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Appendix: AFEAS Report

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
UNITED KINGDOM - DEPARTMENT OF THE ENVIRONMENT
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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WORLD METEOROLOGICAL ORGANIZATION
ALTERNATIVE FLUOROCARBON ENVIRONMENTAL ACCEPTABILITY STUDY (AFEAS)

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I. INTRODUCTION

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INTRODUCTION

This report is the outcome of the Alternative Fluorocarbon Environmental Acceptability Study (AFEAS). AFEAS was organized to evaluate the potential effects on the environment of alternative compounds targeted to replace fully halogenated chlorofluorocarbons (CFCs). The objective was to:

Evaluate all relevant current scientific information to determine the environmental acceptability of the alternative fluorocarbons with special emphasis on:

- the potential of the compounds to affect stratospheric ozone,
- their potential to affect tropospheric ozone,
- their potential to contribute to model calculated global warming,
- the atmospheric degradation mechanisms of the compounds, in order to identify their products and hence,
- the potential environmental effects of the decomposition products.

The alternative compounds to be studied were hydrofluorocarborns (HFCs) with one or two carbon atoms and one or more each of fluorine and hydrogen and hydrochlorofluorocarbons (HCFCs) with one or two carbon atoms and one or more each of fluorine, chlorine and hydrogen. Because they contain hydrogen atoms, HFCs and HCFCs are less stable in the atmosphere than CFCs and thus have greatly reduced ozone depletion potentials. Additionally, HFCs do not contain chlorine atoms which are the key factor in ozone depletion. All compounds meeting the above criteria were evaluated where data exists but emphasis was placed on evaluating the following.

HCFC 123	CCl_2HCF_3
HCFC 141b	CCl_2FCH_3
HCFC 142b	$CClF_2CH_3$
HCFC 22	$CClF_2H$
HCFC 124	$CClFHCF_3$
HFC 134a	CF_3CFH_2
HFC 152a	CF_2HCH_3
HFC 125	CF_3CF_2H

The 52 scientists worldwide who were involved in AFEAS are listed in at the end of this report in Annex A. Experts prepared review papers on all aspects of the topic and each paper was reviewed by one or more scientists. In addition, model calculations were carried out on ozone depletion and halocarbon global warming potentials. A meeting was held in Boulder, Colorado in May 1989 under the chairmanship of Dr. R. T. Watson of the National Aeronautics and Space Administration (NASA) for experts and reviewers to discuss and reach a consensus. The papers in this report are the outcome of that meeting. Summaries of these papers form part of the August 1989 UNEP Science Assessment.

AFEAS was conducted by independent scientists but was organized and sponsored by fifteen CFC producers from around the world as part of cooperative industry efforts to study the safety and environmental acceptability of CFC alternatives. Companies participating in AFEAS are listed in Annex B.

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The statement of work used to initiate this project and the work assignments are given in Annex C.

This report consists of the individual papers prepared for the Boulder meeting, revised to take account of reviewers' opinions and discussion. They are arranged in sections according to subject matter. Where there is more than one paper on a topic, a combined summary and conclusions was prepared to introduce the papers in that section.