cheaply by requiring utilities to package waste on-site and ship it directly to the final respository. DOE disagrees. This may be the first time Tennessee has objected to having federal dollars frittered away inside its borders.

Tennessee sued to stop DOE from sending an MRS proposal to Congress. That caused a delay, but the Supreme Court turned down the appeal in March. In June, the MRS proposal was introduced in Congress.

Nevadans, Tennesseeans, Texans, and Washingtonians are vocal in their complaints about the waste program. Little progress has been made in a year, and Congress is about to try to fix things.

According to the nuclear electric industry, the fix should come in the form of good leadership. There are no serious technical flaws in the plan for burying waste, said Sol Burstein, vice chairman of the Wisconsin Electric Power Company and spokesman for the Edison Electric Institute. The government has become paralyzed by a search for a perfect solution. Perfection is not required, nor is it attainable, Burstein said. "We continue to urge Congress to keep the bargain" it made 5 years ago. One industry official says the utilities have "rattled the saber" in the past, threatening to stop payments to the DOE waste fund—to no effect.

Politicians from the target states see the situation quite differently. For example, Senator Chic Hecht (R) of Nevada claims that there are many technical weaknesses in the government's plan, including the risk of seismic damage from nearby bomb tests, and a threat to the state's tourist industry. "From my point of view," he said in earnest, "there is far too much politics in nuclear waste."

Senator Hecht has come forward with a slew of bills proposing something new—almost anything new. One would move the program off the land and into the ocean, putting nuclear waste in the deep seabed. Another would require that the waste be left to age for 50 years before going anywhere. Another calls for fuel reprocessing, a dead issue, in most people's view. Yet another bill, first proposed by Senator Daniel Evans (R–WA), would create temporary MRSs in four regions of the country. Evans has gone out on a limb, suggesting that his own state of Washington would accept an MRS but not a permanent repository, if other states would do the same.

The most popular idea, sponsored by 50 members from both parties, is to stop all action for 18 months and set up a study group. Congress would order this group to come up with orders for Congress. This nondecision would build squarely upon last year's, which was to put off action until this year.

When this idea won Udall's support at a packed press conference on 1 July, it ended "a dark, dark week" for the nuclear utilities, according to one lobbyist.

One exception to the wait-and-see pattern in Congress is a bill sponsored by Senators Bennett Johnston and James McClure (R–ID), backed by the nuclear utilities, and reported out of the Energy Committee on 29 July. It would simplify and speed up site selection by giving a large reward to any state willing to serve as a host. The money saved by canceling duplicate site investigations ($2 billion) could be spent on "incentives." The prize for a repository would be $100 million a year; for an MRS, $50 million a year. In return, the host would give up the right to block construction of the facility. This proposal, although pragmatic, has an air of desperation about it. It's been called the "bribe Nevada" plan.

On the House side, Representative Udall introduced another action-forcing bill on 15 July that would leave the task of finding a waste site to a kind of Henry Kissinger of the interior. This agent would serve as an internal diplomat for the federal government in quiet negotiations with state leaders. He would be empowered to offer unspecified incentives of the kind in the Johnston-McClure proposal, but any agreement for construction of a waste repository would have to get final approval from Congress.

Udall wants to serve again as a broker for progress. "We must not kid ourselves," he said. "We do our constituents no service by blocking the siting of a permanent geologic repository. Almost all of us already have a de facto nuclear waste dump closer to home than we care to think"—a reference to spent fuel storage chambers at 100 nuclear power plants.

Although there is not yet any physical urgency about removing the waste from the 100 widely distributed power plants, there is a political need to do so, according to Alvin Weinberg of the Institute for Energy Analysis at Oak Ridge, Tennessee. He testified that it is important to get on with the repository, even though his own preference would be to reprocess the fuel. If the siting squabble drags on for another decade or two, he said, "I fear we may lose the nuclear option." ■ **ELIOT MARSHALL**

Yale Accelerator to Be Dedicated

Dedication day for Yale University's upgraded ESTU-1 nuclear accelerator is 7 August. The tandem Van de Graaff electrostatic accelerator has a new booster section in its column that is designed to raise the terminal voltage to 25 megavolts, making it one of the most powerful machines of its type in the world. Although physicists expect the accelerator to bring about an improved understanding of the details of nuclear structure, they also hope the $11-million investment represents a strong Department of Energy (DOE) statement of the importance of university-based research in an age characterized by the increasing trend toward "big science" conducted in centralized facilities.

According to David Hendrie of DOE, the agency now spends about one-fourth of its nuclear physics budget on university research and facilities. The rest goes to the DOE national laboratories, which house several nuclear accelerators, both large and small. The frontier is moving toward higher energies as physicists increasingly recognize the importance of quarks and gluons, which are the constituents of protons, neutrons, and mesons, in determining nuclear structure. To this end, construction began this year on the new $255-million Continuous Electron Beam Accelerator Facility in Newport News, Virginia. And planning is well under way for the even more expensive Relativistic Heavy Ion Collider at Brookhaven National Laboratory.

Nonetheless, nuclear physics is a sufficiently diverse field that it has proven both possible and profitable to maintain a spectrum of comparatively low-energy machines at universities, which can then maintain their traditional and complementary roles of training students and engaging in forefront research. The ESTU-1 upgrade at Yale is one of five that are under way at universities having nuclear accelerators whose operations are supported by DOE. Others are at the University of Washington, Texas A&M University (where the improvements are being financed by the state and by private sources), Duke University, and the Massachusetts Institute of Technology. The improvements aim at providing a spectrum of different capabilities at the various facilities.

One forte of the ESTU-1 will be nuclear molecular physics, the exploration of the molecule-like spectrum of nuclear energy levels generated when two nuclei are briefly in close contact but not completely fused. This is a major area of low-energy nuclear research, but there is no generally agreed upon model for these so-called dinuclear resonances. ■ **ARTHUR L. ROBINSON**