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on the Protection of the Ozone Layer

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FIFTH REVISED DRAFT CONVENTION FOR THE PROTECTION  
OF THE OZONE LAYER

Preamble

The Parties to this Convention,

Aware of the potentially harmful impact on human health and the environment through modification of the ozone layer,

Recalling the pertinent provisions of the Declaration of the United Nations Conference on the Human Environment, and in particular principle 21, which provides that "States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction",

Mindful of the work and studies proceeding within both international and national organizations and, in particular, of the World Plan of Action on the Ozone Layer of the United Nations Environment Programme,

Mindful also of the precautionary measures for the protection of the ozone layer which have already been taken at the national and international levels,

Aware that measures to protect the ozone layer from modifications due to human activities require international co-operation and action, and should be based on relevant scientific and technical considerations,

Aware also of the need for further research and systematic observations to further develop scientific knowledge of the ozone layer and possible adverse effects resulting from its modification,

Determined to protect man and the environment against adverse effects resulting from modifications of the ozone layer,

HAVE AGREED AS FOLLOWS:

Article 1

DEFINITIONS

For the purposes of this Convention:

1. "The ozone layer" means the layer of atmospheric ozone above the planetary boundary layer.
2. "Adverse effects" means changes in the physical environment or biota, including changes in climate, which have significant deleterious effects on human health or on the composition, resilience and productivity of natural and managed ecosystems.
3. "Alternative technologies or equipment" means technologies or equipment the use of which makes it possible to reduce or effectively eliminate emissions of substances which have or are likely to have adverse effects on the ozone layer.
4. "Alternative substances" means substances which reduce, eliminate or avoid adverse effects on the ozone layer.
5. "Parties" means, unless the context otherwise requires, Parties to this Convention.

Article 2

GENERAL OBLIGATIONS

1. The Parties shall take appropriate measures in accordance with the provisions of this Convention and of those protocols in force to which they are party 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.
2. To this end the Parties shall, in accordance with the means at their disposal and their capabilities:
  - (a) Co-operate by means of systematic observations, research and information exchange in order to better understand and assess the effects of human activities on the ozone layer and the effects on human health and the environment from modification of the ozone layer;
  - (b) Co-operate in taking appropriate legislative or administrative measures and in harmonizing appropriate policies to control, limit, reduce or prevent human activities under their jurisdiction or control should it be found that these activities have or are likely to have adverse effects resulting from modification or likely modification of the ozone layer;
  - (c) Co-operate in the formulation of agreed measures, procedures and standards for the implementation of this Convention, with a view to the adoption

(d) Co-operate with competent international bodies to implement effectively this Convention and protocols thereto to which they are party.

3. The provisions of this Convention shall in no way affect the right of Parties to adopt, in accordance with international law, domestic measures additional to those referred to in paragraphs 1 and 2, nor shall they affect additional domestic measures already taken by a Party, provided that these measures are not incompatible with their obligations under this Convention.

4. The application of this article shall be based on relevant scientific and technical considerations.

### Article 3

#### RESEARCH AND SYSTEMATIC OBSERVATIONS

1. The Parties undertake, as appropriate, to initiate and co-operate in, directly or through competent international bodies, the conduct of research and scientific assessments on:

(a) The physical and chemical processes that may affect the ozone layer;  
(b) The human health and other biological effects deriving from any modifications of the ozone layer, particularly those resulting from changes in UV-B radiation;

(c) Climatic effects deriving from any modifications of the ozone layer;  
(d) Effects deriving from any modifications of the ozone layer and any consequent change in UV-B radiation on natural and synthetic materials useful to mankind;

(e) Substances, practices, processes and activities that may affect the ozone layer, and their cumulative effects;

(f) Alternative substances and technologies;

(g) Related socio-economic matters;

and as further elaborated in annexes I and II.

2. The Parties undertake to promote or establish, as appropriate, directly or through competent international bodies and taking fully into account relevant ongoing activities at both the national and international levels, joint or complementary programmes for systematic observation of the state of the ozone layer and other relevant parameters, as elaborated in annex I.

3. The Parties undertake to co-operate, directly or through competent international bodies, in ensuring the collection, validation and transmission of research and observational data through appropriate world data centres in a regular and timely fashion.

Article 4

CO-OPERATION IN THE LEGAL, SCIENTIFIC AND TECHNICAL FIELDS

1. The Parties shall facilitate and encourage the exchange of scientific, technical, socio-economic, commercial and legal information relevant to this Convention as further elaborated in annex II. Such information shall be supplied to bodies agreed upon by the Parties. Any such body receiving information regarded as confidential by the supplying Party shall ensure that such information is not disclosed and shall aggregate it to protect its confidentiality before it is made available to all Parties.
2. The Parties shall co-operate, consistent with their national laws, regulations and practices and taking into account in particular the needs of the developing countries, in promoting, directly or through competent international bodies, the development and transfer of technology and knowledge. Such co-operation shall be carried out particularly through:
  - (a) Facilitation of the acquisition of alternative technologies by other Parties;
  - (b) Provision of information on alternative technologies and equipment, and supply of special manuals or guides to them;
  - (c) The supply of necessary equipment and facilities for research and systematic observations;
  - (d) Appropriate training of scientific and technical personnel.

Article 5

TRANSMISSION OF INFORMATION

The Parties shall transmit through the secretariat to the Conference of the Parties information on the measures adopted by them in implementation of this Convention and of protocols thereto to which they are party in such form and at such intervals as the parties to the relevant instruments may determine.

Article 6

CONFERENCE OF THE PARTIES

1. A Conference of the Parties is hereby established. The first meeting of the Conference of the Parties shall be convened by the secretariat designated under article 7 not later than one year after entry into force of this Convention. Thereafter, ordinary meetings of the Conference of the Parties shall be held at regular intervals to be determined by the Conference at its first meeting.

2. Extraordinary meetings of the Conference of the Parties shall be held at such other times as may be deemed necessary by the Conference, or at the written request of any Party, provided that, within six months of the request being communicated to them by the secretariat, it is supported by at least one third of the Parties.

3. The Conference of the Parties shall by consensus agree upon and adopt rules of procedure and financial rules for itself and for any subsidiary bodies it may establish, as well as financial provisions governing the functioning of the secretariat.

4. The Conference of the Parties shall keep under continuous review the implementation of this Convention, and, in addition, shall:

(a) Consider information submitted through the secretariat in accordance with article 5 as well as reports submitted by any subsidiary body;

(b) Review the scientific information on the ozone layer, on its possible modification and on possible effects of any such modification;

(c) Promote, in accordance with article 2, the harmonization of appropriate policies, strategies and measures for minimizing the release of substances causing or likely to cause modification of the ozone layer, and make recommendations on any other measures relating to this Convention;

(d) Adopt, in accordance with articles 3 and 4, programmes for research, systematic observations, scientific and technological co-operation, the exchange of information and the transfer of technology and knowledge;

(e) Consider and adopt, as required, in accordance with articles 9 and 10, amendments to this Convention and its annexes;

(f) Consider amendments to any protocol, as well as to any annexes thereto, and, if so decided, recommend their adoption to the parties to the protocol concerned;

(g) Consider and adopt, as required, in accordance with article 10, additional annexes to this Convention;

(h) Consider and adopt, as required, protocols in accordance with article 8;

(i) Establish such subsidiary bodies as are deemed necessary for the implementation of this Convention;

(j) Seek, where appropriate, the services of competent international bodies and scientific committees, in particular the World Meteorological Organization and the World Health Organization, as well as the Co-ordinating Committee on the Ozone Layer, in scientific research, systematic observations and other activities pertinent to the objectives of this Convention, and make use as appropriate of information from these bodies and committees;

(k) Consider and undertake any additional action that may be required for the achievement of the purposes of this Convention.

5. The United Nations, its specialized agencies and the International Atomic Energy Agency, as well as any State not party to this Convention, may be represented at meetings of the Conference of the Parties by 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 Conference of the Parties as an observer may be admitted unless at least one third of the Parties present object. Observers shall have the right to participate in the debate without the right to vote. Their admission and participation shall be subject to the rules of procedure adopted by the Conference of the Parties.

#### Article 7

##### SECRETARIAT

1. The functions of the secretariat shall be:

(a) To arrange for and service meetings of the Parties as provided for in articles 6, 8, 9 and 10;

(b) To arrange for and service the meetings of any subsidiary bodies established under article 6;

(c) To prepare and transmit reports based upon the information received in accordance with articles 4 and 5, as well as upon information derived from meetings of subsidiary bodies established under article 6;

(d) To perform the functions assigned to it by any protocols to this Convention;

(e) To prepare reports on its activities carried out in implementation of its functions under this Convention and present them to the Conference of the Parties;

(f) To ensure the necessary co-ordination with other relevant international bodies, and in particular to enter into such administrative and contractual arrangements as may be required for the effective discharge of its functions;

(g) To perform such other functions as may be determined by the Conference of the Parties.

2. The Parties designate the United Nations Environment Programme as responsible for carrying out the secretariat functions until the completion of the first ordinary meeting of the Conference of the Parties held pursuant to article 6.

3. The Parties shall, at the first ordinary meeting of the Conference of the Parties, designate a competent organization existing at the time of the meeting to carry out the secretariat functions under this Convention.

Article 8

ADOPTION OF PROTOCOLS

1. The Conference of the Parties may at a meeting adopt protocols to this Convention pursuant to article 2.
2. The text of any proposed protocol shall be communicated to the Parties by the secretariat at least six months before such a meeting.

Article 9

AMENDMENT OF THE CONVENTION OR PROTOCOLS

1. Any Party may propose amendments to this Convention or to any protocol thereto. Such amendments shall take due account, inter alia, of relevant scientific and technical considerations.
2. Amendments to this Convention shall be adopted at a meeting of the Conference of the Parties. Amendments to any protocol shall be adopted at a meeting of the Parties to the protocol in question. The text of any proposed amendment to this Convention or to any protocol thereto, except as may otherwise be provided in such protocol, shall be communicated to the Parties by the secretariat at least six months before the meeting at which it is proposed for adoption. The secretariat shall also communicate proposed amendments to the signatories to this Convention for information.
3. The Parties shall make every effort to reach agreement on any proposed amendment to this Convention by consensus. If all efforts at consensus have been exhausted, and no agreement reached, the amendment shall as a last resort be adopted by a three-fourths majority vote of the Parties present and voting at the meeting, and shall be submitted by the Depositary to all Parties for ratification, approval or acceptance. For these purposes "Parties present and voting" means Parties present and casting an affirmative or negative vote.
4. The procedure mentioned in paragraph 3 shall apply to amendments to any protocol to the Convention, except that a two-thirds majority of the parties to the protocol in question shall suffice for their adoption.
5. Ratification, approval or acceptance of amendments shall be notified to the Depositary in writing. Amendments adopted in accordance with paragraph 3 of this article shall enter into force between parties having accepted them on the ninetieth day after the receipt by the Depositary of notification of their ratification, approval or acceptance by at least three-fourths of the Parties to this Convention or to the protocol concerned, except as may otherwise be provided in such protocol. Thereafter the amendments shall enter into force for any other Party 90 days after that Party deposits its instrument of ratification, approval or acceptance of the amendments.

Article 10

ADOPTION AND AMENDMENT OF ANNEXES

1. The annexes to this Convention or to any protocol thereto shall form an integral part of this Convention or of such protocol, as the case may be, and, unless expressly provided otherwise, a reference to this Convention or its protocols constitutes at the same time a reference to any annexes thereto. Such annexes shall be restricted to scientific, technical and administrative matters.

2. Except as may be otherwise provided in any protocol with respect to its annexes, the following procedure shall apply to the proposal, adoption and entry into force of additional annexes to this Convention or of annexes to a protocol:

(a) Annexes to this Convention shall be proposed and adopted according to the procedure laid down in article 9, paragraphs 2 and 3, while annexes to any protocol shall be proposed and adopted according to the procedure laid down in article 9, paragraphs 2 and 4;

(b) Any party that is unable to approve an additional annex to this Convention or an annex to any protocol thereto to which it is party shall so notify the Depositary, in writing, within six months from the date of the communication of the adoption by the Depositary. The Depositary shall without delay notify all Parties of any such notification received. A Party may at any time substitute an acceptance for a previous declaration of objection and the annexes shall thereupon enter into force for that Party;

(c) On the expiry of six months from the date of the circulation of the communication by the Depositary, the annex shall become effective for all Parties to this Convention or to any protocol concerned which have not submitted a notification in accordance with the provision of subparagraph (b) above.

3. The proposal, adoption and entry into force of amendments to annexes to this Convention or to any protocol thereto shall be subject to the same procedure as for the proposal, adoption and entry into force of annexes to the Convention or annexes to a protocol thereto. Annexes and amendments thereto shall take due account, inter alia, of relevant scientific and technical considerations.

4. If an additional annex or an amendment to an annex involves an amendment to this Convention or to any protocol thereto, the additional annex or amended annex shall not enter into force until such time as the amendment to this Convention or to the protocol concerned enters into force.

Article 11

SETTLEMENT OF DISPUTES

1. In the event of a dispute between Contracting Parties concerning the interpretation or application of this Convention the Parties concerned shall seek solution by negotiation.
2. If the Parties concerned cannot reach agreement by negotiation, they may seek the good offices of, or jointly request mediation by, a third Party.
3. If the Parties concerned cannot reach agreement within a reasonable period of time by the means set out above the dispute shall upon the request of either of them be submitted to arbitration or to the International Court of Justice.
4. When accepting, approving or ratifying the present Convention or acceding to it any party can declare:
  - (a) That it accepts one or both of the two procedures laid down in paragraph 3; or
  - (b) That it does not consider itself bound by the compulsory dispute settlement clause as laid down in paragraph 3.
5. If the Parties have not, in accordance with paragraph 4 (a) above, accepted the same procedure, the dispute shall be submitted to conciliation in accordance with paragraph 6 below unless the Parties otherwise agree.
6. If one of the Parties to a dispute has made the declaration provided for under paragraph 4 (b) above, a Conciliation Commission shall be created upon the request of one of the Parties. The Commission shall be composed of an equal number of members appointed by each Party concerned, and the Chairman will be chosen by the members jointly. The decision of the Commission shall be final and binding if the parties have so agreed; otherwise the Commission shall render a final and recommendatory award, which the Parties shall consider in good faith.
7. The procedures set out in paragraphs 1-3 shall apply with respect to any protocol except as otherwise provided in the protocol concerned.

Article 12

SIGNATURE

This Convention shall be open for signature at ..... from ..... to ..... by States and by regional economic integration organizations constituted by sovereign States which have competence in respect to the negotiation, conclusion and application of international agreements in matters covered by this Convention and at least one member State of which is a signatory to this Convention.

Article 13

RATIFICATION, ACCEPTANCE OR APPROVAL

1. This Convention and any protocol thereto shall be subject to ratification, acceptance or approval by States. Instruments of ratification, acceptance or approval shall be deposited with the Depositary.
2. This Convention and any protocol thereto shall also be subject to ratification, acceptance or approval by regional economic integration organizations which have competence in respect to the negotiation, conclusion and application of international agreements in matters covered by the instrument concerned, and at least one member State of which is party to the instrument concerned. In depositing their instruments of ratification, acceptance or approval with the Depositary, such organizations shall declare the extent of their competence with respect to the matters governed by the Convention or the relevant protocol. These organizations shall also inform the Depositary of any substantial modification in the extent of their competence.
3. In matters within their competence, such organizations may on their own behalf exercise the rights and fulfil the responsibilities which this Convention or a relevant protocol attributes to their member States. In such cases, the member States of these organizations shall not be entitled to exercise such rights individually.
4. In matters within their competence, such organizations shall exercise their right to vote with a number of votes equal to the number of their member States which are Parties to the Convention or the protocol concerned. Such organizations shall not exercise their right to vote if their member States exercise theirs, and vice versa.

Article 14

ACCESSION

1. This Convention and any protocol thereto shall be open for accession by States and by regional economic integration organizations which have competence in respect to the negotiation, conclusion and application of international agreements in matters covered by the instrument concerned, and at least one member State of which is party to the instrument concerned. The instruments of accession shall be deposited with the Depositary.
2. In their instruments of accession, the organizations referred to in paragraph 1 shall declare the extent of their competence with respect to the matters governed by the Convention or the relevant protocol. These organizations shall also inform the Depositary of any substantial modification in the extent of their competence.

Article 15

RELATIONSHIP BETWEEN THE CONVENTION AND ITS PROTOCOLS

1. A State or a regional economic integration organization referred to in article 12 may not become a party to a protocol unless it is, or becomes at the same time, a Party to the Convention.
2. Decisions concerning any protocol shall be taken only by the parties to the protocol concerned.

Article 16

ENTRY INTO FORCE

1. This Convention shall enter into force on the ninetieth day after the date of deposit of the twentieth instrument of ratification, acceptance, approval or accession.
2. Any protocol to this Convention, except as otherwise provided in such protocol, shall enter into force on the ninetieth day after the date of deposit of the eleventh instrument of ratification, acceptance or approval of such protocol or accession thereto.
3. For each Party which ratifies, accepts or approves this Convention or accedes thereto after the deposit of the twentieth instrument of ratification, acceptance, approval or accession, it shall enter into force on the ninetieth day after the date of deposit by such Party of its instrument of ratification, acceptance, approval or accession.
4. For the purposes of paragraphs 1 and 2, any instrument deposited by an organization referred to in article 12 shall not be counted as additional to those deposited by member States of such organization.

Article 17

RESERVATIONS

No reservations may be made to this convention or to any protocol thereto unless expressly permitted by this Convention or by the protocol concerned.

Article 18

WITHDRAWAL

1. At any time after four years from the date on which this Convention has entered into force for a Party, that Party may withdraw from the Convention by giving written notification to the Depositary.
2. Except as may be provided in any protocol to this Convention, at any time after four years from the date on which such protocol has entered into force for a party, that party may withdraw from the protocol by giving written notification to the Depositary.

3. 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.

4. Any Party which withdraws from this Convention shall be considered as also having withdrawn from any protocol to which it is party.

Article 19

DEPOSITARY

1. The Secretary-General of the United Nations shall assume the functions of depositary of this Convention and any protocols and amendments thereto.

2. The Depositary shall inform the Parties in particular:

(a) Of the signature of this Convention and of any protocol thereto, and of the deposit of instruments of ratification, acceptance, approval or accession in accordance with articles 13 and 14;

(b) Of the date on which the Convention and any protocol will come into force in accordance with article 16;

(c) Of notifications of withdrawal made in accordance with article 18;

(d) Of amendments adopted with respect to the Convention and any protocol, their acceptance by the parties and their date of entry into force in accordance with article 9;

(e) Of the adoption of annexes and of the amendment of any annex in accordance with article 10;

(f) Of notifications by regional economic integration organizations of the extent of their competence with respect to matters governed by this Convention and any protocols, and of any modifications thereof.

Article 20

AUTHENTIC TEXTS

The original of this Convention, 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 Convention.

Done at .....

this .....

Annex I

RESEARCH AND SYSTEMATIC OBSERVATIONS

1. The Parties to the Convention recognize that the major scientific issues are:

(a) Modification of the ozone layer which would result in a change in the amount of solar UV-B radiation that reaches the Earth's surface, with potential consequences for human health, for organisms and ecosystems and materials useful to mankind;

(b) Modification of the vertical distribution of ozone, which could change the temperature structure of the atmosphere with potential consequences for weather and climate;

2. The Parties to the Convention, in accordance with article 3, shall co-operate in conducting research and systematic observations and in formulating recommendations for future research and observation in such areas as:

(a) Research into the physics and chemistry of the atmosphere

- (i) Comprehensive theoretical models: further development of models which consider the interaction between radiative, dynamic and chemical processes; studies of the simultaneous effects of various man-made and naturally occurring species upon atmospheric ozone; interpretation of satellite and non-satellite measurement data sets; evaluation of trends in atmospheric and geophysical parameters, and the development of methods for attributing changes in these parameters to specific causes;
- (ii) Laboratory studies of: rate coefficients, absorption cross-sections, and mechanisms of tropospheric and stratospheric chemical and photochemical processes; spectroscopic data to support field measurements in all relevant spectral regions;
- (iii) Field measurements: the concentration and fluxes of key source gases of both natural and anthropogenic origin; atmospheric dynamics studies; simultaneous measurements of photochemically related species down to the planetary boundary layer, using in situ and remote sensing instruments; intercomparison of different sensors, including co-ordinated correlative measurements for satellite instrumentation; three-dimensional fields of key atmospheric trace constituents, solar spectral flux, and meteorological parameters;

(iv) Instrument development, including: satellite and non-satellite sensors for atmospheric trace constituents, solar flux and meteorological parameters;

(b) Research into health, biological and photodegradation effects

- (i) The relationship between human exposure to visible and ultra-violet solar radiation, and the development of both non-melanoma and melanoma skin cancer, and the effects on the immunological system;
- (ii) Effects of UV-B, including the wavelength dependence, upon (a) agricultural crops, forests and other terrestrial ecosystems, and (b) the aquatic food web and fisheries, as well as possible inhibition of oxygen production by marine phytoplankton;
- (iii) The mechanisms by which UV-B radiation acts on biological materials, species and ecosystems, including: the relationship between dose, dose rate, and response; photorepair, adaptation, and protection;
- (iv) Studies of biological action spectra and the spectral response using polychromatic radiation in order to include possible interactions of the various wavelength regions;
- (v) The influence of UV-B radiation on: the sensitivities and activities of biological species important to the biospheric balance; primary processes such as photosynthesis and biosynthesis;
- (vi) The influence of UV-B radiation on the photodegradation of pollutants, agricultural chemical and other materials;

(c) Research on effects on climate

Theoretical and observational studies of the radiative effects of ozone and other trace species and the impact on climate parameters, for example, land and ocean surface temperatures, precipitation patterns, and exchange between the troposphere and stratosphere and the investigation of the effects of climate change on various aspects of human activity;

(d) Systematic observations

- (i) Of the status of the ozone layer (i.e. the spatial and temporal variability of the total column content and vertical distribution) by making the Global Ozone Observing System, based on the integration of satellite and ground-based systems, fully

- (ii) Of the tropospheric and stratospheric concentrations of source gases for the  $\text{HO}_x$ ,  $\text{NO}_x$ ,  $\text{ClO}_x$  and carbon families;
- (iii) Of the temperature from the ground to the mesosphere, utilizing both ground-based and satellite systems;
- (iv) Of wavelength-resolved solar flux reaching, and thermal radiation leaving, the Earth's atmosphere, utilizing satellite measurements;
- (v) Of wavelength-resolved solar flux reaching the Earth's surface in the ultra-violet range with biological effects (UV-B);
- (vi) Of aerosol properties and distribution from the ground to the mesosphere, utilizing ground-based, airborne and satellite systems;
- (vii) Of maintenance of programmes of high-quality meteorological surface measurements of climatically important variables;
- (viii) Of improved methods for analysing global data from systematic observations of trace species, temperatures, solar flux, and aerosols.

3. The Parties to the Convention shall co-operate, taking into account the particular needs of the developing countries, in promoting the appropriate scientific and technical training required to participate in the research and systematic observations outlined in this annex. Particular emphasis should be given to the intercalibration of observational instrumentation and methods with a view to generating comparable or standardized scientific data sets.

4. The following is a list, in no particular order, of chemical substances of natural and anthropogenic origin which are currently thought to have the potential to modify the chemical and physical properties of the ozone layer.

(a) Carbon substances

(i) Carbon monoxide (CO)

CO has significant natural and anthropogenic sources, and is thought to play a major direct role in tropospheric photochemistry, and an indirect role in stratospheric photochemistry.

(ii) Carbon dioxide (CO<sub>2</sub>)

Carbon dioxide has significant natural and anthropogenic sources, and affects stratospheric ozone by influencing the thermal structure of the atmosphere.

(iii) Methane (CH<sub>4</sub>)

Methane has both natural and anthropogenic sources, and affects both tropospheric and stratospheric ozone.

(iv) Non-methane hydrocarbon species (NMHC)

Non-methane hydrocarbon species, which consist of a large number of chemical substances, have both natural and anthropogenic sources, and play a direct role in tropospheric photochemistry and an indirect role in stratospheric photochemistry.

(b) Nitrogen substances

(i) Nitrous oxide ( $N_2O$ )

The dominant sources of  $N_2O$  are natural, but anthropogenic contributions are becoming increasingly important.  $N_2O$  is the primary source of stratospheric  $NO_x$ , which play a vital role in controlling the abundance of stratospheric ozone.

(ii) Nitrogen oxides ( $NO_x$ )

Ground-level sources of  $NO_x$  play a major direct role only in tropospheric photochemical processes and an indirect role in stratosphere photochemistry, whereas injection of  $NO_x$  close to the tropopause may lead directly to a change in upper tropospheric and stratospheric ozone.

(c) Chlorine substances

(i) Fully halogenated alkanes, e.g.  $CCl_4$ ,  $CFCl_3$  (CFC-11),  $CF_2Cl_2$  (CFC-12),  $C_2F_3Cl_3$  (CFC-113),  $C_2F_4Cl_2$  (CFC-114)

Fully halogenated alkanes are anthropogenic and act as a source of  $ClO_x$ , which play a vital role in ozone photochemistry, especially in the 30-50 km altitude region.

(ii) Partially halogenated alkanes, e.g.  $CH_3Cl$ ,  $CHF_2Cl$  (CFC-22),  $CH_2CCl_3$ ,  $CHFCl_2$  (CFC-21)

The sources of  $CH_3Cl$  are natural, whereas the other partially halogenated alkanes mentioned above are anthropogenic in origin. These gases also act as a source of stratospheric  $ClO_x$ .

(d) Bromine substances

Fully halogenated alkanes, e.g.  $CF_3Br$

These gases are anthropogenic and act as a source of  $BrO_x$ , which behaves in a manner similar to  $ClO_x$ .

(e) Hydrogen substances

(i) Hydrogen (H<sub>2</sub>)

Hydrogen, the source of which is natural and anthropogenic, plays a minor role in stratospheric photochemistry.

(ii) Water (H<sub>2</sub>O)

Water, the source of which is natural, plays a vital role in both tropospheric and stratospheric photochemistry. Additional sources of water vapour in the stratosphere are the oxidation of methane and, to a lesser extent, of hydrogen.



Annex II  
INFORMATION EXCHANGE

1. The Parties to the Convention recognize that the collection and sharing of information is an important means of implementing the objectives of this Convention and of assuring that any actions that may be taken are appropriate and equitable. Therefore, Parties shall exchange scientific, technical, socio-economic, business, commercial and legal information.

2. The Parties to the Convention, in deciding what information is to be collected and exchanged, should take into account the usefulness of the information and the costs of obtaining it. The Parties further recognize that co-operation under this annex has to be consistent with national laws, regulations and practices regarding patents, trade secrets, and protection of confidential and proprietary information.

3. Scientific information

This includes information on:

(a) Planned and ongoing research, both governmental and private, to facilitate the co-ordination of research programmes so as to make the most effective use of available national and international resources;

(b) The emission data needed for research;

(c) Scientific results published in peer-reviewed literature on the understanding of the physics and chemistry of the Earth's atmosphere and of its susceptibility to change, in particular on the state of the ozone layer and effects on human health, environment and climate which would result from changes on all time-scales in either the total column content or the vertical distribution of ozone;

(d) The assessment of research results and the recommendations for future research.

4. Technical information

This includes information on:

(a) The availability and cost of chemical substitutes and of alternative technologies to reduce the emissions of ozone-modifying substances and related planned and ongoing research;

(b) The limitations and any risks involved in using chemical or other substitutes and alternative technologies.

5. Socio-economic and commercial information on the substances referred to in annex I

This includes information on:

- (a) Production and production capacity;
- (b) Use and use patterns;
- (c) Imports/exports;
- (d) The costs, risks and benefits of human activities which may indirectly modify the ozone layer and of the impacts of regulatory actions taken or being considered to control these activities.

6. Legal information

This includes information on:

- (a) National laws, administrative measures and legal research relevant to the protection of the ozone layer;
  - (b) International agreements, including bilateral agreements, relevant to the protection of the ozone layer;
  - (c) Methods and terms of licensing and availability of patents relevant to the protection of the ozone layer.
-