formation concerning hyperfine structure and the lifetimes of atomic states. Optical resonance techniques have been used to develop frequency standards, to measure nuclear spins and magnetic moments, to make precision magnetometers, to study diffusion, to measure disorientation and spin-exchange cross sections, to set a limit on the electric dipole moment of the electron, and to make precision measurements of fine and hyperfine structure intervals. Throughout all this development Kastler's laboratory has played a major role and been an inspiration to other physicists.

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Oceanography: Interior Department Bids for a Major Role

The U.S. Department of the Interior, which has been responsible for the conservation and development of natural resources since its establishment in 1849, began to get an uneasy feeling a few months ago that it was losing its hold, such as it was, on the relatively undeveloped but potentially important field of marine resources. The department's officials found that, while marine science and technology were receiving more and more attention from Congress and the Administration, few people thought of Interior as a major focal point of activity in these fields.

In recent weeks Interior has been trying to establish for itself a new image by setting up a department-wide program of marine resource development. The urgency with which this effort has been launched becomes understandable when one recalls that, twice since January, Interior has seen evidence that, from the standpoint of public "visibility," its work in oceanography might just as well have been performed entirely under water.

Interior wanted to be given responsibility for administering the new sea-grant college program, which Congress authorized shortly before adjournment. But the National Science Foundation was chosen as the administering agency, despite the fact that, in the past, NSF generally had not supported applied research and had never participated in extension service activities.

Applied research and practical demonstrations of marine technology will figure importantly in sea-grant activities. Even so, the Interagency Committee on Oceanography, impressed by NSF's extensive dealings with the academic community through its fellowship programs and basic research grants, said the Foundation was the best agency to administer the program. NSF wanted the assignment, provided the Foundation would not have to become involved in the development of marine hardware.

Testifying before a Senate subcommittee, Thomas F. Bates, science advisor to the Secretary of the Interior, had insisted that major responsibility for programs aimed at developing ocean resources properly belonged to Interior. NSF's role, he said, should be that of supporting basic research and education in oceanography. His plea was given little heed. Had Interior's involvement in oceanography been more conspicuous, the sponsors of the sea-grant program perhaps would have responded differently. Indeed, they might have concluded, without prompting, that the sea-grant legislation should foster between Interior and the sea-grant colleges a relationship similar to that which has long existed between the Department of Agriculture and the land-grant institutions.

Interior, already behind in the capital's continuing game of bureaucratic rivalry because of the loss of the sea-grant program to NSF, was soon to lose more points. The report of the President's Science Advisory Committee's panel on oceanography was made public (*Science*, 22 July), and among its recommendations was one for the creation of a new environmental sciences agency which would administer most non-Navy governmental activities in oceanography.

The agency would consist largely of the Commerce Department's Environmental Science Services Administration (ESSA), Interior's Geological Survey, and the oceanographic programs of Interior's Bureau of Commercial Fisheries and Bureau of Mines. The reorganization recommended would place in a single agency all federal civilian programs related to description, prediction, and modification of the environment (ocean, atmosphere, and solid earth) and to management and development of marine resources.

The panel did not say whether the new agency should be independent or part of Commerce or Interior. But, for Interior, the government's natural-resources department, the panel's statement that "no natural advocate" for oceanography now exists within the federal establishment was painful. Moreover, Interior found nothing consoling in the fact that the panel's proposal for a federal reorganization closely resembles what certain people suspect, with some reason, to be the ultimate goal that J. Herbert Hollomon, assistant secretary of commerce for science and technology, has in mind for ESSA. ESSA was established in 1965 through a reorganization plan which had the principal effect of placing the Weather Bureau and the Coast and Geodetic Survey under the same administrative roof. Four research institutes, for oceanography and other environmental sciences, have been set up within ESSA.

Even before the PSAC report appeared, the heat was on Interior, ESSA, the Navy, and other agencies to strengthen their programs in oceanography. In June Congress passed a bill providing for the establishment of two temporary advisory bodies (*Science*, 10 June), the Cabinet-level Council on Marine Resources and Engineering Development, headed by Vice President Humphrey, and the Commission on Marine Science, Engineering, and Resources. The commission, still not appointed as this was written, will consist of people from government, industry, the academic community, and the oceanographic institutions. Its report to the President will include a recommendation on the government's organizational structure for its oceanographic activities.

Since the commission will be the

administration's own creature, no one will be surprised if its views and those of the council, with which it is to work closely, turn out to be in harmony. If the commission and council should recommend establishment of a new agency of the kind favored by the PSAC panel, this no doubt will become a Johnson administration goal.

A New Dynamism

Some people are skeptical about the usefulness of government interagency councils and committees; few contend that the record of such bodies has been lustrous. In the present circumstances, however, the existence of the marine council appears to be engendering greater dynamism in the oceanographic programs of Interior, ESSA, and other agencies. A big part of the council's job is evaluation of existing programs, and the agencies, aware of this, are trying to do better.

For example, in ESSA, a new office of science and engineering has been set up under the administrator, Robert M. White. It will coordinate all research in ESSA, and one of its goals is, as one official put it, to "weld meteorology and oceanography into one discipline." Interior's response to establishment of the council is especially noteworthy because Interior, except for its Bureau of Commercial Fisheries, had done little oceanographic work in the past. On 25 August, a week after the marine council held its first meeting, Secretary of the Interior Stewart L. Udall announced that his department's various marine-resource-development activities would be drawn together into a unified program.

Stanley A. Cain, assistant secretary of the Interior for fish, wildlife, and parks and former chairman of the University of Michigan's department of conservation, had been named to head a team responsible for the oceanography program's development and coordination. Four other assistant secretaries —responsible for public lands, mineral resources, water and power development, and water pollution control— and Udall's science advisor are supposed to work with Cain in resolving policy questions.

Walter R. Hibbard, Jr., a well-known metallurgist who has been director of the Bureau of Mines since last December, was designated "program manager." Hibbard, working under Cain's policy guidance, is to see that a well-integrated departmental program is put together. He does not exercise management authority over the program, but serves as planning coordinator. He works with other office and bureau heads, such as the heads of the Office of Saline Water, the Bureau of Commercial Fisheries, the National Park Service, and the Geological Survey. For several weeks four interbureau groups have been busy drafting a statement of departmental goals, which Cain will present to the new marine council.

(For advice on the formulation and fulfillment of those goals Interior will look to a group of non-government marine resource experts from the fields of science, engineering, economics, and law. Some 15 people will be appointed soon from industry, the universities, and the oceanographic institutions to serve as a panel of advisors.)

The success of Interior's new team approach will depend to a large extent on whether Cain and Hibbard are forceful and persuasive at their respective levels, and on whether Udall and the other department heads represented on the marine council give oceanography a higher priority than they give many of the other governmental programs which will be competing with it for funds.

Definition Broadened

As the result of integrated planning, however, Interior's oceanographic programs and activities, some of which might seem minor when considered separately, should assume a new importance in the total scheme of the department's interests. In fact, by broadening the definition of oceanography, Hibbard and his staff have found that Interior is now spending between $80 million and $100 million a year in this field. On the basis of the narrower definition used by Interior in reporting its spending estimates for fiscal 1967 to the Interagency Committee on Oceanography (ICO), the total was $27.4 million.

Currently, marine resources are being defined by Interior as including a wide range of categories—mineral, chemical, and energy resources; fishery resources of estuaries and offshore waters; recreation resources, represented by such things as beaches, seashore parks, and sports fish; and water resources, represented, for example, by the fresh-water supply which desalinization methods will make available.

Obviously, when expenditures for such purposes as the purchase of land for a seashore park are included under "oceanography," the total will be impressive. Yet the liberalizing of definitions was encouraged by the PSAC panel. For example, the panel, in its scheme of priorities for oceanography, gave a "very high" rating to the preservation and development of coastal regions for recreation and commerce.

The statement of goals being prepared by Hibbard and his collaborators will serve as a guide by which the new planning, programming, and budgeting (PPB) method, being adopted throughout the government at the Bureau of the Budget's insistence, can be applied to oceanography. Under the PPB system, budget planning is done on a 5-year basis, and program alternatives are compared and evaluated through cost-benefit analysis. Thus, even though the budgetary constraints arising from the Vietnam war perhaps will mean more or less static budgets in oceanography as well as in other fields during the next few years, the preparation of 5-year budget plans could lead to early struggles over the priorities to be observed when funds become more plentiful.

The selection of Hibbard as Interior's oceanography coordinator is significant. Of all the Interior agencies, the Bureau of Mines and the Geological Survey probably have the greatest potential for growth in the field of marine resources. It was not until 1962 that the Geological Survey was authorized by Congress to extend its explorations offshore, although theoretical studies of the marine environment by Survey geologists had been going on for years. The Survey's current budget for such work is, according to ICO, less than $3 million. The Bureau of Mines, too, is starting small. Its ocean engineering budget, only $134,000 two years ago, is still less than $1.5 million.

Fisheries Research

By contrast, the Bureau of Commercial Fisheries has reported to ICO an oceanography budget of about $18 million. It is largely because of BCF's substantial research program in marine biology that Interior's oceanography budget of $27.4 million for fiscal 1967 is second only to the oceanography budget of the Department of Defense. Of the $213.8 million to be spent by all agencies, Defense will spend $114.2 million. Commerce will spend $19.6 million, nearly all of it through ESSA.

Interior's oceanography programs could absorb many additional millions immediately, although even now the Bureau of Mines and other agencies lack some of the scientific and engi-

neering personnel they need. Heavy spending will be necessary before large-scale development of the mineral resources of the continental shelf can begin. The discovery and evaluation of the shelf's mineral deposits will be expensive. Extraction and recovery of the minerals will require a costly development of mining technology.

Even once lots of money is available for a large "in-house" effort by Interior, an ambitious program of marine resource development will demand a major effort by industry. Industry, of course, will have to put up the risk capital for marine mining, just as it has done in exploiting offshore oil reserves. The Bureau of Mines has established a small research center at Tiburon, California, on San Francisco Bay, where it has been collaborating with three industrial firms (Lockheed, International Minerals and Chemicals Corporation, and Merritt, Chapman, and Scott) in the development of marine mineral production technology.

The bureau will also tap the expertise of the universities and oceanographic institutions. Congress recently gave Interior general authority to contract for research. In the past, the Bureau of Mines has lacked broad contracting authority, and were it not for the fact that many of its research centers are located on or near university campuses, the bureau's ties with academia would be quite limited.

Interior's efforts to develop an integrated program for marine resources should show up potential conflicts as well as permit a more comprehensive survey of marine resources. For example, marine mining could cause pollution problems jeopardizing fishery and recreation resources. The government's record up to now in resolving conflicts in the use of natural resources has been poor. Success in avoiding such conflicts in the future development of marine resources would be a substantial achievement in itself.

Interior hopes to get still another benefit from an integrated oceanography program. It expects the program to reinforce its argument that Interior's scientific programs—especially those of the Geological Survey—are vital to the success of its mission as the government's department for the conservation and development of natural resources. Assistant Secretary Cain, keeping the faith, expresses confidence that the Geological Survey and the science programs of other Interior agencies will never be separated from Interior to form a new environmental science agency. "I haven't the slightest fear of that," he says. "Our position is too strong."

—LUTHER J. CARTER

The Senate Revolt: Protesting U.S. Overcommitment Abroad

Those who served with Lyndon B. Johnson in the Senate know from first-hand experience that Johnson is no foreign policy expert, and, indeed, that he was not even much interested in the subject before he assumed the Presidency. Consequently, they are even less inclined to assume that his foreign policy proclamations are Holy Writ than are most other Americans.

This familiarity with the President's interests is one reason why a fairly large group of senators this session staged the biggest congressional revolt in recent decades against a President's foreign policy decisions. Of course, this familiarity was not, of itself, sufficient to breed such an uprising; a catalyst was needed, the catalyst, whether acknowledged or not, was always Vietnam.

The most important personal change which sparked the Senate revolt this year was the growing alienation of Foreign Relations Committee chairman J. William Fulbright (D–Ark.). Fulbright's foreign policy break with the administration gave a respectability and momentum to Senate dissent which had been lacking in previous sessions.

For Fulbright, as for several other senators, President Johnson's quick decision to send troops into the Dominican Republic in 1965 set the stage for the Vietnam dissent of 1966. After holding hearings on the Dominican intervention, Fulbright spoke, in September of 1965, in criticism of the U.S. Dominican decision. The angry White House response which greeted Fulbright's speech seemed to cut the once strong cord between President Johnson and Fulbright. The Dominican intervention made senators, such as Fulbright, who had given general support to the President's Vietnam policy wonder whether the President had a tendency to shoot from the hip whenever the word "Communist" was mentioned.

But even more important than the Dominican intervention in fomenting senatorial dissent was the ever-growing cost and threat of the Vietnam war. The 1966 session started with the somber report of the presidential mission led by Senate Democratic Leader Mike Mansfield (Mont.) and George D. Aiken (R–Vt.). The report warned that the military situation in Vietnam was "open-ended" and offered "only the very slim prospect of a just settlement by negotiations or the alternative prospect of a continuance of the conflict in the direction of a general war on the Asian mainland." This grim message forced many Senators to pay even more serious attention to the dangers inherent in the Vietnam war.

Despite the mollifying influence exerted by the December-January pause in the bombing over North Vietnam, Congress began to express dissatisfaction with Vietnam policy soon after the session opened in January. Without publicizing his intentions or the depth of his concern, Fulbright succeeded in getting his committee members to agree to hold hearings on Vietnam before most of them really knew what was happening. The occasion for the formal discussion was consideration of a $415-million aid supplement for Vietnam. The hearings soon revealed that Fulbright and a number of his committee members were upset by the whole direction of U.S. policy in Vietnam. At these hearings before the Senate Foreign Relations Committee, Secretary of State Dean Rusk received the most unfriendly treatment from Congress of his 5 year tenure as Secretary.

In the House of Representatives, dissent on Vietnam was much less open this year than it was in the Senate. The reasons for this are difficult to ascertain precisely, but several explana-