

Nuclear Power: Hard Times and a Questioning Congress

These are gloomy times for the American nuclear industry, caught up not so very long ago in a dizzying spiral of reactor sales. By early last year the capital commitment to nuclear power generation had edged close to \$100 billion. Now, at the same time that utilities' economic problems have forced them to cancel or delay scores of power plant projects worth perhaps \$50 billion, the civilian nuclear industry finds itself facing what may prove to be the toughest political battles in its 20-year history.

In California, a coalition of anti-nuclear groups claims to have gathered well over the 313,000 signatures needed to place an initiative measure on the ballot next fall which would strongly encourage the state legislature to impose a moratorium on nuclear plant construction. Citizens' movements in support of similar measures appear to be gaining strength in Wisconsin and Vermont, and the governors of several other states—notably New York, Massachusetts, Colorado, and Oregon—have recently expressed misgivings about the safety and reliability of nuclear technology.

This rising restiveness stems at least partly from the hard work of an emerging, though still loosely organized, national political movement that is questioning nuclear power with increasing effectiveness. The movement has a charismatic leader (Ralph Nader), a national constituency, astute technical advice, and a beachhead in Washington occupied by a small but energetic band of lobbyists and their allies in Congress.

The nuclear industry's political situation in Washington has worsened for other reasons as well. The dissolution of the Atomic Energy Commission has left the Executive Branch without a focal point for advocacy; the new Energy Research and Development Administration has thus far sought an image of technological neutrality.

In Congress, the once-solid jurisdictional barriers that held nuclear debate within the friendly confines of the Joint Committee on Atomic Energy from the 1940's onward have substantially

eroded in the past year, and several other committees are taking a new interest in, and a "show-me" attitude toward, nuclear power. Simultaneously, and partly by coincidence, critics and advocates are forming battle lines for a series of congressional debates this year and next on reactor safety, safeguards against theft of plutonium, the breeder reactor program, financial aid to utilities, and storage of radioactive waste.

The gravity of the approaching debates is such that the Atomic Industrial Forum (AIF), the industry's main organization, is planning to move its headquarters from New York to Washington, double its public relations budget to \$1.4 million in 1975, and take an aggressive new stance in defense of nuclear technology.

Lobbyists for nuclear opposition groups, who are out to stop or at least restrain the "nuclear juggernaut," as some of them call it, exude a now-or-never determination, while proponents—the AIF among them—seem optimistic, but edgy. With perhaps only a small excursion into hyperbole, L. Manning Muntzing, the AEC's last director of regulation, predicts that 1975 will be the "go or no-go year for nuclear power."

Not everyone foresees quite so dramatic a showdown. "I've heard the talk about a shoot-out at the OK corral this year," says William Anders, chairman of the Nuclear Regulatory Commission. "I don't quite see it happening that way, although there are tough questions to be addressed."

There does, however, seem to be general agreement that the long national argument over nuclear power is beginning to focus in the Congress. How Congress responds to its new role as a forum for this debate—whether it conveys a mostly positive or mostly negative attitude toward nuclear power—may determine how the budding moratorium movements across the country fare. And their success or failure will mark a political watershed in the "peaceful atom's" turbulent history.

How, after so many years of sporadic national debate and the commit-

ment of so much money by government and industry, has nuclear power arrived at this crossroad?

It's mainly bad luck that the industry's economic and political problems have struck at the same time. Faced with rapidly escalating construction and interest costs, a stagnation of income that followed a sudden plateauing of demand, and an utter fog surrounding future electric power demand, utilities have cut their immediate losses by postponing construction. Costs of nuclear and coal plants have been going up at about equal rates, but delaying nuclear plants meant a larger saving because they cost more to build. All of this is related to the industry's political problems only in the sense that critics are working to make nuclear economics an issue. Nuclear power is a bad buy, they argue. Critics blame the financial troubles of some utilities on overenthusiastic purchasing of a technology whose costs both the AEC and the major manufacturers had grievously underestimated.

The industry, in turn, argues that nuclear power's lower fuel costs make it a better buy even with higher capital costs. By this argument, the utilities' problems reflect the recession and are, presumably, transitory.

Political circumstances, on the other hand, have undergone some changes that would appear to be lasting, particularly in the Congress. The makeup and, by some indications, the character, of the Joint Committee on Atomic Energy have changed dramatically. Many of the 18-member committee's most doctrinaire supporters of nuclear power have retired or been defeated for reelection in the past 2 years. And some of their replacements—especially seven new members this year—have demonstrated noteworthy skepticism in the past on issues of big technology. (Of the five new members of the JCAE who were in Congress at the time of the antiballistic missile debate in 1969 and the supersonic transport debate in 1971, all voted against one or the other and four voted against both the ABM and SST.)

It is also worth noting that the JCAE's new staff director, George F. Murphy, Jr., has indicated a willingness to strike up a dialogue with critics. Altogether, says James Cubie, consumer advocate Ralph Nader's nuclear lobbyist, "the joint committee seems like a whole new ball game."

The splitting of the AEC, and the jurisdictional reforms approved by the

House last year (*Science*, 22 Feb. 1974), have had the effect of spreading "oversight" authority in civilian nuclear matters beyond the JCAE. For instance, the Senate Committee on Government Operations, which handled the energy reorganization legislation last year, has established a handhold on the new Nuclear Regulatory Commission (NRC). The committee chairman, Senator Abraham Ribicoff (D-Conn.) is using this grip to explore an assortment of safety and security questions, including those posed by a commercial plutonium industry.

In the House, the Interior subcommittee on energy and environment has acquired oversight authority in nuclear matters. Subcommittee chairman Morris Udall (D-Ariz.), a presidential aspirant, hasn't yet said what he plans to do with his new authority, although Udall said in a statement last month that he was well aware of the feeling that the joint committee had long been a "closed club" and welcomed the chance to "get a fresh start" in discussing nuclear controversies.

A number of members with no special jurisdictional authority have also emerged as critics or skeptics but not necessarily as opponents of nuclear power. Representative Les Aspin (D-Wis.), famed as a ferret of cost overruns in Pentagon programs, has been probing of late at soaring cost estimates in the breeder program. Aspin has also introduced legislation that would forestall government approval of plutonium as a supplement for uranium fuel in commercial power plants (*Science*, 20 Sept. 1974). Senator William Proxmire (D-Wis.) reportedly has been mulling the possibility of hearings on nuclear costs before his Joint Economic Committee.

Nuclear critics aren't sure how many allies they have in Congress. (Nader's staff, as a case in point, was surprised and delighted to learn recently that Representative Peter Rodino, the New Jersey Democrat who heads the House Judiciary Committee, put his name to a nuclear moratorium bill that died in the last session of Congress.) Representative Mike McCormack (D-Wash.), probably the staunchest and most knowledgeable nuclear advocate in Congress now, guesses that a moratorium bill might garner 40 or 45 votes in the House. Cubie doesn't contest that estimate, but argues that 40 to 60 congressional votes would give the national moratorium movement a tremendous psychological boost. "That



Photo by Eric Poggenpohl
Photographed from a TV screen, Ralph Nader (right) and Norman C. Rasmussen of MIT debated nuclear power in a recent public television broadcast.

would legitimize the whole issue," he says.

All of these changes add up to a political environment that is quite unlike the tightly knit (some would say hermetically sealed) community of allies that prevailed within Congress, the Executive Branch, and industry from the 1950's onward. Moreover, just as this older political fabric has come unraveled, the critics of nuclear technology have begun linking up with each other to form an emerging national movement whose aim is to restrain, if not stop, the development of nuclear power.

The strength and cohesiveness of the nuclear critics, though increasing, are easy to overstate. The movement's leadership consists of perhaps a score of scientists, lawyers, and assorted lobbyists located chiefly in Washington and Cambridge, Massachusetts. Most concern themselves with a bewildering variety of energy issues in addition to nuclear power, and all of them work for independent environmental or consumer groups perennially strapped for money.

Ralph Nader has emerged as the critics' principal banner bearer and political strategist, but for the most part members of the leadership cadre work independently—consulting with Nader, but by no means taking all their cues from him. Much of the movement's technical homework is per-

formed not by Nader's staff but by the small but effective Union of Concerned Scientists in Cambridge led by Henry W. Kendall, a high energy physicist at the Massachusetts Institute of Technology, and by Daniel Ford, a former graduate student in economics at Harvard who has made a Naderesque career of nuclear criticism.

Kendall and Ford first came to prominence in 1971 as the source of detailed critical analyses—and the publisher of droves of leaked AEC reports and memoranda—concerning inadequacies in emergency cooling systems of nuclear plants. Relying for help on an ad hoc "farm system" of sympathetic scientists and engineers, Kendall and Ford (who, in large part, *are* the UCS) have continued to critique the government's development and regulation of nuclear power in issues ranging from fuel problems to accident probabilities to safeguards against theft and sabotage.

The Natural Resources Defense Council, a nonlobbying public-interest law group, has been equally effective in its specialty of illuminating weaknesses in the government's breeder reactor and radioactive waste storage programs.

The coalescence of the critics and the unraveling of the advocates' political power coincides with the arrival of Congress at several important decision points in matters of nuclear technology.

The outlook is for set-piece skirmishes in the following areas this year and into 1976:

Safety. Stricter federal controls on thermal and radioactive emissions from nuclear power plants have largely hushed controversy in these two areas. The concerns of critics now focus on the possibility of a catastrophic loss-of-coolant accident or sabotage in a nuclear power plant.

In an effort to mollify critics, the Atomic Energy Commission last August released a draft version of an enormously complicated accident probability analyses that said, in essence, that such accidents could happen but that the hazard was far less than many seemingly accepted by society. Known best by the name of its project director, Norman C. Rasmussen of MIT, the 3600-page report said the worst conceivable nuclear accident might cause 2300 immediate deaths and some \$6 billion in property damage, although such an accident was highly improbable (*Science*, 6 Sept. 1974).

In Congress, the talking point for safety issues (among them, the validity of the Rasmussen analysis) will be the proposed renewal of the Price-Anderson Act of 1957, which limits a utility's accident liability to \$560 million, \$435 million of which would be paid by the federal government. Critics, arguing that energy technologies should "pay their own way," fought last year to let the act expire in 1977 or to replace it with something more in line with accidents of the magnitude described in the Rasmussen report.

Congress did pass a compromise bill last fall that would have eventually allowed an increase in the liability ceiling and a reduction in the government's role. But President Ford objected to an amendment in the bill by Senator Gaylord Nelson (D-Wis.) that would have allowed Congress to negate its renewal by a joint resolution after studying the Rasmussen report.

To the amazement and delight of critics, Ford vetoed the renewal on constitutional grounds last December, thus guaranteeing further debate in a dramatically different Congress.

Whether the industry really needs Price-Anderson protection indefinitely is a matter of disagreement even among nuclear proponents. The real burden of liability falls not on utilities but on reactor manufacturers like Westinghouse and General Electric. It is they who have lobbied hardest for its renewal, arguing that Price-Anderson protection

is no different in kind than government insurance against crop failures and the collapse of banking institutions. On the other hand, some analysts, such as former AEC commissioner William Kriegsmann, think phasing out Price-Anderson might have a salutary effect on quality control in the industry. "Do away with it," he says, "and you'd probably see nuclear valves coming off the assembly line in a lot better shape."

The insurance debate, which may be timed with completion of the final version of the Rasmussen report this summer, will, in any case, provide for a general airing of nuclear safety concerns.

Plutonium. Congress as a whole is only beginning to face up to the institutional problems posed by a commercial plutonium industry. A latent issue for several years, plutonium safeguards began last year to capture the attention of television networks and major newspapers and the arguments have been mushrooming ever since.

The decision facing Congress is whether to let the Nuclear Regulatory Commission approve the use of plutonium as a supplement for uranium fuel in existing reactors. Proponents argue that the safest thing to do with plutonium—an unavoidable by-product of uranium fission—is to put it back into reactor fuel, thus rendering it inaccessible to prospective thieves. Critics say the security measures necessary for protecting plutonium from the time it leaves a reactor (in spent fuel) to the time it can be extracted, concentrated, put into fresh fuel, and reinstated in a reactor may well add up to a "garrison state" complete with a special federal nuclear security force and all the potential infringements on privacy and civil liberties that special police sometimes entail.

Superimposed on this issue is a debate over the adequacy of current health standards for exposure to plutonium.

The NRC is thinking about holding hearings on plutonium recycling, and the agency has until October to report to Congress on the feasibility of such security measures as "collocating" nuclear fuel processing facilities in high-security compounds. Recycling plutonium, the AEC contended last year, would reduce the need for enriched uranium by 10 percent in the early 1980's; it would also establish a commercial industry as a prelude to introduction of breeder reactors, which are intended to produce plutonium fuel by

the ton starting around the turn of the century.

The breeder. Today's light-water cooled reactors, which burn far more uranium fuel than they produce in the form of plutonium, have long been viewed as merely an interim step toward a breeder reactor economy. The next step, however, has seemed increasingly expensive, while calculations of the economic benefits remain hazy. In 1971, when President Nixon gave top priority to the government's R & D program for sodium-cooled fast breeders, AEC officials estimated that government costs to complete the program would be \$2.5 billion. Almost \$2 billion has also been spent and the most recent AEC cost estimate, probably far more realistic, indicates that another \$8 billion to \$10 billion may be needed. Cost estimates of the single demonstration plant, not yet under construction, have doubled in the past year to \$1.7 billion and the cost of a predemonstration model, the Fast Flux Test Facility (FFTF) being built at Hanford, Washington, has risen from \$87.5 million in 1967 to \$426 million now. According to the congressional General Accounting Office, associated facilities and research will push the FFTF's price to \$933 million.

In many respects, the breeder program calls to mind the supersonic transport program killed by Congress in 1971 over the protestations of the Nixon Administration. Health and safety questions of a speculative nature swirled around the SST, as with the breeder. But in both cases the weakest arguments in favor (or strongest arguments against) had to do with economics. Emphasizing the breeder's rising costs and uncertain benefits, critics will be working this year to restrain new congressional authorizations.

Radioactive waste. The nuclear fuel cycle has its problems from beginning to end, but it is the end—the transportation and storage of high-level waste—that probably will draw the most attention this year.

Some critics point to the AEC's failure over its 27 years to devise an ultimate solution to the waste disposal problem as a fatal flaw in nuclear technology. The AEC contributed to this impression by its strategy of proposing an interim storage facility where nuclear wastes would be kept for the next 20 to 30 years, pending a decision on what to do with it for the duration. Last year the AEC proposed sites in Nevada, Idaho, and the state of

Washington for the storage facility. Late this year or early in 1976, the Energy Research and Development Administration is expected to pick one of them; ERDA's selection of a site should stimulate new discussion of the waste issue.

Many critics—who insist that they are not necessarily opponents of nuclear power—would prefer a simple

and direct remedy of a moratorium on new reactor construction, combined with a gradual phase-out of existing plants and a phase-in of conservation measures and “clean” technologies emphasizing solar and geothermal power. No serious critics expect Congress to impose a moratorium on a technology that is supposed to help relieve the nation of its dependence on foreign

oil, and which already constitutes about 8 percent of the nation's installed generating capacity (20 percent in New England and 30 percent in the Chicago area). Thus, while a few groups, notably Nader's, will lobby for moratorium bills, most will content themselves with sniping at subsidies and airing the technology's troubles, all in hopes that congressional attention will

Science Policy: House Committee Wants in on the Action

Afraid that the White House might suddenly announce plans for a new science policy apparatus and thus achieve a fait accompli, leaders of the House Committee on Science and Technology have made their own move. On 6 March, Representative Olin E. Teague (D-Tex.), chairman of the committee, and Representative Charles A. Mosher (R-Ohio), ranking minority member, introduced the National Science Policy and Organization Act of 1975. But this bill, which embodies some new as well as familiar ideas, is offered not as a final product but as a negotiable package.

On introducing the measure, Teague said, “We have no desire to force a science advisory mechanism on the Executive Office which the President may find distasteful or foreign to his mode of operation. That is wheel spinning.”

Besides calling for clearly thought-out strategies to use science and technology in the pursuit of domestic and foreign policy goals, the Teague-Mosher bill would provide for two major new institutional entities:

- 1) A five-member Council of Advisers on Science and Technology, similar to the Council of Economic Advisers (CEA) and the Council on Environmental Quality (CEQ). There seems to be virtual unanimity in the scientific community that the establishment of such a presidentially appointed body of three or more members would be highly desirable. The AAAS board, the Federation of American Scientists, the National Academy of Sciences' Killian committee, and a number of prominent individual scientists have urged that this be done. Such a council is also central to the science policy legislation passed last fall by the Senate and reintroduced in January by Senator Edward Kennedy (D-Mass.), chairman of the Senate subcommittee on the National Science Foundation.

- 2) A Cabinet-level Department of Research and Technology Operations, based on what appears to be an entirely novel concept. The secretary would play essentially a coordinating and advocacy role rather than exercise functional authority over any scientific agency. The department would take in six agencies—the National Aeronautics and Space Administration, the Energy Research and Development Administration, the National Bureau of Standards, the National Science Foundation, the National Oceanic and Atmospheric Administration, and the Science and Technology Information Utilization Corporation (a new agency that the bill would create). It would not include agencies such as the U.S. Geological Survey (in the Department of the Interior) which perform

functions vital to the departments to which they now belong. But the secretary's recommendations to the Office of Management and Budget would cover the budgets and programs of all federal scientific and technical entities, wherever situated within the bureaucracy. Similarly, in the Cabinet, the secretary would be a voice for science and technology as a whole.

None of the above is presented as the last word, or as even representing a position agreed on within the Committee on Science and Technology itself. The bill is tentative inside as well as out. It leaves it to the discretion of the White House whether the chairman of the council of advisers would be used as the President's personal science adviser. Indeed, if a President were not satisfied with the council arrangement as prescribed in the bill, he could submit to Congress a reorganization plan that would take effect after 60 days unless disapproved by *both* houses (under general law, a presidential reorganization plan is rejected if disapproved by *either* house).

The hope is that there will be a meeting of minds soon between the House committee and the Executive Branch team under Vice President Nelson Rockefeller assigned to come up with plans for a science advisory system. Teague and Mosher might have held up introduction of a bill pending discussion with the White House except for their worry that the Congress was about to be left out of the action. “We heard rumors that they [the White House] might announce what the President's action would be, as a fait accompli,” Mosher told *Science*.

Whether the rumors actually had substance may now be beside the point. What matters most is whether plans formulated by the Rockefeller team are consistent with at least that part of the pending House and Senate bills which commands a broad consensus in the scientific community—namely, the part calling for a council of advisers.

According to one source fairly close to the Rockefeller study up until a few weeks ago, the study has pointed toward a “smallish office of science and technology in the White House.” One can only speculate whether this office (*Science*, 14 March) will, as ultimately defined, take the form of the kind of advisory council favored by the scientific community.

In any case, momentum for replacing, somehow, the White House science advisory apparatus so abruptly dismantled 2 years ago by President Nixon is continuing to build.—LUTHER J. CARTER

give impetus to concerns at home and vice versa. With a rising squeal from such positive feedback, a few state and local moratorium movements may just succeed.

The industry is not, of course, taking all this lying down. Companies such as Westinghouse have started to establish a new public relations presence with the press in Washington and the Atomic Industrial Forum recently has been treated to the disclosure of its war plans.

In an internal memorandum written last December and obtained and widely circulated by environmental groups, the AIF's public relations committee talked about shedding its characteristically defensive posture and mounting

an aggressive "public acceptance" campaign that would include a national speaking program, ghost-written articles for famous scientists, the staging of "special events," and press junkets.

The AIF, though not, in the eyes of the Internal Revenue Service, a lobbying organization, also discussed making an end run around the major news media by direct mailing of information to government decision-makers and community leaders.

"Because of the unwillingness of the major media to present the positive side of the nuclear power story, we must begin reaching such decision-makers directly," the memo said, but added later that "There is an urgent need to initiate frequent and substan-

tive news events, to counter the pseudo-press conferences held regularly by the national critics. . . ."

With both critics and proponents taking increasingly strident positions, the outlook is for an increasingly shrill and bitter collision of moral outrage with moral righteousness, of punchy pamphlets in the mail, zingy ads on television, and staged news events on both sides. There is, in the coming congressional debates, an opportunity for a fresh start in the long and tangled national argument over nuclear power. But it may be too much to expect that members of Congress, any more than ordinary citizens, will succeed in drawing sensible conclusions from the din.

—ROBERT GILLETTE

Pasteur Institute: Public Funds for a Private Institution

Relief for the financially beleaguered Institut Pasteur in Paris is expected soon in the form of increased funding by the French government. This would mean that a plan proposed by the institute's director, Nobel laureate Jacques Monod, to move the institute out of central Paris will not be carried through.

No official word that the government will provide crucial funding was forthcoming when this was written but reliable sources in Paris and in the United States indicate that such a decision has been made. General prospects for science brightened recently when French President Valéry Giscard d'Estaing made an unexpected pronouncement on research funding, giving high priority to major increases in support of R & D including basic research. Besides, the institute is figuratively and literally a national monument—Pasteur is entombed in a chapel on the grounds—and it would be difficult for any French government to allow the institute to be broken up or moved from its historic site.

Monod put forward his plan last October at the same time he announced that the institute's financial condition was so grave that it would no longer be able to pay salaries and bills after May. Opposition to the move was strong

among staff scientists and technicians, whose main argument was that the institute's traditional links with hospitals and universities in Paris were essential to its research and teaching functions.

Monod said at the time that his proposal was a "hypothesis" and apparently did not press the institute's governing board for a decision. A high-level official of the Ministry of Health was invited by the Pasteur board to study the institute, and his report is expected to influence strongly the decision on the matter. The "rapport Morin" had not been released at the time this was written, but informed sources expect the government and the institute to agree on a formula under which the institute will remain in Paris and the government will increase its support.

The institute's financial malaise has become acute in the past few years, but the condition has been present at least since World War II. In fact, it is possible to argue that, from the beginning, the Pasteur has suffered from chronic institutional altruism.

The institute was established in 1886 as a private research organization through international subscription in the blaze of gratitude ignited by Pasteur's development of the rabies vaccine. In France, Pasteur was the great non-imperial hero of the 19th century, and

he still occupies a special place in the French pantheon. Pasteur, his colleagues, and their successors through the years signed over the rights to their discoveries to the institute. But, while the institute, from the beginning, sold vaccines, serums, and biological products, it did so primarily as a public service and did no licensing or collecting of royalties. So it is possible to see the institute's financial problem as the result of its humanitarian policies.

Scientifically, the institute continued to advance in the direction pointed by Pasteur, concentrating with good effect on research on infectious diseases. The contributions of the "pastorians" are too many to enumerate, but they include the development of diphtheria, tetanus, and typhoid vaccines and of BCG, and antituberculosis vaccine. A hospital for infectious diseases has operated on the Paris campus since early in the century, and "peripheral" institutes were established in a number of French colonies. The Paris campus became a reference center for pathogens, an important public health function which continues.

Monod and his colleagues François Jacob and André Lwoff shared the Nobel Prize for Physiology or Medicine in 1965, thus joining five other Pasteur researchers who had earlier won the award. (Jacob, Lwoff, and Monod are counted among the founding fathers of molecular biology. They received the Nobel award for their work in advancing the understanding of the regulation of gene activity and of the manner in which cells synthesize protein.) But despite scientific laurels and public esteem, the institute had for decades