

# COMMISSION OF THE EUROPEAN COMMUNITIES

COM(77) 387 final

Brussels, 8 August 1977

Proposal for a  
COUNCIL RECOMMENDATION

on the fluorocarbons in the environment

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(submitted by the Commission to the Council)

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EXPLANATORY MEMORANDUM

A. INTRODUCTION

1. Transport phenomena in the stratosphere

1.1. Rowland and Molina's theory, published in 1974, states on the basis of studies using a one-dimensional model - that the ozone layer of the stratosphere is reduced by the chlorofluoromethanes F-11 and F-12. As the compounds are very stable and are not destroyed in the troposphere, a proportion of them migrate into the stratosphere where they are decomposed by short-wave radiation to liberate chlorine atoms. These are then available to react with the ozone in a chain reaction thus reducing the ozone concentration and hence increasing the amount of short-wave radiation reaching the earth's surface. While the calculations made by Rowland and Molina have been confirmed by other researchers, they all use essentially the same basic data and similar one dimensional models.

1.2. It has not been possible to measure experimentally the reduction of the ozone layer attributable to chlorofluoromethanes or to other natural or man-made pollutants. The natural variations in the ozone concentration are much greater than might be expected to result from the action of such compounds at least in the short term (e.g. the daily variations at average latitudes are ± 25 %).

1.3. In September 1976 the American National Academy of Sciences published a report concluding that there is still considerable uncertainty about the scale of the potential effects of F-11 and F-12 on the ozone layer. Their predictions are, however, that if emissions were to continue at the 1973 level, there would be an ultimate ozone reduction of about 7 %, and that, at all events, this reduction would be between 2 - 20 %. In particular this reduction will reach 3.5 % after roughly 50 years.

1.4. There is a certain amount of controversy on the theory of Rowland and Molina. The main problems concern :

- the inadequacy of a one-dimensional transport model ;
- insufficient knowledge about atmospheric and stratospheric processes, especially all the essential chemical reactions;
- the possible existence in the troposphere of a mechanism which would trap F-11 and F-12.

1.5. Various research programmes are under way in the Member countries, especially in the Federal Republic of Germany, France and the United Kingdom.

These programmes are essentially concerned with :

- the measurement from the earth and in situ of the concentrations of the minor atmospheric constituents;
- laboratory studies on spectral properties and reactions rates;
- the development of mathematical models.

In view of the desirability of a Community programme in this field, different meetings of national experts organized by the Commission were held in Brussels to investigate the possibilities. There was general agreement on the need to develop Community thinking on the scientific aspects and on research and to ensure that, as far as possible, research in member countries should form a coherent, if not completely comprehensive, programme. The possibility of concerted action or limited support under the indirect action programme is being considered.

1.6. An international meeting under the auspices of the United Nations Environment Programme was held in Washington between 1-9 March 1977 on the stratospheric ozone layer and the various influences upon it. There was a large measure of agreement that depletion of the ozone layer by emissions from the current generation of aircraft emissions is probably negligible, but that fluorocarbons emissions are a matter of concern. The meeting did not discuss actions to control emissions of potential damaging substances into the atmosphere. However, it considered that it would be desirable to investigate all possible methods for such control and their consequences.

### 3.

The meeting defined gaps and made recommendations for a World Plan of Action on the ozone layer.

## 2. Effects on health and the environment

### 2.1. Increased ultraviolet radiation can be associated with:

- increased incidence of malignant melanoma;
- increased incidence of some skin carcinomas (basal and squamous-cell types);
- various effects on plants and on animals.

Relationships between non-melanoma and UV radiation are not independent of social class, colour of skin, etc.

### 2.2.2 Given the band of intense absorption by the fluorocarbons in the infrared region, one could expect a reduction in the infrared flux released to space by the earth-atmosphere system. This would give rise to an increase in the temperature of the earth's surface and the atmosphere (greenhouse effect).

The possible implications of the greenhouse effect on climate were investigated by Ramenathan in 1975. The results of the studies show that if the chlorofluoromethanes continued to be released at the 1973 level, at the steady-state the temperature of the earth would increase by about 1° K. The significance of this figure has yet to be evaluated against other possible influences on climate such as increases in CO<sub>2</sub> concentration, changes in cloud cover and concentration of particulates in the atmosphere.

### 3. Manufacture - economic aspects

- 3.1. Approximately 40% of the world output of chlorofluoromethanes is consumed in Europe (approximately equal to US consumption) and a major part of this (70 to 80%) is used by the aerosol industry particularly in domestic or personal hygiene products. Furthermore, refrigeration and air-conditioning equipment account for between 10 and 20 % ; the remainder is mainly used as an expansion agent in the manufacture of polyurethane foams.

Table 1 shows the available data on production and consumption in 1974 of F-11 and F-12 aerosol propellants in the Member States of the European Community. The Manufacturing Chemists Association has also calculated that, between 1930 and 1975,  $3,450 \times 10^3$  tonnes of F-11 and  $5,080 \times 10^3$  tonnes of F-12 were produced in the world, 85 % and 87% of which respectively were released, i.e.  $2,930 \times 10^3$  tonnes of F-11 and  $4,420 \times 10^3$  tonnes of F-12.

Between 1967 and 1973 production of these two compounds increased by some 10% per year whereas in 1974 the increase over 1973 was 5%. The MCA has also found that in 1975 production decreased by some 15% over 1974.

- 3.2. Whereas -as regards ozone reduction by the direct action of industrial chemicals- the greatest attention has been directed to the F-11 and F-12 CFM's, other halogenated hydrocarbons, such as carbon tetrachloride, methychloroform and chlorofluoromethane F22, and naturally arising compounds may need to be investigated.

The industry is in the process of investigating the possibilities of using other halogenated and non-halogenated hydrocarbons. It is clear that proof will have to be furnished that any substitute compounds are safe, as regards not only the ozone layer but also the direct risk to man and environment. As regards aerosols, the possibilities of using mechanical systems should not be overlooked.

3.3. As regards employment, studies have been undertaken in several Member countries of the number of jobs which are related either directly or indirectly, to some aspect of fluorocarbon manufacture or usage. In the United Kingdom, for example, this figure is put at 50,000. In France, some 20,000 jobs are associated with aerosol production and use. The impact on employment of using some other product in place of F-11 and F-12 will depend on :

- a) the time scale within which such substitution is made (an immediate changeover would have considerably more disruptive effects than a changeover which takes place over an extended period) and
- b) the nature of the substitution itself (mechanical systems, for example, would involve greater changes in industrial structure than the substitution of F-11 and F-12 by some other halogenated hydrocarbon).

A comprehensive study (which is now available) for the Netherlands shows that if a ban on existing fluorocarbon propellants is imposed in this country in about 18 months, the immediate result would be a loss of some Fls 75-80 millions of added value per year and the loss of some 725-950 jobs. In the case of satisfactory replacement of new fluorocarbons propellants and a ban of existing fluorocarbons propellants in about 4 years, the loss of added value would be reduced to some Fls 12-16 millions per year and the loss of some 200-400 jobs could be expected.

B. REGULATIONS OF FLUOROCARBONS1. Proposed regulations in U.S.A.

On May 11, 1977 the Food and Drug Administration (FDA), Environmental Protection Agency (EPA) and Consumer Product Safety Commission (CPSC) proposed a three-step timetable for the phase out of non-essential uses of chlorofluorocarbons as propellants in aerosol products.

This ban is expected to eliminate 60% of the chlorofluorocarbon emissions in the U.S.A. The primary affected products are deodorants, antiperspirants, hair sprays, colognes and fragrances, regulated by FDA ; and household cleaners and air fresheners, regulated by CPSC. The proposed three-step timetable for eliminating chlorofluorocarbons as propellants is as follows:

- before October 15, 1978 no company may manufacture chlorofluorocarbons for use in aerosol products;
- before December 15, 1978, companies must stop using these chemicals as propellants in aerosol products;
- before April 15, 1979 products containing chlorofluorocarbons propellants may not be introduced into commerce. Products already on the market on this date will not have to be recalled.

Exempted from the proposed ban will be essential aerosol products such as products intended for medical use.

These proposed regulations are published in the Federal Register May 13, 1977. Hearing procedures are planned in the summer 1977.



2. The EEC's position

At the EEC level, different meetings of national experts have been held this year.

In January 20-21 the Commission called for a meeting of national experts to discuss the problem of the impact of fluorocarbons on man and the environment with a view to reaching an EC policy on this matter.

On February 17 and April 14, 1977 meetings of the Working Party on the Environment of the Council have been held with the aim of establishing an EEC common position. The Working Party had a working document presented by the Commission departments at their disposal for these consultations.

Meeting in Washington April 26-28 1977, at government level and at the invitation of the U.S. Environmental Protection Agency, the world's major producers and consumers of chlorofluorocarbons concluded that the question of whether regulatory action is needed to counteract the ozone depletion by these chemicals is one to which no easy answer can be given. Most delegations felt that although current knowledge is adequate to give cause for concern about the effects of the use of chlorofluorocarbons on the ozone layer, much remained to be learned especially as far as atmospheric physics and chemistry are concerned and the impact of ultra-violet radiations on health and the ecosystems. They felt that there was a need for more research to clarify some of the uncertainties, and that the second half of 1978 would be a good time to review the fluorocarbons problem. Invited to the Washington Conference, the Commission was able to present to the participating countries the common position which the Member States agreed upon.

This common position is the basis of the present proposal for a recommendation of the Council.

TABLE 1

Production of P-11 and P-12 in 1974 (tonnes) and consumption of these chemicals in aerosols

	<u>D</u>	<u>B</u>	<u>DK</u>	<u>F</u>	<u>I</u>	<u>Ir</u>	<u>Lux</u>	<u>NL</u>	<u>UK</u>
Production	105000	0	0	20000	45000	0	n.a	29000	46000
Import/Export	-35000	+3155	+4246	-35000	- 2920	n.a	n.a	-15000	n.a
Aerosol consumption	48000 (68%)	n.a	1797 (42%)	34500 (77%)	29400 (70%)	n.a	n.a	10850 (77%)	39260 (n.a)

Sources : OECD and other

118. The total production in Western Europe can be estimated at 360000 tonnes.

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The Council of the European Communities,

Having regard to the Treaty establishing the European Economic Community,

Having regard to the proposal for recommendation from the Commission,

Having regard to the Opinion of the European Parliament,

Having regard to the Opinion of the Economic and Social Committee,

Whereas, as stated in the Resolution of the Council of the European Communities and of the Representatives of the Governments of the Member States meeting with the Council of 17 May 1977 on the continuation and implementation of a European Community policy and action programme on the environment (1), it is necessary to carry out a standing review at Community level of the environmental impact of chemicals;

Whereas the problems of the effects of fluorocarbons on the ozone layer and the relationship between ultraviolet radiation and health are currently under evaluation at international level; whereas although a definitive assessment of the impact of fluorocarbons on man and the environment is not yet possible the correlated problems nevertheless need to be considered;

Whereas Member States are carrying out national research on the problem of the possible threat of fluorocarbons on the ozone layer;

Whereas, as regards the economic and social impact of possible measures to regulate fluorocarbons and aerosols, the Commission is undertaking a comprehensive study on a Community wide basis and will make available the results of its study in the second half of 1978;

Whereas the Commission in the second half of 1978 will evaluate the effects of fluorocarbons on man and the environment with a view to reaching a Community policy in the light of the information then available;

Whereas, within the context of the proper functioning of the European Economic Community, certain Members States on the basis of data presently available are contemplating regulatory measures,

Recommends the Members States:

- 1) to pursue and intensify the actions already undertaken for a cooperation on a Community basis in planning this research and in making available and interpreting the results;
- 2) to take immediate steps to encourage all elements of the aerosol and plastic foam industries using chlorofluoromethanes F-11 and F-12 to step up research into alternative products and to promote the development of alternative application devices;

3.

- 3) to take immediate steps to encourage industry and users of equipment containing Chlorofluoromethanes F-11 and F-12 to eliminate the leakage of these chemicals;
- 4) to take all appropriate measures to assure that there will no longer be an increase in production capacity situated within the Community in respect to the Chlorofluoromethanes F-11 and F-12.