

## Weather Modification: Senate Bills Stir Agency Rivalries

Authoritative reports that useful weather modification techniques may be within reach have moved two influential members of the U.S. Senate to action and seem to have triggered a jurisdictional scramble. Doing the scrambling are the U.S. departments of Commerce and Interior and the two Senate committees which look over them. New weather modification bills are before the Commerce and Interior committees, and early hearings are planned. With water shortages now familiar in the East as well as the West, sponsors of the legislation may have reason to hope for broader support than weather modification proposals have attracted in the past.

The quickening interest within the departments and the Senate committees has developed since the issuance in January of reports on weather modification by a National Academy of Sciences panel and a special National Science Foundation commission (*Science*, 28 January). Both groups recommended a larger governmental commitment to weather modification and the assignment of primary responsibility in this field to a single agency.

On 4 February Senator Clinton P. Anderson of New Mexico, the second-ranking Democrat on the Interior Committee, introduced a bill (S. 2875) directing the Secretary of the Interior "to conduct a comprehensive program of scientific and engineering research, experiments, tests, and operations for increasing the yield of water from atmospheric sources." The proposal, though directed only at increasing water resources, contemplates an expenditure for the first 3 years of \$155 million. Such a sum would be huge in comparison with the current year's total spending by all agencies of \$7.2 million on all weather modification work—from rain- and snow-making to hail- and lightning-suppression (though much of the related atmospheric research is paid for out of other funds).

On 10 February Senator Warren G.

Magnuson of Washington, chairman of the Commerce Committee, introduced his bill, S. 2916. It would authorize the Secretary of Commerce "to carry out a program of applied research, development, and experimentation in the field of weather modification and climate control, giving particular attention to areas that have experienced floods, drought, hail, lightning, fog, tornadoes, hurricanes, or other weather phenomena." The Magnuson bill, which would authorize such spending as may be necessary, is intended to make Commerce the agency chiefly responsible for weather modification.

Although adroit compromising may prevent a collision, the Commerce and Interior departments appear to be approaching head-on. Officially, the Magnuson and Anderson bills represent only the views of their sponsors. Unofficially, they probably reflect the views of the two departments.

Senator Magnuson conferred at length with J. Herbert Hollomon, assistant secretary of commerce for science and technology, before introducing his bill. One may surmise that they talked about the weather and the modification thereof. Similarly, Senator Anderson, in preparing his bill, got the advice of Thomas F. Bates, science advisor to the Secretary of the Interior, as well as that of some other scientists with close ties to the Department of the Interior.

Behind-the-scenes trysting of this kind between congressional committees and the agencies for which they are responsible does a bit of violence to the Founding Fathers' "separation of powers" doctrine and to the rule that agency positions on legislation should be cleared by the Bureau of the Budget. But such intimacy in committee-agency relations is so common that no one pretends to be shocked by it. Indeed, an official who refused to help a committee prepare legislation affecting his agency almost certainly would be considered bizarre and unsound.

The legislative developments in the

weather modification field this year have had the aspect of a race, with Senator Anderson grabbing an early lead, only to be overtaken by Senator Magnuson, who now has scheduled hearings on his bill to begin next Monday, 21 February. (Senator Howard W. Cannon, though a cosponsor of the Anderson bill, will conduct most of the Commerce hearings on the Magnuson bill, which he plans to cosponsor also. Unless he withdraws as a cosponsor of the Anderson bill, supporters of that measure will be watching him warily.)

In the past, when Senator Anderson has introduced bills providing for a major expansion of the Interior Department's weather modification program, they were invariably referred to the Commerce Committee. Commerce has jurisdiction over the Weather Bureau, a part of the Commerce Department. Year after year the bills would lie neglected, a circumstance which has tried Anderson's patience.

The Senator and others who have wanted to see Interior's program expanded have had to look to the Appropriations Committee. Money for weather modification has been appropriated for the use of Interior's Bureau of Reclamation under its authority to develop water resources in the West. Last year Anderson was vexed as usual by the treatment which the Commerce Committee accorded his bill authorizing the Interior Department to conduct a \$20-million program in five areas of the United States in order to increase usable precipitation.

No action was taken except for 2 days of field hearings conducted by Senator Cannon last November in Nevada, hearings which never have been published. Some who accuse the Commerce Committee of indifference to weather modification suggest that Cannon was simply putting on a show for home-state constituents. (This view may be unduly cynical, however, as converts to the cause of weather modification have been increasing in number, particularly within the Commerce Department, which at one time displayed comparatively little interest in the subject.)

This year, Senator Anderson resolved that he would get action. After his ambitious new proposal had been drafted, Anderson spoke to Senate Majority Leader Mike Mansfield, one of the 20 western and midwestern senators cosponsoring the bill, and to the Senate parliamentarian, who advises the pre-

siding officer on bill referrals. He suggested that, as a measure designed to augment water supplies, his bill should be referred to the Interior Committee. These overtures succeeded, and S. 2875 was referred as requested and the Committee plans tentatively to hold hearings the 21 and 23 March.

Already Magnuson has written Interior, asserting his own committee's jurisdiction and asking that the bill be referred to Commerce once Interior has considered its water resources aspects. (H.R. 12610, a bill identical with the Anderson measure, has been introduced in the House by Representative Thomas G. Morris, a New Mexico Democrat. The Morris bill has been referred to the Interior Committee; no hearings have been scheduled, and none are likely to be held soon.)

#### A Boost for ESSA

The Magnuson bill would give the Commerce Department a boost toward its apparent objective of establishing itself—through its new Environmental Science Services Administration (ESSA) which includes the Weather Bureau—as the source of most new federal initiatives in the environmental sciences. The Anderson bill, on the other hand, would expand the scope of the Interior Department's activities, especially by adding greatly to its responsibilities for water resources development—nationwide, and not just within the arid western states where Interior's Bureau of Reclamation traditionally has been active.

Even now, the Bureau of Reclamation has, from a cost standpoint, the largest weather modification program of any agency. The bureau's current budget of nearly \$3 million for research and experimentation aimed at increasing rain and snow is more than three times the Commerce Department's budget for weather modification.

The Anderson bill would authorize the Secretary of the Interior to establish, or arrange to have established, (i) a central scientific and engineering facility as the planning, analytic, and administrative center for a comprehensive program of research and operations to tap atmospheric water supplies, and (ii) regional research and operating centers and such mobile facilities as the comprehensive program requires.

The Secretary would request the help of all federal agencies with scientific and engineering competence related to

atmospheric water resources, and such agencies would be "directed to participate . . . on the basis of agreements with the Secretary." Interior could transfer funds for weather modification to other federal agencies, as well as obtain the assistance of educational institutions, private firms, and state and local governments through grants and contracts.

The \$155 million that would be authorized for the first 3 years (funds would be appropriated "as needed" thereafter) would include substantial amounts for basic atmospheric research. Large sums would be spent for costly equipment, including aircraft, radars, and computers. Spending in the amounts proposed would be somewhat greater than the \$40 million to \$50 million a year for all weather-modification activities, including the supporting basic research, recommended by the NSF commission. The commission suggested that spending rise gradually to that level by 1970.

The bill would require that any activities affecting or likely to affect atmospheric water resources be licensed by the Secretary. Also, it would authorize payments in the event the weather modification program gave rise to valid damage claims. Two of the NSF commission's recommendations were indemnification of federally sponsored weather modifiers against damage claims and provision of greater federal regulation of weather modification activities.

In short, where the water-resources aspects of weather modification are concerned the Anderson bill would make the Interior Department the undisputed leader. The department would be given both the legal authority and the funds (provided appropriations even approached the authorizations) to dominate the field.

The Magnuson bill is, upon cursory inspection, a modest-seeming measure, but the philosophy that motivates it is not modest at all. The bill would provide specific authority for the Commerce Department to carry out *applied* research in weather modification and to take over all NSF's commitments and resources directed primarily toward such research.

To judge from the remarks made by Magnuson when introducing the bill, he would have the Commerce Department exercise a leadership that NSF was expected to exercise under a 1958

statute directing it to "initiate and support a program of study, research, and evaluation" in weather modification.

Magnuson commended NSF for its encouragement of basic research, particularly for its support of the National Center for Atmospheric Research at Boulder, Colorado. But he then indicated that the time has come for a large applied-research effort. He noted that the NSF commission recommended that overall responsibility for testing and developing weather modification techniques be assigned to a single agency. The NSF report suggested that the assignment might be given to ESSA or to a completely new agency organized for the purpose.

"I agree with the commission that now is the time to take action," said Magnuson. "Accordingly, I am introducing a bill which will assign such a mission to the Department of Commerce." Magnuson observed that a number of other agencies conduct weather modification programs and that his bill would serve "only as a beginning point of discussion."

#### Debate Invited

"I invite debate so that Congress can come up with the best possible legislation consistent with present scientific achievement," he said. Later, though, the senator added: "This is not a time to consider fragmenting responsibility. Weather modification and weather prediction are intimately related. The Department of Commerce is therefore ideally suited to have this overall responsibility. Other agencies having mission-oriented programs have a legitimate interest in carrying out their programs but not in the overall direction."

Seven federal agencies—NSF, Commerce, Interior, the three military services, and the Department of Agriculture—are now engaged in weather modification research. For example, Agriculture's project "Skyfire" is concerned with lightning-suppression and the avoidance of forest fires, while the Air Force is interested in such matters as fog and cloud dispersal. Apparently, under the concept entertained by Magnuson and the Commerce Department, agencies with an interest in weather modification would either confine their programs to the application of operational techniques developed for them by ESSA or follow ESSA's guidance in developing the techniques themselves.

The Magnuson bill would authorize the Secretary of Commerce to initiate studies through the Federal Council for Science and Technology on inter-agency coordination in the field of weather modification and to make recommendations to other agencies. Within a year after the bill's enactment, the Secretary would be expected to ask Congress for whatever additional legislation was needed to insure interagency coordination. Moreover, the Commerce Department would be the agency to regulate commercial weather modification activities which interfere with the federal program.

Clearly, the department would be what in government parlance is called the "lead agency." It might seem to some, however, that, under the Magnuson bill, Commerce would be not much more dominant than Interior would be under the Anderson bill. Thomas Bates, Interior's science advisor, does not share that view. "We don't need a lead agency for the atmosphere any more than we need one for the land," he said recently. In his judgment the program proposed by Senator Anderson would give Interior a dominant position in weather modification only if Congress neglected those aspects of the field not concerned with water resources.

The Magnuson bill may have been fortunate enough to have caught a distinctly favorable tide. Reports circulate, and are given credence by some responsible officials, to the effect that executive reorganization legislation to be proposed by President Johnson will include a provision which, like the Magnuson bill, would transfer from NSF to ESSA responsibility for initiating programs of applied research in weather modification.

Furthermore, the National Academy of Sciences panel report, like the NSF commission report, seemed to favor ESSA as the lead agency for weather modification. The panel said the practice of dividing up the environmental sciences according to the diverse purposes of federal agencies has been rendered "obsolete by the increased interdependence among the various areas of environmental research and engineering."

In addition, no other agency rivals ESSA with respect to competence in the atmospheric sciences. ESSA says that nearly 200 of its senior professional personnel are engaged in work

## Harvard Economist To Head Institute for Advanced Study

The Institute for Advanced Study in Princeton, New Jersey, has appointed Carl Kaysen to succeed J. Robert Oppenheimer as director, effective 1 July. Kaysen, 45, earned his doctorate at Harvard in 1947 and became a teaching fellow. By 1957 he had become a professor, and 3 years later he was appointed associate dean of the graduate school of public administration. On leave from Harvard from 1961 until 1963, he served in Washington as President Kennedy's Deputy Special Assistant for National Security Affairs. As an adviser to both the Kennedy and Johnson administrations, his efforts have centered around disarmament, the military budget and planning.

Oppenheimer, who is 61, announced last August that he planned to step down as director at the end of this academic year. He will remain at the institute as senior professor of theoretical physics, and will live in a house built for him by the board of trustees "as a token of our affection and gratitude."

Kaysen will be the fourth director of the Institute, which was founded in 1930. His predecessors include Abraham Flexner, an educator and one of the founders of the institute, who was director from 1930 to 1939. Frank Aydelotte, president of Swarthmore College for 19 years, directed the institute from 1939 to 1947, when Oppenheimer took over.

Kaysen's being a social scientist is not expected to cause changes in emphasis at the institute. About his new appointment, he says, "The growth of a good academic institute has to be a slow process. It has to grow from within. I don't plan to go there with any formed plans from without."

The Institute's permanent faculty has 13 members in historical studies, 10 mathematicians, and 5 persons in the natural sciences. In addition, there are about 100 temporary members, most of whom were invited for a year or two. The institute does not grant degrees, has no scheduled curricula or courses, and has no laboratories. Although it is near Princeton University, it has never been part of that institution.—M.K.Z.

having a bearing on weather modification, and that more than 40 of them are Ph.D.'s. By contrast, the Bureau of Reclamation has about a half dozen professionals of its own in the atmospheric sciences. Its weather modification work is done through contract or agreement with universities, private firms, and other government agencies, including the Weather Bureau.

The Interagency Committee for the Atmospheric Sciences (ICAS), which is chaired by Hollomon, will try to adopt a recommendation for presentation to the Federal Council for Science and Technology before the Commerce Committee's hearings are completed on 7 March. Bates represents the Interior Department on ICAS. Whether ICAS can reach any position, much less a unanimous one, in time for the hearings is uncertain.

Some qualified and disinterested observers believe, however, that the Magnuson and Anderson proposals can be compromised without violence to either. They observe that there is a great deal more to weather modification than the increasing of precipitation, which is what the Anderson bill is concerned with.

They suggest that the Interior Department might be given an enlarged role—though not nearly so large a one as Anderson has proposed—in the use of weather modification to enhance water supplies. This would be a concession to the argument that it is only reasonable to let the agency responsible for water resources in general continue to develop a capability for tapping the atmospheric water resources. Such a concession would still leave ESSA with vast possibilities, ranging from investi-

gation of ways in which man-made changes in the environment influence the weather to such matters as hurricane and tornado modification.

In any event, the intramural competition within the government for weather modification programs is less important than the programs themselves. It seems clear from the favorable reception given the NAS and NSF panel reports that the federal effort in weather modification will be expanded. Given a measure of goodwill and legislative craftsmanship, the jurisdictional problems can be settled. Senator Anderson himself has put it this way: "I'm not interested in who does it, so long as the job gets done."—LUTHER J. CARTER

### Representative Thomas Dies

Albert Thomas (D-Texas), a veteran member of the House of Representatives and chairman of the appropriations subcommittee crucial to several scientific agencies, died Tuesday of cancer. He was 67.

He had been in Congress since 1937, and a member of the Appropriations Committee since 1941. Thomas was chairman of the subcommittee on independent offices, which had jurisdiction over granting funds for NASA, the National Science Foundation, the Office of Science and Technology, and other federal agencies not under departmental authority. He served on the Appropriations Committee's defense subcommittee, and on the Joint Atomic Energy Committee's subcommittees on security and communities. He was also a member of the Joint Committee on Reduction of Nonessential Federal Expenditures.

### Announcements

The National Institute of **Child Health and Human Development** has been reorganized to give emphasis to four areas of scientific programming: reproduction, growth and development, aging, and mental retardation. Roy Hertz, scientific director, will have overall responsibility for the programs. Each area will be headed by a program director, in charge of both intramural research activities and the scientific aspects of extramural research.

The University of Notre Dame has established a graduate department of **microbiology** that will offer teaching

and research programs leading to both the master's and doctoral degrees. The department will conduct research at Notre Dame's Lobund Laboratory. Morris Pollard, director of the laboratory since 1961, will begin a 3-year term as head of the new department on 1 July.

The **Institute for College and University Administrators**, which conducts "short courses" for new college presidents and academic deans, is now sponsored by the American Council on Education. Headquarters for the Institute are being transferred from Harvard's graduate school of business administration to the ACE in Washington. Individual institutes for new presidents and deans will be conducted on college campuses across the country.

David C. Knapp, formerly professor of government and dean of the college of liberal arts at the University of New Hampshire, has been appointed director. He succeeds Robert W. Merry, chairman of the doctoral program of the Harvard business school, who had headed the program since its establishment in 1955.

### Grants, Fellowships, and Awards

A center for advanced study in **theoretical psychology** has been established at the University of Alberta, Edmonton, with emphasis on the interdisciplinary and methodological aspects of the field. Postdoctoral programs will be arranged to suit the individual participants; fellowships are offered with stipends of up to \$6000, plus travel grants. Predoctoral students will enroll in one of the department's programs; scholarships ranging to \$4000 and assistantships up to \$3000, plus tuition and travel grants, are available. Additional information may be obtained from T. M. Nelson, Department of Psychology, University of Alberta, Edmonton, Canada.

A chair for a visiting scholar has been created at the **Cranbrook Institute of Science** for individuals who would like to work in the Detroit area for 3 months to 2 years. The program is flexible and well suited to persons on sabbatical or recently retired from academic life, and wanting to remain active in education, research in the natural or physical sciences, or conservation promotion. One appointment will be grant-

ed for any particular period; it will carry a stipend and the use of the new Thomas Edison house at Cranbrook. The first appointment is to begin in September. Further information on requirements and applications is available from the Director, Cranbrook Institute of Science, Bloomfield Hills, Michigan 48013. The institute is an independent, nonprofit organization supported by grants from the government, the Cranbrook Foundation, and from private sources.

The National Science Foundation will provide a limited number of travel grants for U.S. scholars attending the International Congress of **Americanists** in Argentina next September or the International Union of **Prehistoric and Protohistoric Sciences** in Czechoslovakia, also next September. The awards will be based on relevance of the applicants' research. Deadline for receipt of applications: *1 March*. (R. W. Lieban, Program Director for Anthropology, NSF, 1800 G Street N.W., Washington, D.C. 20550)

MIT is offering research associateships in **computer science**, supported by the International Business Machines Corporation. Applications should include an outline of the proposed research; statement of graduate courses, grades, and degrees; professional résumé; at least two letters of recommendation; and an indication of the desired appointment period and stipend. Preference will be given to applications for the whole academic year, although those for shorter terms will be considered. Research associateships at MIT are academic appointments, and although the recipients will have no teaching duties, they may supervise thesis students. Application deadline: *1 March*. (Director, MIT Computation Center, Room 26-142, MIT, Cambridge, Massachusetts)

Fellowships are available at the Stanford University medical school for training in clinical and experimental **cancer radiotherapy**. The 3-year program includes roentgen therapy, interstitial and intracavitary radium application, diagnostic and therapeutic uses of isotopes, clinical oncology, chemotherapy, and clinical and experimental research. Applicants must have graduated from an accredited medical school and have had at least a year of an approved internship. Stipends range from

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