R&D tax credit now applies to both development work on current products and for research on future products. One option would be to refocus credit toward basic and applied research. "This would help those projects now least likely to receive adequate private support. Such a refocusing would also reduce the cost of credit while encouraging firms to do the research likeliest to yield the greatest reward to society."

Treasury estimates put the cost in tax revenues of the R&D tax credit at more than $7 billion between 1981 and 1989. A Treasury Department sample of 1981 tax returns showed that of 2678 companies that claimed R&D tax credits, half of the benefits went to 53 companies which were