be signed, is whether both the Ford Administration and Congress will insist on building U.S. forces up to the ceilings. And will they, perhaps in the name of bargaining chips, deploy as replacements for existing weapons such new ones as a more powerful ICBM and a new strategic bomber? And, further, will they insist on deploying, as *additions* to existing forces, new weapons not covered by the agreement —the submarine-launched cruise missile being a prime example?

A resolution introduced in the Senate by Edward Kennedy (D–Mass.), Walter Mondale (D–Minn.), and Charles Mathias (R–Md.) would support the Vladivostok agreement with the implied condition that all new weapons proposals be submitted to Congress strictly on their merits, without regard to the ceilings. But President Ford, the best authority as to U.S. intentions, has said that the United States has an "obligation" to build up to the ceilings. In this, he is clearly influenced by evidence from the Russian side that Soviet weapons programs are surging ahead. As some arms control specialists believe, the Vladivostok ceilings could be merely the floor for a continuing arms race.

The superpowers' mutual fears and distrust, constantly reinforced by the development and deployment of additional weapons, runs in an as yet unbroken circle. The evidence is that the members of the Politburo, the National Security Council, and the U.S. and Soviet military joint staffs all share the psychology of the deeply buried command bunker and the hard silo.

—LUTHER J. CARTER

Subsequent articles will discuss (i) the evolution of arms control verification, together with the verification problems now under negotiation in Geneva as a final step toward a SALT II agreement, and (ii) the uncertain prospects for SALT III.

Energy R & D: New Jurisdiction for Reorganized House Committee

The energy crisis in the headlines these days centers on the conflict between the Ford Administration and congressional Democrats over plans to save energy. The focus of the dispute is the President's proposal to impose a $3-a-barrel tariff on imported oil. The House on 6 February voted a 90-day delay in the increase (Senate action is pending), and separate groups in House and Senate have been working to fashion alternative programs. At the same time, both House and Senate Democrats appear to be mobilizing for a serious effort to influence energy research and development policy not only through a searching critique of Administration energy R & D budget proposals, but also by fashioning a comprehensive program of their own.

A major arena for the effort will be the House Science and Technology Committee, metamorphosed from the Science and Astronautics Committee as a result of a reorganization of House committees last year (*Science*, 25 October 1974). In addition to its inherited sway over the space program and science policy, the Science and Technology Committee will handle virtually all authorization measures for federal energy and environmental R & D, excluding nuclear energy. (A later article will examine the changing politics of nuclear energy in Congress.)

At the start of the session, the Science and Technology Committee sailed serenely through the storm of reform in which four elder committee chairmen foundered,* but the committee now faces some unusual stresses in dealing with the energy R & D legislation. First, new budget control legislation enacted last year sets a strenuous schedule of legislative deadlines. Science committee chairman Olin E. Teague (D–Texas) says that the committee will conform to the timetable; this means subcommittees reporting out authorization legislation by 1 March and the full committee by 15 March. What formerly was done in months would have to be done in weeks.

Second, the committee will be dealing with the new Energy Research and Development Administration (ERDA) for the first time. ERDA director Robert C. Seamans, Jr.'s, top echelon of assistants are still not out of the "clearance" stage with the White House and are therefore still in "acting" status. Some are carry-overs from organizations dismembered to construct ERDA and may not stay long. Understandably, at this point, the new agency has not completely jelled, and what it says to the committee will sound a shade tentative.

Three of Science and Technology's seven subcommittees are assigned specifically to handle energy and environmental R & D. These are the subcommittee on energy research, development, and demonstration (fossil fuels), chaired by Representative Ken Hechler (D–W.Va.); a second subcommittee with the identical title, except with the parenthetical (fossil fuels) deleted, headed by Representative Mike McCormack (D–Wash.); and a subcommittee on environment and the atmosphere chaired by Representative George E. Brown, Jr. (D–Calif.).

Hechler is ranking Democrat on the committee and comes from a coal-mining state, so it is not surprising that he wound up heading the subcommittee dealing with fossil fuel R & D. Until now he has been primarily identified with issues affecting miners and the coal industry. Coal mine safety has been one of his major interests and he has been probably the most vehement congressional proponent of a total ban on strip mining.

Hechler, however, rejects the suggestion that his new subcommittee will concentrate on coal. He notes that some members of his subcommittee come from oil states and says that, as chairman, he intends to see that the panel operates without bias for a particular fuel.

On his priority list for the subcommittee are looking into ways to speed up development of synthetic fuel dem-

* F. Edward Hebert, Armed Services; Wilbur D. Mills, Ways and Means; Wright Patman, Banking and Currency; and W. R. Poage, Agriculture.

onstration plants, exploring the matter of funding for oil shale development, seeking a balanced R & D program for coal mining, and encouraging of techniques for secondary and tertiary recovery of oil and natural gas.

McCormack, a former staff scientist at the Atomic Energy Commission's Hanford Washington facility and now a third termer in the House, was an early and articulate exponent of action on energy problems. He is also a member of the Joint Committee on Atomic Energy, which has jurisdiction over nuclear R & D, and is identified with the view that further development of nuclear power is necessary and can be accomplished safely. With the retirement from Congress last year of Representatives Chet Holifield and Craig Hosmer, both aggressive advocates of nuclear power, McCormack is seen as having the expertise to take over the role of chief congressional nuclear protagonist if he is so inclined.

McCormack's subcommittee handles the ERDA authorization minus fossil

NAS Reports on International Biological Program

A comprehensive report on the International Biological Program (IBP), the first large-scale attempt to apply systems analysis to the workings of ecosystems, has finally been issued by the National Academy of Sciences (NAS).* The U.S. component of the IBP, begun in the late 1960's and concluded in mid-1974, has been overseen by a national committee under the aegis of NAS. The report was actually completed in mid-1973, but in keeping with the cautious workings of the academy it was not released until this January, at the annual meeting of the AAAS.

While the methodology and contributions of the IBP have been a matter of considerable controversy among ecologists, those who participated in the program consider it to have been a success. They believe it has validated the interdisciplinary team approach to the study of ecosystems as well as the use of systems analysis and mathematical modeling, which, they say, has turned ecology from a descriptive science into one with predictive capabilities that will aid policy-makers in making sophisticated decisions on resource management.

The U.S. component of IBP absorbed about $50 million, mostly from the National Science Foundation (NSF), over a 7-year period. Most of this went into studies of five biomes—grasslands, tundra, desert, coniferous forest, and eastern deciduous forest. Smaller projects within the "environmental management" part of IBP included studies of biological pest control in five major agricultural ecosystems, aerobiology (long-distance dispersal of airborne materials), and marine mammal ecosystems. The other major component of the U.S. portion of IBP involved the study of "human adaptability." Here, select populations (Eskimos, Andean Indians) were studied to determine the limits of physiological adaptation to one's environment and to get baseline data on health of peoples as yet relatively untouched by "civilization." The human adaptability studies involved active cooperation with foreign scientists and organizations; the biome studies were U.S.-based, although researchers have kept in touch with similar efforts in other countries via international conferences.

The NAS report claims that IBP findings have already found numerous applications in forest and water management, control of toxic materials, regional planning, preparation of environmental impact statements, and improvements in health sciences.

A number of scientists—perhaps the most outspoken being Nelson G. Hairston of the University of Michigan Museum of Zoology—have expressed skepticism about whether IBP did anything that wouldn't have been done anyway, and for less money. Critics suggest that the program has provided research funds to second-rate researchers who wouldn't have qualified for grants under the regular NSF grant programs; they suspect that money that might have gone to outstanding individual researchers has been funneled instead to IBP; and they opine that the biome studies have accumulated masses of data while failing to establish chains of cause and effect that could lead to deeper understanding of how ecosystems work. (Hairston quotes one scientist as complaining that the researchers were "getting all the nouns and none of the verbs.") Hairston calls IBP, the concept of which was modeled on the International Geophysical Year, a perfect example of "ecopolitics"—getting up a sexy-sounding program to squeeze money out of Congress.

The other side of that coin is: What's wrong with playing politics if it means more money for a fledgling but vitally important field, ecosystem science? Stanley I. Auerbach of Oak Ridge National Laboratory, who ran the deciduous forest biome study, says the critics don't take into account the fact that if more money had been requested for routine research grants in ecology, Congress, in those pre-environmental crisis days, probably would not have been sympathetic. Orie L. Loucks of the University of Wisconsin, who coordinated the environmental management programs, adds that critics don't understand the NSF criteria for issuing the block grants that went to IBP participants. He says the proposals had to show that a study would reach a level of multidisciplinary integration that could not be achieved if the parties involved worked separately. Interdisciplinary teams wouldn't have gotten funded through normal channels, he says.

It will be some years before the contributions of the U.S. segment of IBP can be evaluated. Two follow-up efforts are already in the works. One is an independent review by Battelle Memorial Institute of the quality of the scientific work sponsored by the IBP. The other assessment, by the NAS, will seek to determine how the IBP approach—multinational, multi-institutional, and multidisciplinary—can be applied to future ecosystem studies. Meanwhile, the actual findings of the IBP will be coming out over the next few years in a steady stream of books and scientific reports.—C.H.

* A limited number of free copies of the 165-page report, *U.S. Participation in the International Biological Program*, are available from Russell Stevens, Division of Biological Sciences, NAS, 2101 Constitution Avenue, NW, Washington, D.C. 20418.

fuel and nuclear R & D.* In terms of the longer run, the panel's purview covers a number of important areas, including physical research, R & D on energy conservation and on energy utilization, energy transmission, energy conversion technology, and work on "exotic" forms such as solar and geothermal energy.

Brown, chairman of the subcommittee on environment and atmosphere earned an undergraduate degree in industrial physics from UCLA and has displayed an interest in environmental issues both as an officeholder at local and state levels in California and in his decade in Congress. The subcommittee's jurisdiction covers the Environmental Protection Agency's R & D programs involving environmental and atmospheric research, including those of the National Weather Service and the National Environmental Satellite Service.

The three subcommittee chairmen sit on each other's committees as members and reportedly have been faithful in attending meetings all around, so that the prospects for coordination seem good. Integration of the work of the energy and environment panels will be done at the full committee level, where Teague presides.

The once dominant theme of the space program is now the province of a single subcommittee on space science and applications headed by Representative Don Fuqua (D–Fla.), with a subcommittee on aviation and transportation R & D chaired by Representative Dale Milford (D–Texas) handling the committee's traditional interest in aeronautics. A subcommittee on domestic and international planning and analysis chaired by Representative Robert Roe (D–N.J.) will handle responsibility for the oversight of all nonmilitary R & D spending not assigned to other subcommittees; it will also keep tabs on international cooperation in science and technology and oversee federal-state-local relations in science and technology.

The subcommittee on science, research, and technology, now headed by Representative James W. Symington (D–Mo.) continues to deal with the National Science Foundation's authorizing legislation and questions of science policy, technology assessment, and scientific resources.

The time scale imposed by the budget control legislation will require heroic changes in Congress's usual early session habits. McCormack, for example, has scheduled 6-day-a-week meetings starting at 8 a.m. if necessary, between 18 February and the end-of-the-month deadline for his subcommittee hearings on its portion of the ERDA authorization. And other subcommittees will be meeting concurrently. Congress as a whole, it should be noted, is not overdoing its total dedication to work despite the demands of the legislative calendar. The traditional Lincoln-Washington birthday, Jefferson-Jackson day recess was officially canceled by the Senate, with the House following suit, but the level of activity during the 10-day period before 18 February is not expected to be high.

Outside Assistance

In tackling the ERDA budget, nevertheless, the Science and Technology Committee will have an unusual degree of assistance from outside the committee staff. In addition to some inputs from the General Accounting Office and the Congressional Research Service in the Library of Congress, the Office of Technology Assessment (OTA), set up by Congress to provide guidance on the utilization of technology, is doing a crash analysis of the ERDA budget.

The then House Science and Astronautics Committee put in a bid last January for help from OTA in setting energy R & D priorities, and this request was updated in December into a specific request for help in the analysis of the annual statement of energy R & D priorities and the timetable for the energy R & D program required from ERDA in its establishing legislation. As part of that effort, OTA agreed to help the committee evaluate the plans and programs included in the ERDA authorization. To do this OTA has not only detailed members of its own staff but recruited an ad hoc panel of experts for two long meetings with the staff and also a group of about a dozen consultants to advise in different energy specialties. This is a unique operation for OTA, a sprint rather than the distance run it is accustomed to, and it is unusual for the committee too. One estimate puts the number of people significantly engaged in the budget analysis effort on the Hill at about 80. Another difference worth noting is that the OTA analysis will be made available to both the Senate Interior subcommittee dealing with the energy budget and to the Joint Committee on Atomic Energy. The cooperation generally between staff members working on energy problems is said to be virtually free of the House-Senate and intercommittee rivalries which ordinarily inhibit such efforts.

On the immediate question of how to reduce energy consumption, Congress so far has acted with considerably less assurance. The task force of the Democratic Steering and Policy Committee appointed to fashion alternatives to Ford's economic and energy programs failed to provide detailed energy recommendations when it reported. Instead, the task force merely put forward options on energy conservation, including higher gasoline taxes, gas rationing, and petroleum allocations.

House Speaker Carl Albert (D–Okla.) then asked the task force chaired by Representative Jim Wright (D–Texas) to come up with a "specific and comprehensive program" on energy within a few weeks. So far the task force has proceeded informally, soliciting views of members sitting on committees dealing with energy problems. The committee is relying on staff available from the personal staffs of task force members and their committees.

House Minority Leader John Rhodes (R–Ariz.) has criticized the Democrats for a "piecemeal" approach and proposed the formation of a House select committee on energy to deal with the problem. The Democratic leadership, however, appears committed to following through on the task force alternative. There appears to be strong feeling among House Democrats that the Ford program is economically ill advised, particularly in present circumstances. Whether or not the rather ad hoc task-force approach will produce a program to deal effectively with the complex of energy problems, the leadership may have decided it is the best way to avoid committee wrangling over yielding the initiative on their parts of the program. (As *Science* went to press 11 February, Senate Democrats announced a draft economy-energy plan counter to Ford's.)

Whatever policy on energy conservation and production prevails will have to be integrated with energy research and development policy; that will add a dimension of difficulty to the task of those charged with fashioning energy R & D policy.—JOHN WALSH

* Under the fiscal year 1976 budget ERDA would get some $1.55 billion for energy R & D, nearly $1 billion of which would go to nuclear R & D. Of the remainder, about $311 million is earmarked for fossil fuel R & D and some $200 million for other nonnuclear R & D.