MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

UNEP

Handbook on Essential Use Nominations

Prepared by the Technology and Economic Assessment Panel

July 1994

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ACKNOWLEDGEMENTS

The TEAP thanks the International Pharmaceutical Aerosol Consortium for its assistance in assembling this Handbook.

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HANDBOOK ON ESSENTIAL USE NOMINATIONS

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Chapter 1

Introduction

1.1 Genesis and purpose of Handbook

The adjustments adopted by the Fourth Meeting of the Parties to the Montreal Protocol (Copenhagen, 23-25 November 1992) mandated a phase-out of production and consumption of CFCs, carbon tetrachloride, 1,1,1-trichloroethane and other fully halogenated controlled substances by 1 January 1996, while allowing Parties to authorize production for uses decided to be essential. Decision IV/25 of the Fourth Meeting set the criteria and the procedure for assessing an essential use nomination and requested each Party to nominate uses to the Secretariat at least nine months prior to the Sixth Meeting of the Parties to the Protocol to be held in 1994. This decision also requested the Technical Options Committees (TOCs) to consider and make recommendations on the nominations.

Decision V/18 of the Parties to the Montreal Protocol calls upon the Technology and Economic Assessment Panel (TEAP) to

> "assemble and distribute a handbook on essential uses nominations including copies of relevant decisions, nomination instructions, summaries of past recommendations, and copies of nominations to illustrate possible formats and levels of technical detail."

The present Handbook on Essential Use Nominations is the TEAP's response to that request and is intended to assist Parties in the preparation of essential use nominations. The Handbook augments and updates Appendix 2 of the UNEP 1994 Report of the Technology and Economic Assessment Panel.

1.2 Content and structure

The Handbook describes the nomination process for essential use exemptions as it has evolved through Articles of the Protocol and decisions of the Parties; the procedures followed under the Protocol; and the experience of the Panel and its Technical Options Committees in managing the process to date.

The Handbook contains three sections: a review of the essential use process; instructions for the completion of essential use nominations; and appendices.The appendices contain provisions of the Montreal Protocol, decisions of the Parties to the Protocol and excerpts from reports of the Technology and Economic Assessment Panel which are relevant to the essential use process. An essential use nomination form is also included.

1.3 Potential for updates

The Panel may revise and update the Handbook as circumstances require. Please consult the Ozone Secretariat to ensure that you have the latest version of the handbook.

Chapter 2

Essential Use Process

2.1 Summary

After production phase-out, Parties may nominate uses for exemption. Parties have nominated essential halon uses for 1994 and 1995 (1 January 1994 phaseout) and CFCs, 1,1,1-trichloroethane and CTC exemptions for after their 1 January 1996 phase-out. Parties operating under paragraph 1 of Article 5 do not need to nominate for years prior to their production phase-outs (currently scheduled 10 years later than dates for developed country Parties).

The phase-out of production does not control the use of substances manufactured prior to the phase-out (stockpiled or recycled). Thus, Parties do not need to submit nominations to allow the continuing use of such substances.

Only Parties to the Protocol can submit nominations. Companies and other organizations must first secure approval and endorsement of their national Governments.

Parties may submit nominations for any future year and nominations may be for more than one year.

Nominations received by January 1 will be decided by the Parties in the third and fourth quarter of that year. Nominations after the deadline will be decided the next year.

2.2 Framework

The nomination and review process for essential use exemptions has evolved through Articles of the Protocol, decisions of the Parties, and recommendations of the Technology and Economic Assessment Panel and its Technical Options Committees. The steps in that process are summarized below.

Article 2 of the Montreal Protocol mandates the phase-out of production and "consumption" of substances that deplete the ozone layer. "Consumption" is defined as production plus imports minus exports. Please note that the Parties are allowed to use stockpiled or recycled substances for as long as they are available after the production phase-out. Article 2 also authorizes the Parties by decision to permit such production and "consumption" as may be necessary for those uses decided by the Parties to satisfy the essential use criteria.

Article 6 of the Montreal Protocol mandates the creation of expert panels to assist the Parties in assessing the control measures provided for in Article 2, including essential use exemptions. This provision led to the formation of the Technology and Economic Assessment Panel (TEAP) and its Technical Options Committees (TOCs).

There are three Assessment Panels: Science; Environmental Effects; and Technology and Economics. The TEAP has seven Technical Options Committees. The TEAP is chaired by Dr. Stephen O. Andersen (United States of America), Dr. Suely Carvalho (Brazil) and Dr. Lambert Kuijpers (Netherlands). The seven TOCs: Aerosol Products, Sterilants, Miscellaneous Uses and Carbon

/...

Tetrachloride (chaired by Ms. Andrea Hinwood, Australia and Mr. Jose Pons, Venezuela); Economic Options (chaired by Dr. Robert Van Slooten, United Kingdom); Flexible and Rigid Foams (chaired by Ms. Jean Lupinacci, USA); Halons (chaired by Mr. Gary Taylor, Canada and Major Thomas Morehouse, USA); Methyl Bromide (chaired by Dr. Jonathan Banks, Australia and Dr. Rodrigo Rodriguez-Kabana, USA); Refrigeration, Air Conditioning and Heat Pumps (chaired by Dr. Lambert Kuijpers, Netherlands); and Solvents, Coatings and Adhesives (chaired by Dr. Stephen O. Andersen, USA and Mr. Jorge Corona, Mexico).

Members of the Committees are from Argentina, Australia, Austria, Bahamas, Belgium, Brazil, Canada, Chile, China, Denmark, Egypt, France, Germany, India, Israel, Italy, Japan, Jordan, Kenya, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Saudi Arabia, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States, Venezuela, and Zimbabwe.

Excerpts from Articles 2 and 6 of the Montreal Protocol are attached as Appendix A.

At their fourth meeting, the Parties established by decision IV/25 a procedure to review requests for exemptions from consumption/production phase-outs to meet the needs of essential uses of halons, CFCs, CTC, 1,1,1-trichloroethane and other fully halogenated substances. Those exemptions are nominated for calendar years after scheduled production is phased out.

The substantive criteria for essential use exemptions are detailed in decision IV/25 of the Parties. Decision IV/25 states that:

> "a use of a controlled substance should qualify 'essential' only if:
>
> (i) It is necessary for the health, safety or is critical for the functioning of society (encompassing cultural and intellectual aspects); and
>
> (ii) There are no available technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health."

Decision IV/25 also states that:

> "production and consumption, if any, of a controlled substance for essential uses should be permitted only if:
>
> (i) All economically feasible steps have been taken to minimize the essential use and any associated emission of the controlled substance; and
>
> (ii) The controlled substance is not available in sufficient quantity and quality from existing stocks of banked or recycled controlled substances, also bearing in mind the developing countries' need for controlled substances."

Decision IV/25 calls on each Party to nominate uses to the Parties at least nine months prior to the meeting of the Parties that is to decide on the exemption.

2.3 Decision IV/25

Essential use nominations are considered for exemptions on an annual basis. Exemptions granted for more than one year (if any) are subject to the review provisions described in paragraph 5 of decision IV/25. Therefore, Parties which are given multiple year exemptions should update their nomination annually to facilitate that review.

Decision IV/25 also tasked the TEAP and its TOCs with the review of nominations for essential use exemptions submitted by the Parties.

The TEAP and its TOCs develop recommendations on the nominations and submit a report through the Secretariat by 31 March of that year, which is at least three months prior to the meting of the Open-ended Working Group (OEWG). The OEWG may also choose to comment on the nominations. The Parties take decisions at their annual meeting.

An essential use exemption is granted to the nominating Party for a specific quantity of a specified ozone-depleting substances (ODS) for a specific time period. A Party granted an essential use exemption may produce or import the specified ODS. Any ODS production and "consumption" to meet the authorized essential uses must be identified in the annual data reporting to the Ozone Secretariat by the Parties involved.

The TEAP and its Halons Technical Options Committee completed an assessment of essential use nominations for halons in 1993, according to the timeframes established by decision IV/25. The Parties agreed, in decision V/14, that no level of production or consumption is necessary to satisfy essential uses of halons in 1994. The TEAP and its TOCs completed the 1994 assessment of nominations for halons, CFCs, 1,1,1-trichloroethane and carbon tetrachloride in 1994, according to the standardized timeframes established by decision V/18 (see section 3.2).

The TEAP issued "Instructions for Nominations for Essential Use Consumption/Production Exemptions of Controlled Substances" in July 1993. The nomination forms contained in the present Handbook are a further elaboration of those instructions.

Decisions IV/25, V/14 and V/18 are attached as Appendix B.

2.4 Steps leading to an essential use exemption

The essential use process consists of the following eight steps:

1. **Application:** An organization in a developed country that is a Party to the Protocol makes an application for an essential use exemption to the relevant authorities in its Government. The Government reviews the application and decides whether it should be nominated. Please note that it is not necessary for Parties operating under Article 5 to submit nominations for years prior to the date of their production phase-out.

2. **Nomination:** The Party submits its essential use nomination use to the Ozone Secretariat by 1 January of the year of decision; earlier submissions are encouraged.

3. **Assignment:** The Ozone Secretariat forwards the nomination to the TEAP which in turn assigns the nomination to the appropriate Technical Options Committee. In some circumstances, two or more TOCs may jointly consider the nomination.

4. **Review:** The TOC reviews the nomination to determine if it meets the criteria for an essential use established by decision IV/25. The Panel then reviews the report of the TOC and either recommends the nomination to the OEWG or reports that it is unable to recommend the nomination. The TEAP report to the OEWG is due by 31 March of the year of decision.

5. **Evaluation:** The OEWG reviews the TEAP report and recommends a decision for consideration by the Parties.

6. **Decision:** The Meeting of the Parties decides whether to allow production for essential use in accordance with the Montreal Protocol and the Parties may attach conditions to their approval.

7. **National authorization:** The Party in possession of an essential use exemption authorizes the applicant to acquire the controlled substance according to the terms of the decision.

8. **Execution of authorization:** The applicant exercises its authorization to use the controlled substance. Please note that the Protocol authorizes but does not mandate production; each applicant must locate a willing supplier and negotiate supply.

2.5 Experience to date

In 1993, nominations were received for halon essential use production/consumption exemptions for 1994. The TEAP unanimously endorsed the recommendation by the Halon TOC that there was no justification for granting exemptions for 1994. This recommendation was endorsed by the Open-Ended Working Group of the Parties to the Protocol and by the Parties at their fifth meeting (Bangkok, 17-19 November 1993).

In 1994, only one nomination for halon essential use exemption was submitted to the Ozone Secretariat. It was not recommended by the TEAP and its Halon TOC and was subsequently withdrawn by the nominating Party at the July 1994 meeting of the OEWG.

Nominations were received by 1 January 1994 for a variety of uses including metered dose inhalers, certain other aerosol products, solvents and adhesives, refrigeration, and laboratory and analytical uses.

The following information was requested for each nomination.

(i) Provide details of the type, quantity and quality of the controlled substances that are requested to satisfy the use that is the subject of the nomination. Indicate the period of time and the annual quantities of the controlled substance that are requested;

(ii) Provide a detailed description of the use;

(iii) Explain why this use is necessary for health and/or safety, or why it is critical for the functioning of society;

/...

(iv) Explain what other alternatives and substitutes have been employed to reduce the dependency on the controlled substance for this application;

(v) Explain what alternatives were investigated and why they were not considered adequate;

(vi) Describe the measures that are proposed to eliminate all unnecessary emissions. At a minimum, this explanation should include design considerations and maintenance procedures;

(vii) Explain what efforts are being undertaken to employ other measures for this application in the future;

(viii) Explain whether the nomination is being made because national or international regulations require use of the controlled substance to achieve compliance. Provide full documentation, including the name, address, phone and fax number of the regulatory authority requiring use of the controlled substance and provide a full copy or summary of the regulation. Explain what efforts are being made to change such regulations or to achieve acceptance on the basis of alternative measures that would satisfy the intent of the requirement;

(ix) Describe the efforts that have been made to acquire stockpiled or recycled controlled substance for this application, both from within your nation and internationally. Explain what efforts have been made to establish banks for the controlled substance;

(x) Briefly state any other barriers encountered in attempts to eliminate the use of the controlled substance for this application.

2.6 The 1993/1994 Review

The review by the TEAP and its TOC for 1996 and beyond was conducted as follows:

To ensure full consideration, the Panel asked the Parties to address fully the requirements of decision IV/25 by providing the information requested.

Members of the relevant TOC evaluated each nomination and reported their review to the Chair. The results of these reviews were discussed at full meetings the Committees and, in some cases, at meetings of the Committees which not all members could attend. In some cases, members of the TOC travelled to manufacturing sites to evaluate the nomination or held seminars and discussions with the applicants. The draft text was discussed in meetings and by phone and circulated by fax and mail for consideration by the full Committee in preparing a recommendation.

Concurrent with the evaluation being undertaken by the TOC, a copy of each nomination was provided to each member of the TEAP. Panel members sometimes consulted with other appropriate, individuals or organizations in order to assist in the evaluation and to prepare the Panels recommendations to the Parties.

The Report of the TEAP, released in March 1994, recommended that the Parties authorize production and consumption of controlled substances for a very limited number of uses:

(i) Aerosol metered dose inhalers (MDIs) (all nominations recommended for 1996);

(ii) Specific cleaning, bonding and surface activation applications in rocket motor manufacturing for the Space Shuttle; and

(iii) Global laboratory/analytical uses.

The Panel recommended, for uses other than laboratory and analytical uses, that the exemptions be subject to:

(i) An annual review of the quantity of controlled substance authorized; and

(ii) Every two years, a review of essentiality, including whether alternatives and substitutes have become technically and economically feasible.

The Panel has recommended a "global exemption" for laboratory and analytical uses in 1996, 1997 and 1998. If the Parties affirm this recommendation at their sixth meeting, no further essential use nominations will be required for laboratory and analytical uses for the years 1996, 1997 and 1998.

Excerpts from the Report concerning the Panel's essential use recommendations are attached as Appendix C.

The 1994 report of the TEAP contains a more thorough description of the essential use process. It is available upon request from the Ozone Secretariat.

Chapter 3

Instructions

Only nominations requesting specific consumption/production exemptions can be evaluated by the TEAP. Nominations that identify a perceived essential use, but that do not request a specific quantity of controlled substance for a specific consumption/production exemption, are not evaluated by the Panel. The nominations are expected to satisfy fully the criteria set in decision IV/25, paragraph 1.

All countries need to be reminded of the definition of essentiality and the way in which they should respond on this issue. The criteria established under decision IV/25 should be reviewed carefully.

Submission to UNEP must be by 1 January at the latest for consideration by the Parties in that year, i.e. submissions for 1997 must be received by 1 January 1996. Earlier submissions are encouraged.

3.1 Essential use nomination

The forms recommended for nomination are attached as Appendix D. A customized form has been developed for MDIs which are recommended in the 1994 review by the TEAP and the OEWG. A general form is provided for all other nominations not previously reviewed and recommended. They call for information in the following areas:

- role of use in society;
- alternatives to use;
- steps to minimize use;
- steps to minimize emissions;
- recycling and stockpiling; and
- quantity of controlled substances requested.

Answers to the questions posed in the nomination form should be brief but informative. In completing the nomination, Parties may refer to the prior nominations and reports of the TEAP and its relevant TOC, as appropriate.

3.2 Schedule for submissions

The schedule for essential use submissions is as follows:

September - October[1]	Applicant organizations prepare and submit essential use applications to national Governments.

[1] These deadlines are set by national Governments.

November - December[2]	Governments review applications and prepare essential use nominations, following guidance contained in the "Handbook on Essential Use Nominations".
January 1[2]	Deadline for essential use nominations to the Ozone Secretariat.
March 31[3]	TEAP and its TOCs publish their evaluation of nominations, which is mailed to Parties.
June - July	The OEWG to the Parties to the Protocol meets and recommends whether the nominations should be approved.
October - November	Parties to the Protocol meet and decide whether to allow production for nominated uses and may specify conditions of the exemption.

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[2] These dates are deadlines established by the Parties.

APPENDIX A

EXCERPTS FROM PROTOCOL PROVISIONS[3]

ARTICLE 2: CONTROL MEASURES

ARTICLE 2A: CFCs

Each Party shall ensure that for the twelve-month period commencing on 1 January 1996, 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 zero. 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 zero.... This paragraph will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by them to be essential.

ARTICLE 2B: HALONS

Each Party shall ensure that for the twelve-month period commencing on 1 January 1994, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Group II of Annex A does not exceed zero. 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 zero.... This paragraph will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by them to be essential.

ARTICLE 2C: OTHER FULLY HALOGENATED CFCs

Each Party shall ensure that for the twelve-month period commencing on 1 January 1996, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Group I of Annex B does not exceed zero. 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 zero.... This paragraph will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by them to be essential.

ARTICLE 2D: CARBON TETRACHLORIDE

Each Party shall ensure that for the twelve-month period commencing on 1 January 1996, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substance in Group II of Annex B does not exceed zero. Each Party producing the substance shall, for the same periods, ensure that its calculated level of production of the substance does not exceed zero.... This paragraph will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by them to be essential.

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[3] For a consolidated description of Protocol provisions see "Handbook for the Montreal Protocol on the Substances that Deplete the Ozone Layer", Third Edition, Ozone Secretariat, August 1993; note that the Handbook does not reflect changes since August 1993.

ARTICLE 2E: 1,1,1 - TRICHLOROETHANE (METHYL CHLOROFORM)

Each Party shall ensure that for the twelve-month period commencing on 1 January 1996, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substance in Group III of Annex B does not exceed zero. Each Party producing the substance shall, for the same periods, ensure that its calculated level of production of the substance does not exceed zero....This paragraph will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by them to be essential.

ARTICLE 2G: HYDROBROMOFLUOROCARBONS

Each Party shall ensure that for the twelve-month period commencing on 1 January 1996, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Group II of Annex C does not exceed zero. Each Party producing the substances shall, for the same periods, ensure that its calculated level of production of the substances does not exceed zero. This paragraph will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by them to be essential.

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 and Articles 2A to 2E, and the situation regarding production, imports and exports of the transitional substances in Group I of Annex C {Articles 2A to 2H} 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.

APPENDIX B

DECISIONS OF THE PARTIES TO THE MONTREAL PROTOCOL[4]

Decision IV/25: Essential uses

1. To apply the following criteria and procedure in assessing an essential use for the purposes of control measures in Article 2 of the Protocol:

(a) That a use of a controlled substance should qualify as "essential" only if:

(i) It is necessary for the health, safety or is critical for the functioning of society (encompassing cultural and intellectual aspects); and

(ii) There are no available technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health;

(b) That production and consumption, if any, of a controlled substance for essential uses should be permitted only if:

(i) All economically feasible steps have been taken to minimize the essential use and any associated emission of the controlled substance; and

(ii) The controlled substance is not available in sufficient quantity and quality from existing stocks of banked or recycled controlled substances, also bearing in mind the developing countries' need for controlled substances;

(c) That production, if any, for essential use, will be in addition to production to supply the basic domestic needs of the Parties operating under paragraph 1 of Article 5 of the Protocol prior to the phase-out of the controlled substances in those countries;

2. To request each of the Parties to nominate, in accordance with the criteria approved in paragraph 1 (a) of the present decision, any use it considers "essential", to the Secretariat at least six months for halons and nine months for other substances prior to each Meeting of the Parties that is to decide on this issue;

3. To request the Technology and Economic Assessment Panel and its Technical and Economic Options Committee to develop, in accordance with the criteria in paragraphs 1 (a) and 1 (b) of the present decision, recommendations on the nominations, after consultations with experts as necessary, regarding:

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[4] For a consolidated description of Protocol provisions see "Handbook for the Montreal Protocol on the Substances that Deplete the Ozone Layer", Third Edition, Ozone Secretariat, August 1993: Note that the Handbook does not reflect changes since August 1993.

(a) The essential use (substance, quantity, quality, expected duration of essential use, duration of production or import necessary to meet such essential use);

(b) Economically feasible use and emission controls for the proposed essential use;

(c) Sources of already produced controlled substances for the proposed essential use (quantity, quality, timing); and

(d) Steps necessary to ensure that alternatives and substitutes are available as soon as possible for the proposed essential use.

4. To request the Technology and Economic Assessment Panel, while making its recommendations to take into account the environmental acceptability, health effects, economic feasibility, availability, and regulatory status of alternatives and substitutes;

5. To request the Technology and Economic Assessment Panel to submit its report, through the Secretariat, at least three months before the Meeting of the Parties in which a decision is to be taken. The subsequent reports will also consider which previously qualified essential uses should no longer qualify as essential;

6. To request the Open-ended Working Group of the Parties to consider the report of the Technology and Economic Assessment Panel and make its recommendations to the Fifth Meeting of the Parties for halons and at the Sixth Meeting for all other substances for which an essential use is proposed;

7. That essential use controls will not be applicable to Parties operating under paragraph 1 of Article 5 of the Protocol until the phase-out dates applicable to those Parties.

Decision V/14. **Essential uses of halons**

1. To note with appreciation the work done by the Technology and Economic Assessment Panel and its Halons Technical Options Committee pursuant to decision IV/25 of the Fourth Meeting of the Parties;

2. That no level of production or consumption is necessary to satisfy essential uses of halon in Parties not operating under paragraph 1 of Article 5 of the Protocol, for the year 1994 since there are technically and economically feasible alternatives and substitutes for most applications, and since halon is available in sufficient quantity and quality from existing stocks of banked and recycled halon.

Decision V/18. **Timetable for the submission and consideration of essential use nominations**

1. To request the Parties to submit their nominations for each production and consumption exemption for substances other than halon for 1996 in accordance with decision IV/25, with the presumption that the Meeting of the Parties will be held on 1 September;

2. To modify the timetables in decision IV/25 for nominations for halon production and consumption exemptions for 1995 and subsequent years, and for nominations for production and consumption exemptions for substances other

than halon for 1997 and subsequent years as follows: to set 1 January of each year as the last date for nominations for decisions taken in that year for any subsequent year;

3. To request the Technology and Economic Assessment Panel and its relevant Technical Options Committees to develop recommendations on the nominations and submit their report through the Secretariat by 31 March of that year;

4. To request the Open-ended Working Group of the Parties to consider the report of the Technology and Economic Assessment Panel and make its recommendations to the subsequent meeting of the Parties;

5. To request the Technology and Economic Assessment Panel to assemble and distribute a handbook on essential uses nominations including copies of relevant decisions, nomination instructions, summaries of past recommendations, and copies of nominations to illustrate possible formats and levels of technical detail.

APPENDIX C

EXCERPTS FROM THE RECOMMENDATIONS IN THE "1994 REPORT OF THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL"

"... the Technology and Economic Assessment Panel unanimously endorses the recommendations of its Technical Options Committees and recommends that the Parties authorize production and consumption of controlled substances after 1 January 1996 for:

1) Aerosol Metered Dose Inhalers (MDIs),

2) Specific cleaning, bonding and surface activation applications in rocket motor manufacturing for the Space Shuttle, and

3) Global laboratory/analytical uses."

(Executive Summary, Page 1)

* * * *

"The Technology and Economic Assessment Panel and its Technical Options Committees are unable to recommend that the following 1994 Nominations satisfy the Essential Use Criteria:

aircraft maintenance
various fire fighting applications
cleaning of live electric equipment
fingerprinting
foam standard-of-reference
furniture adhesives
hornet & wasp pesticides
membrane manufacturing
navigational and guidance devices
refrigeration and air conditioning servicing
silicone coating of medical devices
skin refrigerants, vapo-coolants, and topical anesthetics
uranium enrichment; among others."

(Executive Summary, Page 3)

APPENDIX D

RECOMMENDED FORM FOR NOMINATION FOR ESSENTIAL USE (OTHER THAN METERED DOSE INHALERS)

INSTRUCTIONS:
1. Please submit in English.
2. A separate nomination must be submitted for each proposed essential use.
3. Use photocopies of this application form. Attach supplemental sheets as necessary.
4. You may refer to information from the prior nominations and TEAP/TOC reports, as appropriate.

All nominations should be forwarded to:

Ozone Secretariat
United Nations Environment Programme
Gigiri
P.O. Box 30552
Nairobi
Kenya

Telephone +254 2 621234
Fax +254 2 521930
Fax +254 2 226886
Fax +254 2 226890

Please provide the following Nominating Party information:*

Party/Country _____

_____

Contact Person: _____

Nominating person: _____

Title: _____

* Article 5(1) Parties need apply for exemption until after the dates of their phase-out.

Address: _____
(include city/
code numbers)

_____

_____

/...

Telephone: _____

Fax: _____

E-Mail: _____

Applicant Organization (User)

Contact Person: _____

Address: _____

_____

_____

Telephone: _____

Fax: _____

Nominations must be received no later than 1 January of the year prior to the first year for which an exemption is requested. (1994 Form)

I. Summary of Nomination

A. Please identify and describe in detail the proposed use.

B. Quantities of Controlled Substances Requested
Please indicate below each substance required the proposed use and the quantities requested for of each substance in each year being nominated.

Nominated Quantities (metric tons)

Ozone Depleting Substance**	1996	1997	1998	1999	2000	2001	2002
CFC-11							
CFC-12							
CFC-113							
CFC-114							
CFC-115							
1,1,1-TCA							
CTC							
Halon 1211							
Halon 1301							
Halon 2402							
Other							
Total							

**** Complete this table only for nominated controlled substances.**

Please note that the TEAP recommended to the Parties that nominations granted multi-year exemptions be reviewed biennially for essentiality and annually for quantity required.

II. Substantiation of Nomination

A. Role in Society

1. Why is this use necessary for health and/or safety or critical for the functioning of society?

B. Alternatives/Substitutes

1. Explain what substitutes and alternatives to the proposed use are currently available.

2. Explain what steps are being taken to implement these substitutes and alternatives.

3. Explain why alternatives and substitutes are not sufficient or appropriate to eliminate the proposed use.

C. Steps to Minimize Use

1. Describe all steps that are being taken, including the development of CFC-free replacement products, to minimize the proposed uses.

2. Describe factors that affect the timetable for the introduction of alternatives and substitutes (including regulatory requirements).

D. Steps to Minimize Emissions

1. What steps are being taken to minimize the emissions associated with the proposed uses?

2. Please estimate the ultimate portion of each nominated Ozone Depleting Substance emitted in manufacture or use, or destroyed or recycled.

Breakdown

Ozone Depleting Substance	% Contained in Finished Product	% Released in Manufacture or Use	% Destroyed or Recycled	**Total**
CFC-11				100 %
CFC-12				100 %
CFC-113				100 %
CFC-114				100 %
CFC-115				100%
1,1,1-TCA				100 %
CTC				100 %
Halon 1211				100 %
Halon 1301				100 %
Halon 2402				100 %
Other				100 %

E. Recycling and Stockpiling

1. Explain why recycled and stockpiled substances are not available in adequate quantity and quality for the proposed uses. Give a detailed technical and chemical explanation including descriptions of the appropriate standards of purity for such use.

III. Substantiation of Volumes

1. Please indicate below the actual or estimated quantities of controlled substances used in years prior to the first year for which an exemption is requested.

Years Prior to Nomination
(metric tons)

Ozone Depleting Substance	1993	1994	1995	1996	1997	1998	1999
CFC-11							
CFC-12							
CFC-113							
CFC-114							
CFC-115							
1,1,1-TCA							
CTC							
Halon 1211							
Halon 1301							
Halon 2402							
Other							
Total							

Explain the trends in quantities used in years prior to the nominated year(s).

APPENDIX E

RECOMMENDED FORM FOR NOMINATION OF THE AEROSOL METERED DOSE INHALER (MDI) AS AN ESSENTIAL USE

INSTRUCTIONS:	1. Please submit in English. 2. A separate nomination must be submitted for each proposed essential use. 3. Use photocopies of this application form. Attach supplemental sheets as necessary. 4. You may incorporate by reference, information from the prior nominations, as appropriate.

The term "metered dose inhaler" refers to aerosol products for the delivery of medicines directly to the lungs. Nominations for any other medical aerosol (e.g., nasal inhalers) should be submitted separately.

All nominations should be forwarded to:

Ozone Secretariat
United Nations Environment Programme
Gigiri
P.O. Box 30552
Nairobi
Kenya

Telephone +254 2 621234
Fax +254 2 521930
Fax +254 2 226886
Fax +254 2 226890

Please provide the following Nominating Party information:*

Party/Country _____

_____

Contact Person: _____

* Article 5(1) Parties need not apply for exemptions until after the dates of their phase-out.

Nominating person: _____

Title: _____

Address: _____
(include city/
code numbers)

_____

_____

Telephone: _____

Fax: _____

E-Mail: _____

/...

Applicant Organization (User)

Contact Person: _____

Address: _____

_____

Telephone: _____

Fax: _____

Nominations must be received no later than January 1 of the year prior to the first year for which an exemption is requested. (1994 Form)

I. Summary of Nomination

A. Please identify and describe in detail the proposed uses. *Please indicate for what disease or treatment the proposed use is intended [(i) pulmonary, e.g. asthma, or (ii) non-pulmonary conditions, e.g. cancer].*

B. Quantities of Controlled Substances Requested
Please indicate below each substance required for the proposed use and the quantities requested of each substance in each year being nominated.

Nominated Quantities (metric tons)

Ozone Depleting Substance**	1996	1997	1998	1999	2000	2001	2002
CFC-11							
CFC-12							
CFC-113							
CFC-114							
CFC-115	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
1,1,1-TCA	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
CTC	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Halon 1211	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Halon 1301	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Halon 2402	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Other							
Total							

**** Complete this table only for nominated controlled substances.**

Please note that the TEAP recommended to the Parties that nominations granted multi-year exemptions be reviewed biennially for essentiality and annually for quantity required.

II. Substantiation of Nomination

A. Role in Society

1. Why is this use necessary for health and/or safety or critical for the functioning of society?

   Describe the nature of the disease(s) which the proposed use is intended to treat, e.g., the nature and prevalence of the disease and the role of MDIs (versus other forms of therapy) in treating the disease(s).

B. Alternatives/Substitutes

1. Explain what substitutes and alternatives to the proposed use are currently available.

   Describe any new or existing forms of treatment available if not previously submitted during essential use assessment.

2. Explain what steps are being taken to implement these substitutes and alternatives.

   Explain the education programs that advise users of substitutes and alternatives.

3. Explain why alternatives and substitutes are not sufficient or appropriate to eliminate the proposed use.

C. Steps to Minimize Use

1. Describe all steps being taken, including the development of CFC-free replacement products, to minimize the proposed use including the development or conversion to alternatives.

   Please describe the progress to develop and/or introduce alternatives to CFC-driven MDIs.

2. Describe factors that affect the timetable for the introduction of alternatives and substitutes (including regulatory requirements).

   Please describe the anticipated timescales for efficacy and safety testing and regulatory approval of alternatives to CFC-driven MDIs.

D. Steps to Minimize Emissions

1. What steps are being taken to minimize the emissions associated with the proposed use?

   Please describe waste minimization strategies for CFCs implemented during manufacture, including recovery and recycling programs.

2. Please estimate the ultimate portion of each nominated Ozone Depleting Substance emitted in manufacture or use or destroyed.

Breakdown

Ozone Depleting Substance	% Contained in Finished Product	% Released in Manufacture	% Destroyed	**Total**
CFC-11				100 %
CFC-12				100 %
CFC-113				100 %
CFC-114				100 %
CFC-115	*NA*	*NA*	*NA*	100 %
1,1,1-TCA	*NA*	*NA*	*NA*	100 %
CTC	*NA*	*NA*	*NA*	100 %
Halon 1211	*NA*	*NA*	*NA*	100 %
Halon 1301	*NA*	*NA*	*NA*	100 %
Halon 2402	*NA*	*NA*	*NA*	100 %
Other				100 %

E. Recycling and Stockpiling

1. Explain why recycled and stockpiled substances are not available in adequate quantity and quality for the proposed use. Give a detailed technical and chemical explanation including descriptions of the appropriate standards of purity for such use.

III. Substantiation of Volumes

1. Please indicate below the actual or estimated quantities of controlled substances used in years prior to the first year for which an exemption is requested.

Years Prior to Nomination
(metric tons)

Ozone Depleting Substance	1993	1994	1995	1996	1997	1998	1999
CFC-11							
CFC-12							
CFC-113							
CFC-114							
CFC-115	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
1,1,1-TCA	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
CTC	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Halon 1211	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Halon 1301	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Halon 2402	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Other							
Total							

Explain the trends in quantities used in years prior to the nominated year(s).

2. *What factors (e.g. incidence of disease, treatment guidelines) affect the need for the proposed use?*

APPENDIX F

NAMES OF MEMBERS OF TECHNICAL OPTIONS COMMITTEES

Aerosols, Sterilants, Miscellaneous Uses and Carbon Tetrachloride Technical Options Committee

Chairs	Affiliation	Country
Andrea Hinwood	Environment Protection Authority, Victoria	Australia
Jose Pons	Spray Quimica C.A.	Venezuela
Helen Tope (alternate to A. Hinwood)	Environment Protection Authority, Victoria	Australia

Committee Members	Affiliation	Country
A.J. Barnes	Boehringer Ingelheim	Germany
Nick Campbell	ICI KLEA	UK
S. W. Clarke	The Royal Free Hospital	UK
J.R. Claude*	Universit Descartes	France
Francis M. Cuss	Schering-Plough Research	USA
Donald Dunn	DuPont Chemicals	USA
Charles Hancock	MDT Corporation	USA
Anders Hansson	Astra Draco AB	Sweden
E. V. Hoxey*	Device Technology and Safety	UK
Katsuo Imazeki*	Tokyo Aerosol Industry Co.	Japan
Montfort Johnson*	Montfort A. Johnson & Assoc.	USA
R. C. Knollys	Greys	UK
Shigeo Kojima*	National Institute of Hygenic Sciences	Japan Japan
P. Kumarasamy	Kontrak Manufacturing Svcs.	Malaysia
Hiroshi Kurita	JAHCS	Japan
Rob Layet*	Ensign Laboratories	Australia
Richard Lockey*	University of South Florida	USA
Harry McCain	Aeropres Corp.	USA
Robert F. Morrissey*	Johnson & Johnson	USA
Geno Nardini	Inst. Internacional del Aerosol	Mexico
Dick Nusbaum	Pennsylvania Engineering Co.	USA
Martyn Partridge	Whipps Cross Hospital	UK
Abe Rubinfeld	Royal Melbourne Hospital	Australia
Birgitta Schmekel	University Hospital	Sweden
Albert L. Sheffer	Brigham & Women's Hospital	USA
Greg Simpson	CSIRO	Australia
Ian Smith	Glaxo Group R&D Ltd.	UK
Robert Suber	RJR-Nabisco	USA
Ian P. Tansey	3M Health Care Ltd.	UK
Adam Wanner	University of Miami	USA
Ashley Woodcock	Wythenshawe Hospital	UK
Hua Zhangxi	Ministry of Light Industry	China

* Corresponding members.

Economic Options Committee

Chair	Affiliation	Country
Robert Van Slooten	Department of Trade & Industry	UK

Committee Members	Affiliation	Country
Yusuf Ahmad	Consultant	Kenya
Ulku As	Ministry of Agriculture	Turkey
Penelope Canan	University of Denver	USA
Suely Carvalho	Universidade de Sao Paulo	Brazil
Stephen DeCanio	University of California	USA
Mavis Holmes-Hanek	Ministry of Health & Environment	Bahamas
Ahmed Amin Ibrahim	Academy of Science Research & Technology	Egypt
* corresponding members		
Peter Landymore	Overseas Development Administration	UK
Anil Markandya	Harvard Institute for International Development	USA
Tetsuo Nishide	MITI	Japan
David O'Connor	OECD Development Centre	France
Sergio Oxman	The World Bank	USA
Bai Xianhong	China International Science Centre	China

Flexible and Rigid Foams Technical Options Committee

Chair	Affiliation	Country
Jean Lupinacci	U.S. EPA	USA
Sally Rand (alternate)	U.S. EPA	USA

Committee Members	Affiliation	Country
Godfrey Abbott	Dow Europe/Exiba	Switzerland
Akihiro Aoyama	Polyurethane Chemical Co.	Japan
Paul Ashford	BP Chemicals Ltd/EPFA	UK
Craig Barkhouse	Curon Canada/CFFMA	Canada
Gert Baumann	Mobay Corporation	USA
Ted Biermann	BASF	USA
Michael J. Cartmell	ICI - Polyurethanes	USA
John Clinton	NRG Barriers	USA
Hubert Creyf	Recticel/Europur	Belgium
Shi Jia Fan	Qindao Haier Group Co.	China
Alan Fine	U.S. EPA	USA
Ryoichi Fujimoto	Hitachi Limited	Japan
Susan Herrenbruck	Society of the Plastics Ind.	USA
Katsuo Honma	Urethane Foam Industrial Assn.	Japan
Reg Hurd	British Rubber Manufacturers Assn.	UK
Mike Jeffs	ICI Polyurethanes	Belgium
Robert Johnson	Whirlpool	USA
Akihide Katata	Mitsubishi Electric	Japan
Fran Lichtenberg	Society of the Plastics Ind.	USA
Yehia Lotfi	Technocom	Egypt
Richard Minday	3M ICPD	USA
John Minsker	Dow Chemical	USA
M. Sarangapani	Polyurethane Council of India	India
Sodario Souto	Brastemp S.A.	Brazil
Bert Veenendaal	RAPPA, Inc.	USA
Udo Wenning	Bosch-Siemens Hausgeraete	Germany

Halons Technical Options Committee

Chairs	Affiliation	Country
Tom Morehouse	U.S. Department of Defense	USA
Gary Taylor	Taylor/Wagner Inc.	Canada

Committee Members	Affiliation	Country
Holmer Berthiaume	Department of National Defence	Canada
Walter Brunner	Envico	Switzerland
David Catchpole	BP Exploration (Alaska)	USA
M. Chelliah	Consultant	Malaysia
Tom Cortina	Halon Alternatives Research Corp.	USA
Robert Darwin	Department of the Navy	USA
Philip DiNenno	Hughes Associates	USA
Zhu Halin	Tianjin Fire Research Inst.	China
Chris Hanauska	Hughes Associates	USA
Ding Kangsheng	Zhejiang Chemical Industry Research Institute	China
H.S. Kaprwan	Defence Inst. of Fire Research	India
Takaaki Konno	Fenwal Controls of Japan	Japan
Nikolai Kopylov	All Russian Research Inst. for Fire Protection	Russia
Barbara Kucnerowicz-Polak	State Fire Sevices HQ	Poland
Hans Lagerhorn	Stockholm Fire Department	Sweden
Dipl. Ing. Lambrecht	BASF	Germany
Arthur Lim	Institute of Fire Engineers	Singapore
Kristina Lindgren	Swedish Environmental Agency	Sweden
Yvon Marty	CTFHE	France
Michelle Maynard	NASA	USA
Marion McQuaide	Ministry of Defence	UK
John O'Sullivan	British Airways	UK
Erik Pedersen	Danish Fire Prot. Assn.	Denmark
Gennadi Ryzhov	All Russian Research Inst. for Fire Protection	Russia
Joseph Senecal	Fenwal Safety Systems	USA
Ronald Sheinson	Naval Research Laboratory	USA
Robert E. Tapscott	NMERI	USA
Tony Thornhill	Department of National Defence	Canada
Daniel Verdonik	Department of the Army	USA
Brian Ward	Kidde Fire Protection	UK
Michael Wilson	Wormald Fire Systems	Australia
Roy Young	Loss Prevention Council	UK

Methyl Bromide Technical Options Committee

Chair	Affiliation	Country
Jonathan Banks	CSIRO	Australia

Vice Chair	Affiliation	Country
Rodrigo Rodriguez-Kabana	Auburn University	USA

Committee Members	Affiliation	Country
Joel arap-Lelei	Embassy of Kenya, Netherlands	Kenya
Mohd. Azmi Ab Rahim	Ministry of Agriculture	Malaysia
Thomas A. Batchelor	NZ Apple and Pear Marketing Board	New Zealand
Antonio Bello	Centro de Ciencias Medioambientales	Spain
Barry Blair	Tobacco Research Board	Zimbabwe
Richard C. Bruno	Sun Diamond Growers of California	USA
Adrian Carter	Agriculture Canada	Canada
Vicent Cebolla	Instituto Valenciana de Investigaciones Agrarias	Spain
Bishu Chakrabarti	Central Science Laboratory	UK
Chamlong Chettanachitara	Dept. of Agriculture	Thailand
Patricia Clary	California Alternatives to Toxics/SAFE Alliance	USA
Jorge Corona	Canacintra	Mexico

Committee Members	Affiliation	Country
Miguel Costilla	Agro-Industrial Obispo Colombres	Argentina
Jennifer Curtis	Natural Resources Defense Council	USA
Tom Duafala	TriCal	USA
Patrick Ducom	Ministere de l'Agriculture et de la Peche	France
Joe Eger	Dow Elanco	USA
Michael Graber	Ministry of the Environment	Israel
Avi Grinstein	Laboratory for Pesticide Application	Israel
Doug Gubler	University of California	USA
Joop van Haasteren	Ministry of Housing, Physical Planning and Environment	Netherlands
Toshihiro Kajiwara	Japan Plant Protection Assoc.	Japan
Jaacov Katan	Hebrew University	Israel
Richard Kramer	National Pest Control Assoc.	USA
Laurent Lenoir	UCB SA	Belgium
Maria Ludovica Gullino	University of Turin	Italy
Michelle Marcotte	Nordion International Inc.	Canada
Melanie Miller	S.A.F.E. Alliance	UK
Takamitsu Muraoka	Sanko Chemical Co.	Japan
Maria Nolan	Department of the Environment	UK
Joe Noling	Citrus Research and Education Center	USA
Henk Nuyten	Experimental Garden Breda	Netherlands
Gary Obenauf	Prune, Raisin, and Walnut Marketing Boards	USA
Mary O'Brien	University of Montana	USA
David Okioga	Kenya Agricultural Research Institute	Kenya
William Olkowski	Bio-Integral Resource Center	USA
Sergio Oxman	World Bank	USA
Santiago Pocino	FMC Foret SA	Spain
Michael Host Rasmussen	Ministry of Environment	Denmark
A. Nathan Reed	Stemlit Growers Inc.	USA
Christoph Reichmuth	Federal Biology & Research Centre for Agriculture & Forestry	Germany
Ralph Ross	U.S. Dept. of Agriculture	USA
Tsuneo Sakurai	Tiejin Chemicals Ltd.	Japan
John Sansone	SCC Products	USA
Colin Smith	Rentokil Ltd.	UK
Don Smith	Industrial Research Ltd.	New Zealand
Michael Spiegelstein	Bromine Compounds Ltd.	Israel
Morkyl Steyn	Department of National Health and Population Development	South Africa
Robert Suber	RJR Nabisco	USA
Akio Tateya	Ministry of Agriculture, Forestry and Fisheries	Japan
Robert Taylor	Natural Resources Institute	UK
Bill Thomas	U.S. EPA	USA
Gary Thompson	Quaker Oats	USA
Jorn Tidow	BASF	Germany
Patrick Vail	USDA-ARS	USA
Etienne van Wambeke	Katholieke Universiteit Leuven	Belgium
Kenneth Vick	U.S. Department of Agriculture	USA
Chris Watson	IGROX Ltd.	UK
Robert Webb	Driscoll Strawberry Associates Inc.	USA
Rene Weber	Great Lakes Chemical Co.	USA
James Wells	Department of Pesticide Regulation	USA
Wang Wenliang	Zhejiang Chemical Industry Research Institute	China
Frank V. Westerlund	Calif. Strawberry Advisory Board	USA

Refrigeration, Air Conditioning and Heat Pumps
Technical Options Committee

Chair	Affiliation	Country
Lambert Kuijpers	Technical University	Netherlands

Section Chairs	Affiliation	Country
Rune Aarlien	SINTEF	Norway
R.S. Agarwal	Indian Institute of Technology	India
Ward Atkinson	Sun Test Engineering	USA
James A. Baker	General Motors	USA
Jos W. Bouma	IEA Heat Pump Center	Netherlands
Peter Cooper	Adtec Services	UK
David Didion	NIST	USA
David Gibson	W.S. Atkins Energy Ltd.	UK
Robert Heap	SRCRA	UK
Hans Haukas	Refrigeration Consultant	Norway
Kenneth Hickman	York International Co.	USA
Fred Keller	Carrier Corp.	USA
Pieter Koelet	NV Schatten SA	Belgium
Louis Lucas	IIR	France
Kenneth W. Manz	SPX Corporation	USA
Mark O. McLinden	NIST	USA
Mark Menzer	ARI	USA
S. Forbes Pearson	Star Refrigeration	UK
Chuck Purcell	Battelle PNL Labs	USA
Frederique Sauer	Dehon Service SA	France
Erik Schau	UNITOR Ships Service	Norway
Sonny Sundaresan	Copeland Co.	USA
J. Kenneth Taulbee	Americold	USA
Ed Vineyard	Oak Ridge National Lab	USA
Paulo Vodianitskaia	Consul SA	Brazil
Lau Vors	L&E Teknik og Management	Denmark

Committee Members	Affiliation	Country
R.S. Agarwal	IIT	India
M.S. Alsahafi	Meteorology & Environmental Protection Administration	Saudi Arabia
Kent Anderson	Int. Inst. of Ammonia Refrigeration	USA
Gianfranco Angelino	Politecnico di Milano	Italy
Didier Arnaud	Elf Atochem	France
David Bateman	DuPont	USA
Russell Benstead	EA Technology	UK
Angelo Bertu	Whirlpool	Italy
S.C. Bhaduri	Indian Institute of Technology	India
Donald B. Bivens	E.I. DuPont de Nemours	USA
Paul Brauch	Vilter Manufacturing Corp.	USA
James M. Calm	Engineering Consultant	USA
Douglas Cane	Caneta Research Inc.	Canada
Terry Chadderton	Meat Industry Research Inst.	New Zealand
Denis Clodic	Ecole des Mines	France
Jim Crawford	Trane Co.	USA
Joel Crespin	Unite Hermetique	France
Mark Cywilko	Carrier Transicold	USA
Per O. Danig	Technical University	Denmark
Zahoor Ud Dean	Remco Ltd.	Kenya
Sukumar Devotta	National Chemical Lab.	India
Jan Duiven	AEER	Belgium
Omar El-Arini	Montreal Protocol Fund Secretariat	Canada

Committee Members	Affiliation	Country
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Yu Bing Feng	Zi'an Jiaotong Univ.	China
Herbert T. Gilkey	Engineering Consultant	USA
Poul-Erik Hansen	Danfoss GmbH	Germany
Laiercio Hardt	Embraco S/A	Brazil
John Hatton	Sea Containers	UK
Ulrich Hesse	FKW GmbH	Germany
Shunya Hisashima	JRAIA	Japan
Sachio Hotani	Japanese Assoc. of Refrig.	Japan
Glen Hourahan	ARI	USA
Michael Hughes	Allied Signal, Inc.	USA
Y. Igarashi	Heat Pump Technology Center	Japan
Yukinobo Ikemoto	Mitsubishi Heavy Industries	Japan
Martien Janssen	Re gent Co.	Netherlands
Werner Jensen	Integral Technologie	Germany
Ren Jinlu	GMRI	China
James F. Kanyua	University of Nairobi	Kenya
Yasuhiro Kawanishi	Sanyo	Japan
Bill Kopko	U.S. EPA	USA
Erik Korfitsen	Sabroe Refrigeration A/A	Denmark
Horst Kruse	University of Hannover	Germany
Haw En Kwi	Nippon Denso	Malaysia
Harold Lamb	Atochem North America	USA
H.J. Laue	Fachinform. Karlsruhe GmbH	Germany
Laurent Legin	Societe Trane	France
Peter Likes	Hussman Co.	USA
Anders Lindborg	Frigoscandia AB	Sweden
Hugh McDonald	Ministry of Defence	UK
Edward J. McInerney	General Electric	USA
Katharine Miller	Battelle PNL Labs	USA
Yoshiyuki Morikawa	Matsushita Electric Ltd.	Japan
Peter Moser	Sulzer Friotherm Ltd.	Switzerland
Roland Mottal	IIR	France
Gale Myers	Gas Research Institute	USA
M. Narodoslawsky	Graz University of Technology	Austria
Tetsuo Nishide	MITI	Japan
M. Nonnenmann	Behr & Co. GmbH	Germany
Lars Nordell	LGN - Energikonsult	Sweden
Richard Oas	Safeway Inc.	USA
Tomishige Oizumi	Toshiba Corp.	Japan
Robert Orfeo	Allied Signal, Inc.	USA
Deborah Ottinger	U.S. EPA	USA
Cristophe Petitjean	VALEO	France
E. Preisegger	HOECHST AG	Germany
K. Rao	Kelvinator of India	India
George Redden	Dunhan-Bush Inc.	USA
Wilhelm Ritter	Upper-Austrian Electric Power Co.	Austria
Lindsey Roke	Fisher & Paykel	New Zealand
Kazuo Sahara	Daikin Ind. Ltd.	Japan
Per Samuelsen	Finsam Int. Ltd.	Norway
Norio Sawada	Sanyo Co.	Japan
Rajendra Shende	UNEP IE/PAC	France
Arnon Simakulthorn	Thai Compressor Ltd	Thailand
John Smale	Environment Canada	Canada
Leong Kam Son	York International	Malaysia
Rich Sweetser	Gas Cooling Center	USA
Alan Tang	Sanden AC	Malaysia
Reiner Tillner-Roth	University of Hannover	Germany
Lennert Vamling	Chalmers University	Sweden
Tony Vogelsberg	E.I. DuPont de Nemours	USA
Tom Waltz	The World Bank	USA
Koichi Watanabe	Keio University	Japan

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Committee Members	Affiliation	Country
A. Wilson	Lloyds Register of Shipping	UK
Kiyoshige Yokoi	Matsushita	Japan
Ming Shan Zu	Tsinghua University	China

Solvents, Coatings and Adhesives Technical Options Committee

Chair	Affiliation	Country
Stephen O. Andersen	U.S. EPA	USA

Vice-Chair	Affiliation	Country
Jorge Corona	Canacintra	Mexico

Committee Members	Affiliation	Country
Husamuddin Ahmadzai	Swedish EPA	Sweden
Lorenzo Alvarez	S. America Electronics Operation	Brazil
David Andrews	GEC Marconi Hirst	UK
Jay Baker	Ford	USA
Bryan Baxter	British Aerospace	UK
Jeremy Byatt	Friends of the Earth	Canada
Charles Carpenter	Waste Policy Institute	USA
Pakasit Chanvinij	Thai Airways	Thailand
Mike Clark	Sketchley	UK
Brian Ellis	Protonique	Switzerland
Stephen Evanoff	Lockheed Fort Worth	USA
Joe Felty	Texas Instruments	USA
John Fisher	AT&T	USA
Art FitzGerald	Northern Telecom	Canada
Yuichi Fujimoto	Japan Electrical Manufacturers' Assn.	Japan
G. Gabelmann	ITT Teves	Germany
Leslie Guth	AT&T	USA
Don Hunt	U.S. Air Force	USA
Yoshiyuki Ishii	Hitachi	Japan
Peter Johnson	ICI	UK
William Kenyon	Global Centre for Process Change	USA
Sudhakar Kesavan	ICF	USA
Hiroshi Kurita	Japan Association for Hygiene of Chlorinated Solvents	Japan
Stephen Lai	Singapore Inst. of Standards and Industrial Research	Singapore
Leo Lambert	Digital Equipment Corp.	USA
Mohinder Malik	Lufthansa	Germany
Milton Lubraico	Ford	Brazil
Shigeo Matsui	Japan Audit & Certification Org.	Japan
Annie Maurel-Groleau	Telemecanique	France
James Mertens	Dow	USA
Hank Osterman	Allied Signal Inc.	USA
Fritz Powolny	OXITENO	Brazil
Cynthia Pruett	IBM	USA
Patrice Rollet	Promosol	France
Wolf-Eberhard Schiegl	Siemens	Germany
Hussein Shafa'amri	Ministry of Planning	Jordan
Darrel Staley	Boeing	USA
John Stemniski	Charles Stark Draper Labs	USA
John Wilkinson	Vulcan Materials	USA
Masaaki Yamabe	Asahi Glass	Japan
X'Avier HK Yoong	National Semiconductor	Malaysia

Destruction Technology Sub-Committee of the TEAP

Chair	Affiliation	Country
Abe Finkelstein	Environment Canada	Canada

Sub-Committee Members	Affiliation	Country
Godfrey Abbott	EXIBA	Switzerland
Stephen Andersen	U.S. EPA	USA
Tom Bell	Simon Fraser University	Canada
Jerry Brown	Allied Defense Industries	USA
Nick Campbell	ICI Chemicals	UK
Paul Cammer	Cammer & Associates	USA
Don Colley	Bovar Inc.	Canada
Brent Davey	Centre for Environmental Mgt.	Australia
Dave Davis	Vulcan Chemicals	USA
James DeAngelis	Commodore Environmental Services	USA
Connie Deford	Dow Chemical	USA
Vinci Felix	DuPont	USA
Howard Greene	University of Akron	USA
Robert Hall	U.S. EPA	USA
Kirk Hummel	Radian Corp.	USA
Chun Wai Lee	U.S. EPA	USA
Karen Metchis	U.S. EPA	USA
Koichi Mizuno	MITI	Japan
Maurice Oubre	Dow Chemical	USA
Kash Ram	Environment Canada	Canada
John Reed	Environment Canada	Canada
Rosemary Townsend	Commonwealth EPA	Australia

Inadvertent Losses Sub-Committee of the TEAP

Chairs	Affiliation	Country
Nick Campbell	ICI Chemicals and Polymers Ltd	UK
Lambert Kuijpers	Technical University, Eindhoven	Netherlands

Sub-Committee Members	Affiliation	Country
Kathi Anderson	DuPont(Canada)	Canada
Sandip Bhatia	Navin Fluorine Industries	India
Connie Deford	Dow Chemicals (North America)	USA
Kevin Fay	Alliance for Responsible Atmospheric Policy	USA
Jean Lamont	Department of Trade and Industry	UK
Paul Horwitz	U.S. EPA	USA
Hiroshi Kurita	Japanese Association for the Hygiene of Chlorinated Solvents	Japan
Vivian McIntire	Eastman Chemical Company	USA
John Reed	Environment Canada	Canada
Wolfgang Scholten	Hoechst AG	Germany
Y Umeki	Matsui-DuPont	Japan
John Wilkinson	Vulcan Chemicals	USA
Xiao Xu Pei	Shanghai Inst of Organo Fluorine Mats	China

APPENDIX G

NAMES OF TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL MEMBERS

Chairs	Affiliation	Country
Stephen O. Andersen	U.S. EPA	USA
Suely Carvalho	University of Sao Paulo	Brazil
Lambert Kuijpers	Tech. University Eindhoven	Netherlands

Senior Advisors	Affiliation	Country
Yuichi Fujimoto	Japan Electrical Manufacturers' Assn.	Japan
Carmelina Lombardi	Environment Ministry	Venezuela
John Reed	Environment Canada	Canada
K.M. Sarma	UNEP	Kenya

Panel Members	Affiliation	Country
Stephen O. Andersen	U.S. EPA	USA
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Andrea Hinwood	Environment Protection Authority	Australia
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APPENDIX H

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APPENDIX I

ACRONYMS

CFC - Chloroflourocarbon

CTC - Carbon Tetrachloride

EAP - Effects Assessment Panel

MDI - Metered-Dose Inhaler

ODS - Ozone-Depleting Substance

OEWG - Open-Ended Working Group of the Parties to the Montreal Protocol

SAP - Science Assessment Panel

TCA - Trichloroethane

TEAP - Technology and Economic Assessment Panel

TOC - Technical Options Committee
