used to obtain an evaluation of Barnwell by a team from Argonne National Laboratory. The team suggested that shortcomings in Barnwell's design in respect to maintenance might cause contamination problems such as those that led to the shutdown in the early 1970's of the reprocessing plant in West Valley and "give the industry a further black eye."

While focusing on technical operations, the report also included an economic assessment of reprocessing. The report asserts that the costs of reprocessing spent nuclear fuel are much higher than of purchasing uranium and emphasizes this disparity in its conclusion that reprocessing is not commercially viable. The report's author is Arjun Makhijani, whose technical background includes an electrical engineering degree from Bombay and a doctorate in controlled fusion from Berkeley. Makhijani's facts and findings have drawn fire from industry, but the report has also been seized on by critics of reprocessing. Makhijani, for example, was a member of a panel on reprocessing on 10 August at a hearing on amendments to the Non-Proliferation Act of 1978 held jointly by two House Foreign Affairs subcommittees. A chief topic in the question and answer period was the differences between the report's findings and those of a study conducted for the Atomic Industrial Forum which yielded results much more favorable to reprocessing. The discussion left the advocates of opposing analyses very much at odds. A main point, however, is that congressional foes of reprocessing are broadening their critique.

DOE's Brewer says the department is conducting a technical review of the critical study and he, therefore, prefers to withhold full comment. On the basis of data from other countries he has seen, however, Brewer says he thinks the report is "without technical merit" and that he regards it as a "political issue."

As for criticism of Barnwell's design, Brewer notes that the plant incorporates technology that has been in use for three decades and says that Barnwell's designers took into account difficulties experienced by other reprocessing facilities.

On the matter of costs, the Administration's case for reprocessing is not, in fact, made on narrow economic criteria. It is necessary to "broaden the incentive," says Brewer. "If you simply ran the arguments through an economic sieve you'd never have gotten to electricity and automobiles." The heart of the Administration argument, in favor of reprocessing, as the DOE draft paper put it, is "to provide access to significant remaining fuel value for future generations as well as significantly reduce the volume of high-level waste." According to the paper, "Through reprocessing and the use of the breeder reactor, the amount of energy generated from a given quantity of uranium will increase almost 70 times beyond that generated in a conventional reactor with no uranium and plutonium recovery."

As this illustrates, the opposing sides in the debate over Barnwell disagree fundamentally on the risks and benefits of proceeding on a course that even a decade ago appeared to be manifest destiny for the nuclear enterprise. To critics in Congress, Barnwell, the breeder, and the shift in nuclear foreign policy all would increase the availability of plutonium and, thus, pose too great a risk.

The outcome of the contest over Barnwell is hard to predict since Congress has shown itself to be of two minds on the larger issue. While it has been consistently sensitive to proliferation dangers, Congress, at the same time, deflected Carter Administration intentions by keeping the Clinch River Breeder project alive and voting Barnwell about $10 million a year, enough to maintain it and to provide the basis of a fairly extensive program on safeguards for plutonium. In its impending decisions on funding for the breeder and the fate of Barnwell, Congress will find it harder to continue to have it both ways.—JOHN WALSH

The Academy Under Frank Press

His mild manner masks an ambitious agenda to raise the academy's visibility, influence the White House, and launch policy debates

Frank Press, president of the National Academy of Sciences (NAS), has installed a device just beside his desk that none of his predecessors had: a small Sony TV. Its presence hints at the kind of change taking place at the academy under its 19th president.

A staffer says of Press that he "loves television," meaning that he likes to keep an eye on the network news and to have an impact on it. Millions of Americans get a version of truth from television, and Press wants to contribute to it. He is proud of the fact, as he said recently in an interview, that one night he appeared on all three network broadcasts, talking about the distressed state of high school science. Reporters had interviewed him in connection with a national "convocation" he held at the NAS in May to dramatize the problem. "Can you imagine what it would cost to buy that much prime time?" he asks.

Press does not regularly make the headlines. He was installed officially as president of the academy a little over a year ago, in July 1981. Although he has made some broad changes in the staffing and structure of the NAS since his arrival, these have not stirred much publicity. This is just as Press would like it, for he aspires to discreet success. He describes his ideal method of operation, for example, in an article elsewhere in this magazine ("Rethinking science policy," p. 28), in which he explains how the President's science adviser should influence budget decisions: "quietly, without fanfare, without public pronouncements of successes, with the noises of bureaucratic battle muted, and often without responses to public criticisms. . . ."

This perfectly fits Press's own style, both as President Carter's science adviser from 1977 to 1980, and as a leader of the NAS. His mild demeanor does not denote a modest ambition, however. Nor does it mean he avoids publicity.

A glance at Press's plans reveals that he has a massive agenda. Some of these projects have been completed already; most are just a-borning. Among them are a complete overhaul of the academy's report writing agency, the National Research Council (NRC); an administrative cutback to bring about a 15 percent reduction in personnel and overhead costs next year; a drive to raise private capital for each of the three honorary institutions under the academy's roof; the creation of a separate $3.8-million kitty for special projects of interest to the academy; a variety of new "outreach"

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schemes for getting scientific findings into the hands of congressmen and Cabinet officers who might use them; many plans for improving efficiency at the NAS, including the use of a computerized communication system; and the creation of numerous ad hoc groups of specialists to give quick advice to the White House and Congress.

As evidence that the academy can give advice quickly and informally, Press mentions that he has put together seven small committees to advise the Reagan Administration as it draws up the new budget for research and development. Organized by discipline, the small groups will hold their first meetings this month, prepare briefings on areas of research that may deserve special support, clear the briefings with Press, and present them to the White House staff in October. The operation is quiet, and Press hopes it will aid George Keyworth, Reagan's science adviser.

The approach is markedly different from the one followed last fall. Press last year called a public convocation to discuss the budget, inviting research administrators from around the country. Keyworth was invited as well. When Keyworth arrived, he was bombarded with hostile questions. He did not relish the experience and later said as much.

Since then, Press has praised the science adviser several times in public. His latest proposal for funding basic research agrees in part with Keyworth's avowed intention to "prune the deadwood" from the tree of federal science. Like Keyworth, Press would cut the development budget in order to finance basic research. Unlike Keyworth, Press would also have the government pledge to increase the basic research budget each year by 2 percent above the rate of inflation. Press argues that it is easy to find development projects that deserve to be sacrificed, but he declines to name any candidates.

One change already apparent at the NAS is the shift in style. Press is more careful than his predecessor, the late Philip Handler, about promoting good relations with the staff, the press, and public officials. For example, to help him decide how to run the academy, Press solicited comments from a variety of kibitzers, including reporters, before taking office. Handler never did this. Press has taken an interest in the mechanics of administration. Therefore, he is a more intrusive as well as a more accessible manager. He wants subordinates to feel they are being held to account for the use of time and money. One staffer reports, for example, that the academy was invaded briefly this year by efficiency experts who went from office to office asking how long it took to perform certain tasks. That sent a chill through the corridors.

In the groves of academe

Einstein broods in the garden while the research council reorganizes.

Handler regarded the academy, one of his old assistants says, like a university. Although he was impatient and arrogant at times, his supervision of the offices and panels proliferating within the NRC was relaxed. They operated with some autonomy. Handler often served as a final arbiter of issues only after they had worked their way up to his attention.

Under Press, there may be more routine direction from the top. It surprised some members, for example, that Press asked to review the congressional testimony of all NRC committee members before they give it. In one recent case, a report on the risks of marijuana use (*Science*, 16 July, p. 228), Press stepped in to contradict the conclusions of an expert panel. Thus far, the president's activism has not stirred any public disagreements.

Two other changes of style are often mentioned. One is that Press is interested in science policy and public administration. He has used the academy as a platform for launching debates on the federal budget and secondary education. He has begun to use it as a meeting ground for political leaders and research scientists, traditionally leery of one another. Handler headed the academy during the Vietnam War, when the universities and the government were on bad terms. It was important then to establish one's purity of allegiance. The mood has changed. Press is enthusiastic about the possibilities for bringing together university scientists, government officials, and industrialists.

Another shift has to do with the style of communication. Handler was an impressive and controversial talker whose oratory was envied on Capitol Hill. He wrote his own speeches, and these served as his primary means of communicating the academy's view to the outside world. Press, in contrast, is not an eloquent public speaker. But he is prodding the academy to seek out a broader audience.

The report on problems in secondary education, for example, is being mailed to each of the 16,000 school districts in the country. Scientists who serve on NRC studies are urged to seek out and give briefings to congressmen and other officials who might use the findings. Press footed the bill for six dinner "symposia" involving scientists and decision-makers last year. He hoped that these informal meetings would get more attention for the academy's research and, in at least one instance, a report on nutrition and cancer; it worked.

What are Press's tangible accomplishments after a year in office? The one that looms largest is the reorganization of the NRC, the report-writing institution founded in 1916 to advise the government as it mobilized industry for World War I. The NAS was chartered by President Abraham Lincoln in 1863. It spawned the Academy of Engineering a century later in 1964 and the Institute of Medicine (IOM) in 1970. Today, members of all three bodies give advice to the government on a voluntary basis through the NRC. The government pays well (for travel, printing, and staff expertise), but gets the panel members' contribution free of charge. The NRC produces hundreds of reports annually, many of them so arcane they are forgotten the day they

are issued. In the words of one congressional observer, the NRC has been seen as "moribund" for some time, because its cumbersome structure prevented it from responding quickly and incisively to requests for help. Many people have suggested that a smaller, better-organized NRC would be easier to manage and more likely to produce useful information.

Press himself wrote this year that a few bad performances "have led to perceptions in some quarters that the institution is overly bureaucratic, expensive, unreliable in timely delivery of reports, and often only rehashes what is already known." He decided to do something about this perception. A committee chaired by James Ebert, president of the Carnegie Institution of Washington, studied the NRC and issued recommendations for change last February. Nearly all have been adopted, with the result that the NRC has been reshaped from a complex array of four commissions and four assemblies to a no less complex array of four commissions, two offices, and two boards.

Ebert's group recommended that agriculture be given more attention, so the field has been elevated from a subunit of the natural resources commission to the status of a free-standing board. It reports directly to the governing council, as does the Transportation Research Board. One of the recommendations not adopted was that the health policy divisions of the IOM be merged with the biomedical groups that serve under the Commission on Life Sciences. Press decided to keep them separate. The IOM council, which would have reviewed research projects under the Ebert scheme, was judged to have insufficient expertise in the basic sciences to take on the new responsibility.

Philip Smith, Press's assistant who came to the academy after serving under him at the White House, says the consolidation will take some time. In many cases work in progress must be finished before groups can be melded, but the melding has begun. In the future, he says, the academy will try to rely on ad hoc rather than standing committees for quick advice.

Press is preparing to carry out a second major change in the academy this fall: a move to cut costs by 15 percent in the next year. According to Comptroller David Williams, this may require a reduction of 30 positions from the permanent staff. Some, not all, will be removed by attrition. A hiring freeze is already in effect. One reason for the austerity drive, Smith says, is that costs are rising too rapidly. He mentions that the indirect cost rate the academy charges the government jumped from 50 to 60 percent within the last year.

The largest single financial problem for the NAS at the moment is an unfavorable real estate contract it signed as part of a construction agreement on its Joseph Henry building. As was standard practice several years ago, the NAS agreed to lease a large amount of space in the new building when it was finished. A boom in construction and a slump in demand have put the NAS, like many institutions in Washington, in possession of much expensive, unwanted office space.

In the words of one congressional observer, the NRC has been seen as "moribund."

Federal revenues have fallen at the same time. The peak income year for the academy was 1981, when the government paid for $76 million worth of advice. In 1982, projected revenues are $72 million. Although some believe that the academy's fortunes rise and fall with federal support, Press apparently does not. He would like to reduce the dependence on government income. He has argued that the academy should not campaign avidly for new contracts but should aim for a "stable" federal income of around $74 million.

Press meanwhile has organized fundraising committees to boost the academy's $30-million endowment. Not much has been accomplished. The effort, Press says, is "just getting started." The income from the endowment in 1981, less than $2 million, would not have been enough even to cover the cost of publishing and public relations that year.

Press has secured private donations amounting to around $4 million extending over the next 3 years to pay for special projects the academy is interested in. The money has been given in two lumps. One large pool has been contributed unconditionally by six philanthropic foundations, to be used as the academy chooses. In addition, another foundation has given $359,000 specifically to support a study of government-university relations in scientific research.

Press is particularly pleased with two of the studies supported by the common fund: one chaired by Dale Corson of Cornell University, looking into the ways that government secrecy affects research, and a second chaired by Howard Johnson of MIT, examining the competition among the United States, Europe, and Japan in the high-technology trade. Press believes the Corson report, due out in late September, will be the "Bible" for military-related research for many years. The Johnson committee will be equally potent, Press says, in part because its members are so influential. The latter aims to come up with "rules of the game for international technology competition," usable at least through the remainder of the decade.

In the area of international science, two other projects deserve mention. One is the plan for continuing discussions with the Soviets through the Committee on International Security and Arms Control, chaired by Caltech president Marvin Goldberger. The group meets regularly with Russian delegates to "reduce the threat of nuclear war" and "limit diversion of natural and human resources into weapons production." A quiet communication channel between the superpowers, it is the only exchange program with the Soviets that survived the reaction to the invasion of Afghanistan. Press says that academy members are divided on this matter, but enough are strongly opposed to rapprochement with the Soviets that he will not start any new exchanges now.

On a different front, Press reveals that he has just authorized talks between U.S. academy members and European scientists in planning for a possible joint planetary research program. The discussions have the tacit backing of Keyworth and James Beggs, administrator of the National Aeronautics and Space Administration. As Press describes the idea, planning, funding, and all aspects of research would be shared.

The changes Press has brought to the academy in his first year are modest, but they point the way in which the institution will develop. There will be a greater emphasis on winning private support, especially for projects of tangential interest to the government. To the extent that this succeeds, there will be less dependence on federal funding, with perhaps more independence from the government's point of view. The permanent staff will be smaller. There will be less reliance on standing committees in the NRC, and more on informal, short-lived advisory groups. And if the first year is a guide, Press is likely to push the staff to justify new projects not only in terms of in-house finances but also in terms of a broader public accounting.

—ELIOT MARSHALL