mental effects involved. But the amendment was deleted last month by a conference committee because the House conferees had no time to explore the ramifications of the measure. Last week, however, Senator Kennedy attached a more limited version of the amendment to the Department of Defense Appropriations bill.

The new amendment simply states that "none of the funds appropriated by this Act shall be available for any research involving un-informed or unvoluntary human beings as experimental subjects". The amendment applies only to the Department of Defense, unlike the original amendment which would have applied to all research programmes supported by federal funds, and it is therefore less likely to meet strong opposition in the conference committee. As for its effect, it will force the Department of Defense to review its research programmes and draw up fresh guidelines for experiments involving human subjects.

In the same area, a bill designed to set up a commission on the medical, legal and social implications of advances in biomedical research, which was passed by the Senate in December last year (see *Nature*, **236**, 344; 1971), has died in the backlog of legislation awaiting action before Congress adjourns. It has not been reported out of the House Commerce Committee.

Controlling the Controllers

by our Washington Correspondent

ALLEGATIONS that the Department of Defense has been tinkering with the weather over Vietnam have given the science of weather modification a bad name. But last week a high level advisory committee recommended that the United States research and development programme into weather modification and control should be expanded, and that a lead agency should be designated to provide a semblance of order for federally supported efforts to control the climate. At the same time, however, the committee has urged the United States to eschew all military uses of weather modification and to conduct research as far as possible on an international basis.

The recommendations were made by the newly formed National Advisory Committee on Oceans and Atmosphere, set up by an act of Congress under the chairmanship of Dr William A. Nirenberg, Director of the Scripps Institution of Oceanography. The basis for the committee's recommendations is its belief that "we are on the threshold of a new era of environmental control"—under limited conditions, rainfall can be increased or decreased, snowpack in the mountains can similarly be modified, cold fogs can be cleared, there are promising methods of suppressing hail and there has been progress in attempts to diminish the force of hurricanes. There is also an increasing body of evidence that man inadvertently modifies the climate through pollutants and urbanization. The committee is, however, equally quick to point out that the potential risks from weather modification are great and now need to be addressed.

Expenditure on weather modification experiments by the federal government has increased steadily during the past few years, from $16 million in 1971 to about $25 million in the present financial year. But the committee believes that the "projects have characteristically been inadequately coordinated, underfunded through fragmentation and often not backed by basic research and undertaken with obsolete equipment". Part of the reason for this sorry state of affairs is that no fewer than seven federal agencies have a finger in the pie, and the chief coordinator of the programmes is a relatively low powered subcommittee of the Federal Committee for Science and Technology.

The committee does concede, however, that the establishment in 1970 of the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce, and its subsequent responsibility for monitoring the federal efforts in weather modification, has helped but that "what is lacking is a central focus for the overall effort . . . the present fragmented approach is moving the country ahead in weather modification in an erratic fashion".

The science of weather modification was born in 1946 when Vincent Schaefer and Irving Langmuir conducted their first cloud seeding experiment by dropping pellets of carbon dioxide from an aircraft into a cloud composed of water droplets at below freezing temperature. The dramatic success of this experiment quickly led to a range of weather modification programmes by the federal government, and a number of commercial entrepreneurs also got into the act so that by the late 1950s about 10 per cent of the land area of the United States was under cloud seeding experiments. One problem is that no single agency has been able to regulate all these experiments (even now cloud seeders are not required to report to NOAA before they conduct their experiments) and the committee gives some examples of the chaos which has resulted from this lack of regulation. It is frequently not known whether a cloud seeding programme is affected by similar experiments nearby. The committee cites a case, for example, in which the National Science Foundation reported that two of its major weather modification projects were seriously compromised by unregulated cloud seeding in the vicinity. In one of the cases an investment of a quarter of a million dollars went to waste.

Apart from asking for a lead agency to plan and regulate weather modification programmes, the committee calls for legislation to define the rights and responsibilities of citizens, the states and the federal government in this area. More basic research in cloud physics is also required, the committee recommends, and it asks that research and development of the technology to mitigate the effects of hurricanes should be accelerated. NOAA's hurricane modification project (Project Stormfury) might be better moved from the Atlantic to the Pacific—a suggestion which NOAA already has in mind but which it has had to defer because of lack of suitable aircraft. Finally the committee recommends that a major federal cloud seeding project should be conducted in the northern Great Plains area of the United States. In this region rainfall is scanty and sporadic and farmers have to trap a portion of one year's rainfall to support agriculture in the next year.

Secretary of Commerce Peter G. Peterson has already welcomed most of the committee's recommendations, but he has expressed some reservations about establishing a focus for the federal government weather modification programme in a single federal agency. He has pointed out that weather modification technology should remain available to all agencies and has suggested that it would be unwise to divorce the research from the agency with the responsibility for applying it. He has also accepted the recommendation for a Great Plains project; plans are already being drawn up.

Short Note

Widespread PCBs

A study conducted by the US Geological survey has found polychlorinated biphenyls in "an unexpectedly large number of sampling points in streams, lakes and reservoirs". Detectable levels of the chemical were found in 17 out of 39 states, including remote areas. In May this year, the Environmental Protection Agency recommended an upper limit of 0.1 microgram per litre in river and lake water, but the USGS survey turned up levels between 0.1 and 4.0 micrograms per litre. The FDA has set a limit of 5 mg per kg in food.