Michael L. Knotek of Sandia. At the end of May, some 100 scientists from around the country met at Argonne to discuss uses for the synchrotron. If support for the concept of a 6-GeV synchrotron is won from the Seitz committee and DOE, Argonne will submit a detailed proposal.

Argonne's neutron plan envisages construction of a new machine, the "Argonne Super-Pulsed Spallation Neutron Source" (ASPUN), which would provide 250 times more neutron flux than the laboratory's current Intense Pulsed Neutron Source. The proposed design for ASPUN is based on a fixed-field alternating-gradient accelerator, a concept that was studied extensively during the early 1960s at the Midwestern Universities Research Association laboratory in Stoughton, Wisconsin. Argonne officials consider their laboratory well qualified to win support for ASPUN because IPNS proved to be a more fruitful project than critics once expected. In 1980, a committee chaired by William Brinkman of Bell Labs recommended ditching the project, but two years later a second panel headed by Brinkman concluded that the facility was running "extremely well" and that the laboratory had made "outstanding progress in establishing a strong users program" (PHYSICS TODAY, November 1982, page 19).

Generally, Schriesheim is "looking for ways to couple industries and universities," so as to put Argonne "on the cutting edge of those technologies that are underpinning energy, productivity and efficiency." He would like to build on the laboratory's expertise in sensors, advanced computing and artificial intelligence, and he is evaluating the roles the national laboratories might play in biotechnology and waste and pollution control. He notes that Argonne already is working closely with the steel industry and he regards machine tools as another promising sector for cooperation.

Schriesheim's efforts to sharpen Argonne's missions and build stronger ties with industry appear to be responsive to recommendations issued in 1982 and 1983 by ERAB's Multiprogram Laboratory Panel and a review committee headed by David Packard, chairman of Hewlett–Packard and former Deputy Secretary of Defense (PHYSICS TODAY, January 1983, page 59, and September 1983, page 39). At a press conference last summer, Packard singled out Argonne—along with Lawrence Berkeley and Brookhaven—as in urgent need of "streamlining." This summer, the Office of Science and Technology Policy and the Office of Management and Budget are to issue a report to the President on the implementation of the Packard panel's original recommendations.

Argonne officials say that the lab has been getting better reviews from DOE, following a troubled period. Massey thinks that "the most important thing we were able to do" during his tenure as director was "emerge with a stronger and more focused institution," despite a reduction in the lab's size of 1200 people. The lab's single most important achievement in his years, Massey says, was bringing IPNS into operation.

The Argonne Tandem Linear [heavy ion] Accelerator also came on stream during his years as director, and Massey takes special pride in having reorganized and consolidated activities to create what he says is "one of the strongest" teams in materials science and technology in the US. A disappointment during Massey's tenure was the selection of the Southeastern Universities Research Association over Argonne to build a continuous-beam electron accelerator in an energy range of 0.5–4 GeV (PHYSICS TODAY, July 1983, page 57).

Alvin Trivelpiece, director of DOE's Office of Energy Research, points out that Argonne "will have to compete like everybody else" if DOE decides to proceed with construction of a larger pulsed neutron source or a 6-GeV synchrotron radiation source. Trivelpiece observes that Argonne people "sometimes act as though they already have won the contracts"; he says, however, that Argonne can justly boast of "a greatly improved situation over the last two years." He thinks that "Massey has done a good job of bringing the lab up to a higher level of organized activity" and that "recruiting Schriesheim was an excellent move." —ws

Argonne proposes "proliferation-resistant" breeder

The "integral fast reactor," a novel concept developed at Argonne and its Idaho test facility, is designed to make it very difficult or impossible to use the breeder as a source of plutonium for nuclear weapons. Concern that the deployment of breeder reactors would make it much easier for terrorists and governments to get plutonium for bombs was partly responsible for Congress's decision last year to terminate funding for the Clinch River project.

Argonne's integral fast reactor eliminates all plutonium flows outside the plant complex and keeps plutonium mixed with highly radioactive fission products throughout reprocessing operations. Because the breeder would run on metal rather than mixed-oxide fuels, a relatively simple two-step reprocessing procedure can be employed, Argonne scientists believe. The first step would involve "halide slagging," in which certain fission products are removed to a molten salt solvent, and an electro-refining step, in which the desired metals transfer to an electrode, while additional fission products remain in the electrolyte.

In reprocessing spent fuel from the breeder core, fission products would be removed, yielding a uranium–plutonium mixture for use as new fuel. In reprocessing material from the blanket, uranium as well as fission products would be removed, yielding two streams—one enriched in plutonium for new core fuel, and one consisting largely of uranium for the new blanket.

According to Charles E. Till, Associate Laboratory Director for Reactor Research and Development at Argonne, the integral fast reactor would have superior safety characteristics in addition to being proliferation-resistant. Till is seeking $180 million in government funds for a five-year program, in which the experimental breeder reactor currently operating in Idaho would be converted into an integral fast reactor complex. If Argonne wins support for this program, it would attempt in the next two years to establish the feasibility of the electrolytic reprocessing step, demonstrate adequate burnup rates and test certain safety features.

Till thinks that if DOE decides to back a restructured breeder program, it will have to choose between a traditional concept similar to Clinch River or go with something like Argonne's idea. "There is no third concept as far as I know," Till says.

Delbert Bunch, director of the DOE Office of Breeder Technology Projects, says that the department has received several innovative breeder proposals this year. He considers it virtually certain that DOE will recommend funds for feasibility studies on aspects of a number of projects. James M. Cubie, a veteran anti-breeder lobbyist who currently works for Senator Patrick J. Leahy on the staff of the Senate Appropriations Committee, believes "we can be certain that the industry will make a run this year or next for a Clinch River" or some other breeder project. While Cubie anticipates that the Office of Management and Budget will oppose a revived breeder program, he thinks that breeder advocates have a good chance of winning Congressional approval for a new fast reactor project, and he thinks it likely that the project "will end up in Idaho." Cubie is mindful of the influence wielded by Senator James A. McClure, the Idaho Republican who chairs the Senate Committee on Energy and Natural Resources.

On 19 January, Hans Bethe of Cornell wrote to Presidential Science Adviser George A. Keyworth endorsing Argonne's breeder concept. "The metal breeder," Bethe wrote, "could regain for the US the leadership in breeder reactors which we lost more than a decade ago to France and the Soviet Union." Alvin Trivelpiece, director of DOE's Office of Energy Research, says that Argonne will be in good shape or bad shape" in the years to come, depending largely on "how the nation's breeder program comes out." —ws