Joint Atomic Energy Research Institute announced last year that it had succeeded, for the third time, in producing plutonium. And the Institute for Physical and Chemical Research announced last year that it had succeeded in producing enriched uranium through the gas diffusion method by using two different types of barriers—one a thin film of aluminum, the other a Teflon film—to separate the uranium-235 from the unwanted uranium-238. The concentrations achieved were somewhat less than the concentration needed for practical nuclear power generation and considerably less than the concentration needed for nuclear bombs, but the announcements caused quite a stir in Japan.

The fact that Japan seems on the way toward developing an independent nuclear capability and an independent rocket launching capability has raised fears that Japan, in the future, might decide to rearm itself with nuclear-tipped missiles. The pacifism and the "nuclear allergy" which have dominated Japanese politics since World War II are still running strong. Some Western diplomats, for example, believe any Japanese government that openly advocated nuclear armament today would be thrown out of office. But some industrial circles are said to be pushing for development of nuclear arms, and Prime Minister Eisaku Sato himself gave a speech to a business group in December which some Westerners have interpreted as expressing a personal preference for a nuclear-armed Japan. The Japanese have been reluctant to sign the nuclear nonproliferation treaty, partly from a desire not to place themselves at a disadvantage in developing the peaceful uses of nuclear power. But some circles in Japan have also opposed the treaty from a desire to keep open the option of developing nuclear armaments.

Though atomic energy is probably the most advanced of the "big sciences" in Japan, further progress is threatened by a number of problems. The most serious, perhaps, is a shortage of scientists and engineers in the atomic energy field. The deficit is expected to become acute in a year or two and to reach more than 10,000 by 1975. Other problems include tight budgets at some laboratories, a shortage of plutonium, overlapping responsibilities among some government facilities, and lukewarm support from industry for some of the government projects. Western analysts state that the nuclear ship was considerably delayed while waiting for industry support, and they predict that reactor development will be similarly delayed.

Japan's increasing commitment to "big science" projects may ultimately have profound effects on the nation's entire research establishment. Japanese commentators have suggested that one or more national projects would help alleviate the chronic shortage of research funds, would elevate the general standard of science and technology, and would enhance Japan's prestige as a technical power, thus increasing its political influence and aiding its foreign trade efforts. As one exuberant editorial writer expressed it, "Entry into the field of 'Big Science' will lay the foundations for the lucrative business of the future—the mammoth computers, electronics, the supersonic jets, and other technological marvels." For the past decade, while the United States and other advanced nations have invested in science primarily to enhance national defense or secure international prestige, the Japanese have performed the bulk of their R & D to spur economic growth. Japan has come on fast on this basis alone, but now the Japanese are seeking a broader rationale, something that possesses the "magical charm" needed to win government approval of massive research funding. If they find such a rationale, the impetus might well be enough to launch Japan on the way toward a "scientific miracle" as impressive as the "economic miracle" of the past decade.—PHILIP M. BOFFEY

Environmental Policy Act: Congress Passes a Landmark Measure—Maybe

Congress completed action just before Christmas on the National Environmental Policy Act of 1969, described by Senator Henry M. Jackson, chairman of the Senate Interior Committee, as "the most important and far-reaching conservation measure ever enacted." In part, the act amounts to no more than a statement of good intentions and whether it actually lives up to Senator Jackson's words will depend on how seriously it is taken by the Administration and the Congress itself. Its usefulness will depend also on the efforts of conservationists and others to make the issue of environmental quality weigh heavily enough politically to influence the day-to-day decisions of government administrators and practical politicians.

The act, which had strong backing in both the House and Senate and no significant opposition (final passage in each body was by voice vote), has two major features. The first consists of a declaration of policy that is made more meaningful by an "action-forcing" provision prescribing specific procedures to be followed by federal agencies as they develop policies and plans which would affect the environment. The second requires the President to submit to Congress an annual environmental quality report and to establish, as part of the Executive Office of the President, a high-level Council on Environmental Quality. Congress would hold hearings on the President's report, which the new council would have the task of preparing.

The Environmental Policy Act is loosely analogous to the Employment Act of 1946. That act prescribed full employment as a national goal and established the three-member Council of Economic Advisers, which, although virtually ignored during some periods, has been highly influential in the shaping of government economic policy during the 1960's.

The Environmental Policy Act calls on the government to seek environmental enhancement by "all practicable means, consistent with other essential considerations of national policy. The policy goals include having an environment supporting diversity and individual choice; attaining, to the maximum extent possible, the recycling of depletable resources; and—achieving a "balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities."

According to the act, each person "should enjoy a healthful environment" and has a "responsibility to contribute to the preservation and enhancement of the environment." As the Environmental Policy Act was first passed by the Senate, this provision had the ring of an environmental bill of rights—saying

that "each person has a fundamental and inalienable right to a healthful environment." However, this language was deleted in conference at the insistence of the House conferees.

The act's action-forcing provision contains several specific directives to federal agencies. Among them are requirements that these agencies shall (i) "utilize a systematic interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment"; (ii) develop methods whereby "presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations"; (iii) include in every recommendation or report on proposals for legislation or administrative actions affecting the environment, a detailed statement setting forth such considerations as the environmental effects expected and the available alternatives to the proposed course of action; and (iv) shall make the aforementioned statement public, together with the comments of other agencies.

These directives are not meant to override any provisions of existing law. But, if any agency not already operating under more specific or demanding requirements for environmental protection finds that it cannot legally follow the above procedures, it must propose to Congress, by 1 July 1971, such changes in its governing statutes as may be necessary to allow it to conform to the Environmental Policy Act.

Conservationists have reason to be elated at the act's insistence on rigorous analysis of the environmental consequences of government decisions regarding such things as the construction of dams and highways and the regulation of power companies, pipeline firms, and other utilities. In cases where significant environmental values are put in jeopardy by a project and feasible alternatives have not been pursued or identified, the act should make it easier for citizens groups, members of Congress, and strategically placed administration officials (such as those in the Bureau of the Budget and on the new environmental council itself) to stop the project before harm is done.

Members of the Council on Environmental Quality shall be selected by the President (subject to Senate confirmation) from among persons qualified by training and experience to interpret and analyze environmental trends, but not necessarily from among ecologists or other persons trained in a scientific discipline. They will serve full time, and Senator Jackson and other sponsors of the Environmental Policy Act are hopeful that the council members will soon attain the visibility and prominence in government circles now enjoyed by members of the Council of Economic Advisers. The council is authorized to spend eventually up to $1 million a year on staff and other expenses. However, its staff support may be provided by a new Office of Environmental Quality which Senator Edmund S. Muskie of Maine has proposed be set up in the Executive Office of the President. The Muskie proposal, which Jackson has endorsed, has been approved by the Senate as part of a water quality bill which is now in House-Senate conference.

The Nixon Administration, while never flatly opposing the environmental policy bill, has taken the position that no new council was needed in view of the fact that the President has established a cabinet-level council on the environment. However, in the view of the bill's sponsors, the President's group could serve best in resolving interagency conflicts, while the new council functioned more broadly as a trend-spotting and policy review body.

The analogy drawn between the Environmental Policy Act and the Employment Act of 1946 is an imperfect one. For one thing, while the Employment Act created Congress's Joint Committee on Economics (which has played a valuable educational role within the Congress), the Environmental Policy Act does nothing to coordinate Congress's handling of environmental issues. At the moment, there is no assurance that these issues will not continue to be dealt with by numerous individual legislative committees, which are often jealous of their jurisdiction.

Yet, even here, there is a possibility of improvement. Senator Jackson, in obtaining Senator Muskie's support for the environmental policy bill, has promised to back Muskie's proposal to establish a joint congressional committee on the environment. This body would not handle legislation, but it would allow influential members of the legislative committees that are concerned with environmental issues to meet regularly and consider their responsibilities jointly in a broad, long-term perspective.—LUTHER J. CARTER

AAAS Boston Meeting: Dissenters Find a Forum

It was almost inevitable that the 136th meeting of the American Association for the Advancement of Science would become a target for political action by students. It was held in Boston, a city with the highest concentration of radicals in the country, next to San Francisco. Harvard and M.I.T., on the other side of the frozen Charles River, had been scenes of demonstrations against federally sponsored scientific research projects earlier in the year. And, after the radical activity at recent conventions of other professional societies, such as the Modern Language Association, the American Philosophical Association, the American Historical Association, it appeared certain that the AAAS would get its turn. The AAAS, with its emphasis on the interaction between science and society, provided the students with an ideal forum. Finally, for the third year, key sessions would be televised live. The radicals welcomed the chance to perform.

Students demonstrated at three or four of the major events each day. The hundreds of smaller meetings, however, were generally free of incidents. The convention moved ahead at its usual pace, but nearly all of the 8000 who attended had some contact with the radicals.

The AAAS has been moving toward more social and political concern during the past few years and the program for the Boston meeting reflected it. There were symposiums on arms control, chemical and biological warfare, academic research and the military, and hunger and malnutrition. The Association also laid plans to include a symposium led by students.

Professor Anthony Oettinger of