

Aerosols, Ozone and the NAS: Delay Urged

As the controversy has grown over what regulations are needed to keep gases released from spray cans from destroying the atmosphere's ozone layer, the attention of decision makers in government and industry has increasingly been turned toward the National Academy of Sciences for a definitive answer. This week the Academy concluded 18 months of work on the problem by issuing a report that calls for at most two more years of study before initiating selective regulations.

Citing a lack of knowledge, the report concludes, "It would be imprudent to accept increasing CFM [the chlorofluorocarbon gases in question] use and release, either in the United States or worldwide." Yet, for the same reason, "we wish to recommend against decision to regulate at this time." The report effectively supports the chemical industry position that a decision to regulate can and should be postponed (SN: 9/11/76, p. 166).

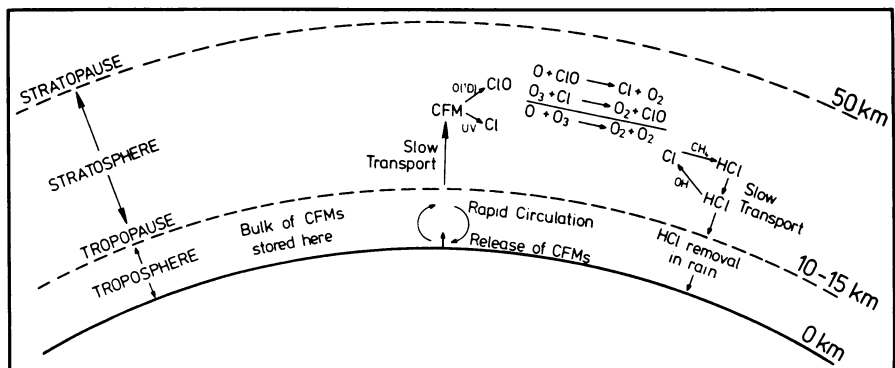
At the Academy's most heavily attended press conference in recent years, the chairman of the NAS Panel on Atmospheric Chemistry, H. S. Gutowsky, outlined the complexity of the problem. The rate of transport of the gases into the atmosphere is uncertain, he said, by a factor of three; the rate of their breakdown is uncertain by a factor of two; and reaction rates with other substances are uncertain by a factor of five.

Thus when the report concludes that continued release of chlorofluorocarbons at 1973 rates would result in an ultimate decrease of ozone by only 7 percent in the next 100 years, the actual figure could be as little as 2 percent or as great as 20 percent. And even this range "does not allow for possible inadequacies of the bases of the calculation."

The panel's report on how CFMS affect ozone was incorporated into a larger report by the Committee on Impacts of Stratospheric Change, which considered what the ozone decreases might do to climate and people. Committee chairman John W. Tukey, a statistician at Bell Labs and Princeton University, said that climate changes caused by CFMS might amount to 40 percent of those associated with changes in atmospheric carbon dioxide concentrations (SN: 3/1/75, p. 138), but that again there were many uncertainties.

Gutowsky said that increases of skin cancer due to increased ultraviolet light transmission would be less than that already caused by changing life-styles (more people are getting suntans). The report says further study of the skin cancer problem should be conducted without regard to CFM effects.

Looking toward the future, the committee concluded: "Selective regulation



Gases from spray cans (CFM) rise to the stratosphere, where the chlorine (Cl) reacts with ozone (O_3) and eventually returns to earth as hydrochloric acid (HCl) in rain.

of CFM uses and releases is almost certain to be necessary at some time and to some degree of completeness. Neither the needed timing nor the needed severity can be reasonably specified today. Costs of a delay in decision are small, not more than a fraction of a percent change in ozone depletion for a couple of years' delay."

Tukey emphasized that the committee's recommended period of delay was for not more than two years. If within that time studies now underway still indicate an ozone depletion of more than a few percent is a major possibility, regulation should begin.

When regulation comes, certain priorities should be kept in mind, the report says. Three quarters of all CFM releases come from spray cans, and alternative spraying techniques are available. Use of CFMS as coolant in home refrigerators accounts for less than one percent of all releases and would probably remain unaffected by future regulations. Since legislative authority may not now be adequate to regulate the uses of fluorocarbons, the Academy report calls for "immediate steps to be taken" to determine and eliminate inadequacies.

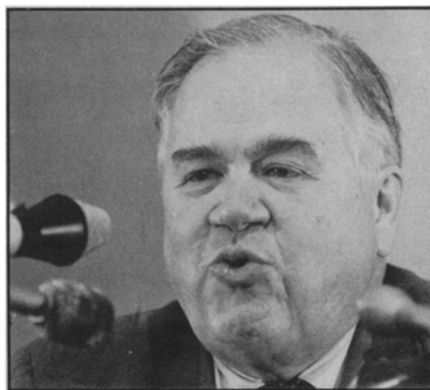
To encourage voluntary restraint on CFM use by individuals, the committee also recommends new legislation to re-

quire labeling of aerosol cans containing chlorofluorocarbons. Public awareness has already caused a sharp decline in production of such propellants, after years of exponential sales growth. However, since more than half the worldwide CFM consumption is now outside the United States, efforts at restraint would have to involve cooperation of many countries to be effective. The effects of regulation would take some time to be felt; the period between fluorocarbon release and ozone destruction may amount to several decades.

To eliminate the remaining uncertainties, the committee recommended massive new research efforts and set forth a probable timetable of results that could be achieved "if we pressed forward vigorously." Within two years, for example, more sophisticated models of the transport processes and chemical reactions involved could be developed, and the possibility of ignoring some major unidentified factor significantly reduced.

Within five to ten years, the climatic effects of light absorption by the CFMS could be described, together with the consequences for agriculture and water supplies. The effects of an ozone decrease, with a resulting increase of transmitted ultraviolet light, could be determined, including possible danger to crops and humans. Greater understanding would also be gained about natural processes that apparently cause periodic ozone variations of some five percent. (Present effects of CFMS on ozone are less than one percent.)

Mario Molina, the University of California chemist who was one of the first to warn about possible dangers from fluorocarbons, told SCIENCE NEWS the Academy's figures were "slightly conservative from our point of view," but within the range of uncertainty. However, whether a further delay is desirable before instituting regulations, he said, depends on what is done during the next two years. He emphasized the need for industry to have time to make a change. □



Tukey: Many uncertainties remain.

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