MONTREAL PROTOCOL ON

SUBSTANCES THAT DEPLETE THE OZONE LAYER

FINAL ACT

1987

FINAL ACT

1. The Conference of Plenipotentiaries on the Protocol on Chlorofluorocarbons to the Vienna Convention for the Protection of the Ozone Layer was convened by the Executive Director of the United Nations Environment Programme (UNEP) pursuant to decision 13/18 adopted by the Governing Council of UNEP on 23 May 1985.

2. The Conference met at the Headquarters of the International Civil Aviation Organization, Montreal, with the kind support of the Government of Canada, from 14 to 16 September 1987.

3. All States were invited to participate in the Conference. The following States accepted the invitation and participated in the Conference:

Algeria, Argentina, Australia, Austria, Belgium, Brazil, Burkina Faso, Byelorussian Soviet Socialist Republic, Canada, Chile, China, Colombia, Congo, Costa Rica, Czechoslovakia, Denmark, Democratic Yemen, Egypt, Finland, France, Germany, Federal Republic of, Ghana, Greece, Indonesia, Israel, Italy, Japan, Kenya, Korea, Republic of, Luxembourg, Malaysia, Mauritius, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Norway, Panama, Peru, Philippines, Portugal, Senegal, Spain, Sweden, Switzerland, Thailand, Togo, Tunisia, Uganda, Ukrainian Soviet Socialist Republic, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland, United States of America, Venezuela.

4. The European Economic Community also participated.

5. Observers from the following States attended the proceedings of the Conference:

Dominican Republic, Ecuador, Hungary, India, Kuwait, Poland.

6. Observers from the following United Nations bodies, specialized agencies, intergovernmental and non-governmental organizations also attended the Conference:

World Meteorological Organization (WMO), General Agreement on Tariffs and Trade (GATT), International Civil Aviation Organization (ICAO), Organization of African Unity (OAU), Council of the European Communities (CEC), Organization for Economic Co-operation and Development (OECD), International Chamber of Commerce (ICC), Federation of European Aerosol Associations, European Chemical Industry Federation, Chemical Manufacturers Association, Natural Resources Defense Council, World Resources Institute, Environmental Defense Fund, Greenpeace, Friends of the Earth, Seattle Foundation (Canada), Mammouth International Humanitarian Societies Square Projects Inc. (Canada), Watto Laboratories International (Canada), Dr. F.A. Homonnay and Associates (Canada), International Organization of Automobile Manufacturers, Alliance for Responsible CFC Policy, Air-Conditioning and Refrigeration Institute (USA), Environmental Protection Agency (USA), Institute for European Environment Policy, National Fire Protection Association, Dupont Canada, The Beloff Group (Canada), Produits Chimiques Allied Canada Inc., United States Air Force.

7. The Conference was formally opened by Dr. Mostafa K. Tolba, the Executive Director of UNEP. In the course of the inaugural ceremony, the Conference heard a welcoming address by the Honourable Tom McMillan, P.C., M.P., Minister of the Environment, on behalf of the Government of Canada.

8. Dr. Mostafa K. Tolba served as Secretary-General of the Conference and Dr. Iwona Rummel-Bulska (UNEP) served as Executive Secretary.

9. The Conference unanimously elected Ambassador W. Lang (Austria) as its President.

10. The Conference also elected the following officers:

Vice-Presidents:	Ambassador E. Hawas (Egypt) Dr. V. Zakharov (Union of Soviet Socialist Republics)
Rapporteur:	Mr. C.R. Roque (Philippines)

11. The Conference adopted the following agenda:

1. Opening of the Conference.

2. Organizational matters:

(a) Adoption of the rules of procedures;
(b) Election of the President;
(c) Election of Vice-Presidents and Rapporteur;
(d) Adoption of the agenda;
(e) Appointment of the members of the Credentials Committee;
(f) Appointment of the members of the Drafting Committee;
(g) Organization of the work of the Conference.

3. Consideration of the draft Protocol to the Vienna Convention for the Protection of the Ozone Layer.

4. Report of the Credentials Committee.

5. Adoption of the Protocol to the Vienna Convention for the Protection of the Ozone Layer.

6. Adoption of the Final Act of the Conference.

7. Signature of final instruments.

8. Closure of the Conference.

12. The Conference adopted as its rules of procedure document UNEP/IG.79/2 proposed by the secretariat.

13. In conformity with the rules of procedure, the Conference established the following Committees:

Committee of the Whole:

Chairman:	The President of the Conference

General Committee:

Chairman:	The President of the Conference
Members:	The Vice-Presidents of the Conference, the Rapporteur and the Chairman of the Drafting Committee

Drafting Committee:

Chairman:	Mr. Jon J. Allen (Canada)
Members:	Argentina Australia France Japan United Kingdom United States

Credentials Committee:

Chairman:	Ambassador Jose M. Bustani (Brazil)
Members:	Finland Germany, Federal Republic of Indonesia Kenya Mexico Norway

14. The main documents which served as the basis for the deliberations of the Conference were:

- Seventh Revised Draft Protocol on [Chlorofluorocarbons] [and Other Ozone Depleting Substances], UNEP/IG.93/3 and Rev. 1;

- Reports of the Ad Hoc Working Group of Legal and Technical Experts for the Elaboration of a Protocol on Chlorofluorocarbons to the Vienna Convention for the Protection of the Ozone Layer (Vienna Group), UNEP/WG.151/L.4, UNEP/WG.167/2 and UNEP/WG.172/2.

15. In addition, the Conference had before it a number of other documents that were made available to it by the Secretariat of UNEP.

16. The Conference approved the recommendation of its Credentials Committee that the credentials of the representatives of the participating States as listed in paragraph 3 should be recognized as being in order.

17. On the basis of the deliberations of the Committee of the Whole, the Conference, on 16 September 1987, adopted the Montreal Protocol on Substances that Deplete the Ozone Layer. The Protocol, which is appended to this Final Act, will be open for signature at the Ministry for External Affairs of Canada in Ottawa from
17 September 1987 to 16 January 1988 and at the United Nations Headquarters in New York from 17 January 1988 to 15 September 1988.

18. The Conference also adopted the following resolutions which are appended to this Final Act:

1. Resolution on the Montreal Protocol.

2. Resolution on the exchange of technical information.

3. Resolution on the reporting of data.

4. Tribute to the Government of Canada.

IN WITNESS WHEREOF the representatives have signed this Final Act.

DONE at Montreal, this sixteenth day of September one thousand nine hundred and eighty seven in one original in the Arabic, Chinese, English, French, Russian and Spanish languages, each language version being equally authentic. The original text will be deposited with the Secretary-General of the United Nations.

1. RESOLUTION ON THE MONTREAL PROTOCOL

The Conference,

Having adopted the Montreal Protocol on Substances that Deplete the Ozone Layer,

Noting with appreciation that the Protocol was opened for signature in Montreal on 16 September 1987,

Recalling the Vienna Convention for the Protection of the Ozone Layer, adopted on 22 March 1985,

Bearing in mind the Resolution of the Conference of Plenipotentiaries on the Protection of the Ozone Layer adopted on the same day which urged in the sixth operative paragraph "all States and regional economic integration organizations, pending entry into force of a protocol, to control their emissions of CFCs, inter alia in aerosols, by any means at their disposal, including controls on production or use, to the maximum extent practicable",

1. Calls upon all States and regional economic integration organizations that have not yet done so to implement the sixth paragraph, bearing in mind the special situation of the developing countries;

2. Appeals to all States to become Parties to the Vienna Convention for the Protection of the Ozone Layer;

3. Urges all States and regional economic integration organizations, including those that have not participated in this Conference, to sign and become Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer;

4. Requests the Executive Director of the United Nations Environment Programme to forward this Resolution to the Secretary General of the United Nations and to circulate it to all States and regional economic integration organizations.

2. RESOLUTION ON THE EXCHANGE OF TECHNICAL INFORMATION

The Conference,

Having adopted the Montreal Protocol on Substances that Deplete the Ozone Layer,

Realizing the importance of reducing as quickly as possible the emissions of these substances,

Recognizing the need for an early exchange of information on technologies and strategies to achieve this,

1. Requests the Executive Director of the United Nations Environment Programme (UNEP), pending the first meeting of the Parties, to make appropriate arrangements to facilitate the exchange of information on technology referred to in Articles 9 and 10 of the Protocol;

2. Appeals to interested States and regional economic integration organizations to sponsor, at the earliest opportunity, in cooperation with UNEP, a workshop with the aim of:

   (a) exchanging information on technologies and administrative strategies for reducing emissions of the substances listed in Annex A to the Protocol and for developing alternatives, taking into account paragraph 2 of Annex II to the Vienna Convention for the Protection of the Ozone Layer; and

   (b) identifying areas in which further research and technical development are required,

3. Urges all interested parties to participate in and contribute to such a workshop and to make expeditious use of the information so gained in order to reduce the emissions of those substances and to develop alternatives.

3. RESOLUTION ON REPORTING OF DATA

The Conference,

Having adopted the Montreal Protocol on Substances that Deplete the Ozone Layer,

Convinced that the timely reporting of complete and accurate data on the production and consumption of controlled substances is critical to the effective and efficient implementation of this Protocol,

1. Calls upon all Signatories to take, expeditiously, all steps necessary to acquire data and report on the production, import and export of controlled substances in a complete and timely fashion in accordance with Article 7 of the Protocol and taking into account paragraph 1 of Article 4 of the Vienna Convention for the Protection of the Ozone Layer;

2. Invites Signatories to consult with other Signatories, and to seek advice and assistance from the United Nations Environment Programme (UNEP) and other relevant international organizations, as necessary, in designing and implementing data reporting systems;

3. Calls upon the Executive Director of UNEP to convene, within six months of the adoption of this Resolution, a meeting of governmental experts with the assistance of experts from relevant international organizations to make recommendations for the harmonization of data on production, imports and exports to ensure consistency and comparability of data on controlled substances.

4. TRIBUTE TO THE GOVERNMENT OF CANADA

The Conference,

Having met in Montreal from 14 to 16 September 1987 at the gracious invitation of the Government of Canada,

Convinced that the efforts made by the Government of Canada and by the civic authorities of Montreal in providing facilities, premises and other resources contributed significantly to the smooth conduct of its proceedings,

Deeply appreciative of the courtesy and hospitality extended by the Government of Canada and the City of Montreal to the members of the delegations, observers and the secretariat attending the Conference,

Expresses its sincere gratitude to the Government of Canada, to the authorities of Montreal and, through them, to the Canadian people and in particular to the population of Montreal for the cordial welcome which they accorded to the Conference and to those associated with its work and for their contribution to the success of the Conference.

MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

The Parties to this Protocol,

Being Parties to the Vienna Convention for the Protection of the Ozone Layer,

Mindful of their obligation under that Convention to take appropriate measures to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer,

Recognizing that world-wide emissions of certain substances can significantly deplete and otherwise modify the ozone layer in a manner that is likely to result in adverse effects on human health and the environment,

Conscious of the potential climatic effects of emissions of these substances,

Aware that measures taken to protect the ozone layer from depletion should be based on relevant scientific knowledge, taking into account technical and economic considerations,

Determined to protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge, taking into account technical and economic considerations,

Acknowledging that special provision is required to meet the needs of developing countries for these substances,

Noting the precautionary measures for controlling emissions of certain chlorofluorocarbons that have already been taken at national and regional levels,

Considering the importance of promoting international co-operation in the research and development of science and technology relating to the control and reduction of emissions of substances that deplete the ozone layer, bearing in mind in particular the needs of developing countries,

HAVE AGREED AS FOLLOWS:

ARTICLE 1: DEFINITIONS

For the purposes of this Protocol:

1. "Convention" means the Vienna Convention for the Protection of the Ozone Layer, adopted on 22 March 1985.

2. "Parties" means, unless the text otherwise indicates, Parties to this Protocol.

3. "Secretariat" means the secretariat of the Convention.

4. "Controlled substance" means a substance listed in Annex A to this Protocol, whether existing alone or in a mixture. It excludes, however, any such substance or mixture which is in a manufactured product other than a container used for the transportation or storage of the substance listed.

5. "Production" means the amount of controlled substances produced minus the amount destroyed by technologies to be approved by the Parties.

6. "Consumption" means production plus imports minus exports of controlled substances.

7. "Calculated levels" of production, imports, exports and consumption means levels determined in accordance with Article 3.

8. "Industrial rationalization" means the transfer of all or a portion of the calculated level of production of one Party to another, for the purpose of achieving economic efficiencies or responding to anticipated shortfalls in supply as a result of plant closures.

ARTICLE 2: CONTROL MEASURES

1. Each Party shall ensure that for the twelve-month period commencing on the first day of the seventh month following the date of the entry into force of this Protocol, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Group I of Annex A does not exceed its calculated level of consumption in 1986. By the end of the same period, each Party producing one or more of these substances shall ensure that its calculated level of production of the substances does not exceed its calculated level of production in 1986, except that such level may have increased by no more than ten per cent based on the 1986 level. Such increase shall be permitted only so as to satisfy the basic domestic needs of the Parties operating under Article 5 and for the purposes of industrial rationalization between Parties.

2. Each Party shall ensure that for the twelve-month period commencing on the first day of the thirty-seventh month following the date of the entry into force of this Protocol, and in each twelve month period thereafter, its calculated level of consumption of the controlled substances listed in Group II of Annex A does not exceed its calculated level of consumption in 1986. Each Party producing one or more of these substances shall ensure that its calculated level of production of the substances does not exceed its calculated level of production in 1986, except that such level may have increased by no more than ten per cent based on the 1986 level. Such increase shall be permitted only so as to satisfy the basic domestic needs of the Parties operating under Article 5 and for the purposes of industrial rationalization between Parties. The mechanisms for implementing these measures shall be decided by the Parties at their first meeting following the first scientific review.

3. Each Party shall ensure that for the period 1 July 1993 to 30 June 1994 and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Group I of Annex A does not exceed, annually, eighty per cent of its calculated level of consumption in 1986. Each Party producing one or more of these substances shall, for the same periods, ensure that its calculated level of production of the substances does not exceed, annually, eighty per cent of its calculated level of production in 1986. However, in order to satisfy the basic domestic needs of the Parties operating under Article 5 and for the purposes of industrial rationalization between Parties, its calculated level of production may exceed that limit by up to ten per cent of its calculated level of production in 1986.

4. Each Party shall ensure that for the period 1 July 1998 to 30 June 1999, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Group I of Annex A does not exceed, annually, fifty per cent of its calculated level of consumption in 1986. Each Party producing one or more of these substances shall, for the same periods, ensure that its calculated level of production of the substances does not exceed, annually, fifty per cent of its calculated level of production in 1986. However, in order to satisfy the basic domestic needs of the Parties operating under Article 5 and for the purposes of industrial rationalization between Parties, its calculated level of production may exceed that limit by up to fifteen per cent of its calculated level of production in 1986. This

paragraph will apply unless the Parties decide otherwise at a meeting by a two-thirds majority of Parties present and voting, representing at least two-thirds of the total calculated level of consumption of these substances of the Parties. This decision shall be considered and made in the light of the assessments referred to in Article 6.

5. Any Party whose calculated level of production in 1986 of the controlled substances in Group I of Annex A was less than twenty-five kilotonnes may, for the purposes of industrial rationalization, transfer to or receive from any other Party, production in excess of the limits set out in paragraphs 1, 3 and 4 provided that the total combined calculated levels of production of the Parties concerned does not exceed the production limits set out in this Article. Any transfer of such production shall be notified to the secretariat, no later than the time of the transfer.

6. Any Party not operating under Article 5, that has facilities for the production of controlled substances under construction, or contracted for, prior to 16 September 1987, and provided for in national legislation prior to 1 January 1987, may add the production from such facilities to its 1986 production of such substances for the purposes of determining its calculated level of production for 1986, provided that such facilities are completed by 31 December 1990 and that such production does not raise that Party's annual calculated level of consumption of the controlled substances above 0.5 kilograms per capita.

7. Any transfer of production pursuant to paragraph 5 or any addition of production pursuant to paragraph 6 shall be notified to the secretariat, no later than the time of the transfer or addition.

8. (a) Any Parties which are Member States of a regional economic integration organization as defined in Article 1(6) of the Convention may agree that they shall jointly fulfil their obligations respecting consumption under this Article provided that their total combined calculated level of consumption does not exceed the levels required by this Article.

(b) The Parties to any such agreement shall inform the secretariat of the terms of the agreement before the date of the reduction in consumption with which the agreement is concerned.

(c) Such agreement will become operative only if all Member States of the regional economic integration organization and the organization concerned are Parties to the Protocol and have notified the secretariat of their manner of implementation.

9. (a) Based on the assessments made pursuant to Article 6, the Parties may decide whether:

(i) adjustments to the ozone depleting potentials specified in Annex A should be made and, if so, what the adjustments should be; and

(ii) further adjustments and reductions of production or consumption of the controlled substances from 1986 levels should be undertaken and, if so, what the scope, amount and timing of any such adjustments and reductions should be.

(b) Proposals for such adjustments shall be communicated to the Parties by the secretariat at least six months before the meeting of the Parties at which they are proposed for adoption.

(c) In taking such decisions, the Parties shall make every effort to reach agreement by consensus. If all efforts at consensus have been exhausted, and no agreement reached, such decisions shall, as a last resort, be adopted by a two-thirds majority vote of the Parties present and voting representing at least fifty per cent of the total consumption of the controlled substances of the Parties.

(d) The decisions, which shall be binding on all Parties, shall forthwith be communicated to the Parties by the Depositary. Unless otherwise provided in the decisions, they shall enter into force on the expiry of six months from the date of the circulation of the communication by the Depositary.

10. (a) Based on the assessments made pursuant to Article 6 of this Protocol and in accordance with the procedure set out in Article 9 of the Convention, the Parties may decide:

(i) whether any substances, and if so which, should be added to or removed from any annex to this Protocol; and

(ii) the mechanism, scope and timing of the control measures that should apply to those substances;

(b) Any such decision shall become effective, provided that it has been accepted by a two-thirds majority vote of the Parties present and voting.

11. Notwithstanding the provisions contained in this Article, Parties may take more stringent measures than those required by this Article.

ARTICLE 3: CALCULATION OF CONTROL LEVELS

For the purposes of Articles 2 and 5, each Party shall, for each Group of substances in Annex A, determine its calculated levels of:

(a) production by:

(i) multiplying its annual production of each controlled substance by the ozone depleting potential specified in respect of it in Annex A; and

(ii) adding together, for each such Group, the resulting figures;

(b) imports and exports, respectively, by following, mutatis mutandis, the procedure set out in subparagraph (a); and

(c) consumption by adding together its calculated levels of production and imports and subtracting its calculated level of exports as determined in accordance with subparagraphs (a) and (b). However, beginning on 1 January 1993, any export of controlled substances to non-Parties shall not be subtracted in calculating the consumption level of the exporting Party.

ARTICLE 4: CONTROL OF TRADE WITH NON-PARTIES

1. Within one year of the entry into force of this Protocol, each Party shall ban the import of controlled substances from any State not party to this Protocol.

2. Beginning on 1 January 1993, no Party operating under paragraph 1 of Article 5 may export any controlled substance to any State not party to this Protocol.

3. Within three years of the date of the entry into force of this Protocol, the Parties shall, following the procedures in Article 10 of the Convention, elaborate in an annex a list of products containing controlled substances. Parties that have not objected to the annex in accordance with those procedures shall ban, within one year of the annex having become effective, the import of those products from any State not party to this Protocol.

4. Within five years of the entry into force of this Protocol, the Parties shall determine the feasibility of banning or restricting, from States not party to this Protocol, the import of products produced with, but not containing, controlled substances. If determined feasible, the Parties shall, following the procedures in Article 10 of the Convention, elaborate in an annex a list of such products. Parties that have not objected to it in accordance with those procedures shall ban or restrict, within one year of the annex having become effective, the import of those products from any State not party to this Protocol.

5. Each Party shall discourage the export, to any State not party to this Protocol, of technology for producing and for utilizing controlled substances.

6. Each Party shall refrain from providing new subsidies, aid, credits, guarantees or insurance programmes for the export to States not party to this Protocol of products, equipment, plants or technology that would facilitate the production of controlled substances.

7. Paragraphs 5 and 6 shall not apply to products, equipment, plants or technology that improve the containment, recovery, recycling or destruction of controlled substances, promote the development of alternative substances, or otherwise contribute to the reduction of emissions of controlled substances.

8. Notwithstanding the provisions of this Article, imports referred to in paragraphs 1, 3 and 4 may be permitted from any State not party to this Protocol if that State is determined, by a meeting of the Parties, to be in full compliance with Article 2 and this Article, and has submitted data to that effect as specified in Article 7.

ARTICLE 5: SPECIAL SITUATION OF DEVELOPING COUNTRIES

1. Any Party that is a developing country and whose annual calculated level of consumption of the controlled substances is less than 0.3 kilograms per capita on the date of the entry into force of the Protocol for it, or any time thereafter within ten years of the date of entry into force of the Protocol shall, in order to meet its basic domestic needs, be entitled to delay its compliance with the control measures set out in paragraphs 1 to 4 of Article 2 by ten years after that specified in those paragraphs. However, such Party shall not exceed an annual calculated level of consumption of 0.3 kilograms per capita. Any such Party shall be entitled to use either the average of its annual calculated level of consumption for the period 1995 to 1997 inclusive or a calculated level of consumption of 0.3 kilograms per capita, whichever is the lower, as the basis for its compliance with the control measures.

2. The Parties undertake to facilitate access to environmentally safe alternative substances and technology for Parties that are developing countries and assist them to make expeditious use of such alternatives.

3. The Parties undertake to facilitate bilaterally or multilaterally the provision of subsidies, aid, credits, guarantees or insurance programmes to Parties that are developing countries for the use of alternative technology and for substitute products.

ARTICLE 6: ASSESSMENT AND REVIEW OF CONTROL MEASURES

Beginning in 1990, and at least every four years thereafter, the Parties shall assess the control measures provided for in Article 2 on the basis of available scientific, environmental, technical and economic information. At least one year before each assessment, the Parties shall convene appropriate panels of experts qualified in the fields mentioned and determine the composition and terms of reference of any such panels. Within one year of being convened, the panels will report their conclusions, through the secretariat, to the Parties.

ARTICLE 7: REPORTING OF DATA

1. Each Party shall provide to the secretariat, within three months of becoming a Party, statistical data on its production, imports and exports of each of the controlled substances for the year 1986, or the best possible estimates of such data where actual data are not available.

2. Each Party shall provide statistical data to the secretariat on its annual production (with separate data on amounts destroyed by technologies to be approved by the Parties), imports, and exports to Parties and non-Parties, respectively, of such substances for the year during which it becomes a Party and for each year thereafter. It shall forward the data no later than nine months after the end of the year to which the data relate.

ARTICLE 8: NON-COMPLIANCE

The Parties, at their first meeting, shall consider and approve procedures and institutional mechanisms for determining non-compliance with the provisions of this Protocol and for treatment of Parties found to be in non-compliance.

ARTICLE 9: RESEARCH, DEVELOPMENT, PUBLIC AWARENESS AND EXCHANGE OF INFORMATION

1. The Parties shall co-operate, consistent with their national laws, regulations and practices and taking into account in particular the needs of developing countries, in promoting, directly or through competent international bodies, research, development and exchange of information on:

(a) best technologies for improving the containment, recovery, recycling or destruction of controlled substances or otherwise reducing their emissions;

(b) possible alternatives to controlled substances, to products containing such substances, and to products manufactured with them; and

(c) costs and benefits of relevant control strategies.

2. The Parties, individually, jointly or through competent international bodies, shall co-operate in promoting public awareness of the environmental effects of the emissions of controlled substances and other substances that deplete the ozone layer.

3. Within two years of the entry into force of this Protocol and every two years thereafter, each Party shall submit to the secretariat a summary of the activities it has conducted pursuant to this Article.

ARTICLE 10: TECHNICAL ASSISTANCE

1. The Parties shall, in the context of the provisions of Article 4 of the Convention, and taking into account in particular the needs of developing countries, co-operate in promoting technical assistance to facilitate participation in and implementation of this Protocol.

2. Any Party or Signatory to this Protocol may submit a request to the secretariat for technical assistance for the purposes of implementing or participating in the Protocol.

3. The Parties, at their first meeting, shall begin deliberations on the means of fulfilling the obligations set out in Article 9, and paragraphs 1 and 2 of this Article, including the preparation of workplans. Such workplans shall pay special attention to the needs and circumstances of the developing countries. States and regional economic integration organizations not party to the Protocol should be encouraged to participate in activities specified in such workplans.

ARTICLE 11: MEETINGS OF THE PARTIES

1. The Parties shall hold meetings at regular intervals. The secretariat shall convene the first meeting of the Parties not later than one year after the date of the entry into force of this Protocol and in conjunction with a meeting of the Conference of the Parties to the Convention, if a meeting of the latter is scheduled within that period.

2. Subsequent ordinary meetings of the Parties shall be held, unless the Parties otherwise decide, in conjunction with meetings of the Conference of the Parties to the Convention. Extraordinary meetings of the Parties shall be held at such other times as may be deemed necessary by a meeting of the Parties, or at the written request of any Party, provided that, within six months of such a request being communicated to them by the secretariat, it is supported by at least one third of the Parties.

3. The Parties, at their first meeting, shall:

   (a) adopt by consensus rules of procedure for their meetings;

   (b) adopt by consensus the financial rules referred to in paragraph 2 of Article 13;

   (c) establish the panels and determine the terms of reference referred to in Article 6;

   (d) consider and approve the procedures and institutional mechanisms specified in Article 8; and

   (e) begin preparation of workplans pursuant to paragraph 3 of Article 10.

4. The functions of the meetings of the Parties shall be to:

   (a) review the implementation of this Protocol;

   (b) decide on any adjustments or reductions referred to in paragraph 9 of Article 2;

   (c) decide on any addition to, insertion in or removal from any annex of substances and on related control measures in accordance with paragraph 10 of Article 2;

(d) establish, where necessary, guidelines or procedures for reporting of information as provided for in Article 7 and paragraph 3 of Article 9;

(e) review requests for technical assistance submitted pursuant to paragraph 2 of Article 10;

(f) review reports prepared by the secretariat pursuant to sub-paragraph (c) of Article 12;

(g) assess, in accordance with Article 6, the control measures provided for in Article 2;

(h) consider and adopt, as required, proposals for amendment of this Protocol or any annex and for any new annex;

(i) consider and adopt the budget for implementing this Protocol; and

(j) consider and undertake any additional action that may be required for the achievement of the purposes of this Protocol.

5. The United Nations, its specialized agencies and the International Atomic Energy Agency, as well as any State not party to this Protocol, may be represented at meetings of the Parties as observers. Any body or agency, whether national or international, governmental or non-governmental, qualified in fields relating to the protection of the ozone layer which has informed the secretariat of its wish to be represented at a meeting of the Parties as an observer may be admitted unless at least one third of the Parties present object. The admission and participation of observers shall be subject to the rules of procedure adopted by the Parties.

ARTICLE 12: SECRETARIAT

For the purposes of this Protocol, the secretariat shall:

(a) arrange for and service meetings of the Parties as provided for in Article 11;

(b) receive and make available, upon request by a Party, data provided pursuant to Article 7;

(c) prepare and distribute regularly to the Parties reports based on information received pursuant to Articles 7 and 9;

(d) notify the Parties of any request for technical assistance received pursuant to Article 10 so as to facilitate the provision of such assistance;

(e) encourage non-Parties to attend the meetings of the Parties as observers and to act in accordance with the provisions of this Protocol;

(f) provide, as appropriate, the information and requests referred to in subparagraphs (c) and (d) to such non-party observers; and

(g) perform such other functions for the achievement of the purposes of this Protocol as may be assigned to it by the Parties.

ARTICLE 13: FINANCIAL PROVISIONS

1. The funds required for the operation of this Protocol, including those for the functioning of the secretariat related to this Protocol, shall be charged exclusively against contributions from the Parties.

2. The Parties, at their first meeting, shall adopt by consensus financial rules for the operation of this Protocol.

ARTICLE 14: RELATIONSHIP OF THIS PROTOCOL TO THE CONVENTION

Except as otherwise provided in this Protocol, the provisions of the Convention relating to its protocols shall apply to this Protocol.

ARTICLE 15: SIGNATURE

This Protocol shall be open for signature by States and by regional economic integration organizations in Montreal on 16 September 1987, in Ottawa from 17 September 1987 to 16 January 1988, and at United Nations Headquarters in New York from 17 January 1988 to 15 September 1988.

ARTICLE 16: ENTRY INTO FORCE

1. This Protocol shall enter into force on 1 January 1989, provided that at least eleven instruments of ratification, acceptance, approval of the Protocol or accession thereto have been deposited by States or regional economic integration organizations representing at least two-thirds of 1986 estimated global consumption of the controlled substances, and the provisions of paragraph 1 of Article 17 of the Convention have been fulfilled. In the event that these conditions have not been fulfilled by that date, the Protocol shall enter into force on the ninetieth day following the date on which the conditions have been fulfilled.

2. For the purposes of paragraph 1, any such instrument deposited by a regional economic integration organization shall not be counted as additional to those deposited by member States of such organization.

3. After the entry into force of this Protocol, any State or regional economic integration organization shall become a Party to it on the ninetieth day following the date of deposit of its instrument of ratification, acceptance, approval or accession.

ARTICLE 17: PARTIES JOINING AFTER ENTRY INTO FORCE

Subject to Article 5, any State or regional economic integration organization which becomes a Party to this Protocol after the date of its entry into force, shall fulfil forthwith the sum of the obligations under Article 2, as well as under Article 4, that apply at that date to the States and regional economic integration organizations that became Parties on the date the Protocol entered into force.

ARTICLE 18: RESERVATIONS

No reservations may be made to this Protocol.

ARTICLE 19: WITHDRAWAL

For the purposes of this Protocol, the provisions of Article 19 of the Convention relating to withdrawal shall apply, except with respect to Parties referred to in paragraph 1 of Article 5. Any such Party may withdraw from this Protocol by giving written notification to the Depositary at any time after four years of assuming the obligations specified in paragraphs 1 to 4 of Article 2. Any such withdrawal shall take effect upon expiry of one year after the date of its receipt by the Depositary, or on such later date as may be specified in the notification of the withdrawal.

ARTICLE 20: AUTHENTIC TEXTS

The original of this Protocol, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

IN WITNESS WHEREOF THE UNDERSIGNED, BEING DULY AUTHORIZED TO THAT EFFECT, HAVE SIGNED THIS PROTOCOL.

DONE AT MONTREAL THIS SIXTEENTH DAY OF SEPTEMBER, ONE THOUSAND NINE HUNDRED AND EIGHTY SEVEN

- - - - -

ANNEX A

CONTROLLED SUBSTANCES

Group	Substance	Ozone Depleting Potential *
Group I		
	$CFCl_3$ (CFC-11)	1.0
	CF_2Cl_2 (CFC-12)	1.0
	$C_2F_3Cl_3$ (CFC-113)	0.8
	$C_2F_4Cl_2$ (CFC-114)	1.0
	C_2F_5Cl (CFC-115)	0.6
Group II		
	CF_2BrCl (halon-1211)	3.0
	CF_3Br (halon-1301)	10.0
	$C_2F_4Br_2$ (halon-2402)	(to be determined)

* These ozone depleting potentials are estimates based on existing knowledge and will be reviewed and revised periodically.

- If 80%, Japan might hold up.
  but need them
- problem of isolation appearance
- If US does not sign @ Montreal
  if 80% parts not reached
-

CFC Producers in Order of Production	CFC Consumers in Order of Consumption	Countries Participating in Negotiations
EEC*	United States	Argentina
United States*	EEC	Australia
Japan	Japan	Austria
Soviet Union		Belgium
Australia		Canada
Canada		Colombia
		Denmark
*Together comprise 80% of production		Egypt
		Finland
		France
		FRG
		Ghana
		Hungary
		Italy
		Japan
		Kenya
		Luxembourg
		Malaysia
		Mexico
		Netherlands
		New Zealand
		Nigeria
		Norway
		Philippines
		Poland
		Portugal
		Spain
		Sweden
		Switzerland
		Thailand
		USSR
		U.S.
		UK
		Venezuela
		Yugoslavia

MAJOR CFC PRODUCING NATIONS*

United States
European Economic Community
Japan
Soviet Union
Australia
Canada

CFC PRODUCERS - DEVELOPING COUNTRIES

Brazil
Mexico
Argentina
India
Venezuela
China

MAJOR CFC CONSUMING NATIONS*

United States	30%
European Economic Community	30%
Japan	8%

POTENTIAL EXPORTERS OF CFC PRODUCTS - DEVELOPING NATIONS

Korea
Taiwan
Singapore
Malaysia
Egypt

POTENTIAL CFC CONSUMING NATIONS - DEVELOPING COUNTRIES

Brazil
Mexico
Argentina
India
China
Egypt

* See attachment figure.

COUNTRY PARTICIPATION

KEY:

1. Signed Vienna Convention
2. 1st UNEP Technical Workshop (Rome)
3. 2nd UNEP Technical Workshop (Leesburg)
4. 1st Negotiating Session
5. 2nd Negotiating Session
6. 3rd Negotiating Session

COUNTRY PARTICIPATION

	1	2	3	4	5	6
Argentina	X			X	X	X
Australia			X	X	X	X
Austria	X	X	X	X	X	X
Belgium	X	X	X	X	X	X
Birkina Faso	X					
Brazil			X	X	X	
Byelorussian SSR	X					
Canada	X	X	X	X	X	X
China		X	X			
Chile	X					
Colombia					X	X
Denmark	X	X	X	X	X	X
Egypt	X	X	X	X	X	X
Finland	X	X	X	X	X	X
France	X	X	X	X	X	
FRG	X	X	X	X	X	
Ghana						X
Greece	X					
Hungary			X	X		X
Italy	X	X	X	X	X	X
Japan		X	X	X	X	X
Kenya		X	X		X	X
Kuwait		X	X			
Luxembourg	X					X
Malawi		X				
Malaysia			X		X	X
Mexico	X			X	X	X

	1	2	3	4	5	6
Morocco	X					
Mozambique			X			
Netherlands	X	X	X	X	X	X
New Zealand	X				X	X
Nigeria		X	X		X	X
Norway	X	X	X	X	X	X
Peru	X					
Philippines				X	X	
Poland					X	X
Portugal				X		
Spain					X	
Sweden	X	X	X	X	X	X
Switzerland	X			X	X	X
Thailand					X	
Turkey		X				
Ukranian SSR	X					
USSR	X	X	X	X	X	X
U.S.	X	X	X	X	X	X
UK	X	X	X	X	X	X
Venezuela						X
Yugoslavia		X	X		X	

Total countries participating: 48

Forwarded to
Sen Baker &
Ken Duberstein

THE WHITE HOUSE

WASHINGTON

September 29, 1987

MEMORANDUM FOR NANCY J. RISQUE

FROM: ROBERT E. JOHNSON Robert E Johnson

SUBJECT: Press Conference on the Findings of the Recent Ozone Expedition in Antartica

Background: On September 16, 1987 the United States and twenty-one other nations signed an international protocol aimed at protecting the stratospheric ozone layer. The outline of the protocol is contained in the attached fact sheet. Representatives of the NASA-NSF-NOAA expedition which tested the ozone layer in Antartica will present their findings at a press conference tomorrow. Their major findings are summarized below.

Discussion: The over 150 scientists who participated in the expedition have written a consensus document which will be made public at the press conference. The major research findings and conclusions of the document are:

- The ozone hole identified over Antartica is fifteen percent larger than the largest previously measured hole of 1985.

- Available evidence indicates that the reduction of the ozone levels measured during the experiments resulted from both meteorological and chemical conditions. A dehydrated air mass depleted nitrogen from the atmosphere which set the stage for chlorine oxides to break down the ozone. (Although the science which supports this scenario is not definitive, these findings strongly suggest that CFCs and Halons are a major cause of ozone depletion.)

- The expedition's report strongly discourages speculation over an assessment of the global implications of these findings. The data from the experiments has not been completely analyzed and data concerning the likelihood of similar meteorological conditions occuring elsewhere does not exist.

United States scientists have taken the lead in developing the science on ozone depletion. They will continue to play a leadership role in the rigorous scientific review of this data - predicted to last until 1990, the year the protocol is scheduled to come into force.

These science findings demonstrate the President's leadership and wisdom in instructing the United States delegation to obtain a

protocol keeping in mind "that the U.S. position...is protecting the ozone layer by eventual elimination of realistic threats from man-made chemicals, and that we support actions determined to be necessary based on regularly scheduled scientific assessments."

Attachment

THE WHITE HOUSE

WASHINGTON

October 8, 1987

MEMORANDUM FOR NANCY J. RISQUE

FROM: ROBERT E. JOHNSON Robert E Johnson

SUBJECT: Stratospheric Ozone Protocol Ratification

Background: On September 16, 1987 the United States and twenty-one other nations signed an international protocol aimed at protecting the stratospheric ozone layer. A meeting was held earlier this week between State, EPA, and CEQ personnel to discuss the process by which the protocol package will be presented to the U.S. Senate. Their current plans are presented below.

Discussion: An environmental impact statement must be submitted with the ozone protocol to the U.S. Senate. The submission schedule will be dictated by the date on which this statement is ready. The following elements make up the anticipated schedule:

- o A legislative environmental impact statement will be submitted because this type of statement does not require an extended public comment period. This will speed up the process by at least two months and allow completion (and submission) of the impact statement by early January.

- o The protocol package can be sent to the Senate up to thirty days before the environmental impact statement. The current proposal is for the President to submit the package to Congress in mid-December.

A second issue of the ratification process is through what White House office does the State Department submit the protocol package to the President. The following considerations seem important here:

- o Ordinarily, the National Security Council processes treaty packages for the President. However, in this case the National Security Council was not the forum within which the policy process took place in generating the protocol. The fundamental question is should the Domestic Policy Council review the protocol package and, if so, how should this be done?

take it thru NSC

- o The Department of Defense has indicated their desire to voice their concerns about the Soviet failure to join the protocol. The review of the protocol package would seem the appropriate time for Defense to do this.

monitor this

National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration
National Science Foundation
Chemical Manufacturers Association

Fact Sheet

Initial Findings from Punta Arenas, Chile September 30, 1987

Antarctic Ozone

INITIAL FINDINGS FROM PUNTA ARENAS, CHILE

This statement has been prepared by the scientists who went to Punta Arenas, Chile to study the Antarctic ozone hole. This summary represents the views of the scientists themselves and not necessarily those of the cosponsoring organizations. The findings that will be presented are preliminary. Under normal circumstances, scientists studying such a complex scientific issue would take many months to years to disclose their initial findings. However, the issue of ozone perturbation is one of justifiable public concern, and hence the public should be kept abreast of the current scientific thinking. It is in this spirit that we would like to share our provisional picture of the Antarctic springtime ozone hole. Furthermore, this will help to stimulate the scientific inquiry and debate that can only lead to an improved and timely understanding of the phenomenon. A much more complete and final interpretation of our findings will be forthcoming after a planned intensive series of scientific meetings and the submittal of a group of scientific papers to the peer review process. This procedure will occur within the next six months.

Description of Goals and Objectives of the Mission

Three basic theories have been proposed to explain the observed decrease in spring-time Antarctic ozone that has been occurring since the late-1970's. One class of theories suggest that the hole is caused by the human activity of loading the atmosphere with chlorinated and brominated chemicals. Chlorofluorocarbons (CFC's) and Halons are contributing increasing levels of chlorine and bromine to the atmosphere. These compounds could then efficiently destroy stratospheric ozone in the Antarctic environment because of the special geophysical conditions that exist in this region of the atmosphere, i.e. a contained polar vortex (an isolated air mass), cold temperatures, and the presence of polar stratospheric clouds. A second class of theories suggests that there have been changes in the circulation of the atmosphere, which now transports ozone-poor air into Antarctica. A third theory postulates solar and cosmic ray induced, periodically enhanced abundances of oxides of nitrogen, which can cyclically destroy ozone.

The NSF-coordinated expedition to the McMurdo station in Antarctica last year was exceptionally successful in increasing our understanding of the Antarctic ozone hole. In conjunction with other experiments, this ground based effort demonstrated the recurrence of the ozone hole, the altitude over which ozone was depleted, that chlorine and nitrogen chemistry was highly perturbed relative to that observed at mid-latitudes, and that the solar cycle theory is an unlikely explanation. However, the McMurdo data were insufficient to distinguish adequately between the relative contributions of the first two classes of theories. Therefore, the goal of the present airborne campaign is to improve our understanding of the relative contributions of these, and possibly other, mechanisms to the formation of the Antarctic ozone hole.

One of the key environmental issues is whether the ozone depletion observed in Antarctica will always be localized in and around Antarctica, or whether it is a precursor of future global changes. A longer term objective of this campaign is to be able to provide information relevant to answering this question.

Participants, Sponsors, and Foreign Government Support

The campaign was coordinated by the National Aeronautics and Space Administration (NASA) and cosponsored by NASA, the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF), and the Chemical Manufacturers Association (CMA). In addition, the British Meteorological Office (BMO) provided a significant contribution to the project.

Scientists, engineers, and other personnel from Harvard University, University of Denver, University of Washington, University of Colorado, National Center for Atmospheric Research, Jet Propulsion Laboratory, NASA Ames Research Center, NASA Langley Research Center, NASA Goddard Space Flight Center, NOAA Aeronomy Laboratory, the British Meteorological Office, the European Center for Medium Range Weather Forecasts (ECMWF), Centre Nationale Recherches Meteorologiques, and Atmospheric and Environmental Research, Inc. participated in this campaign. Dr. J. C. Farman of the British Antarctic Survey kindly made available Halley Bay ozonesonde data. Scientists from both Chile and Argentina were also involved.

Key participants in this campaign were also the flight and ground crews of NASA, Lockheed, and Northrop, who flew and maintained the ER-2 and DC-8 research aircraft under very challenging conditions. Research and Data Systems provided the necessary telecommunication links and support.

The Chilean government hosted the airborne campaign, which was based out of Punta Arenas. The Chilean Air Force supplied the facilities and logistical support. The Chilean Antarctic Institute provided advice regarding the study area. In addition, invaluable assistance was provided by the Direccion General De Aeronautica Civil, and the National Meteorologic Service of Chile.

Other countries also helped: Panama, Costa Rica, Peru, and Ecuador cooperated with the overflights necessary for the transit from the United States to Chile. The government of Argentina offered alternate landing fields for the aircraft as they returned from their Antarctic missions. The National Meteorological Service of Argentina furnished data from Marambio. Lastly, the government of New Zealand assisted with the transcontinental Antarctic flight by the DC-8 that was part of the return to the United States.

Description of Campaign

The Airborne Antarctic Ozone Campaign succeeded in making 12 flights of the high altitude ER-2 aircraft, and 13 flights of the DC-8 medium altitude aircraft over Antarctica. The ER-2 typically operated at geometric altitudes relative to sea level between 12.0 and 18.7 km and flew to 72 degrees South along the Palmer Peninsula. The DC-8 operated at altitudes up to about 10 km and with its long range capability was able to reach the South Pole on several occasions, and is currently returning to the United States via New Zealand after crossing the Antarctic continent. The project had available to it Total Ozone Mapping Spectrometer (TOMS) images of the total ozone column of the southern hemisphere within a day of observation and of the orbits passing over the region of the Antarctic peninsula within 2 to 4 hours of observation. Aerosol and cloud extinction data were also available from the Stratospheric Aerosol Measurement (SAM II) and Stratospheric Aerosol and Gas Experiment (SAGE II), with the latter providing ozone measurements as well. Twice daily analyses and forecasts of winds and temperatures up to 30 mb, 22 km, for three days

ahead, were provided by the BMO in chart form, plus forecasts of the trajectories of air parcels on surfaces along which air masses move. Photochemical modelling along these trajectories was done using the aircraft observations. The ECMWF provided once a day analyses and forecasts up to 30 mb for 10 days ahead. A small theory team assisted the experimental scientists with the interpretation on a day to day basis. This approach was possible because of the availability of rapid data reduction facilities and an extensive, dedicated international telecommunications network.

Detailed lists of the participants, a discussion of the theories being addressed, the approach taken in the tests of these theories, and a description of the apparatus involved are given in the Airborne Antarctic Ozone Experiment Plan (NASA and NOAA, July 1987). Copies are available on request from NASA Ames Research Center or NASA Headquarters.

Data obtained from the ER-2 and DC-8 instrumentation

The spatial and temporal distribution of a large number of relatively short-lived chemical constituents that participate in chemical reactions that affect the abundance of ozone were measured from both the ER-2 and DC-8. Instruments aboard the ER-2 resulted in measurements of the distributions of ozone (O_3), chlorine monoxide radical (ClO), bromine monoxide radical (BrO), total odd nitrogen (NO_y), nitric oxide (NO), and water (H_2O) in the vicinity of the aircraft at altitudes ranging from 12 to 18 km above the Earth's surface, well into the altitude region where ozone is undergoing depletion. Instruments aboard the DC-8 measured the abundances of H_20 and O_3 in the vicinity of the aircraft, the vertical distribution of O_3 for approximately 10 km above the aircraft, and the total column amounts of O_3, hydrochloric acid (HCl), chlorine nitrate ($ClONO_2$), chlorine dioxide (OClO), BrO, hydrofluoric acid (HF), NO, nitrogen dioxide (NO_2), nitric acid (HNO_3), as well as a number of other constituents, above the aircraft altitude.

Additionally, the temporal and spatial distributions of long-lived chemical tracers and dynamical variables were measured in order to understand atmospheric motions. These included measurements of nitrous oxide (N_2O), methane (CH_4), chlorofluorocarbons 11 ($CFCl_3$) and 12 (CF_2Cl_2), carbon tetrachloride (CCl_4), and methylchloroform (CH_3CCl_3). In-situ measurements of all of these species were made from both the ER-2 and DC-8, and column measurements of most from the DC-8. The size distribution, abundance, and composition of particles was determined by instrumentation aboard the ER-2, as well as the vertical distribution of aerosols from 12 to 28 km by the DC-8 lidar, in an effort to understand the role of heterogeneous processes. Additionally, atmospheric pressure, temperature, lapse rate, and winds were measured aboard the ER-2 to determine the state variables and dynamical structure of the atmosphere.

The project had regular ozone sonde data available from the Palmer station, the Halley Bay station, the South Pole station, and McMurdo. These define the vertical distribution of ozone at points not routinely covered by the flight tracks. Ozonesondes were launched at special times from Palmer and the South Pole to coincide with aircraft overflights of those locations.

The analyses of some of these data sets have not yet been completed, either because of the lengthy data reduction procedures required or because of the sheer volume of raw data acquired. An example of the latter is the meteorological data set, whose initial analyses had the primary goal of forecasting the flight conditions. Furthermore, many of the analyses of the chemical data sets are clearly only preliminary, to be refined by recalibration checks and more sophisticated re-analyses available at the home laboratories. As a consequence, the initial picture summarized below cannot be a balanced, complete, and final one.

Results and their relationship to theories

The processes controlling the abundance and distribution of ozone in Antarctica are complex and intertwined. However, given the successful nature of this campaign, we are now in a position to start to more fully appreciate the exquisite balance between the meteorological motions and the photochemistry. We will present our preliminary scientific findings as answers to a series of posed scientific questions that are relevant to public policy.

1) Did the springtime ozone hole occur over Antarctica in 1987?

Yes. TOMS satellite, balloon ozonesonde, and both ER-2 and DC-8 aircraft measurements of ozone showed that the springtime ozone decrease occurred again this year. TOMS showed the spatial extent of the phenomenon is continental or greater in scale and revealed the temporal change in the total column of ozone. The abundance of ozone in August and September of 1987 was lower than any previous year at all latitudes south of 60 degrees. In mid-September of this year column ozone was approximately 15% lower at both 70 and 80 degrees south than the values observed in the lowest previous year of 1985. The balloon-sonde data demonstrated that ozone was depleted in the altitude region between approximately 13 and 24 km at Halley Bay, and 15 and 24 km at Palmer. Ozone trends observed at Halley Bay and at Palmer are quite similar, with an approximate 50% decrease observed from mid-August to mid-September near 18 km. The upward looking lidar aboard the DC-8 observed more than a 50% decrease in O_3 at 77 to 90 degrees south between 14 and 19 km, during September, but no discernible trend between 12 and 14 km. There was also evidence from the lidar data of a decrease in O_3 up to 23 km. The in-situ ER-2 instruments observed changes consistent with this picture.

The TOMS data showed that ozone did not simply change monotonically with time, but in some instances changed dramatically over large spatial scales in the matter of only a day or so. One example of such a rapid change in ozone is demonstrated by the TOMS data for September 4-6 over the Palmer Peninsula and Weddell Sea. Changes of greater than 25 Dobson units (DU) in one day were observed over large regions (3 million square km). The ozone sonde data from Halley Bay and the DC-8 lidar data showed that, during this event, the ozone was depleted over a wide altitude range, from about 14 to 23 km.

2) Does the evidence indicate that both chemical and meteorological processes are responsible for the ozone hole?

The weight of observational evidence strongly suggests that both chemical and meteorological mechanisms perturbed the ozone. Additionally, it is clear that meteorology sets up the special conditions required for the perturbed chemistry.

3) Was the chemical composition of the Antarctic stratosphere observed to be perturbed?

Yes. It is quite evident that the chemical composition of the Antarctic stratosphere is highly perturbed compared to predictions based on currently accepted chemical and dynamical theories. The present findings are consistent with the observations made last year from McMurdo. The distribution of chlorine species is significantly different from that observed at mid-latitudes, as is the abundance and distribution of nitrogen species. The amount of total water within some regions of the vortex is significantly lower than anticipated.

Since late August the abundance of the chlorine monoxide radical within the polar chemically perturbed region has been elevated by a factor of more than 100 relative to that measured at mid-latitudes at the highest altitude at which the ER-2 was flown, about 18.5 km. However, the abundance of ClO was observed to decrease rapidly towards lower altitudes. At the highest flight levels, the abundance of ClO at local solar noon ranged between 0.5 and 1 ppbv for the last month of the campaign. While we have no data at higher altitudes, the observed increase in the abundance of ClO from lower altitudes, coupled with the observed low column abundances of HCl, suggests that the ClO abundance may increase somewhat at altitudes above 18 km. In addition to the steep decrease in ClO abundance at lower altitude, the abundance of ClO was also observed to decrease dramatically outside of the chemically perturbed region.

Chlorine dioxide, OClO, which is most likely formed in a reaction sequence involving the ClO radical, was observed both day and night at highly elevated concentrations compared to those at mid-latitude. The preliminary analyses of these observations are consistent with measurements made from McMurdo last year. The column content of hydrochloric acid, HCl, which is one of the major chlorine reservoirs at mid-latitudes, is very low within the chemically perturbed region reaching column contents below 1×10^{15} molecules per cm^2. In addition, the column amount ratio of HCl/HF within the chemically perturbed region decreased significantly from a normal mid-latitude value of 4 to a value less than unity. While chlorine nitrate was observed, the data have yet to be fully analyzed thus precluding a statement at this time about its abundance.

The bromine monoxide radical has been observed at concentrations of a few pptv within the chemically perturbed region of the vortex at the flight levels of the ER-2. The abundance of BrO decreases at lower altitudes. However, because the observed concentrations are close to the detection limit of the instrument, little more can be said about the altitude dependence. The low measured abundances of BrO, coupled with our current lack of understanding of the ClO + BrO reaction means that we cannot currently assess the significance of this mechanism for ozone reductions at the ER-2 flight levels.

The ER-2 observations of the abundance of odd nitrogen, which is the sum of all nitrogen-containing reservoir and radical species, show, like total water, very low values within the chemically perturbed region of the vortex , indicating that the atmosphere has been denitrified, as well as dehydrated. Abundances of NO_y of 8-12 ppbv were observed outside the chemically perturbed region, while abundances of 0.5 to 4 ppbv were observed inside the chemically perturbed region. A similar large change was observed for one of the nitrogen components, i.e. nitric oxide, NO. In addition, some of the NO_y observations suggest that NO_y component species are incorporated into polar stratospheric cloud (PSC) particles and nitrate was observed in the particle phase on some of the filter samples and on some of the wire impactor samples taken in the chemically perturbed region of the vortex. The column measurements of nitric oxide, nitrogen dioxide, and nitric acid made from the DC-8 exhibit a strong decrease in the abundance of these species towards the center of the vortex. These low values of nitrogen species are contrary to all theories requiring elevated levels of nitrogen oxides, such as the the proposed solar cycle theory.

4) How do the observed elevated ClO abundances support a chemical role in the formation of the ozone hole?

There is no longer debate as to whether ClO exists within the chemically perturbed region near 18 km at abundances sufficient to destroy ozone if our current understanding of the chlorine-ozone catalytic cycle is correct. The rate of decrease in ozone during the month of

September at the highest altitudes at which the ER-2 was operated during this campaign is consistent with simultaneously observed concentrations of ClO. However, our present understanding of key chemical reaction rates and photodissociation products within the catalytic process is incomplete. Thus, laboratory studies are urgently needed. It is essential to define the rate of ClO dimer (Cl_2O_2) formation and the photolysis products of dimer decomposition because only one of several possible routes leads to ozone destruction. Once the results of ongoing laboratory studies become available, these in-situ ClO data will allow the chemical mechanism to be quantitatively defined and its consequences better understood.

There is another line of observational evidence consistent with ozone destruction by chlorine catalysis. In the month of August, a consistent positive correlation between ClO and O_3 was observed. By the middle of September, as the ozone concentration was dropping at ER-2 altitudes, a strong anti-correlation developed between ClO and O_3. The anti-correlation was usually present on both large and small scales within the chemically perturbed region.

There are observations that are not entirely consistent with these chemical arguments. For example, based on preliminary data from this year and data from last year from McMurdo, the observed diurnal behavior of OClO, is difficult to rationalize with the present chemical mechanisms, particularly in light of the new observations that the abundances of BrO are low at ER-2 flight altitudes.

5) Can the elevated abundances of ClO inside the chemically perturbed region of the vortex be explained?

Significant progress was made. Observational data that air within the chemically perturbed region of the vortex is dehydrated and that the NO_y abundances are very low are consistent with theories that have been invoked whereby the chlorine reservoir species, $ClONO_2$ and HCl, can react on the surfaces of polar stratospheric clouds to enhance the abundance of active chlorine species, i.e. ClO. The observations also support the picture that the abundance of NO_y is low because odd nitrogen can be removed from the atmosphere by being tied up in ice crystals, which can then gravitationally settle to much lower altitudes. Low abundances of NO_y are needed to prevent the rapid reconversion of ClO to $ClONO_2$. This picture is further supported by the observations of low column abundances of HCl, by occasional observations of high levels of nitrate found in the ice particles, and by the visual and lidar observations of high cirrus and polar stratospheric clouds.

One observation which is currently difficult to understand is the sharp decrease in the abundance of ClO at lower altitudes. This could be due to a lack of understanding of either the abundance or partitioning of ClO_y, or to dynamical effects. Lack of observations of reactive hydrogen containing radicals, hydroxyl (OH) and hydroperoxy (HO_2) currently prevents an assessment of their role in the conversion of chlorine reservoir species to ClO.

6) How do the observations support a meteorological role in the formation of the ozone hole?

There were instances of rapid large scale changes in total ozone where meteorology appears to have been the controlling factor. One such event occurred over the Palmer Peninsula on September 5. Over a period of 24 hours total ozone as observed by TOMS decreased by 25 DU to below 200 DU over an area of about 3 million square km. Such a rapid decrease is difficult to explain chemically. The origin of that air is not known. It could be either air naturally low in ozone, tropospheric/lower stratospheric, or air in which ozone had been chemically depleted. The feature moved over the Weddell Sea and persisted until

September 16, when it merged with two other regions of low total ozone. Lidar measurements from the DC-8 showed low ozone values and extensive aerosol layers between 14 and 19 km in the region of the TOMS minimum of ozone. This and other similar events evident in the TOMS ozone data and the SAM II PSC data between September 5 and 14 were spatially correlated with deepening surface pressure lows with marked meridional flow from middle to high latitudes at lower stratospheric levels. The detailed meteorological mechanism by which the surface lows produce the low column ozone remains unclear and further analysis is required.

The data offer no support for sustained large scale upwelling. In the restricted region covered by the ER-2, 54 to 72 degrees south latitude and from altitudes of 12.5 to 18.5 km, measurements of CFC-11 and N_2O which act as tracers of air motions show no evidence of a general increase in abundances above about 14 km during the mission, although there were instances of structure and elevated values.

The meteorology must play a role in the dehydration and denitrification processes. It is crucial to understand whether the necessary low temperatures are maintained radiatively or by ascent, or some combination of both.

7) Does the complexity of the situation suggest that we need to understand the interplay between meteorology and chemistry?

Yes. It is clear from our ER-2 flights that the region of dehydrated and denitrified air maintained a sharply defined latitude gradient throughout most of the campaign. On a purely meteorological definition, the vortex edge would be well outside the dehydrated, denitrified region. The meteorological flow must therefore have been such as to maintain a kind of "containment vessel", in which the perturbed chemistry could proceed without being influenced by mixing in more normal stratospheric air from outside or below.

Very low values of CFC-11, CFC-12, CH_3CCl_3, and N_2O were observed at the upper levels of the ER-2 flight track within the "containment vessel". A key question is how these low values are produced and maintained in the chemically perturbed region.

The concept of mixing at the region of sharp latitudinal gradient is important, since it has the potential to supply nitrogen oxides which would tend to decelerate the chlorine chemistry. The meteorology is thus important in the termination phase as well as in the initiation phase.

8) Can we quantitatively separate the contributions of chemistry and meteorology to the formation of the ozone hole?

No. The September 5 event illustrates the complexity of the ozone hole, and the difficulty of deriving unambiguous dynamical or chemical signatures. The magnitude and rapidity of the decrease are difficult to ascribe to a chemical cause. Air of low ozone content appears to have been transported into the region. The origin of that air is not known. It could be either air naturally low in ozone, tropospheric/lower stratospheric, or air in which ozone had been chemically depleted.

Another illustration of the difficulty of clearly establishing chemical or dynamical mechanisms is the decreasing trends in ozone in regions of low ClO outside of the vortex whose magnitudes are comparable to those within the vortex. This is evident from an examination of the ozonesonde data from the Palmer station at 64 °S and comparing it to the Halley Bay data at 78 °S, and the DC-8 lidar data. In addition, downward trends of ozone

were observed in the lower altitude region where ClO concentrations were substantially lower than at 18 km.

9) What are the global implications of the Antarctic ozone hole?

Until we understand the cause or causes of the spring-time Antarctic hole, we will not be able to address this key question in a responsible manner. Thus, at this time, it is premature for us to speculate on this important topic. However, as we continue to analyze the data that we have acquired and further test and expand the pictures that we have developed, we will be in a better position to address this important question.

10) When will the data be in a form suitable for use in formulating national and international regulatory policies?

As noted in the opening paragraph, the schedule for the assimilation and publication of the results is brisk. Peer reviewed publications will appear in 1988. The results from the 1987 ground-based McMurdo campaign will likely appear on about the same schedule. Both sets of these completed conclusions would be the best basis for any possible policy re-evaluations. The major international scientific review scheduled for 1989, which will serve as input to the 1990 policy review of the Montreal Protocol, will have these conclusions available.

UPDATE

An Exemplary Ozone Agreement

It was a milestone in the annals of international politics: diplomats saw the future, didn't like it and decided to change it. The result: a meeting of 49 nations in Montreal and an agreement last week to freeze, then eventually reduce their use of chlorofluorocarbons (CFC's), manmade chemicals that destroy the ozone layer protecting earth from deadly radiation. "For the first time, the nations of the world agreed to cooperate on an environmental problem before there were widespread harmful effects," said U.S. Deputy Assistant Secretary of State Richard Benedick.

RON LEVINE—FIRST LIGHT

CFC-busters: *Thomas (right) and Canadian counterpart*

CFC's are widely used in plastic foams, aerosol sprays and refrigeration systems. For years they have been wafting into the stratosphere—eating away at the ozone and letting more radiation reach the earth's surface, where it causes skin cancer, reduces crop productivity and harms aquatic life. "This is as important as an arms agreement," said atmospheric scientist Michael Oppenheimer of the Environmental Defense Fund, a New York-based lobbying group.

Scientists have been warning about the CFC problem since 1974. Already the air over Antarctica suffers a seasonal "ozone hole," a vast space in the stratosphere with only half the ozone there used to be. Worldwide, the ozone layer is now about 3 percent thinner than it was a decade ago. At the rate it was deteriorating, the U.S. Environmental Protection Agency estimates, there would have been 40 million more cases of cancer in the United States in the next 88 years. Even under the Montreal pact, which freezes CFC consumption at 1986 levels beginning in 1989 and cuts it 50 percent by 1999, the ozone layer will thin by about 2 percent in 70 or so years, causing an estimated 7 million extra cancer cases.

Despite the high stakes, the agreement threatened to founder several times during the talks. At one point the United States proposed that any treaty take effect only after ratification by nations representing 90 percent of CFC production. Finally Washington agreed the pact would become law after ratification by countries accounting for just two-thirds of global output.

But because of two exemptions, some environmentalists charge that the treaty is not as good as it looks. First, developing countries will be allowed to *increase* CFC use 10 percent a year for 10 years if that is thought vital to their economies. Second, the Soviet Union will be permitted to finish CFC plants already under construction in its current five-year plan. As a result, CFC use may fall by only 35 percent rather than the mandated 50 percent. Yet where the treaty fails, the marketplace may succeed. Because manufacturers may no longer use all the CFC's they want, a search for substitutes may phase out CFC's sooner than the treaty envisions.

Whatever the ultimate effects of the Montreal agreement, it is notable as much for the example it sets as for anything it accomplishes. U.S. EPA head Lee Thomas, one of the prime movers behind the ozone agreement, is optimistic that nations will now jointly tackle other environmental perils. High on his list: ocean pollution and the global warming—or "greenhouse effect"—caused by an accumulation of carbon dioxide and other gases.

SHARON BEGLEY *with* MARY HAGER *in Washington*

Vindication for a Blacklist Victim

For a victim of cold-war witch-hunting, Penn Kimball did all right for himself. He was an adviser to New York Gov. W. Averell Harriman and Connecticut Sen. William Benton, wrote for The New York Times and Time magazine and recently retired as a professor at Columbia's prestigious Graduate School of Journalism. He did so well, in fact, that it took him 30 years to find out he *was* a victim of a witch hunt. It's taken him an additional 10 to set the record straight, but last week Kimball, 71, felt sure of vindication.

Though a U.S. district court in New York has yet to announce its verdict, Kimball expects soon to drop his $10 million suit against the FBI, the State Department and the CIA in return for an unequivocal statement that he and his late wife were never disloyal. He also expects the government to admit it erred in 1946 when he, as a Foreign Service candidate, was secretly declared a security risk. Investigators apparently relied on rumors from people suspicious of Kimball's liberal politics—or the beers he shared with suspected communists.

It wasn't until 1977 that Kimball, out of curiosity, asked to see what information the Feds had on him; only then did he learn he'd been blacklisted. How much it changed his life Kimball will never know—though in his 1983 book, "The File," he says it may have cost him an FCC post in the Kennedy administration. As for his $10 million claim, the suit was mainly a way of getting the government's attention, he says. A serious bid for the money "would have taken another 10 years to get to the Supreme Court where Chief Justice Bork and Justices Hatch and Meese would be sitting." Instead, Kimball is going back to Columbia—this time for a Ph.D. in American government.

DAVID GATES

A decade's crusade: *Kimball*

ROBERT McELROY—NEWSWEEK

THE WHITE HOUSE

WASHINGTON

September 17, 1987

MEMORANDUM FOR THE PRESIDENT

FROM: NANCY J. RISQUE

SUBJECT: International Protocol on Chlorofluorocarbons

On behalf of the U.S., EPA Administrator Lee Thomas yesterday signed an international protocol aimed at protecting the stratospheric ozone layer by limiting the future world-wide emissions of chlorofluorocarbons (CFCs) and halons. Joining the United States in signing the protocol were twenty-three other countries, including members of the European Community and Japan - ensuring that, following ratification, the protocol will enter into force after next year. Forty-nine nations, including those who signed the protocol, signed an act approving the meeting's activities. The Soviet Union endorsed the protocol, but their delegation did not have the authority to sign. Countries will have six months within which to formally sign the protocol.

The U.S. delegation in Montreal and an interagency team in Washington worked together to insure that your instructions were carried out. The protocol requires Senate ratification.

Outlined below are some of the major issues that arose during the negotiations of which you should be aware:

o Entry Into Force. The delegation was able to obtain in the protocol a provision that it shall enter into force on January 1, 1989, provided that it is ratified by at least eleven parties representing two-thirds of 1986 estimated global consumption of the controlled substances. These parties would represent countries that now produce over 80% of the CFCs and halons.

o Soviet Allowance. Throughout the negotiations the Soviets wanted reductions based upon 1990 production levels, because of their current five year plan. The U.S. delegation and the other negotiating parties were unanimously opposed to changing the base year from 1986 levels. The Soviets were isolated but firm. A compromise was worked out that allows any party with production facilities under construction or planned for completion prior to the end of 1990 to increase their annual per capita consumption of CFCs and halons up to 0.5 kilograms. We agreed to this because now the Soviets have agreed (as did others) to report their production and consumption levels of CFCs

and halons - something they had opposed earlier - and are committed to limit their CFC and halon production. Neither would have been achieved without the compromise.

o European Community. The European Community (EC) proposed that any regional economic integration organization should be allowed to jointly fulfill their obligations. This, in effect, would have allowed the EC an advantage in world trade markets, by permitting reductions of one member country to offset increases in production of another member country as long as the EC totals were reduced. A compromise was reached that allowed the EC to jointly meet consumption reductions, but each country would be required to individually meet reduced production levels for CFCs. It was also agreed that all the member countries must join in the protocol for this to be permitted.

o Timing. Some timing changes were also accepted to get more desirable features in the protocol. The freeze on halons will take effect at the end of three years, instead of the "one or two years" contained in your instructions. This was needed to get the EC to agree to include halons in the controlled substances listing. Also, a ten year period for the 50% reduction of CFCs was agreed to, instead of the "about eight years" contained in your instructions. The first phase of a 20% reduction of CFCs will occur during the fifth year after entry into force, instead of the "four years" contained in your instructions. The second phase, a further 30% CFC reduction, will occur five years after the first phase. This timing ensured that Japan would agree to the protocol.

All of the fundamental principles contained in your instructions - a weighted voting system, a grace period for lesser developed countries, strong enforcement provisions, periodic assessments of the control provisions, and equitable trade provisions - were incorporated into the protocol.

Overall, the United States was a leader in drafting an international protocol that will reach your ultimate objective of protecting the ozone layer through supporting actions determined to be necessary based on regularly scheduled scientific assessments. This is a significant Administration achievement on both the domestic and the world environmental front.

3d DRAFT

THE WHITE HOUSE

WASHINGTON

September 16, 1987

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The U.S. delegation in Montreal and an interagency team in Washington worked together to insure that your instructions were carried out. The protocol requires Senate ratification.

Outlined below are some of the major issues that arose during the negotiations of which you should be aware:

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o Soviet Allowance. Throughout the negotiations the Soviets wanted reductions based upon 1990 production levels, because of their current five year plan. The U.S. delegation and the other negotiating parties were unanimously opposed to changing the base year from 1986 levels. The Soviets were isolated but firm. A compromise was worked out that allows any party with production facilities under construction or planned for completion prior to the end of 1990 to increase their annual per capita consumption of CFCs and halons up to 0.5 kilograms. We agreed to this because now the Soviets have agreed (as did others) to report their production and consumption levels of CFCs and halons - something they had opposed earlier - and are committed to limit their CFC and halon production. Neither would have been achieved without the compromise.

o European Community. The European Community (EC) proposed that any regional economic integration organization should be allowed to jointly fulfill their obligations. This would, in effect,

allow the EC an advantage in world trade markets, by permitting reductions by one member country to offset increases in production by another member country as long as the EC totals were reduced. The compromise was that the EC could jointly meet consumption reductions, but each country would be required to individually meet reduced production levels for CFCs and halons. It was also agreed that all the member countries must join in the protocol for this to be permitted.

o Timing. Some timing changes were also accepted to get more desirable features in the protocol. The freeze on halons will take effect at the end of three years, instead of the "one or two years" contained in your instructions. This was needed to get the EC to agree to include halons in the controlled substances listing. Also, a ten year period for the 50% reduction of CFCs was agreed to, instead of the "about eight years" contained in your instructions. The first phase of a 20% reduction of CFCs will occur during the fifth year after entry into force, instead of the "four years" contained in your instructions. The second phase, a further 30% CFC reduction, will occur five years after the first phase. This timing ensured that Japan would agree to the protocol.

All of the fundamental principles contained in your instructions - a weighted voting system, a grace period for lesser developed countries, strong enforcement provisions, periodic assessments of the control provisions, and equitable trade provisions - were incorporated into the protocol.

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2nd DRAFT

September 16, 1987

MEMORANDUM FOR THE PRESIDENT

FROM: NANCY J. RISQUE

SUBJECT: International Protocol on Chlorofluorocarbons

On behalf of the U.S., EPA Administrator Lee Thomas today signed an international protocol aimed at protecting the stratospheric ozone layer by limiting the future world-wide emissions of chlorofluorocarbons (CFCs) and halons. The U.S. delegation in Montreal and an interagency team in Washington worked together to insure that your instructions were carried out. The protocol, which still requires Senate ratification, will be discussed by the Domestic Policy Council, and their recommendations will be forwarded to you next week.

Outlined below are some of the major issues that arose during the negotiations of which you should be aware:

o Entry Into Force. The delegation was able to obtain in the protocol a provision that it shall enter into force on January 1, 1989, provided that at least eleven parties representing two-thirds of 1986 estimated global consumption of the controlled substances have ratified it. These parties would represent countries that now produce over 80% of the CFCs and halons.

o Soviet Allowance. Throughout the negotiations the Soviets wanted reductions based upon 1990 production levels, because of their current five year plan. The U.S. delegation and the other negotiating parties were unanimously opposed to changing the base year from 1986 levels. The Soviets were isolated but firm. A compromise was worked out that allows any party with production facilities under construction or planned for completion prior to the end of 1990 to increase their annual per capita consumption of CFCs and halons up to 0.5 kilograms. We agreed to this because now the Soviets have agreed to report their production and consumption levels of CFCs and halons - something they had opposed earlier - and are committed to limit their CFC and halon production. Neither would have been achieved without the compromise.

o European Community. The European Community (EC) proposed that any regional economic integration organization should be allowed to jointly fulfill their obligations. This would, in effect allow the EC an advantage in world trade markets, by permitting reductions by one member country to offset increases in production by another member country as long as the EC totals were reduced. The compromise was that the EC could jointly meet

consumption reductions, but each country would be required to individually meet reduced production levels for CFCs and halons. It was also agreed that all the member countries must join in the protocol for this to be permitted.

o Timing. Some timing changes were also accepted to get more desirable features in the protocol. The freeze on halons will take effect at the end of three years, instead of the "one or two years" contained in your instructions. This was needed to get the EC to agree to include halons in the controlled substances listing. Also, a ten year period for the 50% reduction of CFCs was agreed to, instead of the "about eight years" contained in your instructions. The first phase of a 20% reduction of CFCs will occur during the fourth year after entry into force, which was per your instructions. The second phase, a further 30% CFC reduction, will occur six years after the first phase. This timing ensured that Japan would agree to the protocol.

Overall, the United States was a leader in drafting an international protocol that will reach your ultimate objective of protecting the ozone layer through supporting actions determined to be necessary based on regularly scheduled scientific assessments. This is a significant Administration achievement on both the domestic and the world environmental front. In addition industry observers were generally satisified that they can meet the reductions called for in the protocol during the time periods agreed to.

1st DRAFT

September 17, 1987

MEMORANDUM FOR THE PRESIDENT

FROM: NANCY J. RISQUE

SUBJECT: International Protocol on Chlorofluorocarbons

Pursuant to your instructions of June 25, 1987, EPA Administrator Lee Thomas signed an international protocol today to protect the stratospheric ozone layer by limiting the future world-wide emissions of chlorofluorocarbons (CFCs) and halons. The U.S. delegation in Montreal, the site of the negotiations, and an interagency team in Washington worked together to insure that your instructions were faithfully carried out. The protocol, which still requires Senate ratification, will be discussed by the Domestic Policy Council next week. Their recommendations will be forwarded to you as soon as possible.

Outlined below are some of the major issues that arose during the negotiations of which you should be aware:

o Entry Into Force. Your instructions were that the delegation should attempt to ensure that the protocol enters into force only when a substantial proportion of producing/consuming countries have signed and ratified it. The delegation was able to obtain in the protocol a provision that it shall enter into force on January 1, 1989, provided that at least eleven parties representing two-thirds of 1986 estimated global consumption of the controlled substances have ratified it. Parties making up two-thirds of consumption would represent countries that now produce over 80% of the controlled substances.

o Soviet Allowance. Throughout the negotiations the Soviets were adamant that reductions be based upon 1990 production levels, because their current five year plan ends in 1990. The United States delegation, per your instructions, and the other negotiating parties were unanimously opposed to changing the base year from 1986 levels of production. The Soviets, therefore, were isolated but firm in this demand. A compromise was worked out that allows any party that has production facilities under construction or planned for completion prior to the end of 1990 to increase their annual per capita consumption of CFCs and halons up to 0.5 kilograms. The advantage of this compromise for the protocol is that now the Soviets have agreed to report their production and consumption levels of CFCs and halons - something they had opposed earlier - and are now committed to limit their CFC and halon production. Neither would have been achieved without the compromise.

o European Community. Late in the negotiating sessions the European Community (EC) proposed that any regional economic integration organization should be allowed to jointly fulfill their obligations under the protocol. This would have allowed EC members an advantage in world trade markets, by permitting reductions by one member country to offset increases in production of another member country as long as the EC totals were reduced in accordance with the protocol. The compromise wording was that the EC could jointly meet their consumption reductions, but each country would be required to individually meet reduced production levels for the controlled substances. It was also agreed that all of the member countries must join in the protocol for the EC to be able to jointly meet consumption reductions targets.

o Timing. It was also deemed necessary to agree to some timing changes so as to obtain the more desirable features of the protocol. These included acceptance of the freeze on halons taking effect at the end of three years, instead of the "one or two years" contained in your instructions. This was determined to be necessary to get the EC to agree to including halons in the controlled substances listing. It was also felt necessary to agree to a ten year period during which the 50% reduction of CFCs will occur, instead of the "about eight years" contained in your instructions. The first phase of a 20% reduction of CFCs will occur during the fourth year after entry into force, which was per your instructions. The second phase of a further 30% CFC reduction was negotiated to occur six years later. This timing essentially ensured that Japan would agree to the protocol.

Overall, the United States was viewed as a leader in ensuring an international protocol that will reach your ultimate objective of protecting the ozone layer through supporting actions determined to be necessary based on regularly scheduled scientific assessments. This is a significant Administration achievement on both the domestic and the world environmental front. In addition industry observers were generally satisified that they can meet the reductions called for in the protocol during the time periods agreed to.

Commerce

JR Spradley

MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER (SIGNED IN MONTREAL ON 16 SEPTEMBER 1987, BY THE UNITED STATES AND THIRTY-THREE OTHER DELEGATIONS)

- VOTING

Entry Into Force (EIF)	11 States representing 2/3 of global consumption
Reconsideration of 50% reduction	2/3 of Parties representing 2/3 of Protocol consumption
Other adjustments and reductions	2/3 of Parties representing 50% of Protocol consumption
New substances	2/3 of Parties to adopt and to ratify. Not binding on States not ratifying.

- CONTROLS

Freeze on CFCs at 1986 base	Begins 7 months after EIF of Protocol
Freeze on Halons at 1986 base	Begins 37 months after EIF of Protocol
20% Reduction on CFCs	Begins 1 July 1993
50% Reduction on CFCs	Begins 1 July 1998

- FORMULA: Consumption = Production (P) + Imports (I) - Exports (E)

Caps both consumption and production at 1986 base. Provides some flexibility in production to meet the basic domestic needs of LCDC Parties and for industrial rationalization.

	C=P+I-E	P	P.FlEX
Freeze	100%	100%	+ 10%
20% Reduction	80%	80%	+ 10%
50% Reduction	50%	50%	+ 15%

o TRADE	
Imports from non-parties	Banned one year after EIF
Exports to non-parties	
from LCDC parties	Banned 1 January 1993
from non-LCDC parties	Not subtracted in calculating consumption beginning 1 January 1993
Imports of products containing controlled substances from non-parties	Parties to consider restrictions within 3 years after EIF
Imports of products made with controlled substances from non-parties	Parties to consider restrictions within 5 years after EIF
o SPECIAL CLAUSES	
USSR	Allows USSR production now under construction to be added to 1986 base.
CANADA	Allows small producers (under 25 kilo-tons) to transfer production.
EEC	Allows EEC (or any other REIO) to transfer consumption among members. All members must be Parties.
Low Consuming Developing Countries (LCDCs)	Allows LCDCs to delay implementation of controls for up to 10 years and to increase consumption by up to 0.3 killograms per capita.

SIGNATORIES TO OZONE PROTOCOL

September 16, 1987

SIGNED

7/12

BELGIUM
CANADA ← (Brazil)
EGYPT
FINLAND
FRANCE
FRG
GHANA
ITALY
JAPAN
KENYA
MEXICO
NETHERLANDS
NEW ZEALAND
NORWAY
PORTUGAL
SENEGAL
SWEDEN
SWITZERLAND
TOGO
U.K.
U.S.
VENEZUELA
EEC

Greece
Spain
Ireland
Luxenbourg
Denmark

23 + EEC
22 + EEC
The USSR and Australia signed the Final Act but not the Protocol.

SIGNATORIES TO OZONE PROTOCOL

September 16, 1987

SIGNED

✓BELGIUM
CANADA
EGYPT☆
FINLAND
✓FRANCE
✓FRG
GHANA☆
✓ITALY
JAPAN
KENYA☆
MEXICO☆
✓NETHERLANDS
NEW ZEALAND
NORWAY
✓PORTUGAL
SENEGAL☆
SWEDEN
SWITZERLAND
TOGO☆
✓U.K.
U.S.
VENEZUELA☆
EEC

23 + EEC

I did 22 countries + EEC!

7 LDCs
7 EC
4 other WEur
4 (Canada/US/N Zealand/Japan)
22

Denmark
Panama

The USSR and Australia signed the Final Act but not the Protocol.

U.S.S.R.
Greece
Morrocco
Israel
Behyorussion SSR
Luxembourg

OES PRESS GUIDANCE September 16, 1987

ANNOUNCEMENT OF OZONE PROTOCOL SIGNING

WE ARE PLEASED TO ANNOUNCE THAT THE U.S. WILL TODAY SIGN IN MONTREAL A PROTOCOL TO THE 1985 VIENNA CONVENTION TO PROTECT THE OZONE LAYER THAT PROVIDES A MECHANISM TO CONTROL OZONE DEPLETING CHEMICALS. THE PROTOCOL HAS TAKEN NEARLY TWO YEARS TO NEGOTIATE AND PROVIDES A FREEZE ON PRODUCTION OF OZONE DEPLETING SUBSTANCES AT 1986 LEVELS, INITIALLY REDUCTION TO 80 PERCENT OF THAT LEVEL IN 1994 AND 50 PERCENT OF 1986 LEVELS BY 1999. A PRESS RELEASE ON THE AGREEMENT IS AVAILABLE IN THE PRESS OFFICE.

Drafted: OES/ENV:ADSens:dah

Cleared: OES/E:WANitze
PA: POakley

September 16, 1987

FACT SHEET

PROTOCOL TO CONTROL OZONE DEPLETING SUBSTANCES

On September 16, 1987 the U.S. signed in Montreal a protocol to the 1985 Vienna Convention for the Protection of the Ozone Layer that provides specific mechanisms to control emissions of ozone-depleting substances.

Most major producing and consuming countries, including the EC and Japan, joined in signing the protocol. These countries represent about seventy percent of global consumption and eighty percent of global production of ozone-depleting substances.

Two principal features of the protocol are an obligation relating to the control of emissions of ozone-depleting substances (Article 2) and the restriction of trade in controlled substances with States not party to the protocol (Article 4). On control measures, the text provides for:

- A freeze at 1986 levels on consumption of chlorofluorocarbons 11, 12, 113, 114, and 115 in the second year after entry into force, and of halons 1211, 1301 and 2402 in the fourth year after entry into force.

- Long-term scheduled reductions (of twenty percent by 1994, then an additional thirty percent by 1999) of chlorofluorocarbon consumption.

- Periodic assessments of the control provisions, based upon scientific, environmental, technical and economic information, which could result in addition or removal of chemicals from the list of controlled substances or a change in the reduction schedule or the emission reduction target.

With respect to trade with non-parties, the protocol includes

- A ban on imports from non-parties of the controlled substances within one year of the protocol's entry into force.

- o A ban or restrictions on imports of products containing controlled substances from non-parties within four years of entry into force.

- o Consideration within five years of entry into force of restriction on imports of products produced with controlled substances from non-parties.

- o A prohibition against concluding new agreements which provide non-parties with financial assistance for producing the controlled substances.

The decision to reduce consumption by a total of fifty percent can only be rescinded or amended by two-thirds of the parties representing at least two-thirds of total consumption, allowing us in effect a veto. To ensure that the economic burden of these controls is equitably shared, the protocol will only enter into force when 11 countries representing sixty-seven percent of global consumption have ratified the agreement.

The protocol provides a limited grace period from compliance with the control measures for low-consuming countries who adhere to the protocol. The protocol contains a mechanism to add new substances to the controlled list or delete substances. It also requires an annual report by each party of its production, imports and exports of controlled substances, and measures for treatment of parties that are not in compliance with obligations under the protocol.

In tandem with the negotiations, the Administration engaged in an extensive domestic regulatory review process, including a thorough assessment of the risks and risk management options. Industries which produce and use ozone-depleting substances have actively participated in assessing risk and policy options. We have consulted closely as well with other interested groups as we have developed our negotiating positions -- including discussion with members of the Congress and their staffs.

September 16, 1987

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On September 16, 1987 the U.S. signed in Montreal a protocol to the 1985 Vienna Convention for the Protection of the Ozone Layer that provides specific mechanisms to control emissions of ozone depleting substances.

Most major producing and consuming countries, including the EC, Japan and the Soviet Union, joined in signing the protocol. These countries represent about seventy percent of global consumption and eighty percent of global production of ozone depleting substances;

error = endorsed, but did not sign

Two principal features of the ~~envisioned~~ protocol are an obligation relating to the control of emissions of ozone-depleting substances (Article 2) and the restriction of trade in controlled substances with States not party to the protocol (Article 4). On control measures, the text provides for:

- A freeze on consumption of the major ozone-depleting substances (chlorofluorocarbons 11, 12, 113, 114, and 115 and Halons 1211, and 1301 and 2402) within three years at 1986 levels.

- Long-term scheduled reductions (of twenty percent by 1994, then an additional thirty percent by 1999) of chlorofluorocarbon consumption.

is that right?

- Periodic assessments of the control provisions, based upon scientific, environmental, technical and economic information, which could result in addition or removal of chemicals from the list of controlled substances or a change in the reduction schedule or the emission reduction target.

With respect to trade with non-parties, the protocol includes

- A ban on imports from non-parties of the controlled substances within one year of the protocol's entry into force.

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- Consideration within five years of entry into force of restriction on imports of products produced with controlled substances from non-parties.

- A prohibition against concluding new agreements which provide non-parties with financial assistance for producing the controlled substances.

The decision to reduce consumption by a total of fifty percent can only be rescinded or amended by two-thirds of the parties representing at least two-thirds of total consumption, allowing us in effect a veto. To ensure that the economic burden of these controls is equitably shared, the protocol will only enter into force when 11 countries representing sixty-seven percent of global consumption have ratified the agreement.

The protocol provides a limited grace period from compliance with the control measures for low-consuming countries who adhere to the protocol and thus forego building their own production facilities in the future. The protocol permits us to add new substances to the controlled list or delete substances. It also requires an annual report by each party of its production, imports and exports of controlled substances, and for treatment of parties that are not in compliance with obligations under the protocol.

Prior to concluding the protocol -- and in tandem with the negotiations -- the Administration engaged in an extensive domestic regulatory review process, including a thorough assessment of the risks and risk management options. Industries which produce and use ozone depleting substances have actively participated in assessing risk and policy options. We have consulted closely as well with other interested groups as we have developed our negotiating positions -- including discussion with members of the Congress and their staffs.

Drafted by: OES/ENV:ADSens:dah
Clearances: OES/E:WANitze
EPA:LFisher
OES:ATidball
PA:POakley

Wang no. 6971T