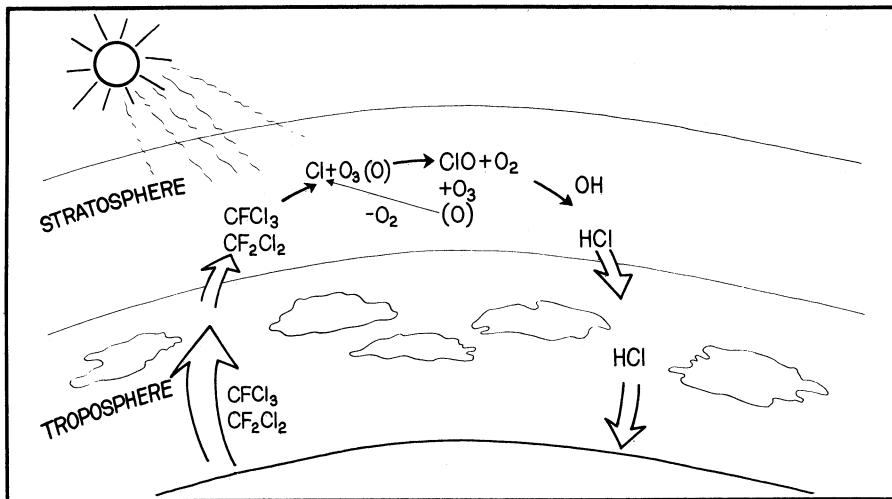


# End of aerosol age? Federal report says probably

Aerosol spray cans may become memorabilia from the Age of Technology when the recommendations of a Federal task force are implemented. With nearly miraculous speed, a theory of ozone destruction by fluorocarbons, first proposed just one year ago, has been tested, probed and pondered by a task force composed of 15 Federal scientific agencies. Although the recommendations, decidedly middle of the road, drew criticism from both sides, the meaning is clear: Unless someone comes up with hard data exonerating fluorocarbons, their use as propellants should be banned by January 1978.

The task force (called, by the appropriately cumbersome name, the Federal Task Force on Inadvertant Modification of the Stratosphere—IMOS) spent five months assessing the risks posed by fluorocarbon aerosol propellants and refrigerants to the earth's ozone layer. Atmospheric chemists F. Sherwood Rowland and Mario J. Molina of the University of California at Irvine theorized last summer that inert fluorocarbon molecules are reaching the stratospheric layer (9 to 12 miles above the earth) and are there broken down by harsh sunlight and release reactive chlorine atoms. These, in turn, destroy ozone ( $O_3$ ) molecules, which serve as an absorptive screen for harmful wavelengths of ultraviolet light. Although ozone concentrations fluctuate naturally, a decrease in the average ozone concentration would result in an increased cumulative exposure to ultraviolet light—perhaps 2 to 3 percent already—and a corresponding increase in human skin cancer and other negative health and environmental effects.

The task force, after reviewing scientific and economic data piling up rapidly since last summer, has concluded that there is "legitimate cause for concern" that fluorocarbons 11 and 12 ( $CFCl_3$  and  $CF_2Cl_2$ ) are damaging the protective ozone shield. Unless new scientific evidence is found, the IMOS committee states



Proposed fluorocarbon breakdown, release of chlorine and destruction of ozone.

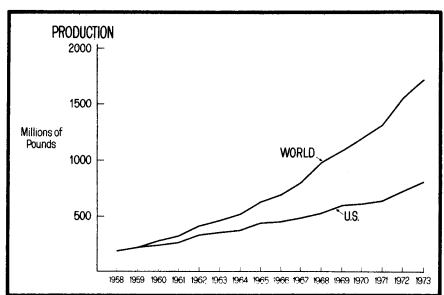
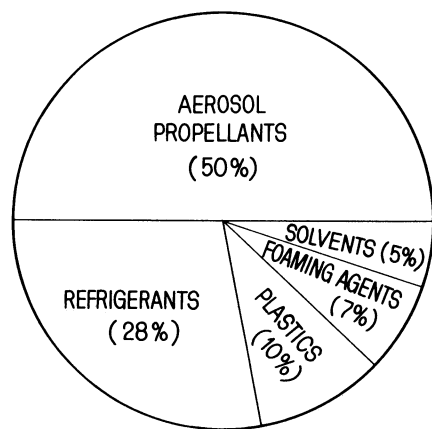
in a report released last week, such as the discovery of major fluorocarbon "sinks" or previously unrecognized natural sources of chlorine in the stratosphere, "it would seem necessary" to restrict the uses of fluorocarbons 11 and 12. Such restriction could allow fluorocarbons in closed systems—refrigeration and air conditioning equipment—but ban their use in aerosol spray cans. The ban could "reasonably be effective" by January 1978, the IMOS committee says. Rulemaking by Federal regulatory agencies could begin as early as spring of 1976 if a National Academy of Sciences assessment of the scientific data, due next spring, confirms the recommended ban. Industry should, in the meantime, redesign closed systems to prevent leakage and decrease the use of fluorocarbons 11 and 12, it states.

About 50 percent of the 800 million pounds of fluorocarbons produced annually in the United States are used in aerosol products. (This represents about one quarter of the total world production.) More than 90 percent of these aerosol product units are personal products such

as hair sprays and deodorants. The committee points out that nonaerosol alternative packages are available already for many of these products. Of the three billion aerosol units sold annually in the United States, however, 40 to 50 percent are *not* propelled by fluorocarbons. In order to protect manufacturers of aerosol products that do not contain fluorocarbons from consumer discrimination, the IMOS committee is recommending an immediate program of labeling to identify products that contain fluorocarbons 11 and 12.

The IMOS report was presented at a press conference in Washington by representatives from the two sponsoring agencies, Russell W. Peterson, chairman of the Council on Environmental Quality, and H. Guyford Stever, chairman of the Federal Council for Science and Technology. Neither would go so far as to recommend a consumer boycott of fluorocarbon products before the proposed ban is effected, calling such action a "personal moral decision." Both, however, said they would use fewer aerosol sprays.

This apparent hedging brought criticism from some, including attorney Tom Stoel of the National Resources Defense Council, an environmental law firm. The possible effects of an ozone reduction and increased ultraviolet light penetration include, he noted from the IMOS report, increased human skin cancer, increased sunburning and skin aging, eye damage, crop damage, livestock cancers, damage to the oxygen-producing phytoplankton, climatic changes and changes in the aquatic and terrestrial ecosystems. If these effects are serious enough to necessitate a ban on aerosol propellants and the redesign of refrigeration and air conditioning systems, Stoel states, then the ban should not be delayed for three years.



U.S. fluorocarbon production represents half of annual world production. One-fourth of that 1.7 billion pounds propels Americans' "personal care products."

The delay is designed, according to the IMOS report, "to allow time for consideration of further research results and for the affected industries and consumers to initiate adjustments." A stunned chemical industry, however, is equally critical of the proposed ban—but from a different perspective. DuPont, the leading U.S. fluorocarbon producer, voiced "strong disagreement" with the proposed ban and called it "tantamount to prejudging" the results of the ongoing atmospheric and chemical research which will take, DuPont says, "at least three years to complete." Although there have been no serious scientific challenges to the Rowland-Molina model during the past year's active research effort, initial predictions of severe ozone depletion have been revised

downward, industry points out, and the model is not yet confirmed by direct stratospheric measurements.

One of IMOS's major charges was to untangle the legal question of which Federal agency or agencies will regulate fluorocarbons. Under the proposed Toxic Substances Control Act, now being hashed out in Senate and House subcommittees, the EPA could prohibit any chemical that poses "unreasonable risks" to health or environment. The IMOS task force is urging rapid passage of the act.

Recognizing, also, that a U.S. ban on aerosol fluorocarbons would restrict the production and release of only one quarter of the total world production, the committee is urging international cooperation coordinated by the State Department. □

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## Natural disasters: Poor state of study

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The great flood of 1975 began quietly with the accumulation of massive thunderheads to the west of Boulder, Colo. At first, the residents saw little reason for alarm, but by 5 p.m. the sky had blackened and rain was pouring over the mountain flanks. Within a half hour torrential rains were falling over the mountain ridges of Salina, and by 7 p.m. the storm had unleashed its full fury over the entire Boulder drainage basin. The first crashing wave of flood water on Middle Boulder Creek arrived at the west end of town. It ruptured water, sewage and gas lines, rent buildings from their foundations and smashed through the Arapahoe Avenue bridges. By 10:30 p.m. the flood had reached its peak. By 10:30 the next morning, disaster officials had counted 95 bodies and estimated property damage at more than \$43 million.

The hypothetical Boulder scenario, along with even more disastrous predictions of what might happen in a San Francisco earthquake and a Miami hurricane, is part of a newly released National Science Foundation study, *Assessment of Research on Natural Hazards*. The study was conducted by Gilbert F. White and J. Eugene Haas of the University of Colorado at Boulder. They found that the state of disaster research in the United States is inadequate, and conclude that it must move in new directions if the costs due to natural disasters are to be kept to a minimum.

Today's research, White and Haas find, concentrates largely on technologically oriented solutions—weather prediction and control, flood-plain control, building codes, and so on. But in many cases, the already existing technology is not being put to use. The residents of Boulder, for instance, have been warned of the dangers of flooding for 80 years but have taken little action to create a comprehensive flood plain management program that might prevent a great disaster. Future research, the study suggests, should focus on the social, economic and political factors that lead to non-adoption of technology. The "people" factors need to be examined in harmony with physical and technical factors. "It is not a question of more or less technology," the researchers say, "but of technology in balance."

In the 400-page study, 15 types of natural disasters are examined, and a variety of suggestions are made for reducing vulnerability to those hazards. In addition to the establishment of a clearing house for dissemination of already available technical information, the researchers call for increased research emphasis on warning systems, structure design, land management and incorporation of prevention measures in emergency plans. □

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## Toward a science adviser: Round one

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Behind the polite facade of mutual congratulations over Congressional-Administration agreement to reinstitute the office of White House science adviser (SN: 5/31/75, p. 349), a quiet power struggle is developing over just how much authority the President is willing to delegate to the new adviser and how far Congressional science leaders are going to push their call for a new cabinet department of science and technology.

Vice President Nelson Rockefeller last week made unusual, informal appearances before both House and Senate groups to outline Administration plans for the proposed Office of Science and Technology Policy (OSTP). As the President's science adviser, the director of OSTP would act as "an early warning system" to alert the President to problems and opportunities developing in technical areas, Rockefeller said. Admitting that the figure of 15 professional staff members was "kind of drawn out of the air," he said OSTP would depend heavily on ad hoc committees of outside experts to make an "intense appraisal" of existing knowledge bearing on various problems.

The new adviser would "review" the budgets of various Government R&D agencies and help "coordinate" their functions through his relationship with the President and the Office of Management and Budget, Rockefeller said. He would also have "access to" the National Security Council and the Domestic Council, where he would review military R&D. What actual authority OSTP would have in any of these areas Rockefeller would not say, but the implication was clear that the Administration does not want a "Science Czar."

Possibly in order to maintain a bargaining position on the sensitive budget and military issues—and especially on whether the new adviser would need Senate confirmation—the House Science and Technology Committee is keeping alive a previous bill sponsored by Chairman Olin

E. Teague (D-Tex.) and ranking minority member Charles A. Mosher (R-Ohio), which would not only reestablish a White House science adviser but also institute a whole new cabinet-level department to bring together widely scattered Federal R&D agencies. Such a major reorganization is opposed by the Administration and would probably generate little enthusiasm on the House floor—much less in the Senate—but as a symbolic stand it clearly represents the committee's dedication to seeing that the OSTP director is given more clout than the present science adviser, H. Guyford Stever, director of the National Science Foundation.

To illustrate the urgency of the present situation, Mike McCormack (D-Wash.) cited Administration indecision on the issue of uranium enrichment, saying the cabinet is now "badly split" and is "floundering over this profoundly important question. The reason is because they don't have any agency to handle it." McCormack proposes that a new cabinet department, to be called STEAM—Science, Technology, Energy and Materials—be established.

NSF Director Stever and National Academy of Sciences President Philip Handler both testified in favor of the President's proposal. Handler said no other bills were "sufficiently mature at this time" to warrant adoption of their more ambitious schemes. Stever went even further, saying the technical agencies of Government are too diverse ever to be joined.

Behind the current confrontation over the authority due a science adviser lies an even more fundamental problem: Science has suddenly become very political. Beginning with Senator Proxmire's attack on "wasteful" research spending (SN: 3/15/75, p. 165), and continuing in the still unresolved flap over the NSF budget (SN: 4/19/75, p. 253), waves have begun to rise in this usually tranquil political backwater. □