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Ad Hoc Working Group of Legal and Technical  
Experts for the Preparation of a  
Protocol on Chlorofluorocarbons to  
the Vienna Convention for the  
Protection of the Ozone Layer (Vienna Group)

Third Session  
Geneva, 27-30 April 1987

REPORT OF THE AD HOC WORKING GROUP ON THE WORK OF ITS THIRD SESSION

PART I: REPORT OF THE PLENARY SESSIONS

A. Introduction

1. The third session of the Ad Hoc Working Group on Legal and Technical Experts for the Preparation of a Protocol on Chlorofluorocarbons to the Vienna Convention for the Protection of the Ozone Layer (Vienna Group) was held at the Palais des Nations, Geneva, Switzerland from 27 to 30 April 1987. The purpose of the session was to enable the Vienna Group to continue and if possible complete its work, begun at its first session in Geneva, Switzerland, in December 1986 on the elaboration of a Protocol on Chlorofluorocarbons. It was agreed that the Bureau of the previous sessions of the Vienna Group should continue in office, namely: Mr. Winfried Lang (Austria), Chairman, Mr. Essam Hawas (Egypt) and Mr. Vladimir Zakharov (USSR), Vice Chairmen and Mr. Paul Mungai (Kenya), Rapporteur.

B. Organizational matters

1. Opening of the meeting

2. The third session was opened by the Chairman of the Vienna Group, Mr. Winfried Lang, who emphasized that the aim of the Group was to protect future generations against the adverse effects of ozone depletion. All participants would have to make concessions on questions of substance. They

would also have to realize that only a step-by-step approach was feasible. Their forum could not determine in full detail events that would only occur ten or more years later. It was only realistic that future action should be reviewed or reconfirmed by States parties to the protocol as further scientific evidence became available. At the end of the previous session he had noted increased flexibility concerning not only readiness to embark on reduction and cuts, but also to include manufactured products in the formulas for adjusted production of chlorofluorocarbons (CFCs). There was growing awareness as well of the need to give developing countries special treatment in view of their specific requirements, and to settle as early as possible the issue of trade, in particular trade with non-parties to the Protocol.

Mr. Lang welcomed Dr. M.K. Tolba, Executive Director of the United Nations Environment Programme.

3. In his statement Dr. Tolba stressed that when the meeting in Vienna broke up he had been concerned that the scientific community had appeared divided on the issue of ozone. European and American delegates had left the meeting with quite different predictions about the rate of ozone depletion and different opinions about the regulatory measures needed to protect human health and the environment. Most of all he had been concerned that scientific debate on those issues might be used as an excuse for doing nothing. He was pleased to see later that a consensus among the scientific community had been confirmed by the major ozone modellers UNEP had brought together in Würzburg in the Federal Republic of Germany. Each of them had applied their models to nine different scenarios of CFC control, ranging from moderate limitation to severe restriction and all had obtained results that were very similar. The degree of discrepancy between the models was, for the most part, smaller than the marginal error in each model. It was therefore no longer possible to oppose action to regulate CFC release on the ground of scientific dissent. Modellers had communicated the preliminary results of their findings to the Chemical Manufacturers' Association, which had been receptive to their models and hoped for a more detailed analysis of CFC production in the Third World, a question that called for close attention. Dr. Tolba presented for immediate action two proposals: the first to act on what was known; the second to expand knowledge into areas as yet unknown. It was known that the ozone layer was under threat from CFC emissions with consequences that could involve the future of life on earth; it was also known that the risks involved could be reduced by reducing CFC and Halon emissions. The course of action should therefore be clear. UNEP wanted to see an international agreement reached at that meeting whereby rates of production and use in the developed world, and by any major producers or users in the developing countries, would be frozen at current levels and reduced to a very small fraction of the frozen levels within the next decade. In concrete terms, the protocol should be agreed at the Geneva meeting. It should be adopted and signed in the summer or early autumn of 1987 and, hopefully, ratified by the parties to it during 1987 and early 1988, so that it could come into force in 1988. In 1990, two years after the entry into force of the protocol, there should be a complete freeze on production and use at 1986 levels. Thereafter, there should be a 20 per cent cutback in production every two years, reducing it to zero by the year 2000. Every four years from the date of entry into force of the

protocol, there should be a rigorous scientific review, the first in 1992 and the second in 1996, in order to confirm, or otherwise, the need for further reduction. At the same time, the search for substitutes and research into recovery technologies and the physics and chemistry of the atmosphere should continue and be accelerated. Dr. Tolba emphasized that the path to regulation was clear and that the time for rational and responsible action had come.

4. Mr. Peter Usher of the UNEP secretariat informed the Vienna Group that the purpose of the scientific meeting held at Würzburg on 9 and 10 April 1987 had been to make available to the Vienna Group: (i) assessment of the implications for the atmosphere of a range of CFC control strategies based upon the sixth revised draft protocol on the control of CFCs; (ii) assessments based on analysis by different models employing identical scenarios of emission controls; (iii) evaluation of the differences, similarities and reliability of model results through intercomparison by experts. He advised the Group of conclusions reached by the scientists participating in the meeting, the most important of which he summarized as follows: the ozone layer could be protected by regulatory measures applied to CFCs; a true global freeze of fully halogenated CFC emissions was predicted to contain ozone depletion to less than 2 per cent by the year 2050; it appeared not sufficient to regulate CFC 11 and 12 alone. Other substances should also be considered as candidates for regulation; if CFCs continued to be emitted, there were prospects for adverse environmental impacts irrespective of whether or not the ozone layer was depleted. The meeting had confirmed that within the limits of models accurately simulating the real stratosphere all models within acceptable limits predicted similar ozone depletions for given CFC control strategies. Therefore Mr. Usher concluded, it was possible to use a representative model to examine any proposed control strategy and estimate ozone change. He added that the report of the scientific meeting would be sent to members of the Co-ordinating Committee on the Ozone Layer with a view to obtaining their opinion on the findings.

## 2. Attendance

5. The third session of the Vienna Group was attended by experts from Argentina, Australia, Austria, Belgium, Brazil, Canada, Colombia, Denmark, Egypt, Finland, France, Germany, Federal Republic of, Ghana, Hungary, Italy, Japan, Kenya, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Norway, Poland, Qatar, Spain, Sweden, Switzerland, Union of Soviet Socialist Republics, United Kingdom, United States of America and Venezuela. Representatives were also present from the World Meteorological Organization, European Economic Community, Economic Commission for Europe, European Federation of Chemical Industry Associations, Environmental Defense Fund, European Environmental Bureau (EEB), Federation of European Aerosol Associations, International Chamber of Commerce, International Organization of Motor Vehicles Manufacturers, Institute for European Environmental Policy, Natural Resources Defense Council, USA House of Representatives, USA Senate and the World Resources Institute.

C. Adoption of the agenda

6. The Working Group adopted the following agenda:

1. Opening of the session.
2. Adoption of the agenda.
3. Review of progress made at the second session.
4. Consideration and finalization of the sixth revised draft protocol on chlorofluorocarbons.
5. Adoption of the report.
6. Other matters.
7. Closure of the session.

D. Organization of work

7. The Chairman suggested that a brief plenary session be held in order to discuss developments since the second session of the Vienna Group, held in February 1986 in Vienna, which might contribute to the solution of outstanding matters, to be followed by the establishment of Ad hoc sub-working groups to address unresolved major issues. He proposed that the following sub-working groups be constituted:

- (a) an Ad Hoc Scientific Sub-Working Group chaired by Mr. Zakharov (USSR);
- (b) an Ad Hoc Sub-Working Group on Formula and Trade issues chaired by Mr. Hawas (Egypt);
- (c) an Ad Hoc Sub-Working Group on Control Measures to continue the consideration of Article II, Control Measures, of the draft protocol on chlorofluorocarbons (Chairman's consultations);
- (d) an Ad Hoc Sub-Working Group on the Special Situation of Developing Countries, also chaired by Mr. Hawas (Egypt).

Participants endorsed the Chairman's proposals for the organization of work and thanked him for his clear assessment of the issues before the Group.

E. Consideration and finalization of the sixth revised draft protocol on chlorofluorocarbons

8. In considering the finalization of the sixth revised draft protocol on chlorofluorocarbons the Committee had before it the report of the Ad Hoc Working Group on the work of its second session (UNEP/WG.167/2).

9. The New Zealand representative expressed hope for early agreement on the protocol. The Chairman's draft text for Article II had been a helpful guide for progress. A New Zealand version of the article had been circulated to delegates, including a programme for CFC reductions over the next ten years.

10. The United States representative said that in Washington analyses and discussions had revealed that many aspects of the protocol, including the difficult issue of defining an emissions formula, and questions of trade and enforcement, were even more complex than was originally thought. Nevertheless, it was also believed that the following general principles and approach consistently advanced by the United States remained valid in the face of the risks from ultraviolet radiation: first, a freeze at 1986 levels of all fully halogenated substances (including halons), weighted collectively according to the ozone-depleting capacity of each individual compound; second, scheduled reductions of those chemicals, step-by-step, down to the point of eliminating emission from all but limited uses for which no substitutes were commercially available - that schedule being linked with, third, frequent reviews of the science, economics, and technology to enable the parties to rationally implement the scheduled reductions. The United States Government remained determined to arrive at an international protocol that would protect the ozone layer, including the maximum possible number of participating States, and also make it unprofitable for those countries which did not accept their share of responsibility.

11. The representative of the Commission of the European Community said that the Community had re-examined its position since the second session of the Vienna Group. It had been greatly helped in that task by the existence of the draft Article II on control measures produced by the Chairman in the light of the discussions in Vienna, and concluded that there was a good prospect of reaching agreement on that central aspect of the protocol, with a text based on the Chairman's ideas. The Community agreed that the control measures should be applied in three stages. The first stage should be a freeze of CFCs at 1986 levels, to take effect within two years of the entry into force of the protocol. At the same time there should be a ban on CFC imports from those countries which had not signed or implemented the protocol. The Community continued to regard control of production as the measure which provided the best safeguard for the ozone layer. What was not produced, could not be emitted, and the stratosphere took no notice of the different sources of CFCs, whether by country or by end use. First, in both the national and the international context, regulations which restricted supply acted through the market to provide an incentive for all end users to move into substitute products. Second, the right to use CFCs should be seen as a scarce and diminishing natural resource, for which the most efficient allocation between competing demands was through market forces. Third, the restrictions must be capable of easy enforcement by all parties. For all those reasons restrictions on production were preferable to restrictions on use, both domestically and internationally. The Community was attempting to find a possible compromise formula by agreeing that all countries should control both imports and production, although that element of the proposal was still subject to further examination of its legal and administrative implications. In any case, the Community must be treated as a single unit. The delegate of the Commission hoped that all participants would recognize that movement in the Community position and the extreme difficulty it would have in moving any

further towards consumption control. The second stage of the control measures should be an automatic reduction in CFC production and imports by 20 per cent of 1986 levels, after the initial freeze. That was the Community's assessment of the strictest level of control which could be agreed to by the largest possible number of countries. It would be pointless to go further, if the possible benefits of doing so were negated by the refusal of significant CFC producers and consumers to sign the protocol. The third stage of the control measures should be the establishment of a regular review procedure every four years, whereby the latest scientific, technical and economic data would be examined, and decisions taken as to the extent and timing of any further reductions which might be needed. The Community's proposal was designed to attract the widest possible support from all sides, in the belief that the priority must be the early adoption of a protocol which all could sign, and which would be straightforward enough to permit early and enforceable implementation.

12. The representative of Argentina wished to express his satisfaction at the progress made during the second meeting of the Vienna Group, and particularly with the general consensus among countries as to the need to give special consideration to the situation of the developing countries as regards control measures to be adopted in the protocol, which should not run counter to their development needs. In that context, he reiterated the need to bear in mind that considerations equity should enjoy priority in the adoption of control measures, since it was not possible to seek to control emissions in the developing countries to the same extent as in the industrialized countries, which had attained per capita levels several times higher than those in the former and were responsible for more than 80 per cent of atmospheric pollution. Mention should also be made of the report of the Developing Countries' Sub-Group to the second session of the Vienna Group in connection with the importance of providing the developing countries with assistance in the fields of research, development and exchange of information, and stressing the need for measures to facilitate access of the developing countries to new technologies and substitute products.

13. The representative of Japan emphasized that Japan hoped that an agreement could be reached on an international protocol for the effective control of chlorofluorocarbons as early as possible. The protocol must be a realistic one, acceptable to as many countries as possible. If it provided for strict measures, it could not be supported by many countries. Various factors must be taken into consideration in determining the control measures, such as scientific uncertainty concerning the ozone depletion process, the social and economic impact of the implementation of the control measures and the availability of alternative substances for CFCs. As was suggested by many countries and in the Chairman's draft article II, a phased approach was necessary. In that context, it was very important that contracting parties to the protocol should have common access to technological information on substitute chemicals and recycling technology. A system of international co-operation should be established with a view to making technological information available to all contracting States, thus avoiding the monopoly of that information by specific countries. It was also important that under international co-operation, a system should be established to promote scientific research and exchange of information among scientists. Finally, it was regrettable that Japan had not been invited to the Ad Hoc scientific meeting at Würzburg. The report of the meeting would have to be carefully examined by their expert.

14. The representative of Egypt welcomed the spirit of flexibility shown by some preceding speakers. Referring to the outcome of the Working Group's consideration of the situation in developing countries, he said that there was consensus in the Working Group on solutions concerning the assistance to be allocated to developing countries and that consensus was reflected in specific amendments and new additions to the draft protocol. The conclusions of the Working Group should be taken care of when finalizing the draft. He emphasized that the case of developing countries should be treated in a flexible and fair way. Leaving room for exemption from control measures would not by itself increase dramatically the emission of CFCs. In the final analysis the real incentive would be to find substitutes and make them available at economic cost and also to assist in implementing new technologies.

15. The representative of Switzerland informed the meeting of his position with respect to the proposal for Article II made by the Chairman at the end of the second session of the Working Group. He supported the basic strategy, namely immediate freeze, reduction schedule and periodic reviews. He expressed his preference for the adjusted production formula and with respect to paragraph 3 proposed a 50 per cent reduction within five years. He maintained the basic ideas of both options of paragraph 4 and stressed particularly the need to add a list of substances not contained in Annex A as candidates for further regulation.

16. The Austrian representative stated that a rapid and efficient reduction of CFC-consumption was one of the priorities of the national environmental policy. It was therefore envisaged that during the forthcoming 12 months the use of CFCs as propellant should be further reduced, on a voluntary basis, by about 25 per cent of total aerosol consumption.

17. The representative of the Federal Republic of Germany said that his country was keenly aware of the potentially harmful and dangerous impact on human health and the environment caused by the emission of CFCs with the resulting modification of the ozone layer. Dr. Tolba had stated the danger in a very impressive way. The Federal Republic was determined to take its obligations under the Vienna Convention for the Protection of the Ozone Layer seriously and consider and implement the necessary measures to protect human health. While the Government of the Federal Republic acknowledged that a strict causal relationship connecting CFC emissions and human health effects has not yet been scientifically established, it should also be recognized that owing to the large time constants involved such a causal link would in all probability only be proven when it was too late to take efficient counter-measures. Precautionary action was therefore urgently needed. It was the considered opinion of the Federal Government that the joint efforts of the international scientific community had accumulated sufficient proof of CFC involvement in ozone layer modification to justify immediate and world-wide action to restrict severely all CFC emissions. In the Federal Republic of Germany, the legal basis was such that it would be possible to achieve a reduction in, or even a partial or total ban on, the use of CFCs. He had noted with great interest the position of Switzerland and Austria concerning the amount of the percentage reduction and its timing.

18. The representative of the USSR urged that the approach towards the development of a protocol should not be made over-complicated. What was needed, was to make and consider concrete proposals for regulations using scientific knowledge or assessment as the basis. To agree to a freeze, it was first necessary to suggest a scientifically based list of chemicals for regulation then to determine future restrictions. It was important to start with a process agreeable to the majority even if the start had to be made at modest levels.

19. The representative of Sweden said that there were great expectations in his country that a powerful UNEP instrument be created very soon to relieve the CFC threat to the ozone layer. The instrument to be agreed upon should be simple and effective. Moreover, it should indicate clearly to producers that they should look for good alternatives to CFCs. It was equally important, he said, that the instrument should address the responsibility of every country to decrease its use of CFCs and shift to other products and methods. He was most encouraged by Dr. Tolba's statement and recommended that it should be taken as a declaration of intent for future action; his outline comprised an effective plan for the phasing out of CFCs if necessary, but it also contained timely control stations which held the way open for other solutions if warranted.

20. The representative of Italy remarked that in spite of persisting differences of views, agreement should and would be possible if from all sides a constructive attitude was taken. The position of Italy was fully reflected in the EEC proposal, which had the advantage of being feasible and practical since no verification measures concerning CFC controls were foreseen in that scheme of the protocol. The Community suggestions, he said, also had the advantage of leaving no loopholes in the implementation of measures limiting the production and uses of CFCs. He supported the Japanese proposal for international co-operation in the search for substitutes that would permit a gradual reduction in the use of fully halogenated hydrocarbons.

21. The representative of Norway stressed that ozone depletion would be large at higher latitudes unless significant measures were taken at international level. He welcomed Dr. Tolba's proposal as a more appropriate course. He expressed the opinion that the Chairman's proposal for regulation at that stage might be too weak to give effective protection to the ozone layer. The proposal should be strengthened to include all major ozone depleting substances, and provide for automatic and significant step wise reduction of the substances based on their ozone depletion potential. In order to obtain an appropriate protocol he would co-operate with other delegations and the Chairman in a flexible way.

22. In accordance with the organization of work (noted earlier in the report) sub-working groups met to discuss particular issues related to the development of a protocol. The reports and/or results of the sub-working groups submitted to the Plenary Session of the Vienna Group follow in Part II.

F. Adoption of the report

23. The Vice-Chairman of the Vienna Group - Chairman of the Ad Hoc Sub-Working Group on Scientific Matters - Mr. V. Zakharov (USSR) - introduced the report of his Working Group. The Vienna Group in plenary took note of the report (for the text of the report, see Part II, Section A., below).

24. Dr. Tolba acting as Chairman of the Ad Hoc Sub-Working Group on Control Measures and Chairman of the Informal Consultations of the Heads of Delegations on control measures, introduced the report of the Ad Hoc Sub-Working Group. The Vienna Group took note of the report and annex (for the text of the report and annex, see Part II, Section B., below).

25. The Vice-Chairman of the Vienna Group, Chairman of the Ad Hoc Sub-Working Group on Formula and Trade Issues, Mr. Hawas (Egypt) introduced the report of the Ad Hoc Sub-Working Group. The Vienna Group in plenary session took note of the report (for the text of the report and annexes, see Part II, Section C., below).

26. The Vice-Chairman of the Vienna Group, Chairman of the Ad Hoc Sub-Working Group on the Special Situation of Developing Countries, Mr. Hawas (Egypt) introduced the report of the Sub-Working Group. The Vienna Group took note of the report (for the text of the report see Part II, Section D., below).

27. The expert from the USSR drew the attention of the experts to the document submitted by the USSR to the Vienna Group at its first session, in December 1986, which was taken into account during the negotiations of the Vienna Group in February at its second session. He recalled that the USSR had proposed during that session not to refer to the year 1986 as such, but only to refer in the protocol to the appropriate years after the entry into force of the protocol.

28. The representative of Colombia said that Colombia had followed the question of the preservation of the ozone layer with special interest and attention, even before the adoption of the Vienna Convention, as well as in the earlier deliberations of the Ad Hoc Working Group. At the current session, views had been exchanged and studied on various aspects concerning, in particular, the reduction formula, trade and control measures and their application, and repercussions on the developing countries. Divergences in the approach to the treatment to be given to CFC production, imports and consumption appeared to show that economic motives and implications failed to correspond to the ultimate objective of the legislation, in which the criterion of fairness should rule. In all the working groups, despite the fact that the working languages were English, French, Russian and Spanish, there was no translation of working papers into Spanish, and in some cases no interpretation either. Accordingly, bearing in mind the importance and implications for development of the measures under consideration, the delegation of Colombia wished to state it gave its approval to the final report with reservations, so that, once the appropriate translation was available, the Colombian authorities and experts might express their opinion and make contributions on the question at the Diplomatic Conference. It was also the wish of the Colombian delegation that the foregoing statement should form part of the final report.

29. Delegates of Venezuela and France expressed the hope that in the future the papers of the Vienna Group would be available in the working languages sooner than had been the case during that session.

30. The representative of Ghana drew the attention of the Group to the very limited representation of the experts from the developing countries taking part in the preparation of the protocol.

31. The representative of Venezuela said that the mandate received by the Sub-Working Group on the situation of the developing countries contained in the report of the Vienna Group on its second session had not been treated in sufficient depth during the current meeting of the Group. It was necessary to keep in mind the interest, and the special situation of the developing countries.

32. The report of the Vienna Group on the work of its third session was adopted by consensus.

#### G. Other matters

33. Due to unforeseen circumstances Mr. Lang, Chairman of the Ad Hoc Working Group (Vienna Group) had to leave the meeting at the end of the second day, 28 April 1987. In his absence Mr. Hawas (Egypt), Vice-Chairman, took the chair.

34. The Vienna Group decided that further negotiations on control measures were needed and that those negotiations would be held under Dr. Tolba's chairmanship in Brussels, 29-30 June 1987.

35. It was decided that the Legal Drafting Group would meet in July 1987 to deal with outstanding legal and institutional matters and prepare the seventh revised draft of the protocol on chlorofluorocarbons to be submitted to the Diplomatic Conference in September. The Working Group welcomed the proposal by the representative of the Netherlands to host the meeting of the Legal Drafting Group in the Hague, 6 to 8 July 1987.

36. It was decided that the Diplomatic Conference on the protocol on chlorofluorocarbons would be held in Montreal from 14 to 16 September 1987 at the kind invitation of the Government of Canada. The Diplomatic Conference would be preceded by a preliminary meeting to deal with outstanding matters which would be held, also in Montreal, from 8 to 11 September 1987.

#### H. Closure of the session

37. Many experts expressed their appreciation of Dr. Tolba's presence at the third session of the Vienna Group, and his role in leading the informal negotiations and the deliberations of the Ad Hoc Sub-Working Group on Control Measures, which had made such remarkable progress during the session.

38. In his closing statement Dr. Tolba expressed his gratitude to all the participants and in particular to the heads of delegations for their understanding and co-operation during the informal negotiations on control measures. He thanked especially the Chairman, Mr. Lang, and the Acting Chairman, Mr. Hawas, for their endeavours to bring the session to a successful conclusion. He said that he would look into the problem of translation and spare no effort to ensure that documents for future sessions were available to participants in the working languages at a very early date. He said that he would do everything possible to ensure better participation by the representatives of developing countries, although he appealed to the developing countries themselves to respond positively to his invitation to participate actively in such important meetings in order to ensure that their interests and concerns were fully taken into account.

39. The Vice-Chairman of the Vienna Group, Mr. Hawas, expressed his satisfaction with the progress made by the Group in their work and declared the third session of the Ad Hoc Working Group of Legal and Technical Experts for the Preparation of a Protocol on Chlorofluorocarbons to the Vienna Convention for the Protection of the Ozone Layer (Vienna Group) closed at 7.30 p.m. on Thursday, 30 April 1987.

PART II: REPORTS OF THE AD HOC SUB-WORKING GROUPS

A. Conclusions of the Scientific Working Group

1. Both the total column content and the vertical, latitudinal, and seasonal distribution of atmospheric ozone respond to the total chlorine and total bromine loadings of the stratosphere.
2. Factors governing the relative efficiency of the compounds to deplete ozone are recognized to be:
  - (a) Rate of release of the compound into the atmosphere;
  - (b) Rate of removal of the compound in the troposphere and its persistence in the stratosphere;
  - (c) Efficiency of the compound in destroying ozone in the stratosphere.

Combining factors (b) and (c) results in a quantity known as the Ozone Depleting Potential (ODP).

3. There are four classes of ozone-depleting substances. Table I lists the specific chemicals included in each class, recommended values for the ozone-depleting potential of each chemical, and their approximate 1985 global production rates. Group (a) contains fully halogenated chlorine compounds with an ODP value near unity; group (b) consists of fully halogenated bromine compounds with an ODP value greater than unity; group (c) contains partially halogenated chlorine compounds with ODP values substantially less than unity that were in widespread commercial use in 1985; group (d) contains partially halogenated compounds not produced in commercial quantities in 1985 but which have potentially large applications in the future as substitutes for group (a) because they have ODP values significantly less than unity.

4. Inspection of Table I, in agreement with the priorities established in Vienna at the second session of the Vienna Group, 23-27 February 1987, shows that at present CFCs 11 and 12 combined are the largest contributors to the predicted depletion of ozone (i.e. ~70 per cent). This Table also indicates that current production of CFC-113 contributes about 12 per cent to the predicted depletion of ozone. It is clear that a protocol which allowed substitution of CFCs 11 and 12 by other fully halogenated CFCs, e.g. CFC-114 or CFC-115, would not protect ozone due to the large ODP values and long lifetimes of these substances. Although at current levels of production, a percentage reduction of CFC-11 and CFC-12 will reduce the risk of ozone depletion more than an equivalent percentage reduction in the production of the other compounds listed in Table I, the high growth rates in production of these other compounds will be a source of concern if these growth rates continue over long periods of time. Therefore, from a scientific perspective, the protocol should consider all of the fully halogenated chemicals which are very long-lived, as a group for the purposes of regulation.

5. Chemical compounds that have low ODP values, such as those in class (d) of paragraph 3 and CFC-22, have significant value as substitutes. A special case is CFC-115 which is used in CFC-502 as an azeotropic mixture with CFC-22. CFC-502 has an ODP value of 0.3.

TABLE I

Group	Chemical	Recommended ODP	Approximate 1985 Global Production Rates** (Million Kg/Yr)
(a)	CFC-11	1.0	340
	CFC-12	1.0	440
	CFC-113+	0.8	160
	CFC-114*	1.0	very low
	CFC-115*	0.6	very low
(b)	Halon-1301*	10	~10
	Halon-1211*	3	~10
(c)	CFC-22+	0.05	210
	Methyl Chloroform	0.1	550
(d)	CFC-123*	<0.05	0
	CFC-132b*	<0.05	0
	CFC-134a	0	0

+ Some chemicals, notably CFC-22 and to a lesser extent CFC-113, are also used as chemical intermediates. Therefore, not all of these chemicals produced are released to the atmosphere.

\* ODP values are preliminary estimates subject to further scientific review.

\*\* Approximate global production rates include estimates of production for the CMA-reporting companies [for CFC-11 and 12 only], the USSR, and some developing countries. Note that total production of each compound is not emitted in the year of production.

6. The ODP values for Halons 1211 and 1301, CFC-114, and CFC-115 are not as well established as the values for the other chemical compounds in table I. Hence, the recommended ODP values for these chemical compounds should be considered provisional. The Scientific Working Group requests that UNEP arrange expeditiously for improved calculations of these ODP values. In addition, UNEP should quantify the ODP values of alternative CFC formulations for judging their acceptability.

7. The ODP values for the Halons pose a special case because they depend synergistically upon the stratospheric chlorine abundance. The values recommended in Table I are based on estimated 1987 abundances of stratospheric chlorine (~2.5 ppbv). Higher stratospheric chlorine abundances would result in higher values for the ODP values of Halons 1211 and 1301.

8. An additional atmospheric property of the CFCs is their potential to contribute to the greenhouse warming. The Scientific Working Group requests that UNEP quantify this property as a guide for judging the acceptability of alternative CFC formulations. For example, CFC-22 not only has a low ODP value relative to that of CFC-11 and CFC-12, but also has a limited greenhouse effect. In contrast, the greenhouse potential of CFC-115 is greater than that of CFC-11 and CFC-12.

9. The Scientific Working Group underscores not only the importance of considering predicted total column ozone changes in selecting a control strategy, but also the changes in the vertical and latitudinal distribution of ozone. Current theory predicts that even when there are only small changes in column ozone, there is still significant change in the vertical distribution of ozone, which would modify the atmospheric temperature profile. Similarly, while a calculated global average ozone depletion is a useful initial guide for policy considerations, analyses with two-dimensional models indicate that column ozone depletions greater than the global average will occur at high latitudes and that smaller rates of depletion will occur close to the equator. These analyses also suggest significant seasonal changes in levels of depletion.

10. The Scientific Working Group reviewed the UNEP Report of the Ad Hoc Meeting to Compare Model Assessments of the Ozone Layer held in Würzburg, FRG, on 9-10 April 1987. In general, the Scientific Working Group endorsed the conclusions of that report. During the discussion of the appropriateness of the CFC scenarios used at the Würzburg meeting, a representative of the US EPA described the rationale for the choices. In addition, the US EPA representative stated that, in his opinion, the future growth rates of the Halons and the growth rates of all chemicals in the developing countries were probably underestimated. Representatives of the European CFC Industry questioned both the projected growth rates and the fraction of current production consumed in developing countries. The predicted ozone response to CFC's is sensitive to the scenario assumptions adopted for carbon dioxide, methane, and nitrous oxide. Those adopted at the Würzburg meeting are simply the current rates of growth of these gases. If the growth rates of CH<sub>4</sub> or CO<sub>2</sub> are lower than assumed the predicted depletion of total ozone by CFCs would be greater. On the other hand, if the growth rates of CH<sub>4</sub> or CO<sub>2</sub> are higher than assumed, the predicted depletion of total ozone by CFCs would be lower. In all of the scenarios examined at this meeting, including a true global freeze of the emissions of all chlorine and bromine containing chemicals, all models examined predicted a depletion of at least 1 per cent in global column ozone.

11. The recommendations made by the Scientific Working Group at the second session of the Vienna Group were endorsed, principally the need for continued scientific research, long-term measurements, and major scientific assessments every four years. The Vienna Convention provides a mechanism for initiating interim reviews as dictated by major changes in scientific knowledge. The most recent major review was published by WMO and UNEP in early 1986. Therefore, the Scientific Working Group recommends that the next major scientific review be published in early 1990.

B. Report of the Ad Hoc Sub-Working Group on Control Measures

12. Dr. Tolba reported on his informal consultations with heads of delegations on possible CFC control measures to protect the ozone layer. He noted a desire among delegations to reach a compromise which would result in a meaningful protocol. He informed participants of the need for certain delegations to seek advice from their capitals before agreeing to resolutions of the Working Group and stressed that such a requirement did not detract in any way from the general desire for co-operation and a search for a solution agreeable to all. Dr. Tolba noted the new areas of agreement reached which included general consensus on the need to freeze CFCs 11, 12 and 113 and also, should scientific evidence confirm the need, to include possibly CFCs 114 and should scientific evidence confirm the need also CFCs 115 to be included in the list of potential ozone depleting substances to be regulated.

13. With respect to CFCs 114 and CFCs 115 some delegations said they required additional information before deciding whether or not to include them in the list of substances to be considered for regulation. Others felt that there was enough information now to require their regulation. Dr. Tolba referred to the report of the scientific group which recommended that CFC 114 and 115 be considered for inclusion in the regulatory list and hoped that the report would be of assistance to delegations in making that decision.

14. With regard to the Bromine containing Halons, Dr. Tolba acknowledged further discussion was necessary before a decision on whether or not to include them in an initial list of substances to be regulated could be made. One major advance said Dr. Tolba, was a decision to consider substances in combination in any regulatory measure and the term combined would be attached to the agreed formula for regulation.

15. Another major breakthrough reported by the Executive Director was the agreement among States to effect a 20 per cent reduction in production two to four years after a freeze applied to the production of ozone depleting substances. Still under discussion, he said, was a proposal to further reduce CFC production by 30 per cent, six years after the coming into force of a protocol. He said that the EEC had proposed the adoption of a production reduction with time without specifying, at that stage, the specific figures to be incorporated in the regulation. However, this move towards reduction would be effected on a simple majority vote and on the basis of scientific information. The consideration of including other potential ozone depleting substances in the protocol would be taken on a majority vote within a four year period after adoption of the protocol.

16. Another important agreement was the undertaking of regular review of the control measures in 1990 and every four years thereafter based on scientific, technical, economic and environmental assessment, each to be carried out one year in advance of the respective review.

17. The report of the informal discussions was welcomed by many delegations, although some complained that negotiations had not advanced sufficiently due to the adoption of fixed positions by some representatives. The representative of the EEC cautioned that the proposals made on behalf of its members applied only to CFCs 11 and 12. The broadening of the terms of the protocol to include control of other substances would depend upon consideration of scientific information.

18. One delegate warned that the Vienna Group was bound by UNEP Governing Council decisions regarding the scope of a protocol and was consequently restricted to considering only the fully halogenated CFCs for regulation. He said that other substances could only be considered on the decision of a subsequent Governing Council. Dr. Tolba agreed to seek a decision from the Council expanding the mandate of the Working Group to consider the Halons.

19. Delegations noted that the control proposals contained in the current draft text of article II had been issued by the Executive Director of UNEP, Dr. Tolba, following his informal consultations.

ANNEX

Article II: Control Measures

Text prepared by the Executive Director after consultation with a  
small sub-working group of heads of delegations

1. Each party, under the jurisdiction of which CFC 11, CFC 12, CFC 113, [CFC 114, CFC 115] are produced shall ensure that within [ 2 ] years after the entry into force of this Protocol the [combined annual production and imports] [combined adjusted annual production] of these substances do not exceed their [1986] level.
2. Each party, under the jurisdiction of which substances referred to in paragraph 1 are not produced at the time of the entry into force of this Protocol, shall ensure that within [ 2 ] years from the entry into force of this Protocol [its combined annual production and imports] [its combined adjusted annual production] do not exceed the level of imports in [1986].
3. Each party shall ensure, that within [ 4 ] years after the entry into force of this Protocol levels of substances referred to in paragraph 1 attained in accordance with paragraphs 1 and 2 will be reduced by 20 per cent.
4. Each party shall ensure that within [ 6 ] (a), [ 8 ] (b) years after the entry into force of this Protocol, the 1986 levels of substances referred to in paragraphs 1 and 2 will be further reduced [by 30 per cent] if the majority of the parties so decide (a) [unless parties by a two-thirds majority otherwise decide], (b), in the light of assessments referred to in Article III, such decision should be taken not later than [ 2 ] (a), [ 4 ] (b) years after entry into force.
5. Parties shall decide by [two-thirds majority] [a majority vote] on:
  - whether substances should be added or removed from the reduction schedule
  - whether further reductions of [1986] levels should be undertaken [with the objective of eventual elimination of these substances].

These decisions shall be based on the assessments referred to in Article III.

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NOTE: A second paragraph reading as follows has to be added to article III:  
REVIEW OF CONTROL MEASURES

Beginning 1990, and every four years thereafter the Parties shall review the control measures provided for in article II. At least one year before each of these reviews, the Parties shall convene a panel of scientific experts with composition and terms of reference determined by the Parties, to review advances in scientific understanding of modification of the ozone layer, and the potential health, environmental and climatic effects of such modification.

C. Report of the Ad Hoc Sub-Working Group on Formula and Trade

1. The Ad Hoc Sub-Working Group had several meetings and extensive discussions in a spirit of co-operation and compromise. Informal smaller group meetings were also held, where different formulas were thoroughly examined.

1. The Formula

2. On the topic of the proposal for a reduction formula, the Sub-Working Group prepared a revised formula based on proposals submitted by the representatives of Sweden and the EEC (for the text, see annex I below). The revised proposal enjoyed wide acceptance and therefore represented to a large extent common ground on which a final decision could be reached after representatives had referred back to their respective capitals. The Working Group recommended that the text of the proposal should be forwarded to the final session of the Vienna Group immediately preceding the Diplomatic Conference.

2. Trade

3. The Sub-Working Group had before it the report on trade issues included in the report of the Ad Hoc Working Group on the work of its second session. It had the opportunity of listening to the views of the legal experts from GATT on the compatibility of an article on control of trade with the provisions of GATT. The GATT legal expert gave the opinion that such an article on control of trade would be in order in accordance with article XX paragraph (b) of the GATT concerning the protection of human, animal or plant life or health. He stressed, however, that the judgement as to whether the action proposed satisfied article XX, lay with the GATT contracting parties normally in the context of a complaint brought by one GATT party against another. The members had discussions with the GATT expert during which he said that the greater the number of commodities controlled, the larger the chances of a challenge from some GATT members. He stressed that that view was based on practical rather than legal considerations.

4. The Group discussed the article on control of trade (for the text, see annex II below). A few points had been bracketed for further consideration. Meanwhile it was felt that paragraphs 2, 5 and 6 of the article would need further discussion in the future. The Sub-Working Group on Formula and Trade recommended also that the report of the Vienna Group on the work of its second session (UNEP/WG.167/2) should be forwarded to the final session of the Vienna Group immediately preceding the Diplomatic Conference.

Annex I

REVISED PROPOSAL FOR REDUCTION FORMULA

The following represents the results of working group discussions (to serve as a basis for future consideration in capitals).

1. Each Party shall ensure that within (x) years after the entry into force of this Protocol, its production of the substances referred to in Annex A does not exceed the level of production in 1986.
2. Each Party shall ensure that within (x) years after the entry into force of this Protocol, its imports of the substances referred to in Annex A do not exceed the level of imports in 1986. The provisions of paragraphs 1 and 2 shall remain in force until (y) years after entry into force of this Protocol.
3. Each Party shall ensure that within (y) years after the entry into force of this Protocol, its production of the substances referred to in Annex A minus quantities destroyed by the techniques to be agreed by parties does not exceed (z) per cent of the level of production in 1986.
4. Each Party shall ensure that within (y) years after the entry into force of this Protocol, its consumption of the substances referred to in Annex A does not exceed (z) per cent of the level of consumption in [1986] [1990].
5. Consumption shall be measured as production, plus imports, minus exports and minus quantities of the substances destroyed by techniques approved by the Parties.

The Parties shall decide - within ( ) years of entry into force of this Protocol - [how to count products containing or manufactured using the substances referred to in Annex A and] how to count exports to countries not party to the Protocol.

6. Each Party shall submit to the secretariat each year its figures [or estimates where actual data are not available] for the production, import and export of substances referred to in Annex A starting with the figure of 1986.
- [7. Alternative 1:  
Any [developing] country, or group of [developing] countries, not producing CFCs at the time of the signing of the Protocol shall be permitted to produce or have produced for it by any Party to the Protocol, substances referred to in Annex A, to a level not exceeding its/their controlled level of imports/aggregated level of imports, as the case may be. The level of production and imports at any one time will not be permitted to exceed the controlled level of imports.]
- Alternative 2:  
[Productions are permitted to transfer from one country to another if these transmissions are certain not to cause an increase of production.]
8. The provisions contained in this Article do not prevent Parties from taking more stringent measures than those set out in this Article.

Annex II

ARTICLE ON CONTROL OF TRADE

1. Within ( ) years after entry into force of this Protocol, each Party shall ban the import (and exports) of the controlled substances in bulk from any State not Party to this Protocol.
- [2. Within ( ) years after entry into force of this Protocol, each Party shall (restrict) (ban) imports of products identified in Annex ( ) containing substances controlled by this Protocol from any State not Party to this Protocol. The Parties shall periodically review, and if necessary, amend Annex ( ).]
3. Within ( ) years after entry into force of this Protocol, the Parties shall determine the feasibility of restricting or banning imports of products produced with substances controlled by this Protocol from any State not Party to this Protocol. If determined feasible, the Parties shall ban or restrict such products and elaborate in an annex a list of the products to be banned and standards for applying such measures uniformly by all Parties.
4. Each Party shall discourage the export of technologies [to non-parties] for the production and use of the controlled substances.
- [5. Except as provided in Article ( ), the Parties shall not provide [to non-parties] bilateral or multilateral subsidies, aid, credits, guarantees, or insurance programmes for the export of products, equipment, plants, or technology for the production (or use) of the controlled substances.]
- [6. The provisions of paragraphs 4 and 5 shall not apply to products, equipment, plants or technologies which improve the containment, recovery, re-cycling, or destruction of the controlled substances, or otherwise contribute to the reduction of emissions of these substances,]
7. Notwithstanding the provisions of this Article, imports referred to in paragraph(s) ( ) may be permitted from any State not Party to this Protocol for a period not to exceed ( ) years from entry into force of the Protocol if that State is in full compliance with Article ( ) and this Article and has submitted information to that effect, as specified in Article ( ).

D. Report of the Ad Hoc Sub-Working Group on the special situation of developing countries

1. The Sub-Working Group held one meeting on 30 April 1987. The basic document before the Group was the report on its work included in the report of the Vienna Group on its second session. The Sub-Group also had before it a proposal submitted by Canada for an article on low consuming countries. Discussions took place in a spirit of co-operation and understanding of the special situation of developing countries on the one hand, and on the other, of the common objective of all participants to protect the ozone layer.

2. The Group took note that in finalizing the protocol it would be necessary to take account of agreed conclusions reached during the second session of the Vienna Group on questions concerning assistance to be received by developing countries and on financial matters.
3. The article on the special situation of low consuming countries (see annex below) represented the main focus of the Group's deliberations on the question of the room to be allowed for developing countries in respect of activities to be controlled by the protocol. Some experts suggested that it might be useful to consider in the future the idea of a periodical revision. It was suggested that it might be advisable to consider in the future the idea of fixing a level above which exemption would not be authorized. Some representatives considered that the word consumption used in the first paragraph of the proposed article would have to be better defined.
4. The Group recommended that the attached Article on the Special Situation of Low Consuming Countries along with other relevant options discussed during the previous sessions of the Vienna Group (in Geneva and Vienna) should be used by Governments for carrying out further analysis of this issue prior to the next round of negotiations.

ANNEX

Article on the Special Situation of Low Consuming Countries

Submitted by the Ad Hoc Sub-Working Group on the  
Special Situation of Developing Countries

1. States signing the protocol whose per capita consumption in (1986) was less than (0.1 kg/capita/yr) (0.20 kg/capita/yr) shall be exempt from controls for a period of (5) (10) yrs after the coming into force of this protocol.
2. Following the (5) (10) yrs exemption period, those countries exempted by paragraph 1 shall be subject to controls in a manner parallel to other members of the protocol.
3. Protocol members shall make all possible efforts to assist those countries exempted to make expeditious use of environmentally safe alternative chemicals and technologies.

Proposal for paragraph 4 by Nigeria

4. The Parties should encourage bilateral and multilateral subsidies, aid, guarantees or insurance programmes to the developing countries for the use of substitute products and alternative technology during their period of exemption from the controls referred to in paragraph 1.