

continued from page 102

possible inadequacies in the bases of the calculation, such as essential chemical reactions not yet recognized to be essential and the possibility of as yet unidentified tropospheric sinks.

If we continue to use halocarbons at a constant rate, ozone reduction would gradually flatten out, approaching a steady state, the report says. To reach half of this value would take roughly 50 years.

The major impacts of increase in biologically active ultraviolet reaching the Earth are: increased incidence of both melanoma and less serious kinds of skin cancer and effects on plants and animals of unknown magnitude.

Once appropriate legislation is in effect, the report recommends that a new review of our current knowledge on the climatic-effect problem be undertaken every three to five years. The Tukey report finds that accumulation of CFM's in the atmosphere increases the absorption and emission of infrared radiation, retarding heat losses from the Earth, thus affecting Earth's temperature and climate. This effect "is inevitably combined with the effect due to increased carbon dioxide and acts in the same direction."

During the past year two relevant scientific discoveries were made, the Tukey report notes. V. Ramanathan (NASA Langley Research Center, Hampton, Virginia) found¹ that F-11 and F-12 are sufficiently effective absorbers of infrared light (near 10 microns) that they might have a significant effect on the Earth's heat balance. F. Sherwood Rowland and Mario J. Molina (who sounded the ozone alarm in June 1974) and J. E. Spencer (University of California, Irvine) found² an unexpected relative insensitivity of chlorine nitrate (ClONO_2) to decomposition by ultraviolet light. The Gutowsky report notes that chlorine nitrate not only temporarily removes ClO from the ClO_x cycle but also NO_2 from the NO_x cycle. When the Panel included chlorine-nitrate reactions in its calculations, it found that the predicted ozone reductions were reduced by a factor of about 1.85, and that the distribution of ozone with altitude was modified. However, Gutowsky notes, the presence of ClONO_2 in the atmosphere has not yet been established.

Uncertainties. The Gutowsky report says the major sources of uncertainty in the ozone-removal predictions (for which numerical estimates can be made) are: in the measurements of seven of the reaction-rate constants (a fivefold range); approximations of the one-dimensional calculations used in the calculations (a threefold range); treatment of photochemical processes and measurements of concentrations of natural stratospheric species (a twofold range for each).

In two years, the report maintains, "if



GUTOWSKY

we pressed forward vigorously," we could: reduce the possibility of an unidentified factor being found and reduce the overall identified uncertainty of the predictions from a tenfold range to a fourfold or fivefold range; have begun to use more sophisticated models of stratospheric transport and chemistry.

By the same token, in five to ten years, the report believes we might clarify, "at least in significant part": detailed climatic consequences of ir absorption by the CFM's and consequent effects on agricultural productivity and possible changes in sea level; consequences of changes in the altitude distribution of ozone.

—GBL

References

1. V. Ramanathan, *Science* **190**, 50 (1975).
2. F. S. Rowland, J. E. Spencer, M. J. Molina, "Stratospheric formation and photolysis of chlorine nitrate, ClONO_2 " *J. Phys. Chem.*, in press.

Seven new members join National Science Board

President Gerald Ford's nomination of seven persons to serve six-year terms on the National Science Board, the policy-making body of the National Science Foundation, won Senate confirmation.

They are Raymond L. Bisplinghoff, chancellor, University of Missouri at Rolla; Lloyd M. Cooke, corporate director-community affairs, Union Carbide Corp., N.Y.C.; Herbert D. Doan, partner, Doan Associates, Midland, Mich.; John R. Hogness, president, University of Washington, Seattle; William F. Hueg Jr, professor of agronomy and dean, Institute of

Agriculture, University of Minnesota, St Paul; Marian E. Koshland, professor of bacteriology and immunology, University of California-Berkeley and Alexander Rich, professor of biophysics, Massachusetts Institute of Technology, Cambridge.

Averch takes up NSF education post

The Senate has confirmed recently the nomination by President Gerald Ford of Harvey A. Averch as Assistant Director for Science Education of the National Science Foundation. Averch has been acting Assistant Director for Science Education at NSF since Lowell J. Paige resigned the position in August 1975.

Averch holds a doctorate from the University of North Carolina and worked for the Rand Corp as senior staff economist before he joined NSF in 1971. From 1971 to 1974, he was director of NSF's Division of Social Systems and Human Resources. Averch became deputy assistant director in the Research Applications Directorate of NSF in 1974.

in brief

The deadline for receipt of nominations for the National Science Foundation's second annual Alan T. Waterman Award is 31 December. The award, which is presented to a young scientist, mathematician or engineer, carries with it a medal and up to \$50 000 a year for three years of research or advanced study. Further information may be obtained from Lois Hamaty, Office of Planning and Resources Management, NSF, Washington, D.C. 20550.

Recent appointments at the International Atomic Energy Agency are Terence Garrett (United Kingdom) as secretary of the General Conference, Charles H. Millar (Canada) as head of the division of nuclear safety and environmental protection, and Svasti Srisukh (Thailand) as director of the division of technical assistance.

The National Research Council in 1976: Current Issues and Studies is available from the NRC Office of Information, 2101 Constitution Avenue N.W., Washington, D.C. 20418.

The International Nuclear Information System's *Atomindex* has converted from a bibliography to the world's only nuclear-science abstracting service. Now incorporating into its data base the service provided by ERDA's discontinued *Nuclear Science Abstracts*, the semi-monthly *INIS Atomindex* is available from UNIPUB, Box 433, Murray Hill Station, New York, N.Y. 10016. The subscription rate is \$110.00 for 24 issues.