

Distr.
GENERAL
E/ESCWA/NR/1994/16
17 November 1994
ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA

**REPORT ON ACTIVITIES IN THE ESCWA REGION RELATED
TO THE PROTECTION OF THE OZONE LAYER**

94 - 7966



UNITED NATIONS
New York, 1994

Preface

International agreements regulating the production and consumption of chemicals harmful to the ozone layer are already in force; deadlines have been set in these agreements for phasing out their consumption, production and export by manufacturers.^{1/}

Efforts aimed at developing alternatives to ozone-depleting substances (ODS) have been rewarded in more than one sphere. Activities geared towards converting existing industrial facilities into safer alternatives are under way, particularly in the developed countries. Developing countries, covered by Article 5 of the Montreal Protocol on Substances that Deplete the Ozone Layer (1987)(also referred to here as the Montreal Protocol, or simply the Protocol) have been granted concessionaire terms and exemptions provided they are parties to the Protocol. Developing countries not party to the Protocol will face severe hardships in a range of industries and services.^{2/}

Only eight countries from the ESCWA region are signatories to the Montreal Protocol; six ESCWA countries have also signed the London Amendment, and only two have signed the Copenhagen Amendment.

The primary role of a regional organization such as ESCWA in this connection is to help create an awareness of the importance of joining international efforts aimed at phasing out ODS; these efforts are not directed solely towards the protection of the ozone layer, but also aim at securing a viable future for a number of vital industries and service activities in the region. Regional organizations could also perform an important task in coordinating national efforts and information-sharing among concerned national, regional and international organizations.

ESCWA, in collaboration with the United Nations Environment Programme (UNEP), has laid the groundwork for regional action aimed at phasing out ODS by carrying out the following activities:

(a) During the 1992-1993 biennium, ESCWA concluded a study on the depletion of the ozone layer in the countries of the ESCWA region. The study reviewed and assessed prevailing practices and conditions related to the utilization of ODS in ESCWA countries;

(b) In December 1993, ESCWA organized an expert group meeting to review the above-mentioned study and to assess issues raised by international agreements for limiting the production and consumption of ODS. At the meeting, representatives of ESCWA member States requested that ESCWA collaborate with other international agencies in holding a series of regional training workshops for engineers and technology managers involved in industries regarded as heavy consumers of ODS. A project document covering possible future activities aimed at promoting ODS substitution was also discussed at the expert group meeting; a summary of the objectives of this project is given in chapter III of this report.

^{1/} See tables in annex III to the present paper.

^{2/} Mainly, those industries and services related to or involving refrigeration, air conditioning, or aerosol products, plastic foam manufacturing, fire-fighting materials in sensitive installations, and the manufacture of firefighting equipment containing ODS, as well as those industries using ODS in cleaning operations.

CONTENTS

	<i>Page</i>
Preface	iii
Abbreviations	vi

Chapter

I. PROTECTION OF THE OZONE LAYER	1
A. International efforts aimed at protecting the ozone layer	1
B. The status of ESCWA member countries in relation to the Montreal Protocol ..	2
C. The role of the regional commissions	3
II. ACTIVITIES UNDERTAKEN BY ESCWA	4
A. A study on the production and consumption of substances harmful to the ozone layer in the ESCWA member countries	4
B. The Expert Group Meeting on Prospects for the Substitution of Ozone-Depleting Substances in the ESCWA Region	5
III. FUTURE EFFORTS AIMED AT PHASING OUT OZONE-DEPLETING SUBSTANCES IN THE ESCWA REGION	7
A. Project description: training in the substitution of ODS in the ESCWA region ..	7
B. Four project workshops	8

ANNEXES

I. Summary of recommendations made at the Expert Group Meeting on Prospects for the Substitution of Ozone-depleting Substances in the ESCWA region	11
II. Tables of contents of volumes I, II and III of the "Regional Survey of Production and Consumption of Substances Harmful to the Ozone Layer in the ESCWA Region"	14
III. Tabular summary of selected Articles of the Montreal Protocol	17

ABBREVIATIONS

CFCs	Chloro-flouorocarbons
ESCWA	Economic and Social Commission for Western Asia
GEF	Global Environment Facility
IFSTAD	Islamic Foundation for Science, Technology and Development
MP	Montreal Protocol
ODS	Ozone-depleting substances
PMP	Party to the Montreal Protocol
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization

I. PROTECTION OF THE OZONE LAYER

Certain chemical substances—mainly the chloro-fluorocarbons (CFCs) used in refrigeration, air conditioning, aerosol products, fire-fighting, and plastic foam manufacturing—are now recognized as a serious threat to the protective ozone layer in the upper atmosphere. In fact, damage already inflicted upon the ozone layer has dramatically reduced the concentration of ozone in the stratosphere above Antarctica and parts of the northern hemisphere, posing hazards to human, animal and plant life.

Activities aimed at the development of harmless or less harmful substances have now been proceeding for a number of years in several R and D and industrial institutions in the developed countries. Effective alternatives to many ozone-depleting chemicals have been developed. Due to the fact that stringent performance requirements must be fulfilled, often for a limited number of applications, certain ODS have been more difficult to replace.^{3/} The search for ODS replacements is further complicated by the necessity of addressing issues related to the toxicity, fire hazard, cost, and environmental impact of the alternatives. These issues, along with performance parameters, materials compatibility and energy efficiency, have to be dealt with.

A. International efforts aimed at protecting the ozone layer

The environmental dangers posed by CFCs and similar chemicals, together with the success achieved in developing acceptable alternatives, have prompted moves by the international community to initially limit and ultimately phase out the production and utilization of ODS.^{4/} As a result of concerted international action, particularly during the late 1980s and early 1990s, agreement was reached on the need to implement programmes specifically aimed at eliminating emissions of ODS.^{5/} In total, one convention and one protocol (along with two amendments to the protocol) have been concluded. They are, respectively:

- (a) The Vienna Convention for the Protection of the Ozone Layer (1985);
- (b) The Montreal Protocol^{6/} on Substances that Deplete the Ozone Layer (1987);
- (c) The London Amendment to the Montreal Protocol (1990);
- (d) The Copenhagen Amendment to the Montreal Protocol (1992).

By July 1994, 138 countries had become signatories to the Montreal Protocol. The Protocol provides for aid to developing countries in their efforts to acquire and implement environmentally sound technologies. On the other hand, countries failing to accede to these agreements and thereby adopt environmentally sound technologies will be increasingly faced with international restrictions covering the supply of raw materials, manufacturing facilities and equipment utilizing ODS.^{7/}

^{3/} Such as the halons used for fire-fighting.

^{4/} Especially in those industries and services related to or involving refrigeration and air conditioning, the manufacture of plastic foam, aerosol-dispensed products, and fire-fighting equipment. Other industries utilizing CFCs as solvents or degreasing agents will also be affected.

^{5/} See, in particular, Articles 2A and 2B of the Montreal Protocol.

^{6/} The Protocol was adopted on 16 September 1987 and came into force on 1 January 1989 (see UNEP/OzL./Rat.28; 31 August 1993).

^{7/} See the Montreal Protocol for further information.

The following table provides information on the status of ratification, accession, acceptance, succession and approval of the agreements on protecting the ozone layer.

Status	Vienna Convention (1985)	Montreal Protocol (1987)	London Amendment	Copenhagen Amendment
	(Number of countries)			
Ratification	23	36	33	11
Accession	105	89	44	14
Acceptance	3	5	4	2
Succession	6	6		
Approval	2	2	10	3
Total	139	138	91	30

Source: Derived from UNEP/OzL./Rat. 39; July 1994.

Annex tables 1 to 5 (in annex III) provide information about deadlines and allowed production and consumption levels set by the Protocol. Amendments concerning quotas requested by developing countries will only be considered if the country is a signatory to the agreement and if that country has provided data on its CFC consumption levels.

The Global Environment Facility (GEF) was established in 1990 and restructured in 1992 to serve as the interim financing mechanism for biodiversity and climate change conventions. Its mandate includes providing assistance to developing countries in phasing out ODS.

Several organizations within the United Nations system are now involved in efforts directed at the substitution of ODS. They are, principally, the United Nations Environment Programme (UNEP), the United Nations Industrial Development Organization (UNIDO) and the World Bank. Regional organizations such as the Islamic Foundation for Science, Technology and Development (IFSTAD) have also expressed a keen interest in promoting the acquisition and utilization of environmentally sound technologies in general, and in supporting the present training activity in particular.

B. The status of ESCWA member countries in relation to the Montreal Protocol

The following ESCWA member countries are among the signatories to both the Vienna Convention and the Montreal Protocol: Bahrain, Egypt, Jordan, Kuwait, Lebanon, Saudi Arabia, the Syrian Arab Republic and the United Arab Emirates.^{8/} Egypt has ratified the Protocol, while all of the other countries have acceded to it. Only six ESCWA member countries (namely, Bahrain, Egypt, Jordan, Kuwait, Lebanon and Saudi Arabia) are signatories to the London Amendment to the Protocol,^{9/} and only Egypt and Saudi Arabia are signatories to the Copenhagen Amendment to the Protocol.^{10/} The remaining ESCWA member countries—Iraq, Oman, Qatar and Yemen—have not yet signed the Protocol.

^{8/} See Doc. UNEP/OzL./Rat.39; July 1994.

^{9/} Ibid.

^{10/} Ibid.

A much-quoted reason for the delay in signing the Protocol on the part of developing countries is the lack of awareness^{11/} of the grave implications the ban on trading in CFCs and other ODS might have on related industrial and service activities. Another cause for the present lack of vitality in phasing out ODS in the region is the weakness of the institutional structures designated as "ozone units" in the countries of the region. It is therefore essential that action be taken to highlight the following:

- (a) The serious implications of delays in signing and complying with the Protocol^{12/} and other international agreements related to it;
- (b) The benefits, in terms of financial resources and expertise, available from international funds earmarked for ODS substitution in the developing countries;^{13/}
- (c) The necessity for establishing viable institutional capabilities in order to tap the available local, regional and international resources.^{14/}

C. The role of the regional commissions

The role of the regional commissions in ODS substitution has generally focused on the following:

- (a) Surveying the production and consumption of ODS;
- (b) Enhancing awareness at the regional and national levels, for the benefit of the economies of the region's countries, of the importance of complying with international agreements and of active implementation of ODS-replacement activities;
- (c) Training engineering and managerial personnel involved in industries using ODS;^{15/}

^{11/} Principally, those institutions charged with monitoring and coordinating national environmental programmes.

^{12/} See the Montreal Protocol for further information on specific articles dealing with this aspect.

^{13/} A review of World Bank and other documents indicates that among the ESCWA member States, Jordan benefited the most from funding provided by the Multilateral Fund for the Implementation of the Montreal Protocol. Through the efforts of the Ozone Unit at the Department of the Environment of the Ministry of Municipal and Rural Affairs and the Environment, a grant agreement was finalized last year totalling US\$ 1.5 million. This first set of projects covers assistance to aerosol product manufacturers and the Jordanian Petroleum Refining Company, and institutional support for the Department of Environment. (Information from the 1994 work programme covering the World Bank-implemented Montreal Protocol operations). A list of new projects aimed at phasing out ODS in the domestic refrigeration sector has been prepared in cooperation with UNIDO and approved by the Executive Committee of the Multilateral Fund. The total amount allocated to these projects is around US\$ 2.4 million. Plans for other projects to be presented for approval by the end of 1994 total around US \$1.7 million. The new set of projects covers many areas, including foam manufacturing. (Information provided by the Department of the Environment in Amman, Jordan.)

^{14/} Almost all countries in the region which are party to the Protocol have established or designated "ozone units". These units may, however, vary in terms of their institutional links, scope of activity and effectiveness. One of the most active national ozone units in the region is that set up in Jordan within the Department of the Environment at the Ministry of Municipal and Rural Affairs and the Environment.

^{15/} Regional training activities aimed at specific applications of CFC alternatives appear to be the most effective, according to a presentation by the Ozone Operations Resource Group appended to an office memorandum of the World Bank dated 23 February 1994.

(d) Coordinating programmes aimed at the acquisition of ozone-friendly technologies and materials.

Furthermore, introducing a regional dimension to the work of the principal agencies concerned with ODS replacement has obvious advantages of economy and rationalization.

The following paragraphs contain an outline of the activities both planned and already undertaken by ESCWA in this regard.

II. ACTIVITIES UNDERTAKEN BY ESCWA

A. A study on the production and consumption of substances harmful to the ozone layer in the ESCWA member countries

Studies of industrial and other anthropogenic activities causing emissions of ozone-depleting substances have been undertaken throughout the world. The aim of these studies has primarily been to provide bases for action to limit and phase out the consumption of ODS. In the ESCWA region, the "Regional survey of production and consumption of substances harmful to the ozone layer in the ESCWA region"^{16/} was concluded in 1992. The survey, comprising three volumes,^{17/} was jointly sponsored by ESCWA and UNEP and was carried out by an Egyptian firm of consultants.^{18/} The survey's report, which reviews and assesses prevailing practices related to ozone-layer depletion in several ESCWA member States,^{19/} concludes that:

(a) Substantial quantities of chemicals harmful to the ozone layer are currently imported and consumed in the ESCWA member countries;

(b) The countries concerned generally pay very little attention to reducing the consumption of the harmful materials;

(c) There is very little awareness among the public of the potential danger of producing and consuming ozone-depleting substances.

The survey also points out that ample opportunities exist for reducing the production and consumption of ODS in the region. It highlights the need for international cooperation and the pooling of resources to cope with the tasks involved in the conversion processes and to identify and implement relevant plans of action. Furthermore, the survey attempts to formulate a strategy for the phased implementation of a programme to control the production and utilization of ozone-depleting substances in the region. It also underlines the need for international cooperation and the pooling of resources for the implementation of activities in areas where the intensive use of certain domestic and industrial devices results in high levels of ODS emissions.

The first volume of the survey outlines the issues involved and provides a summary of international efforts aimed at phasing out ODS. The methodology adopted in the Survey and a

^{16/} See volume I of document E/ESCWA/ID/1993/4(I) for a description of the aims of this survey.

^{17/} Annex II to this report includes the contents of all three volumes.

^{18/} Environmental Quality International, 3B Bahgat Ali Street, Zamalek, Cairo, Egypt; telephone: 3400052 or 3408284; and fax: 3413331.

^{19/} Bahrain, Dubai, Egypt, Jordan, Iraq, Kuwait, Qatar, Oman, Saudi Arabia, the Syrian Arab Republic and Yemen.

summary of its findings at the national and regional levels are also presented in this volume. Volumes II and III present the results of the survey for individual ESCWA member countries.

In compiling the Survey, a number of limitations were faced: there was a lack of basic knowledge of ODS dangers and their uses in the region, the requirements for collecting data were lengthy and complicated, and there were funding and time constraints. Additionally, it was found that data related to ozone consumption were not adequately documented in a number of ESCWA member countries.^{20/}

B. The Expert Group Meeting on Prospects for the Substitution of Ozone-Depleting Substances in the ESCWA Region

The Meeting was held in Amman on 1 and 2 December 1993, under the patronage of Jordan's Minister of Municipal and Rural Affairs and the Environment. It was financed by UNEP, and organized jointly by the Science and Technology programme and the Industry Division of ESCWA. Along with ESCWA, the Department of the Environment in the Ministry of Municipal and Rural Affairs and the Environment coordinated the details of the Ministry's participation and contribution to the Meeting.

1. Objectives of the Meeting

The main objectives of the Meeting were as follows:

- (a) Provide member States with an opportunity to discuss the survey referred to above;
- (b) Deliberate future actions to be taken both individually (by the member countries in cooperation with concerned international organizations) and jointly (at the subregional and regional levels);
- (c) Discuss the implications of international agreements aimed at phasing out the use of ODS;
- (d) Review national activities aimed at the protection of the ozone layer by means of limiting the use of ODS and/or phasing them out altogether in the countries of the region;
- (e) Review plans for future activities aimed at the substitution of ODS in the ESCWA region. The ultimate objective of this review was to lay the foundations for a future regional strategy to be implemented by ESCWA, UNEP and UNIDO in cooperation with regional and national organizations, with the aim of phasing out ODS in the region.

It was also planned that the institutions represented at this Meeting would duplicate and improve upon this regional activity at the national level by further surveying and analysing aspects of ozone-depleting activities and products of particular interest to them, and would develop strategies for the acquisition, adaptation, development and implementation of ozone-friendly technologies.

^{20/} Requests for updated information in the member States were made by ESCWA following the Expert Group Meeting in December 1993. The responses received so far, however, do not provide a sufficient basis for updating the information gathered earlier.

2. Participants

A total of 23 experts representing nine countries of the region participated in the Meeting. A representative of the UNEP Regional Office for Western Asia also attended.

Representatives from governmental organizations in the region—primarily ministries of health, industry and the environment—also attended the Meeting. Non-governmental organizations were represented by participants from Jordanian Society for the Control of Environmental Protection and the Association of Lebanese Industrialists.

3. Material presented

The substantive material presented by ESCWA to the Meeting consisted of the following:

(a) The ESCWA/UNEP "Regional survey of production and consumption of substances harmful to the ozone layer in the ESCWA region";

(b) A detailed proposal for future action aimed at the protection of the ozone layer, submitted for consideration by the Meeting (see chapter 3 of the present report).

4. Issues discussed

The Meeting observed that many countries in the region had not yet ratified the Montreal Protocol. It was concluded that further delays in ratifying and implementing international agreements on ODS would drastically limit these countries' chances of benefiting from the financial and technical aid available for the conversion to less harmful and/or harmless alternatives.

The trade restrictions stipulated by international agreements with regard to ODS and products utilizing ODS were also discussed. It was pointed out that member countries stood to gain from initiating energetic ODS replacement programmes in anticipation of this situation; i.e., there would be eligibility for assistance from international funds and expertise provided by international organizations on the one hand, and on the other, these countries could avoid the economic disruptions and dislocations which would be caused by the restrictions planned for future trade in ODS and in products utilizing ODS.

The participants made presentations about their countries' efforts to protect the ozone layer, and indicated the measures being taken to control ozone-depleting emissions and to substitute ODS with safer alternatives. Some of the presentations required that certain entries in the above-mentioned ESCWA/UNEP survey concerning ODS consumption be updated or corrected.

The dearth of documented information on the modes of ODS utilization in the region and the lack of mechanisms for coordinating activities at the national, regional and international levels were also considered. The need for member countries to establish specialist units in their environment ministries and/or departments was underlined. Some of the main functions of these units would be to collect and collate data on the importation and consumption of ODS and to monitor developments in their replacement and in the utilization of safer alternatives. Such units were regarded by the participants as an absolute necessity for urgent future efforts aimed at ODS substitution.

Annex I includes a list of the recommendations made by the participants at the conclusion of the Expert Group Meeting. The implementation of the Meeting's other recommendations will be

considered in consultation and cooperation with specialized agencies of the United Nations and concerned institutions in the member States.

III. FUTURE EFFORTS AIMED AT PHASING OUT OZONE-DEPLETING SUBSTANCES IN THE ESCWA REGION

Due to resource constraints the programme of work and priorities covering the biennium 1994-1995 could not address activities aimed at ODS substitution. The importance of the subject from both the economic and social angles, as well as the requests made by member countries for activities related to ODS substitution in specific industries^{21/} nevertheless prompted ESCWA to formulate a project document, the contents of which are described in the following paragraphs. ESCWA has been in contact with the concerned UNIDO, UNEP and World Bank departments in order to secure their participation and support for implementing this project, which comprises four workshops on environmentally sound technologies for refrigeration, air conditioning, the manufacture of plastic foam, aerosol products, and fire-fighting equipment. The results of these contacts are encouraging; it may be possible to conduct the training exercises as extrabudgetary activities during 1995 and the coming biennium in cooperation with concerned national, regional and international organizations.

ESCWA will also, within the limits of available resources, investigate the possibilities of implementing other recommendations of the regional Expert Group Meeting on Prospects for the Substitution of Ozone-Depleting Substances in the ESCWA Region. Of particular importance are those recommendations dealing with information dissemination, the promotion of networking, and the establishment of active focal points in the ESCWA member countries.

A. Project description: training in the substitution of ODS in the ESCWA region

The main aim of the project is to train between 120 and 160 engineers and managers from industrial public- and private-sector institutions and from enterprises offering consulting and extension services in environmentally sound technologies in selected industries—namely, those related to refrigeration and air conditioning, plastic-foam manufacturing, aerosol products, and fire-fighting equipment and materials. The project will also attempt to sensitize key institutions and individuals in the member States to the necessity of responding to the stipulations of major international agreements such as the Montreal Protocol and its subsequent amendments regarding the elimination and phasing out of ODS. It will also attempt to highlight mechanisms for obtaining technical support and financial assistance from specialized United Nations agencies and funds.^{22/}

Among others, the participants will include representatives of chambers of trade and industry and representatives of concerned professional associations. The participation of regulatory bodies concerned with the environment and labour safety in selected ESCWA member States will be sought as well.

The workshops are designed to alert local producers and importers of the materials and equipment utilized by the above-mentioned industries to the necessity of converting to environmentally sound products and technologies and to provide them with information on alternative products and

^{21/} In addition to the recommendations made at the Expert Group Meeting held in December 1993, requests were received from Iraq, Lebanon, Saudi Arabia and the Syrian Arab Republic for training activities addressing ODS substitution in certain industries.

^{22/} Particularly the Multilateral Fund for the Implementation of the Montreal Protocol. This Fund has a total budget allocation of US\$ 6.6 million for 1994. Its 1994 work programme continues to concentrate on larger developing countries; more emphasis is being placed on establishing local capacity and formulating policies for phasing out ODS.

processes. These parties will also be made more aware of the facilities and incentives offered by international agreements and funding schemes.

This project is also expected to enable technologists, managers and entrepreneurs to plan and implement alternative production methods smoothly and economically. Their ability to respond to technological change in general will be enhanced, as will their ability to compete with other producers, both internally and externally. In particular, participants representing emerging technology extension and consulting service enterprises will be in a better position to advise other manufacturers on conversion to environmentally sound alternative technologies in other industries at the national level. Finally, the project will, through the expertise which is to be developed, enable the ESCWA region to fulfil its obligations in the global effort to phase out the production and utilization of ozone-depleting substances. The issues to be addressed by the project are directly related to major items in the ESCWA mandate for sustainable development, environmental protection and the impact of science and technology on industrial development.

To conclude, it should be mentioned that the project is linked to other ESCWA projects dealing with industrial development and small and medium-sized enterprises.

B. Four project workshops

The following paragraphs provide information about the workshops to be held within the framework of the above-mentioned project.

1. Workshop I: environmentally sound refrigeration and air-conditioning technologies

Among the issues to be addressed in this workshop will be those of conservation, recycling and the replacement of CFC refrigerants with harmless and less harmful alternatives in the manufacturing, handling and servicing of household refrigerators, mobile air conditioners, centrifugal chillers, industrial refrigerators, freezers and cold stores. Detailed information on CFC substitutes and on essential modifications to existing equipment and auxiliary materials will also be discussed. Furthermore, information regarding the safety and handling characteristics of CFC substitutes^{23/} will be made available to the participants.

2. Workshop II: environmentally sound plastic-foam manufacturing technologies

This workshop will provide focused training in new methods related to the manufacture of plastic foam and the use of safer substitutes, e.g., water and other "ozone friendly" substances. The workshop will also deal with equipment and tooling modifications necessitated by the new processes and with the safety precautions involved.

3. Workshop III: environmentally sound aerosol propellants and related technologies

Training in this workshop will focus on the following issues:

- (a) Replacing CFCs with cheaper hydrocarbon-based propellants, particularly liquefied petroleum gas (LPG);

^{23/} A number of CFC substitutes suggested for use in refrigeration are inflammable; others, unlike the original CFCs, may constitute health hazards.

- (b) Deodorizing the new propellants used in cosmetics, air fresheners, etc.;
- (c) Retrofitting plant equipment to use CFC substitutes;
- (d) The safety aspects of the new propellants.

Mechanical propulsion methods and the utilization of inert gases in toiletries will also be addressed.

4. Workshop IV: environmentally sound fire-fighting equipment and manufacturing technologies

Several industrialized countries are well on their way towards eliminating CFCs (such as halons for fire-fighting) in all but a few "essential applications" required for high-risk industrial processes, aircraft, museums and art galleries, etc. For example, it is planned that the production and supply of new batches of halons will be phased out in the European Union by 1995.

This workshop will deal with halon alternatives and their ranges of application, and will also cover the "essential applications" for which the use of halons or less harmful alternatives may still be used. Since halons are relatively stable from the chemical point of view, it would be advantageous to set up a series of national and regional halon banks; in view of this, methods for recycling and reuse will be addressed and necessary "banking" arrangements considered.

Other issues addressed in this workshop will include the following:

- (a) The replacement of halons with carbon dioxide, dry chemical formulations, water-sprinkling systems and high foam expansion methods for extinguishing fires;
- (b) The minimization of halon emissions during equipment servicing, testing and fire-fighting training exercises;
- (c) Modifications in manufacturing and quality-control procedures.

The training materials presented at the workshops will be published and distributed for the benefit of national efforts aimed at ODS replacement. Furthermore, the workshops will pave the way for follow-up action at the national level, including national training exercises on the subjects of the four workshops. These workshops will also make it possible to more effectively coordinate the operations of the national focal points on methodologies for implementing ODS-replacement activities and in the acquisition of environmentally sound technologies.

The training exercises could be implemented as extrabudgetary activities during the second half of 1995 and all of 1996, depending on resource availability.



Annex I**SUMMARY OF RECOMMENDATIONS MADE AT THE EXPERT GROUP MEETING ON PROSPECTS FOR THE SUBSTITUTION OF OZONE-DEPLETING SUBSTANCES IN THE ESCWA REGION**

The participants in the Expert Group Meeting held in December 1993 made a series of recommendations to the Governments of the ESCWA member countries and to national, regional and international organizations involved in ODS replacement and the protection of the environment. Considering the seriousness with which participants in the Meeting viewed the situation—particularly the impact of CFC bans on industries in the region—the recommendations are understandably ambitious. A summary of these recommendations is given below.

A. Recommendations to the Governments of ESCWA member countries

Recognizing that important international efforts aimed at protecting the ozone layer are being made, and that a number of ESCWA member countries have not yet ratified important international agreements on limiting and phasing out the use of ODS, and considering that significant assistance will be made available to the signatories to agreements on limiting/eliminating ozone-depleting emissions, the Governments of the ESCWA member countries were urged by the participants to do the following:

- (a) Ratify the Vienna Convention, the Montreal Protocol, and the latter's London and Copenhagen amendments;
- (b) Implement national programmes for reducing damage to the ozone layer, incorporating the following:
 - (i) Manpower training;
 - (ii) Research and development (R and D);
 - (iii) Technology acquisition, assessment, adaptation and development;
 - (iv) Data collection in a manner that is consistent with standard international requirements, and the introduction of measures to coordinate information gathering and utilization activities among national and regional institutions.

Governments of the region which have not established institutional arrangements for dealing with ODS were also encouraged to establish or designate focal points for this purpose.

B. Recommendations to concerned national bodies and international organizations**1. Recommendations on technology transfer and adaptation**

Considering the necessity of introducing new and modified technologies for phasing out ODS, the Meeting recommended that the following be done:

- (a) Identify priorities for technology acquisition, adaptation and development;

- (b) Elaborate mechanisms for conducting technology acquisition, assessment, adaptation and development;
- (c) Conduct adequate risk assessment of ODS replacements;
- (d) Identify and disseminate information about available mechanisms for financing technology acquisition, adaptation and development activities;
- (e) Examine and assess the roles and contributions of private and public industrial enterprises as well as those of regulatory institutions, R and D centres and non-governmental organizations (NGOs) in technology acquisition, adaptation and development;
- (f) Investigate the possibilities and advantages of acquiring the necessary technologies for manufacturing substitutes for ODS and make recommendations concerning the acquisition of such technologies.

It was further agreed that adequate information on available technologies and new materials, as well as hands-on experience in conversion to new ozone-friendly technologies, could be conveniently and effectively acquired through the implementation of pilot projects for demonstration, continuous training and technology development. The possibilities for establishing such facilities should be investigated, wherever possible, in cooperation, with concerned national bodies and international organizations.

The participants urged ESCWA, UNEP and other concerned international organizations to tackle issues relating to technology acquisition, adaptation, assessment, regulation and development in a detailed technical study which should form an integral part of a plan of action for phasing out ODS in the region.

2. Recommendations on information exchange

Considering the importance of information gathering and dissemination in activities aimed at limiting and substituting ODS, the Meeting urged ESCWA, UNEP and other concerned international organizations to implement activities facilitating the enhanced exchange of information among ESCWA member countries about technologies leading to the replacement of ODS. The Meeting also recommended that training workshops be held for engineers and technicians in industries using ODS, with the aim of introducing and disseminating alternative materials and technologies.

The Meeting further recommended that information relating to sources of financial support and technical expertise be identified and that a data bank be set up to ensure that information about alternative technologies and substances, and about new rules and regulations governing the phasing out of ODS would be available to all ESCWA member countries. In particular, it was recommended that ESCWA and UNEP more closely coordinate efforts with existing information networks,^{24/} in order to promote information availability for national, regional and international projects relating to ODS replacement.

The Meeting urged ESCWA to promote the establishment of national focal points in each ESCWA member country to deal with all aspects of ODS substitution; it was also recommended that these units act as centres for collecting information on ODS consumption and on ODS replacement efforts.

^{24/} Such as the facility set up by UNEP in Paris.

3. Recommendations concerning a strategy and plan of action

Considering both the importance and benefits of concerted efforts related to limiting and substituting ODS in the ESCWA region, the participants recommended that a regional ODS-replacement strategy be formulated which should address the following:

- (a) Information collection and dissemination;
- (b) Pilot projects for introducing environmentally sound technologies;
- (c) The role of private enterprise;
- (d) Establishing capabilities in the manufacture of compatible equipment and materials;
- (e) The role of governmental and non-governmental organizations.

The strategy should form the basis for a series of activities organized within an integrated plan of action. These activities would include the following:

- (a) Carrying out an in-depth technical study;
- (b) Holding training workshops covering:
 - (i) Refrigeration and air-conditioning;
 - (ii) Plastic-foam manufacture;
 - (iii) Aerosol products;
 - (iv) Fire-fighting equipment;
- (c) Setting up business forums and exhibitions of products, technologies and services;
- (d) Forming a network of concerned organizations for pooling information and coordinating technology acquisition, technology assessment and training activities;
- (e) Setting up a data bank for information on technologies, products and services, as well as on regulations and funding sources.

The Meeting called upon ESCWA and UNEP to play an instrumental role in the formulation of this strategy at the regional level; however, this strategy was not to be considered a substitute for national strategies.

C. Recommendation pertaining to the "Regional survey of production and consumption of substances harmful to the ozone layer in the ESCWA region"

Recognizing the importance of the contribution made by this survey to regional efforts aimed at ODS substitution, the Meeting recommended that ESCWA revise and update said survey. It was agreed that ESCWA should request concerned institutions in the member States to update the information presently included in the study within a period of three months.

Annex II

**TABLES OF CONTENTS OF VOLUMES I, II AND III OF THE "REGIONAL SURVEY
OF PRODUCTION AND CONSUMPTION OF SUBSTANCES HARMFUL TO THE
OZONE LAYER IN THE ESCWA REGION"**

CONTENTSVolume I

	<u>Page</u>
INTRODUCTION	1
BACKGROUND	2
The Ozone Problem	2
1. The Ozone Layer	2
2. Ozone Depletion Potential (ODP) and Global Warming Potential	5
International Efforts	5
1. The Vienna Convention	5
2. The Montreal Protocol	7
3. Subsequent Developments	7
4. ESCWA Region and the Montreal Protocol	8
METHODOLOGY	10
SUMMARY OF RESULTS	11
I. The Regional Level	11
Awareness of the Ozone Depletion Problem and Prior Efforts to Collect Information on ODSs in the Region	11
Regional Utilization Rates for ODSs	11
Types, Quantities, and Uses of ODSs in ESCWA Countries	11
Per-Capita Use of ODSs in the ESCWA Region	16
Cost Estimates	16
II. The Country Level	22
STRATEGY FOR CONTROLLING OZONE DEPLETION IN THE ESCWA REGION	27

ATTACHMENTS

- ATTACHMENT 1: Summary of 1987 Montreal Protocol and 1990 Revisions
 ATTACHMENT 2: Sample Questionnaires and Registration Form (for Egypt)
 ATTACHMENT 3: Multipurpose Questionnaire (for remaining ESCWA countries)
 ATTACHMENT 4: ODS User Format (for remaining ESCWA countries)
 ATTACHMENT 5: Persons and/or Organizations Contacted
 ATTACHMENT 6: Calculations Used to Derive ESCWA costs for CFC Substitution
 ATTACHMENT 7: Calculations of Phasing Out CFCs in Egypt According to Scenario 1

Volume II

AMOUNTS OF OZONE DEPLETING SUBSTANCES IMPORTED AND USED IN EGYPT	1
USES OF OZONE DEPLETING SUBSTANCES IN EGYPT	17
OZONE DEPLETION POTENTIALITY (ODP) IN EGYPT	25
COST OF COMPLIANCE WITH THE MONTREAL PROTOCOL	25

Volume III

BAHRAIN	1
Amounts of Ozone Depleting Substances Imported and Used in Bahrain	2
Uses of Ozone Depleting Substances in Bahrain	7
Ozone Depletion Potentiality in Bahrain	11
Cost of Phasing Out Ozone Depleting Substances	11
IRAQ	14
Amounts and Trends of Ozone Depleting Substances Imported by Iraq	16
Uses of Ozone Depleting Substances in Iraq	22
Ozone Depletion Potentiality in Iraq	25
Cost of Phasing Out Ozone Depleting Substances	25
JORDAN	28
Amounts of Ozone Depleting Substances Imported and Used in Jordan	30
Trends of Importation and Uses of Ozone Depleting Substances in Jordan	30
Uses of Ozone Depleting Substances in Jordan	34
Ozone Depletion Potentiality (ODP) in Jordan	37
Cost of Phasing Out Ozone Depleting Substances	37
SYRIAN ARAB REPUBLIC	39
Amounts and Trends of Ozone Depleting Substances Imported by the Syrian Arab Republic	40
Uses of Ozone Depleting Substances in the Syrian Arab Republic	47
Ozone Depletion Potentiality in the Syrian Arab Republic	50
Cost of Phasing Out Ozone Depleting Substances	50

OTHER ESCWA MEMBER COUNTRIES	53
Saudi Arabia	55
Yemen	58
Qatar	58
Dubai	64
Kuwait	64
Oman	68

Annex III**TABULAR SUMMARY OF SELECTED ARTICLES OF THE MONTREAL PROTOCOL**Annex table 1. Group I/Annex A to the Montreal Protocol

Period commencing:	1 July 1989 and each 12-month period thereafter	1 July 1991 (and ending 31 December 1992)	1 January 1995 and each 12-month period thereafter	1 January 1997 and each 12-month period thereafter	1 January 2000 and each 12-month period thereafter
Calculated consumption and production not to exceed:	1986 levels*	150% of calculated 1986 levels	50% annually of calculated 1986 levels*	15% annually of calculated 1986 levels*	Zero**

* Such levels may exceed the 1986 levels by no more than 10 per cent.

** Such levels may exceed the 1986 levels by no more than 15 per cent.

Annex table 2. Halons: Group II/Annex A to the Montreal Protocol

Period commencing:	1 January 1992 and each 12-month period thereafter	1 January 1995 and each 12-month period thereafter	1 January 2000 and each 12-month period thereafter
Calculated consumption and production not to exceed:	1986 levels*	50% of calculated 1986 levels*	Zero**

* Such levels may exceed the 1986 levels by no more than 10 per cent.

** Such levels may exceed the 1986 levels by no more than 15 per cent.

Annex table 3. Fully halogenated CFCs: Group I/Annex B to the Montreal Protocol

Period commencing:	1 January 1993 and each 12-month period thereafter	1 January 1997 and each 12-month period thereafter	1 January 2000 and each 12-month period thereafter
Calculated consumption and production not to exceed:	80% of calculated 1989 levels*	15% of calculated 1989 levels*	Zero**

* Such levels may exceed the 1986 levels by no more than 10 per cent.

** Such levels may exceed the 1986 levels by no more than 15 per cent.

Annex table 4. Carbon tetrachloride: Group II/Annex B to the Montreal Protocol

Period commencing:	1 January 1995 and each 12-month period thereafter	1 January 2000 and each 12-month period thereafter
Calculated consumption and production not to exceed:	15% of calculated 1989 levels*	Zero**

* Such levels may exceed the 1986 levels by no more than 10 per cent.

** Such levels may exceed the 1986 levels by no more than 15 per cent.

Annex table 5. Methyl chloroform: Group III/Annex B to the Montreal Protocol

Period commencing:	1 January 1993 and each 12-month period thereafter	1 January 1995 and each 12-month period thereafter	1 January 2000 and each 12-month period thereafter	1 January 2005 and each 12-month period thereafter
Calculated consumption and production not to exceed:	1989 levels*	70% annually of calculated 1989 levels*	30% annually of calculated 1989 levels*	Zero**

* Such levels may exceed the 1986 levels by no more than 10 per cent.

** Such levels may exceed the 1986 levels by no more than 15 per cent.