OZONE DEPLETION, INTERNATIONAL REGIME FOR ITS CONTROL AND ITS IMPLEMENTATON IN PAKISTAN.

By

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LL.M. (International Law)

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FINAL APPROVAL

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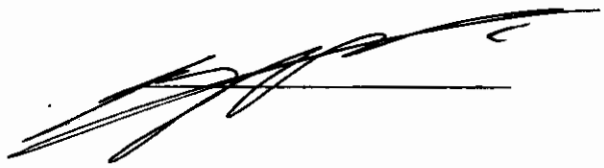

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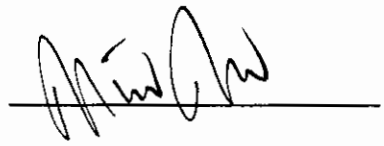

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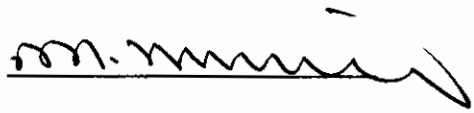

LIST OF ABBREVIATIONS

Ac	Accession
Ap	Approval
CBR	Central Board of Revenue (Pakistan)
CCOL	Coordinating Committee on the Ozone Layer (UNEP)
CFC	Chlorofluorocarbon
CFM	Chlorofluoromethane
CP	Country Programme (Pakistan)
CPU	Country Programme Update (Pakistan)
CTC	Carbon Tetrachloride
DU	Dobson Unit
EEC	European Economic Community
EPA	Environmental Protection Agency
EU	European Union
ExCom	Executive Committee of MLF
FC	Fluorocarbon
GEF	Global Environment Facility
GOME	The Global Ozone Monitoring Experiment
GoP	Government of Pakistan
GSK	Glaxosmithkline
HBFC	Hydrobromofluorocarbon

HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
HFE	Hydrofluoroether
IOC	International Ozone Commission
IR	Infrared
MAC	Mobile air conditioners
MCF	Methyl Chloroform (TCA)
MDI	Metered Dose Inhaler
MeBr	Methyl Bromide
MLF	Multilateral Fund for the Implementation of the Montreal Protocol
MLFS	Multilateral Fund Secretariat
MoE	Ministry of Environment (Pakistan)
MOP	Meeting of the Parties (to the Montreal Protocol)
MP	Montreal Protocol
MT	Metric Tonnes
NASA	National Aeronautics and Space Administration (US)
NGO	Non-governmental Organization
NOU	National Ozone Unit (Pakistan)
NRDC	Natural Resources Defense Council (US)
ODC	Ozone Depleting Chemicals
ODP	Ozone-Depletion Potential
ODS	Ozone-Depleting Substances

PFC	Perfluorocarbon
R	Ratification
RMP	Refrigeration management plan
PRAL	Pakistan Revenue Automation Ltd.
Sc	Succession
SMEs	Small and medium-sized enterprises
TCA	1,1,1-trichloroethane (also methyl chloroform)
TEAP	Technology and Economic Assessment Panel (UNEP Montreal Protocol)
TOMS	Total Ozone Mapping Spectrometer
UARS	Upper Atmosphere Research Satellite
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
VC	Vienna Convention for the Protection of Ozone Layer
WB	World Bank
WMO	World Meteorological Organization

Acknowledgements

I undertook to write this thesis as an essential part of the academics for my masters in International law. I was indecisive about the topic of the thesis and to some extent confused when my worthy teacher Mr. Muhammad Munir, Assistant Professor of Law, IIU, Islamabad came to my rescue and encouraged me to select the present topic. He also guided me throughout my research work. I did have an idea that it was going to be a challenging job but was ignorant of the fact that it would be a gigantic task. I found myself in state of complete disappointment when I failed to find enough material in the libraries near and around me but it was on account of able guidance of Mr. Muhammad Maqsood Akhtar, Programme Manager, Ozone Cell (Montreal Protocol Project), Ministry of Environment, Islamabad that I was put in right direction and able to humbly work on this thesis. I don't over estimate my effort that may be improved by others or me in the field in future but I am confident that my best is in this thesis. I am grateful to my worthy senior colleague Syed Asghar Hussain Sabzwari, Senior Advocate Supreme Court of Pakistan for his kind guidance and my younger brother Syed Qamar Hussain Sabzwari, Barrister at Law who has always been available to and facilitate me. I am also obliged to thank my friends Ch. Munir Sadiq, Muhammad Saif Ullah, Hifz ur Rehman and Rehman Ullah Shah for their help and good wishes.

ABSTRACT

OZONE DEPLETION, INTERNATION REGIME FOR ITS CONTROL AND ITS IMPLEMENTATION IN PAKSITAN

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The protection of the ozone layer has been a major international concern over the past three decades, spanning the fields of environment, trade, cooperation and sustainable development. It has been positive example for all people and nations who care about preserving the fragile global environment. According to the United Nations Environment Programme (UNEP), the ozone layer is now expected to pre-1980 levels by the year 2050. Thanks to the Vienna Convention (1985) on the protection of the ozone layer, the successful implementation of the Montreal Protocol (1987) on the substances that deplete the ozone layer, its London amendment (1990), Copenhagen Amendment (1992), Montreal Amendment (1997) and Beijing Amendment (1999).

Montreal Protocol has so far been ratified by 195 countries including Pakistan. Pakistan ratified the Vienna Convention, the Montreal Protocol, the London Amendment in 1992, the Copenhagen Amendment in 1995 and the Montreal Amendment and Beijing Amendment in 2005.

The Montreal Protocol calls for phasing out the use of certain Ozone Depleting Substances (ODSs) like Chlorofluorocarbons (CFCs), Carbon Tetra Chloride (CTC), Halons, Methyl Bromide, Methyl Chloroform etc. by the year 2010 (50% by 2005 & 85% by 2007, 100% by 2010) in the developing countries (Article 5 parties). The developed countries (non-article 5 parties) have already phased out the use of CFCs in 1996 as required under the Montreal Protocol.

In first chapter of this paper the formation of ozone layer, causes of its depletion and impacts of ozone depletion have been discussed. The international instruments to face the challenges of this global problem follow next chapter. Objectives and salient features as well as status of ratification by the international community of the Vienna Convention for the Protection of the Ozone Layer, 1985, the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987, four amendments to the Montreal Protocol i.e. The London Amendment-1990, The Copenhagen Amendment-1992, The Montreal Amendment-1997and The Beijing Amendment-1999 have been discussed in this chapter.

Pakistan efforts to implement the Montreal Protocol along with its amendments have been analyzed in the Chapter 3. It has been tried to find out the obstacles in implementation of Montreal Protocol in Pakistan and some suggestions to its better implementation have also been given. The thesis ends with the conclusion.

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CHAPTER 1.

WHAT IS OZONE DEPLETION

1.1 Introduction.

Ozone is a form of oxygen. It was first discovered by C.F.Schnbein in 1839[1]. The oxygen we breathe is in the form of oxygen molecules (O_2) - two atoms of oxygen bound together. Normal oxygen, which we breathe, is colorless and odorless. Ozone, on the other hand, consists of three atoms of oxygen bound together (O_3). It is an irritating, pale-blue gas that is explosive and toxic, even at low concentration.[2]

Ozone occurs in two layers of the atmosphere. The layer closest to the earth's surface is the troposphere[3]. Here, ground level or "bad" ozone is an air pollutant that is harmful to breathe and it damages crops, trees and other vegetation. It is a main ingredient of urban smog. The troposphere generally extends to a level about 6 miles up, where it meets the second layer, the stratosphere[4]. The stratosphere or "good" ozone layer extends upward from about 6 to 30 miles and protects life on earth from the Sun's harmful ultraviolet (UV) rays.

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[1] JABBAR, ABDUL & ASIF MUNIR, "*Ozone Layer and its Prevention: from theory to practice*", SDPI, Islamabad, 1993, p. 2.
[2] "*Encyclopedia Britannica*", The University of Chicago, Chicago, Vol. 9,15th ed. 2005, p. 40.
[3] Ibid., Vol. 11, p. 944.
4 Ibid., Vol. 11, p. 944.

The Ozone layer forms a thin shield in the stratosphere, approximately 20-40 km above the Earth's surface, protecting life below from the sun's ultraviolet (UV) radiation. It absorbs the lower wavelengths (UV-C) completely and transmits only a small fraction of the middle wavelengths (UV-B). Nearly all of the higher wavelengths (UV-A) are transmitted to the Earth where they cause skin-aging and degrading of outdoor plastics and paint. Of the two types of UV radiation reaching ground level, UV-B is the most harmful to humans and other life forms.

Manufactured chemicals transported by the wind to the stratosphere are broken down by UV-B, releasing chlorine and bromine atoms which destroy ozone. As ozone is depleted, other factors remaining constant, increased transmission of UV-B radiation endangers human health and the environment, for example, by increasing skin cancer and cataracts, weakening human immune systems and damaging crops and natural ecosystems.

Notable, most ozone-depleting substances (ODSs) are also 'greenhouse gases' that contribute to climate change, causing sea level rise, intense storms and changes in precipitation and temperature.[5]

[5] "*The Implications to the Montreal Protocol of the Inclusion of HFCs and PFCs in the Kyoto Protocol, Report of the HFC and PFC Task Force of the Technology and Economic Assessment Panel* (Ozone Secretariat, United Nations Environment Programme, October 1999).

1.2 Ozone Depletion.

1.2.1 Identification of Ozone Variations: Early Theories.

In 1924, Gordon M B Dobson invented a new spectrophotometer to measure the amount of ozone in the atmosphere. He discovered that there were day-to-day fluctuations in the ozone amount over Oxford, England, and that there was a regular seasonal variation.[6] He hypothesized that these variations in ozone might be related to variations in atmospheric pressure. To test this idea, he had several more spectrophotometers constructed and distributed throughout Europe. These measurements demonstrated regular variations in ozone with the passage of weather systems.

The first scientist to identify the ozone 'layer' and its full workings was Sydney Chapman, who presented his findings in 1930 in a lecture to the Royal Society of London.[7] He developed a photochemical theory of stratospheric ozone formation and destruction, based on the chemistry of pure oxygen, He explained how sunlight could generate ozone by striking molecular oxygen in the atmosphere.

In 1934, Gotz, A R Meetham and Dobson published an interpretation of this phenomenon, pointing out that the shape of the turnaround was dependent on the shape of the altitude profile of the ozone concentration.[8] They thus provided experimental confirmation of the basic Chapman theory of ozone formation and loss.

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[6] DOBSON, G M B & HARRISON, "Measurements of the Amount of Ozone in the Earth's Atmosphere and Its Relation to Other Geophysical Conditions", Proceedings of Royal Society of London, Series A. Vol. 110, 1926, pp 660-693(as cited in CAGIN, S & DRAY, P, " Between Earth and Sky: How CFCs Changed our World and Endangered the Ozone Layer, Pantheon, New York. 1993).

[7] CHAPMAN, S, "Some Phenomena of the Upper Atmosphere", Proceedings of Royal Society of London, Series A 132, 1931 (as cited in CAGIN, S & DRAY, 1993).

[8] GOTZ, F W P, MEETHAM, A R & DOBSON, G M B "The Vertical Distribution Of Ozone In The Atmosphere", Proceedings of the Royal Society of London, Series A. Vol. 145, 1934, pp 416-446 (as cited in CAGIN, S & DRAY, 1993).

In preparation for the International Geophysical Year in 1957, a worldwide network of stations was developed to measure ozone profiles and the total columns abundance of ozone using a standard quantitative procedure pioneered by Dobson. The World Meteorological Organization (WMO) established the framework for ozone-observing projects, related research and publications; this network eventually became the Global Ozone Observing System, with approximately 140 monitoring stations. The British Antarctic Survey and Japanese Scientific Stations in Antarctic in 1957 installed such ozone monitors, which eventually recorded the depletion of the ozone that was later called the Antarctic ozone hole.[9]

1.2.2 Modern Scientists Hypothesize Threats To Ozone.

In 1970, Paul Crutzen of The Netherlands demonstrated the importance of catalytic loss of ozone by the reaction of nitrogen oxides, and theorized that chemical processes that affect atmospheric ozone can begin on the surface of the Earth.[10]

At the same time, James Lovelock of the United Kingdom (UK) developed the electron-capture detector, a device for measuring extremely low organic gas contents in the atmosphere. Using this device in 1971 aboard a research vessel, he measured air samples in the North and South Atlantic. In 1973 he reported that he had detected CFCs in every

[9] STEPHEN O ANDERSON & K MADHAYA SARMA, *" Protecting the Ozone Layer: The United Nations History"*, Ed. Lani Sinclair, Earthscan India, New Delhi, 2004, Page 6.
[10] CRUTZEN, P, "The Influence of Nitrogen Oxides on the Atmospheric Ozone Content", Quarterly Journal of the Royal Meteorological Society, Vol. 96, no. 408, 1970, pp 320-325.

one of his samples, 'wherever and whenever they were sought'. He concluded that CFC gases had already spread globally throughout the atmosphere.[11]

In 1971, Harold Johnston of the US, who had carried out extensive studies of the chemistry of nitrogen compounds, showed that the nitrogen oxides produced in the high-temperature exhaust of the proposed fleet of SSTs could contribute significantly to ozone loss be releasing the nitrogen oxides directly into the stratospheric ozone layer.[12] In 1972, Crutzen elaborated on this theory with a paper that explained the process by which ozone is destroyed in the stratosphere, and presented estimates of the ozone reduction that could result from the operation of supersonic aircraft.[13]

Two atmospheric scientists at Harvard University, Steven C Wofsy and Michael B McElroy, were also examining the effects of SSTs on ozone, and concluded in a paper published in 1974 that "nitric oxide emitted by supersonic aircraft would lead to a significant reduction in the concentration of atmospheric ozone...A traffic model by Broderick et al for 1990 could lead to a reduction of about 2 percent in the column density of O_3.[14]

The research of Stolarski and Cicerone, published in 1974, conclude that chlorine released in the stratosphere could deplete ozone. A single chlorine atom, through a catalytic chain reaction, could eliminate tens of thousands of ozone molecules.[15]

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[11] LOVELOCK, J E, MAGGI, R J & WADE, R J, "Halogenated Hydrocarbons in and over the Atlantic", Nature, Vol. 241, 1973, pp 12-20, 35-38.
[12] JOHNSTON, H S, "Reduction of Stratospheric Ozone by Nitrogen Oxide Catalysts from Supersonic Transport Exhaust", Science, Vol. 173, 1971, pp 517-522.
[13] CRUTZEN, P, "AThreat to the Earth's Ozone Shield", Ambio, Vol. 1, no. 2, 1972, pp 41-51.
[14] WOFSY, S C & MCELROY, M B, "Hox, Nox and ClOx: Their Role in Atmospheric Photochemistry", Canadian Journal of Chemistry, Vol. 52, 1974, pp 1582-1591.
[15] STOLARSKI, R & CICERONE, R, "Stratospheric Chlorine: A Possible Sink For Ozone", Canadian Journal of Chemistry, Vol. 52, 1974, pp 1610-1615.

Two chemists at the University of California at Irvine, Mario J Molina and F Sherwood Rowland, were the first to study CFCs (then referred to as chlorofluorometanes, or CFMs) as a possible source of chlorine in the stratosphere. In a paper published in the 28 June 1974 issue of Nature, Molina and Rowland hypothesized that when CFCs reach the stratosphere, ultraviolet radiation causes them to decompose and release chlorine atoms, which in turn become part of chain reaction; as a result of the chain reaction, a single chlorine atom could destroy as many as 100,000 molecules of ozone.[16] Molina and Rowland estimated that "if industry continued to release a million tons of CFCs into the atmosphere each year, atmospheric ozone would eventually drop by 7 to 13 percent". Rowland reported his and Molina's calculation that:

> If CFC production rose at the then-current rate of 10 percent a year until 1990, and then leveled off, up to 50 percent of the ozone layer would be destroyed by the year 2050. Even a 10 percent depletion, he said, could cause as many as 80,000 additional cases of skin cancer each year in the United States alone, along with genetic mutations, crop damage, and possibly even drastic changes in the world's climate.[17]

Rowland and Molina called for a ban on aerosol CFCs when in September 1974 they told the American Chemical Society:

> If nothing was done in the next decade to prevent further release of chlorofluorocarbons, the vast reservoir of the gases that would have built up in the

[16] MOLINA, M & ROWLAND, F S, "Stratospheric Sink For Chlorofluoromethanes: Chlorine Atom – Catalyzed Destruction of Ozone", Nature, Vol. 249, 1974, pp 810-812.
[17] CAGIN & DRAY (1993), op cit.

meantime would provide enough chlorine atoms to int5ure continuing destruction of the ozone layer for much of the twenty-first century. They urged that the use of the compounds as aerosol propellants be banned.[18]

Rowland and Molina's scientific conclusions were confirmed by Wofsy, McElroy, and Nien Dak Sze in 1975, when they published a paper in science that concluded: "Freons[19] are a potential source of stratospheric chlorine and may indirectly cause serious reductions in the concentration of ozone... Allowing for reasonable growth in the Freon industry, 10 percent per year, the reduction in O_3 could be 2 percent by 1980 and, if left unchecked, could grow to the disastrous level of 20 percent by the year 2000.[20] Even if Freon use were terminated as early as 1990, it could leave a significant effect which might endure for several hundred years.

Later in February 1975, the newly created Federal Interagency Task Force on Inadvertent Modification of the Stratosphere heard testimony from McElroy, who said that bromine appears to be so effective at ozone depletion that it could be used as a weapon.[21] Bromines and bromine compounds, including methyl bromide, were coming into increasing use in such roles as the manufacturing of plastics and fumigation of croplands.

Following the research of Wofsy and McElroy, Stolarski and Cicerone, and Rowland and Molina, the US National Academy of Sciences in March 1975 established the panel of Atmospheric Chemistry to assess 'the extent to which man-made

[18] BRODEUR, P, "Annals of Chemistry", The New Yorker, 9 June, 1986.
[19] Freon is the trademark of CFCs marketed by DuPont Corporation.
[20] WOFSY, S C, MCELROY, M B & SZE, N D, "Freon Consumption: Implications for Atmospheric Ozone", Science, Vol. 187, February 14, 1975.
[21] SULLIVAN, W, "Ozone Depletion Seen as a War Tool", New York Times, February 28, 1975, p. A20.

halocarbons, particularly CFCs, and potential emissions from the space shuttle might inadvertently modify the stratosphere. The Academy concluded in a 1976 report that the long term release of CFCs will cause an appreciable reduction in the amount of stratospheric ozone.[22]

On instructions from the Governing Council of UNEP, UNEP organized a meeting of experts from many countries in Washington, DC in March 1977. This meeting resulted in a World Plan of Action on the Ozone Layer. As a part of this plan, UNEP established a Coordinating Committee on the Ozone Layer (CCOL) in which all interested countries shared the results of their studies.[23]

1.2.3 Discovering and Measuring the Antarctic Ozone Hole.

As early as October 1981, Dobson-instrument measurements from Japanese, British and other Antarctic research stations recorded a drastic 20 percent reduction in ozone levels above Antarctica. The next year, during the 1982 Antarctic spring in October, reading from a new Dobson instrument registered similar low ozone levels. Michael J Prather, McElroy and Wofsy of the Center for Earth and Planetary Physics at Harvard University in 1984 concluded that an increase in the concentration of inorganic chlorine in the stratosphere could cause a significant change in the chemistry of the lower stratosphere leading to a reduction potentially larger than 15 percent in the column density of ozone.

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[22] STEPHEN O ANDERSON & K MADHAYA SARMA," *Protecting the Ozone Layer: The United Nations History*", Ed. Lani Sinclair, Earthscan India, New Delhi, 2004, P. 11.

[23] STEPHEN O ANDERSON & K MADHAYA SARMA," *Protecting the Ozone Layer: The United Nations History*", Ed. Lani Sinclair, Earthscan India, New Delhi, 2004, P. 12.

This could occur, for example, by the middle of the next century, if emissions of man-made chlorocarbons were to grow at a rate of 3 percent per year.[24]

Farman, Gardiner and Shanklin of the British Antarctic Survey published their findings in May 1985 confirming that ozone levels above Antarctica had been significantly depleted every Antarctic spring since at least 1981. Their paper attributed the ozone depletion to CFCs.[25]

Susan Solomon, Roland R Garcia, F Sherwood Rowland and Donald J Wuebbles in an article published in June 1986 issue of Nature concluded that the remarkable depletion in the total atmospheric ozone content in Antarctica were largely confined to the region from about 10 to 20 km, during the period August to October. They suggested that chlorine compounds might react on the surfaces of polar stratospheric clouds, perturbing gas-phase chlorine in ways that could greatly accelerate ozone loss in the Antarctic lower stratosphere.[26]

In August 1986, four teams of US researchers arrived in Antarctica as part of the first National Ozone Expedition to study the ozone hole over Antarctica. The NOAA Aeronomy Laboratory team made ground-based visible absorption measurements; the University of Wyoming team carried out balloon-based ozone and aerosol particle measurements; the State University of New York at Stony Brook team made ground-based microwave emission measurements; and the Jet Propulsion Laboratory team made ground-based solar infrared absorption measurements. All four of the teams successfully

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[24] PRATHER, M J, MCELROY, M B & WOFSY, S C, "Reductions in Ozone at High Concentrations of Stratospheric Halogens", Nature, Vol. 312, 1984, pp 227-231.
[25] FARMAN, J S, GARDINER, B G & SHANKLIN, J D, "Large Losses of Total Ozone in Antarctic Reveal Seasonal CLOx/NOx interaction", Nature, Vol. 315, 1985, pp 207-210.
[26] SOLOMON, S, GARCIA, R R, ROWLAND, F S & WUEBBLES, D J, "On the Depletion of Antarctic Ozone", Nature, Vol. 321, 1986, pp 755-758.

measured the formation and strengthening of the ozone hole, confirming the phenomenon. Their measurements and findings, according to NASA, strongly suggested that perturbed chlorine chemistry was involved.[27]

The volume of ozone hole over Antarctic was twice over of size of Europe i-e 28.2 Million Square Kilometers as recorded on September 19, 1998. An Antarctic ozone hole (what scientists called an "ozone depletion area ") that is three times larger than the entire land mass of the United States- the largest such area ever observed/detected by a Nasa spectrometer. As documented on September 3, 2000, the hole expands to a record size of approximately 11.5 Million Square Miles (30.3 Million Square Kilometers)[28].

1.3 Causes of Ozone Depletion.

When the natural balance between the creation and obliteration of stratospheric Ozone is tipped in favor of destruction, the Ozone exhaustion takes place. The main cause of this diminution is Chlorine and Bromine released from man-made compounds such as CFCs though natural phenomena can cause temporary ozone loss.

In Industry, in a variety of ways, CFCs are used and it has been proved amazingly useful in many products. CFCs came to be used in refrigerators, home insulation, plastic, foam and throwaway food containers; this was discovered by American chemist Thomas Midgley in the 1930s,

In 1974 for the first time, it was propounded by Sherwood Rowland and Mario Molina that the likely leading cause of Ozone depletion was a synthetic group of

[27] URL.http//: www.hyperion.gsfc.nasa.gov/Analysis/aircraft/aaoe.html, (last visited 13-09-2009.)
[28]URL.http//: www.theozonehole.com/Ozoneholehistory.htm (last visited 13-09-2009.)

compounds known as the Chlorofluorocarbons (CFCs). In 1984, until the discovery of the Ozone hole over Antarctica by the British Antarctic Survey, however, this proposal was not taken seriously.

Chlorofluorocarbons are not cleanse back to earth by rain or destroyed in response to other chemicals after their release. CFCs can remain in the atmosphere from 20 to 120 years or more, they simply do not break down in the lower atmosphere.[29]

CFCs are ultimately carried into the stratosphere in a process that can take as long as 2 to 5 years, though they are heavier than air.

Methyl Bromide (employed as a pesticide), Halons (utilized in fire extinguishers), and Methyl Chloroform (used as a solvent in industrial processes for essential applications) are some of the other chemicals that harm the Ozone coating. The Bromine atoms are released upon the breaking up of Methyl Bromide and Halons , which are 40 times more destructive to Ozone molecules than Chlorine atoms.[30]

List of Class I, Class II Ozone Depleting Substances and ODS-uses are given in Appendix A and B respectively.

1.4 Effects of Ozone Depletion

A variety of health problems in humans, including skin cancers, eye cataracts and a reduction in the ability to fight off disease can be caused due to Ultraviolet (UV) radiation from the Sun. Moreover, microscopic life in the surface oceans which is the basis of the world's food chain, certain varieties of vegetation including rice and soya

[29] URL.http//:www.ace.mmu.ac.uk/eae/Ozone_Depletion/Older/Causes.html (last visited 13-09-2009.)

[30]URL.http//: www.epa.gov/Ozone/Science/q_a.html (last visited 13-09-2009)

crops, and polymers used in paints, clothing and other materials can suffer harm/damage due to UV radiation.

The amount of UV radiation that reaches the earth's surface will increase as loss of ozone in the stratosphere because of mankind's pollution with ozone depleting chemicals such as CFCs. Health disorders, damage to plant and aquatic life, and degradation of materials will probably increase as an outcome. The global climate might also be affected by Ozone depletion.[31]

1.4.1 Effects on Human Health

Laboratory and epidemiological studies demonstrate that UV radiation causes non-melanoma skin cancer and plays a major role in malignant melanoma development. In addition, UV radiation has been linked to cataracts. All sunlight contains some UV radiation, even with normal ozone levels. It is always important to limit exposure to the sun. However, ozone depletion will increase the amount of UV radiation and the risk of health effects. There is an increased risk of skin cancer because of UV radiation. According to a study significant harm can be caused by even small amounts of UV radiation. UV radiation is also linked to some types of skin cancer and it is also attributed to damage to the genetic material of DNA.

One of the adverse effects caused by UV radiation in the eyes is "snowblindness". It occurs typically when the eyes are exposed to UV radiation coming form unusual directions, such as in snow-covered mountains. Snowblindness is very painful, sometimes described as the feeling of having sandpaper in the eyes. Eye cancer,

[31] URL.http//:www.ace.mmu.uk/eae/Ozone_Depletion/Older/Impacts.html (last visited 13-09-2009)

conjunctivitis and pterygium are some of the common eye diseases associated with increased UV radiation. There is concern that one consequence of increased UV-B irradiance might be an increase of certain infectious diseases. The concern arose from an increasing number of observations showing influences of UV-B radiation on the immune system.

1.4.2 Effects on Animal Health

The problem of possible consequences of ozone depletion for animal health is much broader than that for human health because of the numerous difference species. Yet, there are even fewer data available for animals. Very little appears to be k known about UV effects in wild animals. Most information relates to experimental animals; it is good to keep in mind that these animals are highly selected, usually for investigating problems of human health. Some more independent information is available on domestic animals form veterinary medicine.

Cancer of the eye also occurs in many animal species, including horses, sheep, swine, cats and dogs, and are particularly in cattle. In several experiments designed to investigate the induction of skin cancer by ultraviolet radiation, a fraction of the animals also developed eye cancers. In all of these experiments the irradiation had a strong UV-B component. Snowblindness and cataract were induced experimentally in rabbits; the action spectra showed a high effectiveness of UV-B radiation.

1.4.3 Effects on Land Plants

Physiological and developmental processes of plants are affected by UV radiation, even by the amount of UV radiation in present-day sunlight. Despite mechanisms to reduce or repair these effects and a limited ability to adapt to increased levels of UV radiation, plant growth can be directly affected by UV radiation.

The growth process of almost all green plants is inhibited by excessive UV radiation. Some of the plant species may be lost forever and reduce global food supply because of Ozone depletion as the concern grows.

Recent studies confirm earlier reports that a sizeable portion of the plant genome can exhibit changes in gene expression due to UV.B and that many of the UV.B regulated genes are plant organ specific.

1.4.4 Effects on Marine Ecosystems.

The foundation of aquatic food webs is formed by Plankton. The upper layer of the oceans has sufficient sunlight to support the photosynthesis of food Plankton is normally placed. As much as human DNA can be damaged by the strong solar radiation the same applies to plankton and other light dependent organisms, which often experience cell damage, as UV radiation is able to penetrate up to 20 meters down in clear water. Still at this stage/level of UV radiation both plant (phytoplankton) and animal (zooplankton) species gets harmed by it. As with the other Earth's species the smaller aquatic plants (plankton etc) are more prone to UV radiation than larger organisms.

Solar UV radiation has been found to cause damage to early developmental stages of fish, shrimp, crab, amphibians and other animals. The most severe effects are decreased reproductive capacity and impaired larval development. Even at current levels, solar UV radiation is a limiting factor, and small increased in UV exposure could result in significant reduction in the size of the population of animals that eat these smaller creatures.

1.4.5 Effects on Materials

The materials will degrade faster because of Ozone depletion. These materials include PVC (used in window and doorframes, pipes and gutters), nylon and polyester. The entire have the same composition i.e. they are composed of compounds known as polymers. The adverse effects of UV radiation from the Sun can also be seen on Synthetic polymers, naturally occurring biopolymers, as well as some other materials of commercial interest.

Today's materials are somewhat protected from UV radiation by special additives. Therefore, any increase in solar UV levels will therefore accelerate their breakdown, limiting the length of time for which they are useful outdoors.

1.4.6 Effects on Global Climate

Ozone depletion itself can affect the global climate, whilst increases of UV radiation may have an effect on the production and removal of Carbon Dioxide, the main greenhouse gas. Ozone can ensnare much of the infrared (IR) heat trying to escape the Earth to space

as it is also a greenhouse gas, and well as it acts as a filter to the incoming UV radiation from the Sun. Ozone's contribution to the greenhouse effect is reduced in case of destruction of stratospheric Ozone. Some of the global warming due to man-made emissions of Carbon Dioxide, Methane and Nitrous Oxide can be compensated. As luck would have it, the cooling potential of the layer will be lost as the Ozone layer gradually repairs itself during the 21st century. The further contribution to the potential problem of global warming is more drastically, the replacement chemicals to CFCs, the HCFCs, which themselves do little harm to the Ozone coating but are very strong greenhouse.

CHAPTER 2

INTERNATIONAL LEGAL INSTRUMENTS FOR PROTECTION OF OZONE LAYER

2.1 Introduction

For many years, environmental problems were characterized by issues of local pollution - effluent pipes discharging to rivers and lakes or low-level chimneys creating atmospheric problems in their immediate vicinity. These problems generally do not require very sophisticated science to establish a solution and rarely involved more than one political jurisdiction in developing the enforcing the appropriate regulations.

Since the late 1960s, however, environmental issues have taken on a more global and complex nature. Issues such as stratospheric ozone depletion, acid rain, or global warming are large-scale issues necessitating the involvement of several nations in defining their cause and effects, and in implementing management actions. These issues are also scientifically more complex. Consequently, they require a greater understanding of global ecological systems (e.g. the global carbon cycle), of longer time-scales (sometimes centuries), and of integrated ecological processes.

In order to deal with regional and global environmental change, it became necessary to develop new scientific and political mechanisms that could operate at the international level. While there are many variations of the theme, the concept of developing an

International Convention as a first step in addressing problems has become well established, frequently under the general guidance of the United Nations Environmental Programme.

2.2 Vienna Convention for the protection of ozone layer, 1985

The issue of Ozone depletion of the ozone layer, which surrounds the Earth and protects it from excessive radiation from the sun was already being avidly debated in scientific circles by the time of the Stockholm Conference. UNEP had been concerned with the protection of the ozone layer since its establishment in 1973. The UNEP Governing Council, at its meeting in April 1976, 'recognizing the potential impact that stratospheric pollution and a reduction of the ozone layer may have on mankind', requested the Executive Director 'to convene a meeting of appropriate international governmental and non-governmental organizations: to review all aspects of the ozone layer, identify related ongoing activities and future plans, and agree on a division of labour and a coordinating mechanism for: inter alia, the compilation of research activities and future plans; and the collection of related industrial and commercial information'. In accordance with this mandate, UNEP convened the first international meeting of experts on this issue in March 1977 in Washington, DC. UNEP, WMO, WHO and ICSU made presentations to this meeting on the current knowledge regarding the ozone layer and the likely impacts of its depletion. The meeting reached an agreement to initiate a World Plan of Action on the Ozone Layer. As a result of the recommendations of the World Plan of Action, UNEP established a Coordinating Committee on the Ozone Layer (CCOL) to periodically assess ozone depletion. The Committee was composed of representatives of all the organizations actively participating in the Action Plan and of representatives of countries that had

major scientific programmes contributing to it. The committee met first in 1977 and yearly thereafter until 1986.

The UNEP Governing Council discussed the issue of ozone depletion at its meeting of 1981. It requested the Executive Director to initiate work to negotiate a Global Framework Convention for the Protection of the Ozone Layer and establish a working group for this purpose. A first draft international convention for the protection of stratospheric ozone layer was officially submitted by Finland and Sweden to the meeting of The UNEP Governing Council held in 1982. This draft covered all the parameters ultimately covered by the Vienna Convention in 1985. At the end of the meeting held in Vienna in January 1984, a revised draft of the convention emerged. The last meeting of the working group, now called an intergovernmental group took place in Vienna in January 1985 as a prelude to the conference of the plenipotentiaries, i.e. of diplomatic agents of governments having full powers to negotiate, in contrast to the meetings of experts with no authority to commit their governments in any way.

The conference of the plenipotentiaries for a Convention for the Protection of the Ozone Layer took place in Vienna on 18-22 March 1985. Thirty-four countries attended the meeting, including ten developing countries. The meeting decided that UNEP would discharge the functions of the secretariat in the interim until the first meeting of the Conference of the Parties to the Vienna Convention, which would designate the secretariat from among those international organizations willing to carry out the secretariat functions.

The Vienna Convention created a general obligation for nations to take appropriate measures to protect the ozone layer and a process by which regulations could

be created by the governments of countries to establish control measures. The Convention also established a mechanism for international cooperation in research, monitoring, and exchange of data on the state of the stratospheric ozone layer and on emissions and concentrations of CFCs and other relevant chemical. Most importantly, the Vienna convention established the framework for a future protocol- the Montreal Protocol on Substances that Deplete the Ozone Layer.

2.2.1 Objectives

2.2.1.1 Protect human health and the environment against adverse effects resulting from human activities

The ultimate objective of the Convention is to protect human health and the environment against adverse effects resulting from human activities which modify or likely to modify the Ozone layer and urges the Parties to take appropriate measures in accordance with the provisions in the Convention and its Protocols which are in force for that Party.

2.2.1.2 Co-operate for better understanding

To achieve the aforementioned objectives, the Parties, within their capabilities, are expected to: co-operate to better understand and assess the effects of human activities on the ozone layer and the effects of the modification of the Ozone layer; adopt appropriate measures and co-operate in harmonizing appropriate policies to control the activities that are causing the modification of the Ozone layer; cooperate in the formulation of agreed measures for the implementation of the Convention; and cooperate with competent

international bodies to implement effectively the Convention and protocols to which they are party.

The main thrust of the Convention was to encourage research and overall co-operation among countries and exchange of information. Even so it took four years to prepare and agree. Twenty nations signed it in Vienna, but most did not rush to ratify it. The Convention provided for future protocols and specified procedures for Amendment and dispute settlement.

2.2.2 Summary of Provisions

What came to be known as the Vienna Convention, which emerged after negotiations, had 21 articles and two annexes.

(a) Articles 1-5 dealt with matters such as: definitions; general obligations; research and systematic observations; co-operation in the legal, scientific and technical fields; and transmission of information.

(b) Articles 6-10 concerned institutional arrangements such as conference of parties, secretariat, adoption of the protocols under the Convention, amendments of the Convention or a protocol under the Convention, and adoption and amendment of annexes.

(c) Articles 11-15 dealt with legal aspects such as settlements of disputes, signature, ratification, acceptance, approval or accession, and the right to vote.

(d) Article 16-21 defined the relationship between the Convention and a protocol under the Convention, entry into force, reservations, withdrawal, depository, and authentic texts being in all the six United Nations languages.

(e) Annex 1 concerned research and systematic observations specifying areas such as: physics and chemistry of the atmosphere; health, biological and photo degradation effects; and effects on climate. The systematic observations dealt with many sources of importance to Ozone layer depletion such as Carbon substances, Nitrogen substances, Chlorine substances including CFCs, Bromine substances and Hydrogen substances.

(f) Annex 2 dealt with exchange of scientific, technical, social, economic and commercial information between countries.[1]

2.2.3 Membership

The Convention is open for ratification, acceptance, approval and accession to all States and regional economic integration organizations.

Date of adoption	22. 3.1985
Place of adoption	Vienna, Austria
Date of entry into force	22. 9.1988
Languages	Arabic, Chinese, English, French, Russian, Spanish
Depositary	Secretary-General of the United Nations

[1] URL.http//:www.unep.org/ozone/vc-text.shtml (last visited 27-08-2009)

2.3 Montreal Protocol, 1987

Article 8 of the Vienna Convention provide for adoption of protocols to fulfill the obligations of the Convention. Despite many attempts to take at least a first step to control CFCs, the governments failed to agree on any thing concrete. To keep the process going, the USA on behalf of the Toronto Group proposed a specific Resolution on a Protocol Concerning Chlorofluorocarbons. The UNEP Governing Council discussed the Vienna Convention in May 1985. The Council's decision closely followed the text of resolution.

The conference of the Plenipotentiaries in Montreal led to a solution only after intense negotiation. Fifty-five countries and the European Economic Community attended the negotiations, six environmental NGOs and six United Nations and intergovernmental organizations participated. Ambassador Lang of Austria presided. The Montreal Protocol on Substances that Deplete the Ozone Layer was negotiated and signed by 24 countries and by the European Economic Community on September 16, 1987 This day, 16 September, was designated by the 49th Session of the General Assembly of the United Nations in 1994 as the International Day for the Preservation of the Ozone Layer.[2] The Protocol called for the Parties to phase down the use of CFCs, halons and other man-made ODCs.

The protocol came into force on 1st January 1989, when it was ratified by 29 countries and the European Economic Community (EEC). Since then the several other countries have ratified it. The Montreal Protocol stipulates that the production and

[2] STEPHEN O ANDERSEN & K MADHAYA SARMA, *" Protecting the Ozone Layer: The United Nations History"*, Ed. Lani Sinclair, Earthscan India, New Delhi, 2004, p. 84.

consumption of compounds that deplete Ozone in the stratosphere--Chlorofluorocarbons (CFCs), Halons, Carbon Tetrachloride, and Methyl Chloroform--are to be phased out by 2000 (2005 for Methyl Chloroform). Scientific theory and evidence suggest that, once emitted to the atmosphere, these compounds could significantly deplete the stratospheric Ozone layer that shields the planet from damaging UV radiation.

Man-made chlorines, primarily Chlorofluorocarbons (CFCs), contribute to the thinning of the Ozone layer and allow larger quantities of harmful ultraviolet rays to reach the earth.

The Montreal Protocol on Substances that Deplete the Ozone Layer is one of the first international environmental agreements that include trade sanctions to achieve the stated goals of a treaty. It also offers major incentives for non-signatory nations to sign the agreement. The treaty negotiators justified the sanctions because depletion of the Ozone layer is an environmental problem most effectively addressed on the global level. Furthermore, without the trade sanctions, there would be economic incentives for non-signatories to increase production, damaging the competitiveness of the industries in the signatory nations as well as decreasing the search for less damaging CFC alternatives.

The Vienna Convention addresses primarily the science, Ozone layer monitoring and general obligations of Parties. The Montreal Protocol deals specifically with the substances to be controlled, the measures to be taken along with associated timing, compliance issues. The Protocol also addresses issues of technology transfer and financial measures, including the Financial Mechanism.

2.3.1 Summary of provisions

2.3.1.1 Control Measures

Article 1 provided the definitions. A controlled substance in a manufactured product (such as a refrigerator) was excluded from the definition of controlled substances to avoid double counting, since it would already have been counted when it was produced or imported. Consumption was defined as production plus imports minus exports (in bulk, i.e. traded as a pure substance or as a mixture).[3] This definition allowed a substance to be used any time from stockpiled quantities, even after a phase-out, that would have been counted when it was produced or imported. Production was defined as amounts produced minus amounts destroyed by technologies approved by the Parties. Exports to non-parties were to be subtracted from the production figures up to 1 January 1993, under Article 3.

2.3.1.2 Something for every country

Several very specific paragraphs were drafted in order to satisfy all of the parties. The Soviet Union raised the special issue of its CFC manufacturing plants, which were contracted for under its five-year plan and insisted that those plants should be taken into account while fixing the base year for production and consumption. Some other countries, including Japan and Luxembourg, also had problems with manufacturing plants that were under construction in 1986. To meet this concern, a special paragraph of Article 2, Paragraph 6, was introduced, allowing countries to take into account the production from the factories that were under construction in 1986 or contracted for prior to 16 September 1987 (the date of the Protocol), and provided for in national legislation prior to 1 January 1987. It was pointed out, inter alia by Canada, that industry might like to close down a plant when the production had decreased to a certain low level and instead increase production at another of its plants, which might be located in another

[3] UNEP, "*Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer*", Nairobi, 7th ed. 2006, p. 4.

state. A special paragraph, Article 2, Paragraph 5, was inserted to deal with this issue. It stated that, if a party produced less than 25,000 tones in 1986, it could transfer it production quota or receive a production quota from any other party, provided that the total for both parties was within the control limits. Such transfers had to be notified to the secretariat. The European Economic Community countries were allowed to fulfill their consumption controls jointly, but production controls would have to be fulfilled individually, under Article 2, Paragraph 8.[4]

2.3.1.3 Strengthening control in future

Any changes to the control measures on the Annex A substances or to the ODPs, which were called 'adjustments', could be decided, based on scientific assessments under Article 2, by two-thirds of the parties, representing at least 50 percent of the consumption; such an adjustment needed no United Nations. This was a legal innovation, praised later by many scholars. Parties could take ratification by each party, as an amendment would, and would be binding on all parties six months after its notification by the depository, the Secretary General of the more stringent steps than required by the control measures under Article 2.[5]

2.3.1.4 Trade Restrictions

Trade measures against non-parties were approved under Article 4. Imports from non-parties were banned one year from the entry into force of the Protocol, but exports to non-parties were to be banned from 1 January 1993. The products containing the controlled substances were to be listed; imports of such products were to be banned by parties that had not objected to such a list. Significantly, there was no ban on export of such products to non-parties. Each party was to discourage export of technologies for producing or utilizing controlled substances to non-parties. Each party was to discourage export of technologies for producing or utilizing controlled substances to non parties.

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[4] Ibid.
[5] Ibid., p. 4.

Again, significantly, the word 'ban' was not used. No party was to provide any subsidies or credits for export of any products or technology that would facilitate the production of controlled substances to non-parties. These restrictions would not be applicable to products or technologies for recycling of controlled substances. No trade restriction would apply to a non-party that submits data and convinces a meeting of the parties that it is in full compliance with the control measures.[6]

2.3.1.5 Concessions to developing countries

Developing countries with an annual per capita consumption of less than 0.3kg, any time within ten years, were allowed to delay their implementation of the control measures by ten years. The parties would facilitate access of developing countries to alternative substances and technologies, assist them to make use of such alternatives, and facilitate provision of aid for this purpose, under Article 5[7]. Article 10 provided for technical assistance to the developing countries.[8]

2.3.1.6 Science: the guide to future controls

Article 6 provided for an assessment of the control measures at least once in four years on the basis of available scientific, environmental, technical and economic information. This had been praised as an innovative measure that facilitated an immediate first step and further stringent action progressively on scientific advice and technological feasibility.[9]

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[6] Ibid., p. 12.
[7] Ibid., p. 14.
[8] Ibid., p. 18.
[9] Ibid., p. 17.

2.3.1.7 Other Provisions

Annual reporting on production and consumption was mandatory for each controlled substance, under Article 7[10]. The base-line data for 1986 were to be reported by each party within three months of entry into force of the protocol for that party.

There was no agreement on the non-compliance procedure. Article 8 provided for the parties to consider and approve at their first meeting a procedure and institutional mechanism for non-compliance. This allowed approval of the non-compliance procedure through a decision of the parties.[11]

Article 9 provided for information exchange between the parties. The information to be provided was on alternatives to controlled substances, technologies for recycling or destruction of controlled substances, and control strategies. Parties were to promote public awareness on the environmental effects of the Ozone depleting substances. Each party should provide a report every two years on its activities under this Article.[12]

Article 12 provided for a secretariat to service the meetings of the parties under Article 11, which would be held regularly under the rules of procedure to be finalized by the first meeting of the parties. The parties, under rules to be finalized in the first meeting, would contribute the funds required by the Protocol.[13]

Any country, which became a party after the Protocol entered into force, would have to fulfill the obligations that applied on the date of entry into force of the Protocol for it, under Article 17[14]. Under Article 18, no reservations may be made to the

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[10] Ibid.
[11] Ibid., p. 18.
[12] Ibid.
[13] Ibid., p. 21.
[14] Ibid., p. 22.

Protocol[15]. Any party, other than a developing country party operating under Article 5, could withdraw from the Protocol any time after four years after assuming the control obligations, under Article 19[16].

The Protocol would come into force on 1 January 1989, provided that at least 11 countries representing at least two-thirds of 1986 CFCs consumption ratified it, under Article 16[17]. The meeting did not include carbon tetrachloride, methyl chloroform, methylene chloride, and HCFC-22 in the list of substances to be controlled, through the issue of including them was discussed.

2.3.2 Advisory Bodies

A major factor contributing to the success of the Montreal Protocol has been the way in which the Parties have been advised on economic, technical, science and environmental issues. This advice is provided through three expert assessment panels whose membership is on the basis of expertise, but recognizing the need for regional and developed and developing country representation.

1 It should be noted that the term "developing country" in the Montreal Protocol refers to those countries listed in Decision 1/12E - with the addition of Turkey (resulting from Decision III/5). It does not include countries with economies in transition and although there may be some overlap with other UN or OECD definitions, it is specific to the Montreal Protocol.

[15] Ibid.
[16] Ibid.
[17] Ibid.

2 These countries are referred to as "Parties operating under paragraph 1 of Article 5" - or as Article 5(1) Parties.

3 The pressure to move can be both consumer and regulation driven.

2.3.3 Summary of Montreal Protocol Control Measures

The Montreal Protocol is one of the most successful environment protection agreements in the world. The Protocol sets out a mandatory time-table for the phase out of Ozone depleting substances. This time-table has been under constant revision, with phase out dates accelerated in accordance with scientific understanding and technological advances.The time table is given in Appendix C.

2.3.4 Entry into Force

The Protocol entered into force on 1 January 1989 in accordance with its provisions when 29 countries and the European Community representing approximately 82 per cent of world consumption had ratified it.

2.3.5 How to become a Party

The Protocol is closed for signature. It remains open for ratification, acceptance, approval or accession by any state or regional economic integration organization wishing to become a Party.

2.3.6 Reservations

No reservations may be made to the Protocol.

2.3.7 Optional / Mandatory Declarations

None.

2.3.8 Withdrawal/Defunciation

Any Party that withdraws from the Convention is automatically considered to have withdrawn from the Montreal Protocol. Any Party may withdraw from the Protocol in accordance with the relevant provisions of the Convention and the Protocol by notifying the depositary in writing. Such withdrawal shall take effect upon expiry of one year after the date of its receipt by the depositary or one year from the date specified in the Parties' instrument of withdrawal, whichever is later.

2.3.9 Amendments to Montreal Protocol

2.3.9.1 The London Amendment

The London Amendment was adopted in 1990 at the 2nd Meeting of the Parties to the Montreal Protocol held in London in June 1990. The amendment introduced control measures for both production and consumption for three new groups of substances, namely other halogenated CFCs (Annex B, Group I substances), Carbon Tetrachloride (Annex B, Group II) and Methyl Chloroform or 1,1,1-trichloroethane (Annex B, Group III). Control measures also included restrictions on trade with non-Parties.

The grace period of Article 5 Parties for the control measures was continued however a new paragraph in Article 5 recognized that developing the capacity of the Article 5 Parties and their implementation of the control measures depended on effective implementation of the financial mechanism and transfer of technology, in accordance with the amended Articles of the Protocol. The amendments to Article 5 allowed the Article 5 Parties to notify the Ozone Secretariat that they were unable to implement their obligations due to inadequate implementation of Articles 10 and 10A; the Meetings of the Parties were authorized to make a decision on this. During the period between the notification and decision of the Meeting of the Parties, the non-compliance procedures would not apply to such Article 5 Parties. Another amendment was added, stipulating that the timetable for the Article 5 parties would be reviewed again in 1995. The amendments allowed the Article 5 Parties to inform a Meeting of the Parties if they were unable to obtain adequate supply of controlled substances for meeting their basic domestic needs. Amendment to Article 19 allowed Article 5 Parties to withdraw from the Protocol four years after the beginning of the control obligations for them (1999) if they so chose.

The financial mechanism was also established (Article 10 of the Protocol) for providing financial and technical assistance to developing countries to enable their compliance with their obligations under the protocol. The financial mechanism meets the agreed incremental costs of developing countries in order to enable their compliance with the control measures of the Protocol. The meeting established an interim financial mechanism pending the entry into force of the Landon Amendment, and adopted a budget for the Secretariat of the Multilateral Fund.

The amendment further introduced HCFCs (Annex C, Group I substances), but only required reporting of production and consumption data for the Annex and did not introduce control measures for the Annex Group.

The London Amendment entered into force on 10 August 1992.

2.3.9.1.1 Financial Mechanism

Developing countries expressed their angry reaction against Montreal Protocol because it obliged the parties to discontinue the production of Ozone depleting substances, to transfer of these substances to non-parties and to import these substances or products containing or produced with them from non-parties. As a result China, India, Brazil and Mexico refused to sign the Protocol. According to them, they would have to bear a cost of 230 Million US Dollars to restructure their industries to be able to use CFCs substitutes.[18] The London Amendment largely rectified the situation. The Parties at the second meeting of the parties to the Montreal Protocol accepted that the needs of the Parties operating under paragraph 1 of Article 5 were such as to require coordinated an specific action beyond that already in place and decided (Decision II/8) to establish a financial mechanism, including a Multilateral Fund for the Implementation of the Montreal Protocol to be contributed by the developed countries according to the United Nations scale of contributions. There were to be several key elements to the Mechanism:

i) It was to enable the compliance of Parties operating under paragraph 1 of Article 5 with control measures set out in Article 2 of the Protocol.

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[18] MUNIR, MUHAMMAD, "*The Polluter Pays Principle in International Environmental Policy and Law: Economic and Legal Analysis*", Islamabad Institute of Legal Studies, Islamabad, 2003, p. 70.

ii) It would provide financial and technical co-operation to the Parties operating under paragraph 1 of Article 5 to enable their compliance.

iii) The Mechanism would meet all agreed incremental costs of Article 5 countries to enable their compliance.

While the Multilateral Fund has become the dominant feature, the Mechanism also includes other multilateral, bilateral and regional co-operation where such co-operation is in accordance with the policies and guidelines of the Fund

List of Parties categorized as operating under Article 5 paragraph 1 of the Montreal Protocol is given in given in Appendix D.

2.3.9.1.2 Multilateral Fund for the Implementation of the Montreal Protocol

The Multilateral Fund is the dominant instrument of the financial mechanism. It began its operation in 1991. The main objective of the Multilateral Fund is to assist developing country parties to the Montreal Protocol whose annual per capita consumption and production of Ozone depleting substances (ODS) is less than 0.3 kg to comply with the control measures of the Protocol. Currently, 146 of the 195 Parties to the Montreal Protocol meet these criteria. They are referred to as Article 5 countries.

Contributions to the Multilateral Fund from the industrialized countries, or non-Article 5 countries, are assessed according to the UN scale of assessment.

As at April 2008 the contributions made to the Multilateral Fund by some 49 industrialized countries (including Countries with Economies in Transition or CEIT countries) totaled over US $ 2.3 billion. The Fund is managed by an Executive

Committee assisted by the Fund Secretariat. Projects and activities supported by the Fund are implemented by four international implementing agencies.

The Executive Committee has held 54 meetings since the establishment of the Multilateral Fund in 1990. During these meetings, the Executive Committee approved the expenditure of US $2.28 billion, to support about 5,700 projects and activities in 146 developing countries to be implemented through the four implementing agencies and by bilateral agencies.

The implementation of these projects will result in the phase-out of the consumption of more than 249,577 ODP tonnes and the production of about 174,206 ODP tonnes of Ozone depleting substances. Of this total, about 215,462 ODP tonnes of consumption and 158,737 of production have already been phased out from projects approved as of December 2006.

To facilitate the phase-out by Article 5 countries, the Executive Committee has approved 138 country programmes, and has funded the establishment and the operating costs of Ozone offices in 142 Article 5 countries.[19]

The Multilateral Fund is the dominant instrument of the Financial Mechanism. It meets the incremental costs of a Party moving from Ozone depleting technology to Ozone benign technology. In doing so the funding is also intended as an incentive for an early shift away from ODS. The categories of eligible incremental cost cover the supply of substitute chemicals, the conversion of existing production facilities and plants where the ODS is used in manufacturing as an intermediate, and end use. Eligibility can include

[19] URL.http//:www.multilateralfund.org/ (last visited 27-08-2009)

patents and royalties, capital cost of equipments, trainings, pre-mature retirement of equipments, research and development, technical assistance, and recovery and recycling. Some provision for operating costs of new plants can be made for a period.

In all use sectors, including foams, refrigerants, aerosols, halons and solvents, environmentally safe and proven technologies are available and are being transferred as part of investment projects. There are still issues of access to some technologies at a fair and equitable price, as well as the penetration of technology to the shop floor and into the small and informal sector in some countries.

Funding is also provided for Country Program preparation, Institutional Strengthening, Project Preparation, Technical Assistance, Training, and Demonstration.

2.3.9.2 The Copenhagen amendment

The Copenhagen Amendment was adopted in 1992 at the 4th Meeting of the Parties to the Montreal Protocol held in Copenhagen and following decisions were made.[20]

- The amendment introduced control measures for consumption only for HCFCs (Annex C, Group I substances). The amendment further introduced control measures for both production and consumption for two new groups of substances, namely HBFCs (Annex C, Group II substances) and Methyl Bromide (Annex E, Group I).
- The Meeting of the Parties approved a new non-compliance procedure. The strength of the Implementation Committee had been increased to ten Parties, with two members each from each geographic region. The Implementation Committee would receive, consider and report on any submission by any of the Parties or by

[20] STEPHEN O ANDERSEN & K MADHAYA SARMA, *" Protecting the Ozone Layer: The United Nations History"*, Ed. Lani Sinclair, Earthscan India, New Delhi, 2004, pp. 138-144..

the Ozone Secretariat on any possible non-compliance. It would report to the Meeting of the Parties, including any recommendations that it considered appropriate. The Parties would take the final decision. Any Party, not a member of the Implementation Committee but identified in a submission, would be entitled to participate in that meeting.

- The debate over the Multilateral Fund was concluded successfully, with approval of the terms of reference for the permanent Multilateral Fund, the Executive Committee and contributions.
- The meeting decided that a use of a controlled substance should qualify as essential only: if it were necessary for health, safety or the functioning of society; if it encompassed cultural and intellectual aspects; and if there were no available technically and economically feasible alternatives or substitutes that were acceptable for the environment and human health. Exemptions on essential uses would be permitted only if all economically feasible steps had been taken to minimize essential use and emissions, and if the controlled substance was not available in sufficient quantity and quality from existing stocks of banked or recycled controlled substances.
- There was no need to expedite the amendment procedure under Article 9 of the Vienna Convention.
- The responsibility for the legal interpretation of the Protocol rested ultimately with the Parties themselves.
- Insignificant quantities of controlled substances originating from inadvertent or coincidental production during a manufacturing process from unreacted

feedstock, or from their use as process agents which were present in chemical substances as trace impurities and that were emitted during product manufacture or handling, need not be considered as covered by the definition of a controlled substance.

- If Article 5 Parties exceeded the maxim level of consumption prescribed by Article 5, and thus became ineligible for the grace period, the Implementation Committee would decide on the obligations of such Parties on a case-by-case basis.
- Five destruction technologies processes were approved.
- Recovered, reclaimed or recycled substances were exempt from being counted as controlled substances; participants urged all the Parties to recover substances as much as possible.

The Copenhagen Amendment entered into force on 14 June1994.

2.3.9.3 The Montreal Amendment

The Montreal Amendment was adopted in 1997 at the 9th Meeting of the Parties to the Montreal Protocol held in Montreal. This is the only amendment that did not introduce new substances to the protocol. The meeting, after discussions, approved the following adjustments, amendments and decisions:[21]

- The baseline of production for Article 5 Parties was set as the average of 1995-1997 for Annex A and Annex B substances.

[21] Ibid., pp. 167-170.

- A methyl bromide phase-out by 2005 was approved for the non-Article 5 Parties and by 2015 for Article 5 Parties.
- The trade restrictions for methyl bromide were approved.
- The Multilateral Fund would meet the incremental costs of phasing out methyl bromide irrespective of the cost-effectiveness.
- In light of TEAP assessment in the year 2002, the Meeting of the Parties would decide in 2003 on further specific interim reductions of methyl bromide for Article 5 Parties beyond 2005.
- Criteria for critical-use exemptions were approved. Uses would be considered critical if the nominating Party considered that a lack of availability of methyl bromide for that use would result in significant market disruption, that there were no feasible alternatives that were acceptable by environmental and health standards, and that alternatives were suitable to the crops and circumstances of the nominations. The critical use would be approved only if, inter alia, it was demonstrated that effort was being made to evaluate, commercialize, and get regulatory approval of alternatives.
- Any Party had been allowed, on notification to the Ozone Secretariat, to use up to 20 tonnes of methyl bromide in emergencies. The Secretariat and TEAP would assess the use according to the critical methyl bromide criteria and present the information to the next Meeting of the Parties.
- The TEAP reported the development of non-CFC metered-dose inhalers on the market and gave broad principles about a transition framework. The essential uses

were recommended for inhalers and halon-2402 for 1999 for the Russian Federation.

- The meeting requested an ad hoc working group of legal experts to report in 1998 on any amendments necessary for the non-compliance procedure.
- This meeting introduced anew article regarding control of trade with Parties.
- In another Article, a licensing system for trade in new, used or recycled substances was made mandatory by 1 January 2000 for all Parties, with an extension of time for Article 5 Parties for HCFCs until 2005, and for methyl bromide until 2002. Extensions would be granted if countries were unable to introduce the licensing system before that date.

The Montreal Amendment entered into force on 10 November 1999.

2.3.9.4 The Beijing Amendment

The Beijing Amendment was adopted in 1999 at the 11th Meeting of the Parties to the Montreal Protocol held in Beijing, China. In its final decisions, the eleventh Meeting of the Parties approved:[22]

- A reduction in the allowance for production for meeting the needs of Article 5 Parties, along with a consumption-reduction schedule of the Article 5 Parties.
- A freeze in HCFC production from 1 January 2004 for non-Article 5 Parties and from 2016 for Article 5 Parties; trade restrictions on HCFCs from 2004.
- Adding the new ODS, bromochloromethane, to the list of controlled substances, with a phase-out by January 2002.

[22] Ibid., pp. 174-179.

- Each Party providing data on methyl bromide used for quarantine and pre-shipment applications. The pre-shipment applications were specified as those occurring with 21 days prior to export to meet the official requirements of the imposing country or existing official requirements of the exporting country. The TEAP was requested to report on alternatives for quarantine pre-shipment at he 2003 meeting.
- A replenishment of US$440 million for the Multilateral Fund for 1997-1999, noting the carry-over of US$35.7 million and arrears from the countries with economies in transition of US$34.7 million.
- The basis of contribution to the Fund changing from dollars to a fixed exchange rate mechanism. Through this mechanism, Parties could pay in their own convertible currencies if fluctuations in its inflation rate were less than 10 per cent for the preceding three years. The implementation would be reviewed by the end of 2001.
- Removal of three uses from the list of global exemptions for laboratory and analytical uses.
- Urging the non-Article 5 Parties to develop strategies for management of CFCs, including for recovery or recycling, disposal and destruction.
- The assessment panels were requested to submit another comprehensive assessment by 2002. The Scientific Assessment Panel was requested to continue its collaboration with the Intergovernmental Panel on Climate Change on aviation and global atmosphere. The Scientific Assessment Panel and the TEAP were requested to develop criteria to assess the potential ODP of new chemicals, and

mechanisms to facilitate public-private cooperation in the evaluation of potential ODPs of new chemicals. The report was requested for the Meeting of the Parties in 2003.

- The Scientific Assessment Panel and the TESP were requested to develop ways to involve the private sector in assessing ODPs.

The Beijing Amendment entered into force on 25 February 2002.

2.3.10 Status of Ratification

As the Vienna Convention and Montreal Protocol are closed for signatures but are open for ratification, acceptance, approval or accession by any state or regional economic integration organization wishing to become a party. 28 states are signatories of the Vienna Convention and 46 are signatories of the Montreal Protocol. Up till now 195 states have become member of the Vienna Convention, 195 of the Montreal Protocol, 193 of the London Amendment, 189 of the Copenhagen Amendment, 175 of the Montreal Amendment whereas 156 of the Beijing Amendment.

The table showing the status of Ratification, Accession, or Approval of the Vienna Convention, Montreal Protocol and its amendments is given in Appendix E.

2.3.11 tates that Have Not Ratified the Ozone Treaties

The only State which has not yet ratified the Ozone Treaties is:

Asia and the Pacific

1. Timor Leste

Status as of 22 May 2009

CHAPTER 3

PAKISTAN AND THE MONTREAL PROTOCOL

3.1 Introduction

Since the first signing of the Montreal Protocol, the United Nations Environment Program (UNEP) has been constantly urging the Government of Pakistan to become a party to this international agreement. Pakistan, however, decided to wait as the Montreal Protocol did not, at the time, adequately address or define the requirements of implementing a phase out of the controlled substances. The parties, during their second meeting in June 1990, agreed to amend the Montreal Protocol and to establish the Multilateral Fund to assist qualified developing countries to meet their obligations and to reduce their use of controlled substances.

The Ministry of Environment, Urban Affairs, Forestry and Wildlife was of the view that it would be in the national interest if Pakistan ratified the Montreal Protocol. Its enforcement would protect the national as well as global environment, besides preventing serious hazards to human health and survival. As a consequence, and after obtaining the consent of other government agencies and departments, Pakistan ratified the Montreal Protocol on Substances that Deplete the Ozone Layer (MP), the London Amendment on December 18, 1992. Later on Pakistan ratified the Copenhagen Amendment on February 17, 1995, the Montreal Amendment and the Beijing

Amendment on September 2, 2005. Pakistan falls under Paragraph 1 of Article 5 of the Montreal Protocol in terms of the levels of consumption of Ozone depleting substances (ODS) which, in 1995, was 0.022 Kg per capita.

The Government of Pakistan has entrusted Ozone-related issues and implementation of the Montreal Protocol to the Ministry of Environment, which is the designated authority for the implementation of Montreal Protocol. The ministry has established an Ozone Cell which is responsible for the implementation of the provisions of the Montreal Protocol, review of various policy and implementation options, monitoring of phase out projects and ODS consumption and fulfilling the Government's data reporting obligations. The Ministry also guides and assists other ministries and industry for implementation of phase out activities.

A member or representative of each ministry or division listed below has been designated as part of the Ozone National Team, which is the approval authority for all ODS phase out projects:

- Secretary / Joint Secretary, Ministry of Environment (Chairman);
- Joint Secretary, Ministry of Industries and Production (Member);
- Financial Advisor, Ministry of Industries and Production (Member);
- Joint Secretary, Ministry of Science and Technology (Member);
- Joint Secretary, Ministry of Defense (Member);
- Joint Secretary, Ministry of Petroleum and Natural Resources (Member);
- A Representative, Ministry of Commerce (Member);
- A Representative of Chambers of Commerce and Industries (Member);

- A Representative of Economic Affairs Division (Member);
- Director, Ozone Cell, Ministry of Environment (Secretary);
- A Representative of Industry and Trade Associations (Member);
- Director General, Environment Protection Agency, Punjab (Member);
- Director General, Environment Protection Agency, Baluchistan (Member);
- Director General, Environment Protection Agency, NWFP (Member) and
- Director General, Environment Protection Agency, Sindh (Member).

The Ozone National Team, through its members, ensures implementation of policies for the phasing out of ODS, such as financial, tax and trade incentives and the enforcement of quotas, bans and reporting requirements by the concerned government ministries, departments and private sector organizations. It also consults and draws expert advice from agencies and organizations concerned with or affected by the implementation of the ODS phase out programs.

3.2 Establishment of Ozone Cell

The Ministry of Environment is responsible for implementation of the provisions of the Montreal Protocol. Keeping in view Pakistan's commitments to the international community, an Ozone Cell under the project titled "Institutional Strengthening for the implementation of the Montreal Protocol for the phase-out of Ozone Depleting Substances" with the financial assistance of Multilateral Fund of the Montreal Protocol has been established in this Ministry. Ozone Cell became operational in January 1996[1].

[1] Ozone Cell, M/o Environment, GOP, *"Ozone"*, Islamabad, March 2003, p. 4.

3.2.1 Functions of Ozone Cell

The main functions of Ozone Cell are given below:-

- To take necessary measures for the implementation of provisions of Montreal protocol;
- To process phase out sub-projects for financial assistance from Multilateral fund (MF) through UNIDO / World Bank;
- To coordinate phase out activities with UNDP / UNIDO / WB / MFMP / UNEP;
- To assist local industry in the preparation of phase out sub-projects;
- Dissemination of information on ODS free technologies and phase out activities;
- To oversee and monitor import & usage of ODS as well as implementation of phase out projects;
- Establish and maintain data base regarding demand and supply of ODS in the country and
- Formulation and enactment of policies and legislation for the phasing out of ODS.

3.2.2 ODS Regulatory / Policy measures taken by Ozone Cell

Ministry of Environment (Ozone Cell) is collaboration with the Ministry of Commerce has taken the following major steps to reduce consumption of ODS in the country in accordance with the ODS phase out schedule to fulfill Pakistan's commitment under the provision of the Montreal Protocol.

i) In July 1998, an import authorization / licensing system was introduced to regulate and monitor imports of ODS in the country.

ii) In July 1999, a freeze was imposed on the imports of the CFC, to the level of average consumption of 1995, 1996 and 1997 thus enabling Pakistan to implement the first control measure under the Montreal Protocol.

iii) In July 2000, the Ministry of Commerce, in the Import trade and Procedures Order, introduced a complete phase out schedule for import of ODSs, to give legal effect to its efforts to phase out ODSs in accordance with the Montreal Protocol.

iv) In August 2000, the Ministry of Commerce issued a public notice explaining the procedures and guidelines for the import of ODS (refrigeration gases) and introduced a quota system based on the average import of the last three years. Import quotas were allotted to eligible importers of CFCs.

v) In December 2004, Ministry of Commerce issued another import order allocating quota for the importers of Halons and Carbon Tetra Chloride (CTC) and banning the import of Methyl Bromide (except for quarantine purposes with the approval of Plant Protections Department) and Methyl Chloride as there are no eligible importers.

vi) In May 2007, Ministry of Commerce on the recommendation of Ministry of Environment (Ozone Cell) imposed ban on import of CTC to fulfill Pakistan's international obligation in an effective manner.

vii) In July 2008, Ministry of Commerce on the recommendation of Ozone Cell, Ministry of Environment and Federal Board of Revenue(Revenue Division) imposed ban on import of CFC-based compressors under the new Trade Policy 2008-09 although it was not obligatory under the provisions of the

Montreal Protocol. It is pertinent to mention here that Pakistan is the only country in the region which has taken this effective voluntarily step with a view to contributing maximum towards global efforts for the protection of ozone layer. UNEP has appreciated Pakistan for taking this bold step.

3.2.3 Progress of Ozone Cell

Ozone Cell, Ministry of Environment in collaboration with the implementing agencies UNDP, UNEP, UNIDO, World Bank and other national / international stakeholders has made following remarkable achievements for phasing out the use / consumption of ODS in the country.

- Completed 21 projects in the foam / refrigeration sector and converted the enterprises into Ozone friendly Technology in collaboration with the implementing agency World Bank.
- Completed 33 projects out of total of 36 projects in the metal cleaning industries in collaboration with UNIDO. Remaining three projects are at advance stage of implementations.
- Trained 350 customs officers under Refrigeration Management Plan (RMP) to enhance their capacity to curb illegal trade of ODS. Under RMP, the training of 3000 servicing technicians to build up their capacity for the retrofitting of CFC-based refrigerators / air conditioners has been completed.
- Halons Banking & recycling facility in the fire extinguishing sector has been established at Haseen Habib Corporation, Lahore, to regulate the

import of Halons in accordance with the provisions of Montreal Protocol. UNIDO is the implementing agency.

- In pursuance of the Nations ODS phase out policy 2000 approved by the Cabinet, Ministry of Environment (Ozone Cell) is effectively monitoring and regulating import of various ODS in the country to fulfill international commitments. In this regard, licensing system for ODS imports introduced through the Ministry of Commerce is already in place and is being enforced through Custom departments.
- Pakistan imposed ban on the import of Methyl Chloroform Import order for CTC, Halons, Methyl Chloroform and Methyl Bromide (except for pre-shipment and quarantine purposes), almost five years ahead of the target date (i.e. Ist January.2010 fixed for 100% phasing out of ODS under Montreal Protocol. Besides, Pakistan has also banned CTC import w.e.f 28th May 2007, 2-½ year ahead of target date. This shows Pakistan's commitment to make the world ozone friendly.

3.3 Country Program

Ministry of Environment, embarked upon the preparation of Country Program for phasing out ODS with the financial support from Multilateral Fund / United Nations Environment Program (UNEP) in April 1995. M/s Hagler Bailly was hired to carry out an in-depth study of the import and consumption of the ODS and also prepare an Action Plan to phase out use of these substances. Country Programme was discussed in a National Workshop organized by Ozone Cell in July 1996 before its submission to

Multilateral Fund / UNEP. The Executive Committee of the Multilateral Fund, at its 20th meeting held in Montreal in October 1996 approved the Country Program of Pakistan.

Prior to the formulation of the Country Program, a country study was completed. The study covered collection of data on supply of ODS from Government sources, importers and distributors, and data on demand from the industries and repair and maintenance workshops.

The purpose of this Country Program (CP) was to[2]:

- Reflect the commitment of the Government for achieving compliance with the obligations of the Montreal Protocol, in the face of the difficult economic, technological and social problems that Pakistan will face in the implementation of necessary measures;
- Present the data, information and analyses from which an approach to phasing out ODS has been developed, to indicate the overall strategy, actions, institutional and policy frameworks for implementing, in a co-ordinated and cost-effective manner, the phasing out of ODS and the adoption of substitutes and associated technologies; and
- Provide a basis for monitoring the progress of implementation of the action plan, the extent of compliance with control measures, and the overall effectiveness in reducing the consumption of ODS.

[2] M/o Environment, GOP, "*Pakistan Country Program to Phase Out Ozone Depleting Substances*", Islamabad, ,July 1996, p. 1.

The Pakistan Country Program for the phase out of ODs covered the period 1996-1999 and reflected the commitment of the Government and the private sector, represented in the Ozone Cell, to implement the actions contained in the program aimed at implementing and accelerating the phase out of ODS in the country with the technical and financial co-operation of the Multilateral Fund for the implementation of the Montreal Protocol (MF) and implementing agencies.

3.3.1 Salient Features of Country Program (CP)

3.3.1.1 Current Consumption

Pakistan does not produce any ODS. The total consumption in 1995 was 2923 metric tonnes i.e. 2,557.4 ODP tonnes. With a population of 132 (at that time) million, the per capita consumption is about 0.022 kilograms. Thus Pakistan operates under paragraph 1 of Article 5 of the Montreal Protocol.[3]

On the basis of study and survey, consumption of ODS in different sectors in 1995 was observed as follows.

CFC-12 is used as a refrigerant and CFC-11 is used mainly as a blowing agent during the manufacture of insulation of refrigerators, deep freezers, and lorries that transport frozen products. The largest ODS using sub-sector is the repair and maintenance of domestic refrigerators, deep freezers, and mobile air conditioning units. No cold storage capacity operating on ODS was located. All cold storage facilities use ammonia as a refrigerant. There are a few centrifugal chilling units that use CFC-11 and

[3] Ibid., p. 3.

CFC-13 as refrigerants. CFC-12 is also used as a coolant in passenger coaches of Pakistan Railways.

CFC-115 (R-502) is used as a refrigerant in the mobile cold storage units that transport frozen food or ice-cream.

CFC-11 is used as a blowing agent in the manufacture of flexible slabstock foam (mattresses, cushions etc.) and flexible molded polyurethane foam for automotive seats.

Carbon Tetrachloride is used as a cleaning agent in the air-conditioning, refrigeration, and textile industry to degrease equipment in workshops. Small amounts are used for production of some pharmaceutical and agricultural products and as a catalyst in the oil petroleum refining industry.

Methyl Chloroform is used for the cleaning of medical equipment and is appropriate for precision cleaning of heavy grease. It is extensively used as a general metal cleaning agent in a wide range of manufacturing and maintenance industrial processes. Methyl chloroform is also used in the fabric and clothing dry cleaning industry.

Most of the halons were used for refilling existing large fire protection systems installed in buildings, computer facilities, chemical plants and aircrafts.

3.3.1.2 Forecast Consumption

It was observed in the Country Program that Pakistan is a developing country that has enjoyed relatively rapid economic growth rates in recent years, spurring both industrial

and consumer demand for goods. It has a highly diversified industrial structure and the use of ODS is mainly in sectors that produce consumer and essential goods and services, e.g., refrigeration and air-conditioning, foam products, solvents, etc. Sales of such consumer goods have been increasing at an overall annual growth rate of about 10.05%. This increase is due to factors such as the increased economic growth and competitive nature of the market, increasing per capita income, urbanization and rural electrification.[4]

The forecast consumption was estimated on the basis of following assumptions:

1 No attempt is made to comply with the Montreal Protocol; and
2 Unconstrained quantities of controlled substances continue to be available from existing substances at current prices.

3.3.1.3 Industry Structure

Pakistan does not produce any controlled substances and consumption is determined by Imports. However it was not possible in all the cases to reconcile the import data with that collected at the end-use level.[5]

On the basis of import data collected from the Central Board of Revenue (Pakistan Customs) in the Ministry of Finance and field surveys, Country Program included the data on Import of ODS (1995).

[4] Ibid., p. 6.
[5] Ibid., p. 8.

3.3.1.4 Implementing the Phase Out

3.3.1.4.1 Strategy Statement by the Government

Although the grace period given to the parties defined in paragraph 1 of Article 5 of the Montreal Protocol can be fully utilized, Pakistan will make every effort to phase out ODS before the end of this period. In view of this commitment and the prevailing environment in the country, the following line of action is proposed for implementing the ODS phase out program[6]:

1. An early technological and industrial conversion to prevent subsequent supply problems in the different sectors that use ODS, and to endure and early assimilation of new technologies,
2. Initiation of a national campaign on ODS phase out to elicit national support and enhance public awareness,
3. Provision of financial incentives in the form of lower tariffs on equipment and materials required for implementing the phase out. At the same time, imposition of higher import tariffs on ODS,
4. Establishment of clearing house for exchanging information and data on the operational mechanism for implementation,
5. Banning the manufacture and import of equipment operating with ODS,
6. Provision of regulations and technical guidelines for accommodating the needs of the society,
7. Evolving an national consensus regarding the phase out,

[6] Ibid., p. 17.

8. Drawing technology transfer plans covering all necessary conditions, including knowledge and manpower, training and education as well as on the provision of necessary equipment for implementing ODS phase out,
9. Establishing linkages with international activities on ODS phase out programs,
10. Providing financial, tax and trade incentives and controls for implementation of Montreal Protocol sub-projects and for other projects leading to the phase out.

By employing such a strategy, it was hoped that Pakistan will be able to phase out the consumption of the controlled substances within the time frame and limits specified for Article 5 countries in the Montreal Protocol. It was expected that consumption of ODS in 2010 will be less than specified by the Montreal Protocol limits.

3.3.1.4.2 Action Plan

Since the ratification of the Montreal Protocol, the Government of Pakistan has been planning the development of a realistic schedule to phase out ODS consumption in the country. The explicit objective of the action plan is to sustain the pace of ODS phase out by using the Multilateral Fund programs as an incentive for voluntary initiatives by ODS users. By the time a significant part of each sector and sub-sector has converted to non-ODS use, regulations completely restricting future use will have come fully into force and would be the primary legislative instrument for restricting or banning continued use of ODS in the county. This calls for the co-ordination, facilitation and monitoring activities of the Government to be geared up.

The following decisions have been taken in this respect.

- The creation of a National Ozone Cell to co-ordinate and facilitate the ODS phase out process, and to promote awareness on ozone layer protection.
- Establishment of a system to monitor ODS imports and consumption.
- Adaptation of national laws to the terms of the Montreal Protocol, the amendments ratified by the Governemt, and the decisions of other parties to the Montreal Protocol.
- Preparation of programs for priority sectors.
- Promotion of early conversion in priority sectors through a system of incentives and disincentives to encourage phase out of ODS[7].

A summary of the action plan is given in Appendix F.

3.3.1.4.3 Roles in Implementing the Strategy

The role of the Government is to promote and facilitate ODS phase out, to be fulfilled through the Ozone Cell. This institution's privileged position, with direct access to all international and national agencies involved, allows it to implement the action plan effectively, focusing on different sectors as needed. The government, through the Ozone Cell, will follow up and evaluate the process, both within the country and abroad, so that it can propose and adopt the required changes in a timely manner. Finally, the government will exercise its power to issue rules and regulations on its own initiative

[7] Ibid., p. 20.

and at the request of those affected if there are deviations that cannot be corrected in any other way.[8]

The Ministry of Environment has been designated as the national authority responsible for overall supervision and management of the imports and consumption of ODS in Pakistan.

3.3.1.4.4 Timetable and Consumption Implications

Pakistan will make every effort to phase out ODS before the deadlines specified in Montreal Protocol. It is also expected that the spontaneous reduction of ODS consumption will also take place due to economic and market reasons.[9]

Under the Country Program, it is expected that in the year 2000 the use of CFCs in new air conditioning and refrigeration equipment will be completely replaced with that of substitutes. The continued use of CFCs to service the units already sold is, however, foreseen.

Pakistan hoped to eliminate the use of CFC-11 in manufacture of domestic refrigerators and foam by the year 2000. In the solvent sector, spontaneous reduction will take place as commercial substitutes are available in the market.

3.3.1.4.5 Monitoring Arrangements

Monitoring of the consumption will involve two main strategies. The first will be based on quotas or licenses issued for future imports. The second strategy will involve the co-

[8] Ibid., p. 32.
[9] Ibid., p. 24.

operation of the major suppliers. This second step is very important as any deficits between quotas granted and actual imports, need to be determined. The co-operation of Pakistan Customs will also be necessary[10].

The Ozone Cell will be responsible for compiling and analyzing information from various sources and maintaining consumption records, including details on utilization of quotas. It will follow up on projects aimed at phasing out ODS. In this respect, the Ozone Cell will prepare quarterly reports for the Ozone National Team as well as annual reports to be presented to the National Assembly of Pakistan during the first quarter of each fiscal year. These annual reports will also be supplied to the implementing agencies and Ozone Secretariat.

To comply with the Montreal Protocol's data reporting requirements, the Government of Pakistan through the Ozone Cell will report:

- Annually to the Ozone Secretariat, as per the requirements of Article 7 of the Montreal Protocol;
- Annually on the progress of implementation of the Country Program will be submitted to the Multilateral Fund Secretariat; and
- Regularly to the implementing Agencies on progress of project implementation.

[10] Ibid., p. 25.

3.3.1.4.6 Schedule of Phase out for the ODSs

Phase out schedule of Controlled Substances in Pakistan prepared in the Country Program for the period 1995-2010 is given in Appendix G.

3.4 National ODS Phase-out Policy

A National ODS Phase-out Policy prepared by the Ozone Cell, Ministry of Environment has been approved by the ECC of the Cabinet in November 2000 which envisaged introduction of statutory rate of duty on import of exclusive components and raw material required both for the production and servicing of CFC products along with restrictions on the production of CFC products after 31st December 2003.[11]

Pursuant to the decisions of the ECC, the Ministry of Commerce has issued instructions on the proposed reduction and phase out schedule of the ODS as under:

50% reduction from 1995-97 average levels on 01-01-2005

July 2002	10%
July 2003	15%
July 2004 (valid till 30-06-2005)	25%

85% reduction from 1995-97 average levels on 01-01-2007

July 2005	15%

[11] Government of Pakistan, M/o Environment, Ozone Cell, "*Brief on Ozone Cell*", Islamabad, 09-09-2005, p. 5.

July 2006 (valid till 30-06-2007)	20%
100% reduction from 1995-97 average levels on 01-01-2010	
July 2007	5%
July 2008	5%
July 2009 (valid till 31-12-2009)	5%

The National ODS Phase out Policy when implemented fully will set a milestone to accomplish the Government of Pakistan's commitments to the Multilateral Fund to phase out ODS and encourage the industry to switch over to non-CFC production.

3.5 Country Program Updation

Best efforts were made at the time of preparation of Country Program to portray ODS consumption in the different sectors. During project implementation, it was revealed that due to incomplete data some companies using ODS were not identified and that some sub-sectors consuming substantial amount of ODS were possibly missed out. In addition, over the last seven years, a few establishments were closed while others quickly took over the market share, which changed the characteristics of the market. There was also some variations in ODS consumption data reported by the National Ozone Unit (NOU) in recent years for Art.7 reporting under the Montreal Protocol and Country Program reporting to Multilateral Fund. This all resulted in the necessity to update the Country Program for phasing out the ODS. Pakistan received funding to update its original Country Program in March 2002. The World Bank in cooperation with Ozone Cell,

Ministry of Environment, Government of Pakistan prepared country Program Update. The Executive Committee of Multilateral Fund in its 41st meeting held at Montreal in December 2003 approved it.[12]

This Country Program Update provided an overview of activities implemented under the Montreal Protocol on substances that deplete the Ozone Layer in Pakistan, an assessment of the initial Country Program, including its approach and proposed activities, an analysis of remaining ODS consumption in the country and presentation of a strategy, action plan and cost estimates to complete the phase out.

3.5.1 Salient features of the Country Programme Update

3.5.1.1 Overall Assessment of the Implementation of the Original Country Program

Original Country Program was reviewed in Chapter 2 of the Country Program Update. This review indicates that Pakistan was able to make progress in ODS phaseout in some areas, however, will have to accelerate phase out immediately in some sectors, and maintain phaseout momentum in others, in order to meet all its Montreal Protocol obligations.

The Country Programme had anticipated that by the end of its period, in approximately the year 2000, most companies would have already phased out ODS. ODS phaseout did not occur at the speed predicted due to a combination of factors, including low ODS prices.

[12] Ibid., p. 4.

At the time the Country Programme was prepared, Pakistan considered refrigeration and foam sectors to be a priority for conversion. Since then, the solvent sector has revealed itself to be as important as the other sectors and will in fact be a critical sector to address in order to allow Pakistan to meet the 85% CTC consumption reduction in 2005. Moreover, because it was estimated in the Country Programme that the halon supply would slowly decrease on its own, a strategy for reducing and eliminating consumption was not introduced during the country Programme preparation and implementation. The consumption of halon 1201 has remained steady and with the first Montreal Protocol obligation having already taken effect in 2002, Pakistan finds itself out of compliance.

3.5.1.2 Overall Objectives

The main objectives of the Country Programme Update were described to provide information on the recent use and consumption of ODS, correct any past data reporting inconsistencies and establish an accurate baseline where required, and to incorporate the sectors and ODS consumption not targeted in the previous Country Programme into an overall phaseout strategy. The Country Programme has consequently been updated taking into account remaining sectors/sub-sectors for all ODS (excluding HCFCs) and will also serve as the basis for Pakistan's action plan to phaseout all remaining ODS use.

The Country Programme Update is the result of the collection and an analysis of latest ODS consumption data and includes an assessment of all ongoing and completed projects, including actual dates when each beneficiary enterprise(s) under a project

ended ODS use. The Country Programme Update formed the basis for determining remaining eligible ODS consumption under ExCom Dec. 35/57.[13]

3.5.1.3 Methodology

In order to obtain accurate data for the Country Programme Update and to establish the level of ODS consumption that is eligible for funding, both ODS supply and demand data sources were utilized. A field survey to assess the consumption sector on a substance-wide basis was conducted through survey forms, letters, phone calls, visits and faxes. Surveys and meetings were arranged at different locations to collect the data from all available references that had been garnered from developing and implementing past ODS projects, as well as from previously unidentified consumers of ODS. To assess ODS supply, importers, wholesalers and distributors were directly contacted.

A summary of import records was first obtained from Pakistan Revenue Automation Ltd. (PRAL), a firm that posts all import records electronically before clearance of goods. Data obtained from PRAL represents the ODS which was imported under ODS PCT codes. This information was the starting point for correlating data from distributors, retailers and end-users.

Specifically, data was obtained from CFC, CTC and halon importers in Karachi and Lahore and from individual industrial consumers in Karachi, Lahore and adjoining cities (Faisalabad and Gujranwala in the province of Punjab where most industries are located). The Ozone Cell along with the Ministries of Agriculture and Health and CBR

[13]Ozone Cell, MoE, GoP, *" The Islamic Republic of Pakistan Country Programme Update"*, Islamabad, 2003, p. 19.

also facilitated data collection and provided data in some cases. All data collected was subsequently analyzed and compared to import figures from CBR, quota information sent to the Ozone Cell by CFC importers and studies conducted on CTC and halon sectors by consultants for the Ozone Cell and UNIDO (in anticipation of sector phaseout plans that will be submitted to the MLF).

Based on results of the field survey, sector studies and the subsequent analysis, the Government is in a position to plan its ODS phaseout strategy.

3.5.1.4 Action Plan

In view of the strategic direction provided by the MLF Executive Committee at its 35th meeting to Art.5 countries for meeting their Montreal Protocol obligations during the compliance period, the Government of Pakistan had decided to move from a project-by-project approach and embark on sector-wide phaseout plans and umbrella projects to phase out remaining consumption of Annex A, Annex B and Annex E substances.[14]

Because of the remaining level of un-funded CFC consumption of over a 1000 ODP tonnes Pakistan has decided that its immediate priority for CFC phaseout is to address the manufacturing sector to end the introduction of new CFC-based refrigerators into the market, while commencing activities in the servicing sector to ensure sufficient CFC supply in the coming years. Pakistan will thus seek MLF assistance on this basis.

The overall objectives of the action plan is to eliminate the use of CFC in the refrigeration and foam sectors by 2006, in time for the 2007 CFC reduction targets, and

[14] Ibid., p. 35.

in the servicing and MDI sectors by the end of 2009, end the imports of virgin halon that are over the permitted levels under the Montreal Protocol by 2004, drastically cut CTC consumption for the 85% reduction target in 2005 and eliminate TCA for solvent applications by 2005. The plan also addresses the chemicals that are currently not consumed in the reporting year of the Country Programme Update, to ensure that no Montreal Protocol compliance targets are surpassed in future years. A summary of the sector plans and projects that have been prepared with the assistance of UNIDO and the World Bank are included in this section, along with the estimated costs to Pakistan to phaseout the various ODS. The sector strategies that will comprise part of the overall action plan to the Country Programme Update are as follows:

- Foam and Refrigeration Sector Phaseout through Umbrella Projects (The World Bank)
- Refrigerant Management Plan (UNIDO)
- Halon Phase-out Strategy (UNIDO)
- Sector Plan for Phasing Out CTC (in process agent and solvent applications) and other Solvents (UNIDO)

Pakistan's action plan for phasing out remaining CFC will consist of projects to convert CFC-based manufacturing and to address the servicing sector. These projects will be complemented by Government actions to curb the supply of CFC-based components, and within the context of the servicing sector project, actions that target service technician practices as well as the end consumer of refrigerators and freezers.

3.5.1.5 Policies and Regulations

Pakistan began formulating policies for controlling and reducing ODS consumption as part of the original Country Programme preparation process with the establishment of the Ozone Cell and enacted the first regulation in 1998 with a licensing system for all ODS. Along with the establishment of a quota reduction system for CFC in 2000, these measures provide Pakistan with a solid regulatory and policy base for continued and accelerated action in its OCS phase-out strategy.

The Ozone Cell will play a major role in phasing out remaining CFC, halon and CTC consumption by 2010 by reviewing and developing policy and regulatory proposals for action by appropriate Government agencies. It will step up its public awareness raising activities to reach specific groups that particularly require information on the planned phaseout activities of the country in the next seven years, such as service technicians and residual users of CTC.

Action on general ODS policy in Pakistan will thus include enhancement of the existing policy framework by developing complementary regulations to ensure industry compliance with sector phaseout targets, such as to lay out specific requirements on quantities of other ODS that may be imported into Pakistan. For CFC, it would be to expand the quota to include CFC-13 and for other ODS, it would be to lay out a quota reduction schedule in line with Montreal Protocol phaseout obligations per controlled substance. As the sector plan on the manufacturing sector (foam and refrigeration) is implemented, Pakistan will require a regulation to block new manufacturers using ODS from springing up across the country.

The need for developing new policies or for strengthening existing policies will be evaluated during the implementation of the final ODS phaseout strategy. However, because Pakistan is out of compliance for halon and is at risk of non-compliance for CTC consumption in 2005, policy measures aimed at these two sectors must be immediately executed. Specific measures will be defined and implemented in the context of the two sector plans with UNIDO. A summary of general legal measures the Ozone Cell will consider for possible use include[15]:

- Resuscitation of the third component of the original 2000 National ODS policy-a cut-off date for the manufacturing of CFC-based products that was not executed with a later date of December 31,2006;
- Ban on all new installations of ODS-using systems (including MACs);
- Prohibit the placement on the market of products containing CFC and halon (the exception would be for the time being MDIs and halon extinguishers for critical uses);
- Ban the import of all CFC-containing equipment and attach a reference to a prohibition of CFC in products, including pre-mixed polyol and aerosols to all import licenses (to safeguard against any commencement of use);
- Develop a quota reduction schedule for all ODS solvents (1,1,1 TCA, CFC-113 and CTC);

[15] Ibid., p. 42.

- Prohibit the import and offering for sale and use of ODS solvents (1,1,1TCA, CFC-113, CTC) after quota reductions implemented;
- Prohibit the filling or refilling of CFCs into imported equipment;
- Instate procedures relating to seizure of shipment, disposition of seized goods and associated penalty provisions.

Finally, the Government of Pakistan recognizes how critical it is that there is sustainable phaseout throughout the country after conversion take place and policies are instated. It therefore, will explore the possibility of having the Environmental Protection Agencies (EPAs) of the provinces involved in monitoring and where required, enforcement. Cooperation at the provincial level will be especially important for implementing the RMP.

3.5.1.6 Technical Assistance

To ensure that the Country Programme Update's action plan can be successfully implemented on all fronts, a focus on strengthening the capacity in the country to enforce ODS policy is needed. Technical assistance will be required to not only assist MoE in managing the ODS phaseout strategy, but other Government agencies involved in controlling ODS use. For example, there will be an increasing need to enable customs officers to identify any anomalies in ODS imports and verify that shipments contain what is indicated in the bill of lading. As the CFC quota is reduced, there is the possibility of illegal shipments of CFC. Pakistan has varying capacities at its ports. In

order for CBR and the Ozone Cell to better manage the supply of ODS into the country, uniform and comprehensive training is required for all custom officers.[16]

The Ozone Cell will take the lead in monitoring and coordinating the implementation of the overall phaseout strategy. With a new demand on implementing multiple activities simultaneously and on meeting performance targets agreed upon within sector plans, in addition to the ongoing requirements under the Institutional Strengthening project with UNDP, further strengthening of the Ozone Cell will be required. The success of the overall action plan for phasing out remaining ODS is heavily dependent on several regulatory measures being put into place in a relatively short time period. To further develop the policy and regulatory framework as soon as possible, there will be a need for administrative and coordination support. It will thus be necessary for the Ozone Cell to recruit supplementary staff to oversee, manage, monitor and report on the implementation of the sector plans and the overall ODS phaseout strategy.

Each sector plan includes a technical assistance component. The cost of technical assistance is within the total estimated cost of each sector plan with the exception of the MDI sector. CFC-based MDIs will have to be addressed as soon as possible and it is estimated that Pakistan will require at least US$ 50,000 to develop a strategy to build awareness among stakeholders and coordinate activities between ministries.

[16] Ibid., p. 42.

3.5.1.7 Implementation of the Action Plan

As mentioned above, Pakistan was out of compliance with Annex A, Group II chemicals and was at risk of not meeting the 2005 85% reduction target for Annex B, Group II chemicals at the time of preparation of CPU. Thus, the action plan must give priority to these areas while continuing to steadily decrease the demand for the other controlled substances through the completion of ongoing projects and new projects in the manufacturing sector and through training and awareness raising in the after sales demand for controlled substances. Annex III provides an initial three-year action plan (2003-2005) based on the Country Programme Update and proposed sector plans and umbrella projects, to be refined as projects commence.

Proposed Actions (Overall) for implementing the Action Plan and suggested time-frame is given in Appendix H.

3.6 Incorporating control Measures in Import Policy

Pakistan is not a producing country of the Ozone Depleting Substances but imports these substances to meet its domestic needs. On the initiative of the Ministry of Environment, Government of Pakistan has taken following steps regarding import of ODS to reduce consumption of the ODS.

- In July 1998, an import authorization / licensing system was introduced to regulate and monitor the imports of ODSs in the country.
- In July 1999, a freeze was imposed on the imports of the Chlorofluorocarbons (CFC) to the level of average consumption of

1995, 1996 and 1997 thus enabling Pakistan to implement the first control measure under the Montreal Protocol.

- In July 1999, the Ministry of Commerce, in the import Trade and Procedures Order, introduced a complete phase out schedule for import of the ODS, to give legal effect to its efforts to phase out the ODS in accordance with the Montreal Protocol.
- In August 2000, the Ministry of Commerce issued a public notice explaining the procedures and guidelines for the import of the ODSs (refrigeration gases) and introduced a quota system, based on the average import of the last three years. Import quotas were allotted to eligible importers of the CFCs.
- In December 2004, Ministry of Commerce issued another import order allocating quota to the importers of Halons and Carbon Tetra Chloride (CTC) and banning the import of Methyl Bromide (except for quarantine purposed with the approval of Plant Protection Department) and Methyl Chloride as there are no eligible importers.

Table showing Ozone Depleting Substances (ODSs) being imported in Pakistan and their phase out schedule under the provisions of the Montreal Protocol is given in Appendix I.

Ozone Depleting Substances (ODSs) being imported in Pakistan and their phase out schedule under the provisions of the Montreal Protocol and current status on 31-12-2008 is as follows:-.

S#	Substances	Phase out Schedule
	Annex A.Group-1	
1.	CFC-11	Freeze at 1995-97 average levels on 01-07-1999.
2.	CFC-12	50% reduction from 1995-97 average levels on 01-01-2005.
3.	CFC-113	85% reduction from 1995-97 average levels on 01-01-2007.
4.	CFC-114	100% reduction from 1995-97 average levels on 01-01-2010.
5.	CFC-115	

Current Status.

Target achieved. 21 projects completed by World Bank in refrigerant and foam sector. CFC imports remained 626 MT against allocated quota of 837 MT in 2006, 170 MT against allocated quota of 251 MT in 2007 and 49 MT against allocated quota of 200 MT in 2008.

	Annex A. Group-II	
6.	Halon 1211	Freeze at 1995-97 average levels on 01-01-2002.
2.	Halon 1301	50% reduction from 1995-97 average levels on 01-01-2005.
3.	Halon 2402.	100% reduction from 1995-97 average levels on 01-01-2010.

Current Status.

Target achieved. Halons Banking and Recycling System established at M/s Haseen Habib Corporation at Lahore by UNIDO. Imports remained zero in 2006, 2007 & 2008 against allocated quota of 7.1 MT.

Annex B.Group-II

9.	Carbon Tetrachloride-CTC	85% reduction from 1998-2000 average levels on 01-01-2005. 100% reduction from 1998-2000 average levels on 01-01-2010.

Current Status.

Target achieved. Ban imposed on CTC import w.e.f. 28th May 2007, 2½ years ahead of the target date to ensure compliance under the provision of the Montreal Protocol. Imports within allocated quota of 38 MT, 29 MT & 18 Mt remained zero in 2006, 2007 & 2008 respectively.

Annex B.Group-III

10.	Methyl Chloroform	Freeze at 1998-2000 level s on 01-01-2003. 30% reduction from 1998-2000 average levels on 01-01-2005. 70% reduction from 1998-2000 average levels on 01-01-2010. 100% reduction from 1998-2000 average levels on 01-01-2015.

Current Status.

Target achieved. Ban imposed on methyl chloroform import in November 2004. Imports are zero since 2005.

Annex C. Group-I

11.	HCFC 22	Freeze at baseline figure of year 2015 on 01-01-2016. 100% reduction on 01-01-2040.

Annex E. Group-I

12.	Methyl Bromide	Freeze at 1995-98 average levels on 01-01-2002. 20% reduction from 1995-98 average levels on 01-01-2005. 100% reduction from 1995-98 average levels on 01-01-2015.

Current Status.

Ban imposed on the import of methyl bromide (except for pre-shipment and quarantine purposes) since November 2004.

CTC is an area of concern for Pakistan because we had to drastically reduce its import to 85% (from 684MT to 56MT) on 1st January 2005. Under an agreement between Pakistan and Multilateral Funds on the United Nations, Pakistan has to reduce gradually the import of CTC from 1st January 2005 to 1st January 2009. This reflects Pakistan's zeal to accelerate the phase out of this hazardous chemical one-year before the timeframe under the provision of the Montreal Protocol. In the light of said agreement, five importers have been allowed to import a total of 56,38,29 and 13.5 MT of CTC for the years 2005,2006,2007 and 2008 thus bringing its import to zero on 1st January, 2009[17].

As per ODS phase out schedule, Pakistan is required to phase out a total volume of 2122.9 MT by Ist January 2010 and 1952.63 MT ODS has been phased out so for. As

[17] AKHTAR, MUHAMMAD MAQSOOD, "Montreal Protocol and Pakistan's commitments", The Finance Karachi, 11 September 2006, p. 4.

per target 85% ODS was required to be phased out till 2007 whereas Pakistan have actually phased out over and above 91% ODS, thus we are ahead of the target.

3.7 Restrictions of import to quota holders

In the backdrop of the import orders issued by the Ministry of Commerce, 2 Halons importers, 29 CFC importers and 5 CTC importers have been allocated quotas of the respective substances to regulate their import in accordance with our phase out schedule to meet international commitments.

3.8 Obstacles in implementation of Montreal Protocol in Pakistan

3.8.1 Illegal Trade of ODS

Illegal trade of ODS is a matter of concern not only for Pakistan but the entire world. Why did this world wide black marketing market emerge? To find out we must examined the weaknesses in the ozone regime – in the protocol itself and in the national regulations implemented in response – that allowed illegal trade in ODS to appear and flourish, and consider to what extent the problem could have been anticipated earlier and more effectively. If Govt. bans the use of any substance, provided that the alternatives are expensive, a black market is bound to develop.

Environmental investigation agency's investigation into the smuggling of ODS in developing countries reveal the central role played by the transit trade in confusing the trail between the producer or broker and the black market destination. Sources reveal that Dubai free trade zone functions as a major center for illegal trade in ODS, especially as a

conduit for illegal ODS passing into Pakistan and India. It has been identified that few Pakistan dealers in league with Afghan smugglers and Pakistan-based businessmen in Dubai are at the forefront of this illegal trade. Singapore has also been identified as a major hub of the illegal trade on ODSs.

A lack of specialized training in identifying ODS among many of the customs officials, coupled with the underhand methods employed by the smugglers, such as mislabeling and mis-declaring the goods, enables CFCs to be mover around with relative ease.

Pakistan is also facing the illegal trade problem. The methods by which the black market traders get the material into the country are varied, including through the porous borders and also by mis-declaration in legal import and by the import of mixed containers concealing the illegal material. Another method by which smugglers move illegal materials into Pakistan is by mis-declaring the quantity of the import.

To overcome the problems of illegal trade, UNIDO in collaboration with Ozone Cell, MoE, has launched "Customs Officers Empowerment Project" and imparted training to 350 custom officers. The objective of the project is to empower the customs officers with know how regarding the ODSs, its impacts on the Ozone layer and human health, enhance the capacity in identification of ODSs.

Besides, on the international level, UNEP initiated tri-partite dialogue among Afghanistan, Iran and Pakistan. Under this dialogue, two meetings of the ozone and custom officers of the three counties have been held so far at Tehran and Kabul in 2004

and 2007 respectively. UNEP is now planning to sponsor Ministerial level meeting of these countries shortly so that this daunting challenge could be met in an effective manner.

UNIDO under Refrigerant Management Plan will also provide 40 sets of NTRON Refrigerant identifiers to the Customs. Three sets have already been delivered for training.

3.8.2 CFC based Metered Dose Inhalers

CFC-based Metered Dose Inhalers (MDIs) an area on concern for Pakistan, as use of MDIs in asthma and other pulmonary problems (Emphysema & Bronchospasm etc.) is of extremely crucial nature and is life saving. Non CFC-based MDIs are not cost effective and any one if imported from non Article 5 countries would pose severe financial burden on poor patients of Article 5 countries as millions of their people are living below the poverty line.

CFC phase-out in MDI manufacturing poses a challenge to developing countiers, including Pakistan, both in achieving the national CFC compliance targets in the years 2008 and 2009, and complete CFC phase-out by January 01, 2010, under the provisions of the Montreal Protocol.

Approximately 19.8 million people (12% of the total population) in Pakistan suffer from asthma and/or COPD. At present, two types of MDIs are available in the market to cater for the needs of asthma patients-CFC-based MDIs and non-CFC-based MDIs. Almost all the asthma patients use CFC-based MDIs which are easily affordable

for patients, being cost effective. Pakistan has three Karachi-based pharmaceutical firms, namely GlaxoSmithKline, Macter International (Pvt) Limited and Zafa Pharmaceutical Laboratories manufacturing CFC based MDIs. These firms produce approximately 3.95 million units of CFC MDIs per annum.

The 56th Executive Committee meeting of the Multilateral fund Secretariat of the Montreal Protocol held in November, 2008 at Doha, allocated fund for the conversion of Zafa Pharmaceutical Laboratories (Pvt) Limited and GlaxoSmithKline Pakistan Limited (only 21% funding representing the percentage of local ownership). Unfortunately, the third firm Macter (Pvt) International could not meet the criteria of the Executive Committee for funding.

In order to meet the challenge of non-availability of CFC for MDIs beyond 2009, the Ozone Cell, Ministry of Environment, in collaboration with the Drugs Control Organization of the Ministry of Health and national and international partners (UNDP and UNEP), is proactively working for the conversion from CFC-MDIs to CFC-free MDIs and requesting an Essential Use Nomination (EUN) of CFC for the MDI manufacturing sector in Pakistan.

It is worth mentioning here that the supply of CFC is required for essential use in MDI manufacturing till the conversion of the CFC-based MDI manufacturing firms into Ozone friendly technology is completed. Thus, Pakistan along with four other countries in the region, has submitted documents to the Montreal Protocol's Medical Technical

Options Committee for EUN of CFC for MDI manufacturing by Zafa, Macter and GlaxoSmithKline beyond 2009.[18]

3.8.3 Lack of Legislation

Although Pakistan has taken so many administrative steps to phase out ODSs in accordance with the phase out schedule as set by the Montreal Protocol for Article 5 countries, but yet no legislation has been made in this regard. It is established fact that powerful and most effective administrative measures can not replace the weakest type of legislation. By proper legislation, the chance of biased treatment or undue favor to any one who is likes of the concerned authorities has to be ruled out.

3.8.4 Top Down Approach

In Pakistan during legislation or policy formulation top down approach is applied. Decisions are framed and notified for implementation without taking the relevant industries into confidence. In countries like Japan bottom up approach is preferred. The basic units are briefed about the problem and solutions sought. Since the industries and the management get a chance to debate the issue well in time, decisions are taken and all implanting agencies respond and find no difficulty in implementation. On the contrary in Pakistan the government generally holds itself responsible for policy making and implementing. Owing to deficiency in manpower either unnecessary expansion occurs

[18] Report presented in International Awareness and Information Exchange Workshop on the Transition Strategy for CFC-Metered Dose Inhalers in Pakistan, held on 14th March, 2009 at Karachi, organized by Ozone Cell, Ministry of Environment in collaboration with UNEO/ROAP, UNDP and National Stakeholders, p. 2.

in government agencies or many institutions are involved in the process. This practice results in delays, lack of cooperation, half achieved objectives etc.

3.9 Suggestions for better implement of Montreal Protocol in Pakistan

3.9.1 Legal Provision to the ozone protection

The first and the foremost important thing is that the deficiency of the Constitution of Pakistan regarding environmental issue particularly Ozone depletion has to be removed. It is very unfortunate that there isn't any specific provision for environmental protection in our constitution. Although, the constitution has fully empowered the federal and provincial legislative to make laws for the protection of environment, and the Supreme Court of Pakistan has extended the scope of Article 9 of the constitution of the Islamic Republic of Pakistan to cover some aspects of the environmental pollution[19]. But a separate article is needed in the constitution of the country.

Although The Pakistan Environmental Protection Act, 1997 is in the field to cater the environmental problems, but there exist no provisions in the said act regarding control of Ozone Depleting Substances. It is, therefore, needed that the act of 1997 may be amended suitably as well as Rules for Regulation and Control of the Ozone Depleting Substances may be framed accordingly. In the said amendments and rules, the terms of consumption, calculated level of import and consumption, Ozone Depleting Substances, may be defined. Regulations of consumptions of ODSs, Regulation of import from countries party to the Montreal Protocol only with a valid License, Prohibition of import of ODSs from non parties countries, Prohibition on the sale of ODSs without registration

[19] *"Shehla Zia Vs. Wapda"* (PLD 1994 SC 693).

with the competent authority, Regulation for the purchase of ODSs, Regulation on the use of ODSs, Prohibition on new investments with Ozone depleting substances, Regulation of import, export and sale of products made with or containing Ozone Depleting Substances, Regulation on reclamation and destruction of Ozone Depleting Substances etc may be specified in the proposed legislation.

It will not be out of place to have a bird's eye view of the draft Ozone Depleting Substances (Regulation and Control) Rules submitted to Ministry of Environment for approval. These Rules are needed for carrying out the purposes of the Pakistan Environmental Protection Act, 1997 for regulating the import, sale, consumption and stock of ODSs by the importers, dealers and buyers.

Proposed Ozone Depleting Substances (Regulation and Control) Rules.

The Ozone Cell has submitted draft Ozone Depleting Substance (Regulation and Control) Rules for approval of the federal Government as required under the Environmental Protection Act, 1997 and notification to the official gazette of Pakistan.

There are as many as 25 rules with 3 schedules. The rules contain the preamble as usual which disclosed the authority exercised for rules making.

Rule 1(1) gives the full nomenclature of the rules whereas Rule 1(2) provides for date of enforcement of Rules that is date of publication in official gazette.

It has unusually and perhaps inevitably very long definition clause comprising Rule 2(a) to Rule 2(x). The rules framers have pains to give definitions to the various terms which are used or employed in the Rules.

Rule 3 pertain to specification, quantity and phase out rate of the Substances. The Substances to be consumed should be of given specifications. Import quantity and phase out rate of the substances shall be prescribed and notified in the official gazette according to Rule 3.

Rule 4 provides for issue of license by the licensing authority. It may be mentioned that the Ministry of Commerce has been nominated as Licensing Authority and has been defined as such in Rule 2(h).

Rule 5 contemplates various conditions which an importer has to meet.

Rule 6 is supplementary to Rule 5 and requires an importer to furnish information mentioned therein.

Rule 7 provides a ban on trade of the Substance in violation of these Rules.

Rule 8 is very important. It is split into 6 sub rules and itself it is a complete code of duties and rights of the Ministry.

Rule 9 casts an obligation on the Licensing Authority to submit written information about issue and suspension or cancellation of the licenses within 10 days.

Rule 10 is intended to set mode of payment regarding imports through a commercial bank according to the approved system of payment by the State Bank of Pakistan. It also obliges the license holder to send a copy of application and other documents to the Ministry which pertained to applying to any commercial bank. Likewise the commercial bank shall process the application and send information to the Ministry.

According to Rule 11 the concerned custom office shall notify to the Ministry on priority basis all the details about the import.

Rule 12 requires the importers to submit six monthly details of the specifications, quantity and type of the Substances imported as per schedule 2 as well as its sale and distribution.

Rule 13 provides for maintaining updated documentation regarding the quantity, quality, type and price of the Substance imported, quantity and type of the Substance sold to the buyers directly or through the dealer and quantity and type of the Substance in stock. It also provides the penalty of notice to delinquent who fails to maintain or submit the documentation.

Rule 14 empowers the Ministry to inspect the Substance brought in by the importer at the custom point.

Rule 15 makes it compulsory for a dealer willing to purchase the Substance from the importer and subsequently to sell it to the buyer, to get himself registered with the Ministry and secure its approval for trading of such Substance. Such a dealer is also obliged to comply with the conditions set forth by the Ministry.

The dealer is also required under Rule 16 to maintain the record like the importer under schedule 3. He is also required to submit the report likewise. According to Sub Rule 2 the buyer of the Substance when demanded shall furnish details of specification, quantity etc as well as consumption for the designated purpose to the Ministry.

Rule 17 puts an embargo on consumption of the Substance imported or bought for any purpose other than allowed. Sub Rule 2 contemplates action as per the existing laws against delinquent importer or the buyer.

Rule 18 empowers the Ministry to issue necessary orders and instruction for effective regulation and control of the consumption and trading of the Substance.

Similarly Rule 19 authorized the Ministry to depute inspector, surveyor or the expert on the relevant subject for the aforestated purpose.

Rule 20 requires the concerned agency, person, firm or enterprise to extend necessary cooperation to such official deputed for the inspection, supervision or monitoring.

Rule 21 provides for formation of sub-committees or task force for the effective regulation and control of the consumption and trading of the Substance and prescribes function, duty, authority and procedure of the sub-committee or task force.

According to Rule 22 the Authority has been vested with powers to frame and enforce necessary guidelines.

The Authority is also empowered to inflict punishment to those who violate the Rules while consuming and trading the Substance according to Rule 23.

According to Rule 24 the existing laws will prevail for matters not provided in these Rules whereas those which find mention shall be governed by these rules which will prevail over other laws.

According to Rule 25 power has been reserved for making necessary changes or alterations in the schedules.

There are 3 schedules.

Schedule 1 pertains to Specifications of Substances group-wise and clarification of the abbreviations is given. Further relationship of group of the Annexure of the Protocol is given at the end of the schedule.

Schedule 2 provided for the format in respect of the obligation cast on the importer regarding import.

Schedule 3 also is the format for the dealer to meet his obligation under Rule 15.

The Rules appeared to have been framed without assistance of an expert. The Rules are not couched in proper language. The language employed in the Rules is not free from ambiguity. It is cumbersome. Un-necessarily there is lot of confusion which could be avoided if the rules were mindfully prepared with assistance of legal mind. There is repetition and various Rules appeared to overlap each other. The penalty clauses regarding issue of notice for not issuing the license to a delinquent importer is meaningless. Like wise under Rule 23 the Authority is empowered to inflict punishment mechanically whereas no punishment is provided in the Rules.

3.9.2 Awareness Raising Campaigns

Desire to protect humanity from adverse effects of ozone depletion was the clear motivation for the near-universal participation. This desire was strengthened in most of the industrialized countries by the enormous publicity on the issue through the mass media. Awareness campaigns for specific target groups can play an important role to discourage the use of Ozone Depleting Substances. By using the print and electronic media;

We can encourage the consumers to buy the products (aerosol spray cans, refrigerators, fire extinguishers etc.) that are labeled "Ozone Friendly" or "CFC free". The product labels should indicate that they do not contain Ozone depleting substances such as CFC or Halons. The consumers should be encouraged to ask for more information from the seller to ensure that the product is Ozone friendly.

We can motivate the people to replace their old refrigerators and appliances, which are causes of ozone depletion. This can be done to replace out-dated portable Halons fire extinguishers, which should be returned to fire brigade authorities or the management of Halons Banking & Recycling System.

Office workers can be encouraged to help their office/firm/company to identify existing ODS equipments (e.g. water coolers, refrigerators, air conditioners, cleaning solvents, fire extinguishers) and products (foam cushions/mattresses, aerosol sprays etc.) and develop a plan for replacing them with cost-effective ozone-friendly alternatives.

Teachers can be motivated to inform their students about the importance of protecting the environment and in particular the Ozone layer, its depletion, impacts of ozone depletion and encourage them to disseminate information among friends and kiths and kin.

Journalists can be encouraged to contribute articles in the print media and present news events and stories through electronic media to ozone layer, impacts of its depletion and ways and means for its protection for sustained life on Earth.

We can encourage our children to tell their family and friends how important it is to protect the ozone layer. They should ask their parents to choose ozone-friendly products.

Citizens can be motivated to read and learn more about the affects of ozone depletion on people, animals and environment. They should go through the national strategy and policies to implement the Montreal Protocol and get in touch with your

country's National Ozone Unit (Ozone Cell) to have first hand knowledge and information on Ozone related issues.

Industrialists and other related people can be encourage to identify the alternative ozone friendly products, technologies in consultation with Ozone Cell and carry out replacement.

It is known to us very well that no country or community on earth can seek protection against any liability by taking a stance that it is not involved at all in producing ozone depleting substances as the entire world as a whole is exposed to the ozone problem regardless of the place it originates from. All the concerned producers should ensure that such products are not sent to market and their products invariable should bear a certificate that there is no Ozone depleting substance. It is to be remembered that fact alone that some specific product is Ozone friendly does not serve the purpose. To meet the challenge that confronts the world community at large awareness campaign has to be zealously launched. The education must reach the lowest ebb with full effect that is the only way to protect the world from the hazards.

3.9.3 Participation of NGOs

Non-Governmental Organizations operate outside the realm of government and are characterized by their non-profit status. Environmental NGOs have actively participated and played an important role in efforts to protect the stratospheric ozone layer in developed countries.

By involving the NGOs in our strategies to control the ozone depletion, we can achieve better results. NGOs can play their effective role for this purpose:-

- By identifying and promoting policies and measures to implement the protocol faster than mandated;
- By advocating Ozone and climate safe and environmentally sustainablie technologies;
- By serving as watch dogs not only on illegal trade but also on many other issues;
- By striving to ensure that the goals of the Montreal Protocol are being achieved;
- By organizing the press conferences, seminars, public forums, dialogues to raise awareness about the environmental and health impacts of Ozone depletion;
- By driving public campaigns for public boycotts of the products containing of ODSs / creating consumer demand for Ozone friendly products;
- By pressurizing government and industry to implement strictly and effectively the phase out schedule of ODSs in accordance with the provisions of the Protocol, and
- By monitoring implementation of the Montreal Protocol.

3.9.4 Caution for the Future

The positive developments so far lead to confidence that the Montreal Protocol will succeed in its objective of protecting the Ozone layer. However, this should not lead to complacency that the problem has been solved. There have so far been no signs of the reversal of the depletion that has already occurred. The Antarctic Ozone Hole continues to be an annual feature in the Antarctic spring, September-October, with an area of about 22 million square kilometers.[20]While the scientists fully assure us that the ozone layer will recover if the Montreal Protocol is fully implemented, caution and vigilance are needed to avoid creating new problems for the ozone layer. We must remember to navigate carefully around the potholes on the road ahead.

[20]STEPHEN O ANDERSEN & K MADHAYA SARMA, *"Protecting the Ozone Layer: The United Nations History"*, Ed. Lani Sinclair, Earthscan India, New Delhi, 2004, p. 362.

CONCLUSION

Ozone Layer protects life on Earth from the sun's harmful ultraviolet (UV) rays. Some man made chemicals such as Chlorofluorocarbons (CFCs), Halons, Carbon Tetra Chloride (CTC) and Methyl Bromide etc. cause thinning of Ozone Layer, which is called Ozone Hole. This Ozone Hole allows more Ultraviolet radiation to reach the earth, as a consequence, health disorders, damage to plants and aquatic life, and degradation of materials is being increased. The issue is global, both in cause and impact. It does not matter where the substances that depleting the Ozone layer are used, eventually they find their way to the stratosphere where the impact of Ozone depletion effects the whole globe, albeit to differing extents depending on latitude. Given that the Ozone layer is depleted by global emissions without regard to the source of those emissions, control measures must be applied globally, to avoid the emission reductions in one country being offset by increased production and consumption in another.

Protection of Ozone layer, the ultimate objective of the Montreal Protocol on Substances that Deplete the Ozone Layer, allows life on earth to prosper. Realizing the seriousness of the Ozone layer depletion over the Antarctic and the recent phenomenon of thinning of the layer, Pakistan signed the Vienna Convention (1985) and the Montreal Protocol (1987) on December 18, 1992. It was the first step towards preparing an action program for the phase out of ODSs in Pakistan. The Government of Pakistan has taken several steps towards the implementation of the Montreal Protocol on Substances that Deplete

the Ozone layer. Pakistan has formulated policy and initiated regulatory measures to reduce the imports of ODS in the country as Pakistan does not manufacture any ODS. Ozone Cell has been established since 1996 in the Ministry of Environment to work as Secretariat for the activities for implementation of the provisions of the Montreal Protocol. After an in-depth survey of the import and consumption of the ODSs through M/s Hagler Baily, a Country Programme was prepared which was approved by the executive committee of the Multilateral Fund at its 20th meeting held in Montreal in October, 1996.

Best efforts were made at that time to portray ODS consumption in the different sectors. But when during project implementation, it was revealed that due to incomplete data some companies using ODS were not identified, some sub-sectors consuming substantial amount of ODS were possibly missed out and during this period a few establishments were closed while others quickly took over the market share, which changed the characteristics of the market, Country Programme Update was prepared by the World Bank in co-operation with Ozone Cell which was approved by the executive committee of the Multilateral Fund at its 41st meeting held in Montreal in December, 2003. During this period, a National ODS phase out policy was also prepared in November 2000, which was approved by the cabinet. This policy envisaged introduction of statutory rate of duty on import of exclusive components and raw material required both for the production and servicing of CFC products along with restrictions on the production after 31st December 2003.

In 1998, an import authorization / licensing system was introduced to regulate and monitor import of ODS in the country. A freeze was imposed on the imports of CFC to

the level of average consumption of 1995, 1996 & 1997 in July 1999. A complete phase out schedule for imports of ODSs through Import Trade and Procedures Order was introduced in July 2000. In August 2000, a quota system, based on the average import of the last three years was introduced. Another Import Order was issued in December 2004, allocating quota for the importers of Halons and Carbon Tetra Chloride (CTC) and banning the import of Methyl Bromide (except for quarantine purposes with the approval of Plant Protection Department) and Methyl Chlorine as there were no eligible importers. This was done almost five years ahead of the target date (i.e. Ist January 2010 fixed for 100% phasing out of ODS under Montreal Protocol). Imports of CTC were completely banned in May 2007, 2 ½ years ahead of target date. Pakistan has also imposed complete ban on import of CFC-based compressors vide National Trade Policy, implemented from July 2008. These all steps show Pakistan's commitment with the comity of nations to make the world Ozone friendly.

At the same time it is also a ground reality that there are a lot of challenges, Pakistan facing in implementation the provisions of the Montreal Protocol. So many shortcomings have also been detected in Pakistan's strategies in this regard.

One challenge, the matter of concern not only for Pakistan, but the entire world, is the growth of thriving black market in illegal shipments of CFCs and ODSs. As we are hading towards target date of complete phase of ODS, the graph of illegal trade and smuggling of ODS is increasing. The illegal trade of ODS is considered one of the most profitable business after drugs trafficking. UNEP and all the parties to the Montreal Protocol are making efforts jointly as well as individually to curb this menace. In order to combat this challenge, Pakistan has imparted training to 350 custom officers in

collaboration with UNIDO to enhance their capacity on the ODS issues. Their training has yielded encouraging results and in the recent past, the customs department has foiled two attempts of ODS illegal trade.

Another matter of serious concern for Pakistan is use of CFC in MDIs. At present the local production is supplied almost totally to the local market. The locally produced products and the imported products still fall short of the amount necessary to supply the affected population of Pakistani and as such it is expected that as demand increases the local production will be increased in order to meet the demand. This will necessitate an increase in the consumption of CFC to the extent of 33% of the total allowable limit for Pakistan. The current level of consumption and the anticipated increase in consumption may put Pakistan at the risk on non-compliance. In view of aforementioned facts, the production of local manufactured range of MDIs, in inevitable to cater the need of asthma patients living below the poverty line.

Lack of proper legislation is also a hurdle in effective implementation of Montreal Protocol measures in the country. Similarly another hurdle is decision making behavior of Official authorities without taking the relevant stake holders into confidence which results in delays, lack of co-operation, half achieved objectives etc.

To overcome the challenges, obstacles and problems it is suggested that specific legislation for implementation of the provisions of the Montreal Protocol should be made. Extent of awareness needs to be enhanced amongst the specific target groups, especially the relevant industries to reduce the use of Ozone depleting substances and the products containing ODSs by using the print and electronic media. We also believe that quality not quantity of knowledge matters in developing a proper sense of awareness among masses.

In Pakistan, the government generally holds itself responsible for policy making and implementing. There is a need to change the approach and involvement of NGOs and private sector is necessary. The main objective should include assessment of possible harm by individual industry, possible measures to reduce the hazard, dissemination of current information on the issue, interaction with national and international agencies and development of a legislative channel to manage the problem.

It is clear that humanity should be vigilant forever to ensure that Ozone depleting substances are banished from the world. Eternal vigilance is the price of a safe world.

> Yet this we ask ere you leave us, that you speak to us and give us of your truth.
> And we will give it unto our children, and they unto their children, and it Shall not perish.
>
> Khalil Gibran, 1883-1931

APPENCICES

APPENDIX A

List of Class I Ozone Depleting Substances

Chemical Name		Lifetime, in years
Group I		
CFC-11 Trichlorofluorometane	(CC13F)	45
CFC-12 Dichlorodifluoromethane	(CC12F2)	100
CFC-113 1,1,2-Trichlorotrifluorothane	(C2F3C13)	85
CFC-114 Dichlorotetrafluoroethane	(C2F4C12)	300
CFC-115 Monochloropentafluoroethane	(C2F5C1)	1700
Group II		
Halon 1211 Bromochlorodifluoromethane	(CF2C1Br)	16
Halon 1301 Bromotrifluoromethane	(CF3Br)	65
Halon 2401 Dibromotetrafluoroethane	(C2F4Br2)	20
Group III		
CFC-13 Chlorotrifluoromethane	(CF3C1)	640
CFC-111 Pentachlorofluoroethane	(C2FC15)	
CFC-112 Tetrachlorodifluoroethane	(C2F2C14)	
CFC-211 Heptachlorofluoropropane	(C3FC17)	
CFC-212 Heptachlorofluoropropane	(C3F2C16)	
CFC-213 Pentachlorotrifluoropropane	(C3F3C15)	
CFC-214 Tetrachlorotetrafluoropropane	(C3F4C14)	
CFC-215 Trichloropentafluoropropane	(C3F5C13)	
CFC-216 Dichlorohexafluoropropane	(C3F6C12)	
CFC-217 Chloroheptafluoropropane	(C3F7C1)	
Group IV		
CC14 Carbon tetrachloride		26
Group V		
Methyl Chloroform 1,1,1-trichloroethane	(C2H3C13)	5.0

Group VI		
Methyl Bromide	(CH3Br)	0.7
Group VII		
CHFBr2		
HBFC-12B1	(CHF2Br)	
C2HFBr4		
C2HF2Br3		
C2HF3Br2		
C2HF4Br		
C2H2FBr3		
C2H2F2Br2		
C2H2F3Br		
C2H3FBr2		
C2H3F2Br		
C2H4FBr		
C3HFBr6		
C3HF2Br5		
C3HF3Br4		
C3HF4Br3		
C3HF5Br2		
C3HF6Br		
C3H2FBr5		
C3H2F2Br4		
C3H2F3Br3		
C3H2F4Br2		
C3H2F5Br		
C3H3FBr4		
C3H3F2Br3		
C3H3F3Br2		
C3H3F4Br		
C3H4FBr3		
C3H4FBr2		
C3H4F3Br		
C3H5FBr2		
C3H5F2Br		
C3H6FBr		
Group VIII		
CH2BrCl Chlorobromomethane		0.37

List of Class II Ozone Depleting Substances

Chemical Name	Lifetime, in years.
HCFC-21 (CHFC12) Dichlorofluoromethane	1.7
HCFC-22 (CHF2C1) Monochlorodifluoromethane	12.0
HCFC-31 (Ch2FC1) Monochlorofluoromethane	
HCFC-121 (C2HFC14) Tetrachlorofluoroethane	
HCFC-122 (C2HF2C13) Trichlorodifluoroethane	
HCFC-123 (C2HF3C12) Dichlorotrifluoroethane	1.3
HCFC-124 (C2HF4C1) Monochlorotetrafluoroethane	5.8
HCFC-131 (C2H2FC13) Trichlorofluoroethane	
HCFC-132b (C2H2F2C12) Dichlorodifluoroethane	
HCFC-133a (C2H2F3C1) Monochlorotrifluoroethane	
HCFC-141b (C2H3FC12) Dichlorofluoroethane	9.3
HCFC-142b (C2H3F2C1) Monochlorodifluoroethane	17.9
HCFC-221 (C3HFC16) Hexachlorofluoropropane	
HCFC-222 (C3HF2C15) Pentachlorodifluoropropane	
HCFC-223 (C3HF3C14) Tetrachlorotrifluoropropane	
HCFC-224 (C3HF4C13) Trichlorotetrafluoropropane	
HCFC-225ca (C3HF5C12) Dichloropentafluoropropane	1.9
HCFC-225cb (C3HF5C12) Dichloropentafluoropropane	5.8
HCFC-226 (C3HF6C1) Monochlorohexafluoropropane	
HCFC-231 (C3H2FC15) Pentachlorofluoropropane	
HCFC-232 (C3H3F2C14) Tetrachlorodifluoropropane	
HCFC-233 (C3H2F3C13) Trichlorotrifluoropropane	
HCFC-234 (C3H2F4C12) Dichlorotetrafluoropropane	
HCFC-235 (C3H2F5C1) Monochloropentafluoropropane	
HCFC-241 (C3H3FC14) Tetrachlorofluoropropane	
HCFV-242 (C3H3F2C13)	

Trichlorodifluoropropane	
HCFC-243 (C3H3F3C12) Dichlorotrifluoropropane	
HCFC-244 (C3H3F4C1) Monchlorotetrafluoropropane	
HCFC-251 (C3H4FC13) Trichlorofluoropropane	
HCFC-252 (C3H4F2C12) Dichlorodifluoropropane	
HCFC-253 (C3H4F3C1) Monochlorotrifluoropropane	
HCFC-261 (C3H5FC12) Dichlorofluoropropane	
HCFC-262 (C3H5F2C1) Monochlorodifluoropropane	
HCFC-271 (C3H6FC1) Monochlorofluoropropane	

APPENDIX B

Ozone Depleting Substance-uses

Use	Ozone Depleting Substances
Refrigeration and Air Conditioning	CFC 11, 12, 113, 114, 115 HCFC 22, 123, 124
Aerosols	CFC 11, 12,114
Foam Blowing/Rigid Insulation Foams	CFC 11, 12, 113 HCFC 22, 141b, 142b
Fire Extinction	Halons (e.g. halon-1301, halon-1211)
Pest Control/Soil Fumigation	Methyl bromide
Solvents (used for cleaning precision parts)	CFC113 HCFC 141b, 2225 1,1,1 trichloroethane Carbon tetrachloride

APPENDIX C

Time-Table for the Phase Out of Ozone Depleting Substances.

Ozone Depleting Substances	Developed Countries	Developing Countries
Chlorofluorocarbons (CFCs)	Phased out end of 1995	Total phase out by 2010
Halons	Phased out end of 1993	Total phase out by 2010
Carbon tetrachloride	Phased out end of 1995	Total phase out by 2010
Methyl chloroform	Phased out end of 1995	Total phase out by 2015
Hydrochlorofluorocarbons (HCFCs)	Freeze from beginning of 1996	
	35% reduction by 2004	
	65% reduction by 2010	Freeze in 2016
	90% reduction by 2015	at 2015 base level
	100% reduction by 2020	Total phase out by 2040
Hydrobromofluorocarbons (HBFCs)	Phased out end of 1995	Phased out end of 1995
Methyl bromide	Freeze in 1995 at 1991 base level	Freeze in 2002 at average
	25% reduction by 1999	1995-1998 base level
	50% reduction by 2000	20% reduction by 2005
	70% reduction by 2001	Total phase out by 2015
	Total phase out by 2005	

APPENDIX D

List of Parties Categorized as Operating under Article 5 Paragraph I of the Montreal Protocol

(Updated as of 27 August 2009)

1. Afghanistan
2. Albania
3. Algeria
4. Angola
5. Antigua & Barbuda
6. Argentina
7. Armenia
8. Bahamas
9. Bahrain
10. Bangladesh
11. Barbados
12. Belize
13. Benin
14. Bhutan
15. Bolivia
16. Bosnia and Herzegovina
17. Botswana
18. Brazil
19. Brunei Darussalam
20. Burkina Faso
21. Burundi
22. Cambodia
23. Cameroon
24. Cape Verde
25. Central African Republic
26. Chad
27. Chile
28. China
29. Colombia
30. Comoros
31. Congo
32. Congo, Democratic Republic of
51. Ghana
52. Grenada
53. Guatemala
54. Guinea
55. Guinea Bissau
56. Guyana
57. Haiti
58. Honduras
59. India
60. Indonesia
61. Iran, Islamic Republic of
62. Iraq
63. Jamaica
64. Jordan
65. Kenya
66. Kiribati
67. Korea, People's Democratic Republic of
68. Korea, Republic of
69. Kuwait
70. Kyrgyzstan
71. Lao People's Democratic Republic
72. Lebanon
73. Lesotho
74. Liberia
75. Libyan Arab Jamahiriya
76. Madagascar
77. Malawi
78. Malaysia
79. Maldives
80. Mali
81. Marshall Islands
82. Mauritania
102. Panama
103. Papua New Guinea
104. Paraguay
105. Peru
106. Philippines
107. Qatar
108. Rwanda
109. Saint Kitts and Nevis
110. Saint Lucia
111. Saint Vincent & the Grenadines
112. Samoa
113. Sao Tome and Principe
114. Saudi Arabia
115. Senegal
116. Serbia
117. Seychelles
118. Sierra Leone
119. Singapore
120. Solomon Islands
121. Somalia
122. South Africa
123. Sri Lanka
124. Sudan
125. Suriname
126. Swaziland
127. Syrian Arab Republic
128. Tanzania, United Republic of
129. Thailand
130. The Former Yugoslav Repubic of Macedonia
131. Togo
132. Tonga

33. Cook Islands	83. Mauritius	133. Trinidad and Tobago
34. Cost Rica	84. Mexico	134. Tunisia
35. Côte d'Ivoire	85. Micronesia,	135. Turkey
36. Croatia	Federal States of	136. Turkmenistan
37. Cuba	86. Moldova	137. Tuvalu
38. Djibouti	87. Mongolia	138. Uganda
39. Dominica	88. Montenegro	139. United Arab
40. Dominican	89. Morocco	Emirates
Republic	90. Mozambique	140. Uruguay
41. Ecuador	91. Myanmar	141. Vanuatu
42. Egypt	92. Namibia	142. Venezuela
43. El Salvador	93. Nauru	143. Viet Nam
44. Equatorial	94. Nepal	144. Yemen
Guinea	95. Nicaragua	145. Zambia
45. Eritrea	96. Niger	146. Zimbabwe
46. Ethiopia	97. Nigeria	
47. Fiji	98. Niue	
48. Gabon	99. Oman	
49. Gambia	100. Pakistan	
50. Georgia	101. Palau	

APPENDIX E

The table showing the Status of Ratification, Accession, or Approval of the Vienna Convention, Montreal Protocol and its Amendments.

	Signature	Signatur e	Ratification*	Ratification*	Ratification*	Ratification*	Ratification*	Ratification*
Party	Vienna Convention	Montrea l Protocol	Vienna Convention	Montreal Protocol	London Amendment	Copenhagen Amendment	Montreal Amendment	Beijing Amendment
Afghanistan			17.06.2004(Ac)	17.06.2004(Ac)	17.06.2004(Ac)	17.06.2004(Ac)	17.06.2004(Ac)	17.06.2004(Ac)
Albania			08.10.1999(Ac)	08.10.1999(Ac)	25.05.2006(Ac)	25.05.2006(Ac)	25.05.2006(Ac)	25.05.2006(Ac)
Algeria			20.10.1992(Ac)	20.10.1992(Ac)	20.10.1992(Ac)	31.05.2000(R)	06.08.2007(R)	06.08.2007(R)
Andorra			26.01.2009(Ac)	26.01.2009(Ac)	26.01.2009(Ac)	26.01.2009(Ac)	26.01.2009(Ac)	26.01.2009(Ac)
Angola			17.05.2000(Ac)	17.05.2000(Ac)				
Antigua and Barbuda			03.12.1992(Ac)	03.12.1992(Ac)	23.02.1993(Ac)	19.07.1993(Ac)	10.02.2000(R)	
Argentina	22.03.1985	29.06.19 88	18.01.1990(R)	18.09.1990(R)	04.12.1992(R)	20.04.1995(Ac)	15.02.2001(R)	28.08.2006(R)
Armenia			01.10.1999(Ac)	01.10.1999(Ac)	26.11.2003(Ac)	26.11.2003(Ac)	18.12.2008 (R)	18.12.2008 (R)
Australia		08.06.19 88	16.09.1987(Ac)	19.05.1989(R)	11.08.1992(At)	30.06.1994(At)	05.01.1999(At)	17.08.2005(At)
Austria	16.09.1985	29.08.19 88	19.08.1987(R)	03.05.1989(R)	11.12.1992(R)	19.09.1996(Ap)	07.08.2000(R)	23.09.2004(R)
Azerbaijan			12.06.1996(Ac)	12.06.1996(Ac)	12.06.1996(Ac)	12.06.1996(Ac)	28.09.2000(Ap)	
Bahamas			01.04.1993(Ac)	04.05.1993(Ac)	04.05.1993(Ac)	04.05.1993(Ac)	16.03.2005(At)	16.03.2005(At)
Bahrain			27.04.1990(Ac)	27.04.1990(Ac)	23.12.1992(At)	13.03.2001(R)	13.03.2001(R)	
Bangladesh			02.08.1990(Ac)	02.08.1990(Ac)	18.03.1994(R)	27.11.2000(At)	27.07.2001(At)	
Barbados			16.10.1992(Ac)	16.10.1992(Ac)	20.07.1994(At)	20.07.1994(At)	10.12.2002(Ac)	10.12.2002(Ac)
Belarus	22.03.1985	22.01.19 88	20.06.1986(At)	31.10.1988(At)	10.06.1996(R)	13.03.2007(At)	13.03.2007(At)	13.03.2007(At)
Belgium	22.03.1985	16.09.19 87	17.10.1988(R)	30.12.1988(R)	05.10.1993(R)	07.08.1997(R)	11.08.2004(R)	06.04.2006(R)
Belize			06.06.1997(Ac)	09.01.1998(Ac)	09.01.1998(Ac)	09.01.1998(Ac)	17.01.2008(Ap)	17.01.2008(Ap)
Benin			01.07.1993(Ac)	01.07.1993(Ac)	21.06.2000(R)	21.06.2000(R)	16.11.2007(At)	16.11.2007(At)
Bhutan			23.08.2004(Ac)	23.08.2004(Ac)	23.08.2004(Ac)	23.08.2004(Ac)	23.08.2004(Ac)	23.08.2004(Ac)
Bolivia			03.10.1994(Ac)	03.10.1994(Ac)	03.10.1994(Ac)	03.10.1994(Ac)	12.04.1999(Ac)	
Bosnia and Herzegovina			01.09.1993(Sc)	01.09.1993(Sc)	11.08.2003(Ac)	11.08.2003(Ac)	11.08.2003(Ac)	
Botswana			04.12.1991(Ac)	04.12.1991(Ac)	13.05.1997(Ac)	13.05.1997(Ac)		
Brazil			19.03.1990(Ac)	19.03.1990(Ac)	01.10.1992(At)	25.06.1997(R)	30.06.2004(R)	30.06.2004(R)
Brunei Darussalam			26.07.1990(Ac)	27.05.1993(Ac)	03.03.2009(Ac)	03.03.2009(Ac)	03.03.2009(Ac)	03.03.2009(Ac)
Bulgaria			20.11.1990(Ac)	20.11.1990(Ac)	28.04.1999(R)	28.04.1999(R)	24.11.1999(R)	15.04.2002(R)
Burkina Faso	12.12.1985	14.09.19 88	30.03.1989(R)	20.07.1989(R)	10.06.1994(R)	12.12.1995(R)	11.11.2002(R)	11.11.2002(R)
Burundi			06.01.1997(Ac)	06.01.1997(Ac)	18.10.2001(At)	18.10.2001(At)	18.10.2001(At)	18.10.2001(At)
Cambodia			27.06.2001(Ac)	27.06.2001(Ac)	31.01.2007(Ac)	31.01.2007(Ac)	31.01.2007(Ac)	31.01.2007(Ac)
Cameroon			30.08.1989(Ac)	30.08.1989(Ac)	08.06.1992(At)	25.06.1996(At)		
Canada	22.03.1985	16.09.19 87	04.06.1986(R)	30.06.1988(R)	05.07.1990(At)	16.03.1994(R)	27.03.1998(R)	09.02.2001(At)
Cape Verde			31.07.2001(Ac)	31.07.2001(Ac)	31.07.2001(Ac)	31.07.2001(Ac)	31.07.2001(Ac)	
Central African			29.03.1993(Ac)	29.03.1993(Ac)	29.05.2008(R)	29.05.2008(R)	29.05.2008(R)	29.05.2008(R)

Republic								
Chad			18.05.1989(Ac)	07.06.1994(R)	30.05.2001(R)	30.05.2001(R)	30.05.2001(R)	
Chile	22.03.1985	14.06.1988	06.03.1990(R)	26.03.1990(R)	09.04.1992(At)	14.01.1994(R)	17.06.1998(R)	03.05.2000(R)
China			11.09.1989(Ac)	14.06.1991(Ac)	14.06.1991(Ac)	22.04.2003(Ac)		
Colombia			16.07.1990(Ac)	06.12.1993(Ac)	06.12.1993(Ac)	05.08.1997(At)	16.06.2003(Ac)	15.09.2006(Ac)
Comoros			31.10.1994(Ac)	31.10.1994(Ac)	31.10.1994(Ac)	02.12.2002(Ac)	02.12.2002(Ac)	02.12.2002(Ac)
Congo		15.09.1988	16.11.1994(Ac)	16.11.1994(Ac)	16.11.1994(R)	19.10.2001(Ac)	19.10.2001(Ac)	19.10.2001(Ac)
Cook Islands			22.12.2003(Ac)	22.12.2003(Ac)	22.12.2003(Ac)	22.12.2003(Ac)	22.12.2003(Ac)	22.12.2003(Ac)
Costa Rica			30.07.1991(Ac)	30.07.1991(Ac)	11.11.1998(R)	11.11.1998(R)	01.12.2005(R)	01.12.2008(R)
Côte d'Ivoire			05.04.1993(Ac)	05.04.1993(Ac)	18.05.1994(R)	08.10.2003(R)		
Croatia			21.09.1992(Sc)	21.09.1992(Sc)	15.10.1993(R)	11.02.1997(R)	08.09.2000(R)	25.04.2002(R)
Cuba			14.07.1992(Ac)	14.07.1992(Ac)	19.10.1998(R)	19.10.1998(Ap)	12.09.2005(At)	12.09.2005(At)
Cyprus			28.05.1992(Ac)	28.05.1992(Ac)	11.10.1994(At)	02.06.2003(At)	02.06.2003(At)	02.09.2004(R)
Czech Republic			01.01.1993(Sc)	01.01.1993(Sc)	18.12.1996(Ac)	18.12.1996(Ac)	05.11.1999(Ap)	09.05.2001(At)
Democratic People's Republic of Korea			24.01.1995(Ac)	24.01.1995(Ac)	17.06.1999(Ac)	17.06.1999(Ac)	13.12.2001(Ac)	13.12.2001(Ac)
Democratic Republic of the Congo			30.11.1994(Ac)	30.11.1994(Ac)	30.11.1994(Ac)	30.11.1994(Ac)	23.03.2005(Ac)	23.03.2005(Ac)
Denmark	22.03.1985	16.09.1987	29.09.1988(R)	16.12.1988(R)	20.12.1991(Ac)	21.12.1993(At)	24.09.2003(At)	24.09.2003(At)
Djibouti			30.07.1999(Ac)	30.07.1999(Ac)	30.07.1999(Ac)	30.07.1999(Ac)	30.07.1999(Ac)	
Dominica			31.03.1993(Ac)	31.03.1993(Ac)	31.03.1993(Ac)	07.03.2006(Ac)	07.03.2006(Ac)	07.03.2006(Ac)
Dominican Republic			18.05.1993(Ac)	18.05.1993(Ac)	24.12.2001(Ac)	24.12.2001(Ac)		
Ecuador			10.04.1990(Ac)	30.04.1990(Ac)	23.02.1993(R)	24.11.1993(At)	16.02.2007(Ac)	
Egypt	22.03.1985	16.09.1987	09.05.1988(R)	02.08.1988(R)	13.01.1993(R)	28.06.1994(R)	20.07.2000(R)	06.03.2009(R)
El Salvador			02.10.1992(Ac)	02.10.1992(Ac)	08.12.2000(Ac)	08.12.2000(Ac)	08.12.2000(Ac)	13.11.2007(Ac)
Equatorial Guinea			17.08.1988(Ac)	06.09.2006(Ac)	11.07.2007(Ac)	11.07.2007(Ac)	11.07.2007(Ac)	11.07.2007(Ac)
Eritrea			10.03.2005(Ac)	10.03.2005(Ac)	05.07.2005(Ac)	05.07.2005(Ac)	05.07.2005(Ac)	05.07.2005(Ac)
Estonia			17.10.1996(Ac)	17.10.1996(Ac)	12.04.1999(R)	12.04.1999(R)	11.04.2003(Ac)	22.12.2003(R)
Ethiopia			11.10.1994(Ac)	11.10.1994(Ac)				
European Community	22.03.1985	16.09.1987	17.10.1988(Ap)	16.12.1988(Ap)	20.12.1991(Ap)	20.11.1995(Ap)	17.11.2000(Ap)	25.03.2002(Ap)
Fiji			23.10.1989(Ac)	23.10.1989(Ac)	09.12.1994(Ac)	17.05.2000(Ac)	19.02.2007(Ac)	19.02.2007(Ac)
Finland	22.03.1985	16.09.1987	26.09.1986(R)	23.12.1988(R)	20.12.1991(Ac)	16.11.1993(At)	18.06.2001(At)	18.06.2001(At)
France	22.03.1985	16.09.1987	04.12.1987(Ap)	28.12.1988(Ap)	12.02.1992(Ap)	03.01.1996(Ap)	25.07.2003(Ap)	25.07.2003(Ap)
Gabon			09.02.1994(Ac)	09.02.1994(Ac)	04.12.2000(Ac)	04.12.2000(Ac)	04.12.2000(Ac)	04.12.2000(Ac)
Gambia			25.07.1990(Ac)	25.07.1990(Ac)	13.03.1995(R)	30.04.2008(R)	30.04.2008(R)	30.04.2008(R)
Georgia			21.03.1996(Ac)	21.03.1996(Ac)	12.07.2000(Ac)	12.07.2000(Ac)	12.07.2000(Ac)	
Germany	22.03.1985	16.09.1987	30.09.1988(R)	16.12.1988(R)	27.12.1991(R)	28.12.1993(R)	05.01.1999(R)	28.10.2002(R)
Ghana		16.09.1987	24.07.1989(Ac)	24.07.1989(R)	24.07.1992(R)	09.04.2001(R)	08.08.2005(Ac)	08.08.2005(Ac)
Greece	22.03.1985	29.10.1987	29.12.1988(R)	29.12.1988(R)	11.05.1993(R)	30.01.1995(R)	27.01.2006(R)	27.01.2006(R)
Grenada			31.03.1993(Ac)	31.03.1993(Ac)	07.12.1993(Ac)	20.05.1999(Ac)	20.05.1999(Ac)	12.01.2004(Ac)
Guatemala			11.09.1987(Ac)	07.11.1989(Ac)	21.01.2002(Ac)	21.01.2002(Ac)	21.01.2002(Ac)	21.01.2002(Ac)
Guinea			25.06.1992(Ac)	25.06.1992(Ac)	25.06.1992(Ac)			

Guinea-Bissau			12.11.2002(Ac)	12.11.2002(Ac)	12.11.2002(Ac)	12.11.2002(Ac)	12.11.2002(Ac)	12.11.2002(Ac)
Guyana			12.08.1993(Ac)	12.08.1993(Ac)	23.07.1999(At)	23.07.1999(At)	23.07.1999(At)	02.06.2008(At)
Haiti			29.03.2000(Ac)	29.03.2000(Ac)	29.03.2000(Ac)	29.03.2000(Ac)	29.03.2000(Ac)	
Holy See			05.05.2008(Ac)	05.05.2008(Ac)	05.05.2008(Ac)	05.05.2008(Ac)	05.05.2008(Ac)	05.05.2008(Ac)
Honduras			14.10.1993(Ac)	14.10.1993(Ac)	24.01.2002(R)	24.01.2002(R)	14.09.2007(Ac)	14.09.2007(Ac)
Hungary			04.05.1988(Ac)	20.04.1989(Ac)	09.11.1993(Ap)	17.05.1994(Ac)	26.07.1999(R)	23.04.2002(Ap)
Iceland			29.08.1989(Ac)	29.08.1989(Ac)	16.06.1993(Ac)	15.03.1994(R)	08.02.2000(R)	31.03.2004(R)
India			18.03.1991(Ac)	19.06.1992(Ac)	19.06.1992(Ac)	03.03.2003(Ac)	03.03.2003(Ac)	03.03.2003(Ac)
Indonesia		21.07.1988	26.06.1992(Ac)	26.06.1992(R)	26.06.1992(Ac)	10.12.1998(Ac)	26.01.2006(R)	26.01.2006(R)
Iran (Islamic Republic of)			03.10.1990(Ac)	03.10.1990(Ac)	04.08.1997(At)	04.08.1997(At)	17.10.2001(At)	
Iraq			25.06.2008(Ac)	25.06.2008(Ac)	25.06.2008(Ac)	25.06.2008(Ac)	25.06.2008(Ac)	25.06.2008(Ac)
Ireland		15.09.1988	15.09.1988(Ac)	16.12.1988(R)	20.12.1991(At)	16.04.1996(At)	06.10.2005(At)	06.10.2005(At)
Israel		14.01.1988	30.06.1992(Ac)	30.06.1992(R)	30.06.1992(R)	05.04.1995(R)	28.05.2003(R)	15.04.2004(R)
Italy	22.03.1985	16.09.1987	19.09.1988(R)	16.12.1988(R)	21.02.1992(Ap)	04.01.1995(R)	01.05.2001(R)	22.10.2004(R)
Jamaica			31.03.1993(Ac)	31.03.1993(Ac)	31.03.1993(Ac)	06.11.1997(R)	24.09.2003(Ac)	24.09.2003(Ac)
Japan		16.09.1987	30.09.1988(Ac)	30.09.1988(At)	04.09.1991(At)	20.12.1994(At)	30.08.2002(At)	30.08.2002(At)
Jordan			31.05.1989(Ac)	31.05.1989(Ac)	12.11.1993(R)	30.06.1995(R)	03.02.1999(R)	01.02.2001(R)
Kazakhstan			26.08.1998(Ac)	26.08.1998(Ac)	26.07.2001(Ac)			
Kenya		16.09.1987	09.11.1988(Ac)	09.11.1988(R)	27.09.1994(R)	27.09.1994(R)	12.07.2000(R)	
Kiribati			07.01.1993(Ac)	07.01.1993(Ac)	09.08.2004(Ac)	09.08.2004(Ac)	09.08.2004(Ac)	09.08.2004(Ac)
Kuwait			23.11.1992(Ac)	23.11.1992(Ac)	22.07.1994(Ac)	22.07.1994(Ac)	13.06.2003(Ac)	30.07.2007(Ac)
Kyrgyzstan			31.05.2000(Ac)	31.05.2000(Ac)	13.05.2003(R)	13.05.2003(R)	13.05.2003(R)	05.10.2005(R)
Lao People's Democratic Republic			21.08.1998(Ac)	21.08.1998(Ac)	28.06.2006(Ac)	28.06.2006(Ac)	28.06.2006(Ac)	28.06.2006(Ac)
Latvia			28.04.1995(Ac)	28.04.1995(Ac)	02.11.1998(At)	02.11.1998(At)	14.06.2002(At)	09.07.2004(At)
Lebanon			30.03.1993(Ac)	31.03.1993(Ac)	31.03.1993(Ac)	31.07.2000(Ac)	31.07.2000(Ac)	21.11.2008(Ac)
Lesotho			25.03.1994(Ac)	25.03.1994(Ac)				
Liberia			15.01.1996(Ac)	15.01.1996(Ac)	15.01.1996(Ac)	15.01.1996(Ac)	30.11.2004(Ac)	30.11.2004(Ac)
Libyan Arab Jamahiriya			11.07.1990(Ac)	11.07.1990(Ac)	12.07.2001(Ac)	24.09.2004(Ac)		
Liechtenstein			08.02.1989(Ac)	08.02.1989(Ac)	24.03.1994(R)	22.11.1996(Ac)	23.12.2003(At)	23.12.2003(At)
Lithuania			18.01.1995(Ac)	18.01.1995(Ac)	03.02.1998(R)	03.02.1998(R)	17.03.2004(At)	17.03.2004(At)
Luxembourg	17.04.1985	29.01.1988	17.10.1988(R)	17.10.1988(R)	20.05.1992(R)	09.05.1994(R)	08.02.1999(R)	22.01.2001(R)
Madagascar			07.11.1996(Ac)	07.11.1996(Ac)	16.01.2002(Ac)	16.01.2002(Ac)	16.01.2002(Ac)	16.01.2002(Ac)
Malawi			09.01.1991(Ac)	09.01.1991(Ac)	08.02.1994(At)	28.02.1994(Ac)	27.02.2009(R)	27.02.2009(R)
Malaysia			29.08.1989(Ac)	29.08.1989(Ac)	16.06.1993(Ac)	05.08.1993(Ac)	26.10.2001(R)	26.10.2001(R)
Maldives		12.07.1988	26.04.1988(Ac)	16.05.1989(R)	31.07.1991(R)	27.09.2001(R)	27.09.2001(R)	03.09.2002(Ac)
Mali			28.10.1994(Ac)	28.10.1994(Ac)	28.10.1994(Ac)	07.03.2003(At)	07.03.2003(At)	25.03.2004(At)
Malta		15.09.1988	15.09.1988(Ac)	29.12.1988(R)	04.02.1994(Ap)	22.12.2003(At)	22.12.2003(At)	22.12.2003(At)
Marshall Islands			11.03.1993(Ac)	11.03.1993(Ac)	11.03.1993(Ac)	24.05.1993(Ac)	27.01.2003(Ac)	19.05.2004(Ac)
Mauritania			26.05.1994(Ac)	26.05.1994(Ac)	22.07.2005(At)	22.07.2005(At)	22.07.2005(At)	
Mauritius			18.08.1992(Ac)	18.08.1992(Ac)	20.10.1992(Ac)	30.11.1993(R)	24.03.2003(At)	24.03.2003(At)
Mexico	01.04.1985	16.09.1987	14.09.1987(R)	31.03.1988(At)	11.10.1991(At)	16.09.1994(At)	28.07.2006(At)	12.09.2007(At)

Micronesia (Federated States of)			03.08.1994(Ac)	06.09.1995(Ac)	27.11.2001(Ac)	27.11.2001(Ac)	27.11.2001(Ac)	27.11.2001(Ac)
Monaco			12.03.1993(Ac)	12.03.1993(Ac)	12.03.1993(Ac)	15.06.1999(At)	26.07.2001(At)	03.04.2003(At)
Mongolia			07.03.1996(Ac)	07.03.1996(Ac)	07.03.1996(Ac)	07.03.1996(Ac)	28.03.2002(R)	24.06.2008(R)
Montenegro			23.10.2006(Sc)	23.10.2006(Sc)	23.10.2006(Sc)	23.10.2006(Sc)	23.10.2006(Sc)	23.10.2006(Sc)
Morocco	07.02.1986	07.01.1988	28.12.1995(R)	28.12.1995(R)	28.12.1995(Ac)	28.12.1995(Ac)		
Mozambique			09.09.1994(Ac)	09.09.1994(Ac)	09.09.1994(Ac)	09.09.1994(Ac)		
Myanmar			24.11.1993(Ac)	24.11.1993(Ac)	24.11.1993(Ac)	22.05.2009(Ac)		
Namibia			20.09.1993(Ac)	20.09.1993(Ac)	06.11.1997(R)	28.07.2003(At)	01.10.2007(At)	01.10.2007(At)
Nauru			12.11.2001(Ac)	12.11.2001(Ac)	10.09.2004(Ac)	10.09.2004(Ac)	10.09.2004(Ac)	10.09.2004(Ac)
Nepal			06.07.1994(Ac)	06.07.1994(Ac)	06.07.1994(Ac)			
Netherlands	22.03.1985	16.09.1987	28.09.1988(Ac)	16.12.1988(At)	20.12.1991(At)	25.04.1994(Ac)	21.02.2000(At)	13.11.2001(At)
New Zealand	21.03.1986	16.09.1987	02.06.1987(R)	21.07.1988(R)	01.10.1990(At)	04.06.1993(R)	03.06.1999(R)	08.06.2001(R)
Nicaragua			05.03.1993(Ac)	05.03.1993(Ac)	13.12.1999(R)	13.12.1999(R)		
Niger			09.10.1992(Ac)	09.10.1992(Ac)	11.01.1996(Ac)	08.10.1999(R)	08.10.1999(R)	25.08.2005(R)
Nigeria			31.10.1988(Ac)	31.10.1988(Ac)	27.09.2001(R)	27.09.2001(R)	27.09.2001(R)	24.05.2004(R)
Niue			22.12.2003(Ac)	22.12.2003(Ac)	22.12.2003(Ac)	22.12.2003(Ac)	22.12.2003(Ac)	22.12.2003(Ac)
Norway	22.03.1985	16.09.1987	23.09.1986(R)	24.06.1988(R)	18.11.1991(R)	03.09.1993(R)	30.12.1998(R)	29.11.2001(R)
Oman			30.06.1999(Ac)	30.06.1999(Ac)	05.08.1999(Ac)	05.08.1999(Ac)	19.01.2005(R)	19.01.2005(R)
Pakistan			18.12.1992(Ac)	18.12.1992(Ac)	18.12.1992(Ac)	17.02.1995(R)	02.09.2005(R)	02.09.2005(R)
Palau			29.05.2001(Ac)	29.05.2001(Ac)	29.05.2001(Ac)	29.05.2001(Ac)	29.05.2001(Ac)	29.05.2001(Ac)
Panama		16.09.1987	13.02.1989(Ac)	03.03.1989(R)	10.02.1994(R)	04.10.1996(Ac)	05.03.1999(R)	05.12.2001(R)
Papua New Guinea			27.10.1992(Ac)	27.10.1992(Ac)	04.05.1993(Ac)	07.10.2003(Ac)		
Paraguay			03.12.1992(Ac)	03.12.1992(Ac)	03.12.1992(Ac)	27.04.2001(R)	27.04.2001(R)	18.07.2006(Ac)
Peru	22.03.1985		07.04.1989(R)	31.03.1993(Ac)	31.03.1993(Ac)	07.06.1999(Ac)	20.05.2008(Ac)	
Philippines		14.09.1988	17.07.1991(Ac)	17.07.1991(R)	09.08.1993(R)	15.06.2001(R)	23.05.2006(R)	23.05.2006(R)
Poland			13.07.1990(Ac)	13.07.1990(Ac)	02.10.1996(Ac)	02.10.1996(Ac)	06.12.1999(R)	13.04.2006(R)
Portugal		16.09.1987	17.10.1988(Ac)	17.10.1988(R)	24.11.1992(R)	24.02.1998(R)	03.10.2003(R)	08.05.2006(R)
Qatar			22.01.1996(Ac)	22.01.1996(Ac)	22.01.1996(Ac)	22.01.1996(Ac)	29.10.2009(R)	29.10.2009(R)
Republic of Korea			27.02.1992(Ac)	27.02.1992(Ac)	10.12.1992(Ac)	02.12.1994(At)	19.08.1998(At)	09.01.2004(At)
Republic of Moldova			24.10.1996(Ac)	24.10.1996(Ac)	25.06.2001(Ac)	25.06.2001(Ac)	24.05.2005(Ac)	05.12.2006(Ac)
Romania			27.01.1993(Ac)	27.01.1993(Ac)	27.01.1993(Ac)	28.11.2000(At)	21.05.2001(R)	17.11.2005(At)
Russian Federation	22.03.1985	29.12.1987	18.06.1986(At)	10.11.1988(At)	13.01.1992(At)	14.12.2005(At)	14.12.2005(At)	14.12.2005(At)
Rwanda			11.10.2001(Ac)	11.10.2001(Ac)	07.01.2004(Ac)	07.01.2004(Ac)	07.01.2004(Ac)	07.01.2004(Ac)
Saint Kitts and Nevis			10.08.1992(Ac)	10.08.1992(Ac)	08.07.1998(Ac)	08.07.1998(R)	25.02.1999(R)	08.01.2009(R)
Saint Lucia			28.07.1993(Ac)	28.07.1993(Ac)	24.08.1999(Ac)	24.08.1999(Ac)	24.08.1999(Ac)	12.12.2001(R)
Saint Vincent and the Grenadines			02.12.1996(Ac)	02.12.1996(Ac)	02.12.1996(Ac)	02.12.1996(Ac)	11.05.2009(R)	11.05.2009(R)
Samoa			21.12.1992(Ac)	21.12.1992(Ac)	04.10.2001(At)	04.10.2001(At)	04.10.2001(At)	04.10.2001(At)
San Marino			23.04.2009(Ac)	23.04.2009(Ac)	23.04.2009(Ac)	23.04.2009(Ac)	23.04.2009(Ac)	23.04.2009(Ac)
Sao Tome and Principe			19.11.2001(Ac)	19.11.2001(Ac)	19.11.2001(Ac)	19.11.2001(Ac)	19.11.2001(Ac)	19.11.2001(Ac)
Saudi Arabia			01.03.1993(Ac)	01.03.1993(Ac)	01.03.1993(Ac)	01.03.1993(Ac)		

Senegal		16.09.1987	19.03.1993(Ac)	06.05.1993(R)	06.05.1993(R)	12.08.1999(Ac)	12.08.1999(Ac)	08.10.2003(R)
Serbia			12.03.2001(Sc)	12.03.2001(Sc)	22.03.2005(Ac)	22.03.2005(Ac)	22.03.2005(Ac)	22.03.2005(Ac)
Seychelles			06.01.1993(Ac)	06.01.1993(Ac)	06.01.1993(Ac)	27.05.1993(R)	26.08.2002(Ac)	26.08.2002(Ac)
Sierra Leone			29.08.2001(Ac)	29.08.2001(Ac)	29.08.2001(Ac)	29.08.2001(Ac)	29.08.2001(Ac)	29.08.2001(Ac)
Singapore			05.01.1989(Ac)	05.01.1989(Ac)	02.03.1993(Ac)	22.09.2000(Ac)	22.09.2000(Ac)	10.01.2007(Ac)
Slovakia			28.05.1993(Sc)	28.05.1993(Sc)	15.04.1994(Ap)	08.01.1998(Ac)	03.11.1999(Ap)	22.05.2002(R)
Slovenia			06.07.1992(Sc)	06.07.1992(Sc)	08.12.1992(At)	13.11.1998(At)	15.11.1999(R)	23.01.2003(R)
Solomon Islands			17.06.1993(Ac)	17.06.1993(Ac)	17.08.1999(Ac)	17.08.1999(Ac)	17.08.1999(Ac)	
Somalia			01.08.2001(Ac)	01.08.2001(Ac)	01.08.2001(Ac)	01.08.2001(Ac)	01.08.2001(Ac)	01.08.2001(Ac)
South Africa			15.01.1990(Ac)	15.01.1990(Ac)	12.05.1992(Ac)	13.03.2001(Ac)	11.11.2004(Ac)	11.11.2004(Ac)
Spain		21.07.1988	25.07.1988(Ac)	16.12.1988(R)	19.05.1992(At)	05.06.1995(At)	11.05.1999(At)	19.02.2002(At)
Sri Lanka			15.12.1989(Ac)	15.12.1989(Ac)	16.06.1993(Ac)	07.07.1997(Ac)	20.08.1999(Ac)	27.11.2002(Ac)
Sudan			29.01.1993(Ac)	29.01.1993(Ac)	02.01.2002(Ac)	02.01.2002(Ac)	18.05.2004(Ac)	18.05.2004(Ac)
Suriname			14.10.1997(Ac)	14.10.1997(Ac)	29.03.2006(Ac)	29.03.2006(Ac)	29.03.2006(Ac)	29.03.2006(Ac)
Swaziland			10.11.1992(Ac)	10.11.1992(Ac)	16.12.2005(Ac)	16.12.2005(Ac)	16.12.2005(Ac)	16.12.2005(Ac)
Sweden	22.03.1985	16.09.1987	26.11.1986(R)	29.06.1988(R)	02.08.1991(R)	09.08.1993(R)	12.07.1999(R)	28.03.2002(R)
Switzerland	22.03.1985	16.09.1987	17.12.1987(R)	28.12.1988(R)	16.09.1992(R)	16.09.1996(R)	28.08.2002(R)	28.08.2002(R)
Syrian Arab Republic			12.12.1989(Ac)	12.12.1989(Ac)	30.11.1999(Ac)	30.11.1999(Ac)	30.11.1999(Ac)	
Tajikistan			06.05.1996(Ac)	07.01.1998(Ac)	07.01.1998(Ac)	07.05.2009(Ac)	07.05.2009(Ac)	07.05.2009(Ac)
Thailand		15.09.1988	07.07.1989(Ac)	07.07.1989(R)	25.06.1992(R)	01.12.1995(R)	23.06.2003(R)	14.11.2006(R)
The Former Yugoslav Republic of Macedonia			10.03.1994(Sc)	10.03.1994(Sc)	09.11.1998(R)	09.11.1998(R)	31.08.1999(Ac)	23.05.2002(Ac)
Togo		16.09.1987	25.02.1991(Ac)	25.02.1991(R)	06.07.1998(At)	06.07.1998(At)	26.11.2001(At)	26.11.2001(At)
Tonga			29.07.1998(Ac)	29.07.1998(Ac)	26.11.2003(R)	26.11.2003(R)	26.11.2003(R)	26.11.2003(R)
Trinidad and Tobago			28.08.1989(Ac)	28.08.1989(Ac)	10.06.1999(R)	10.06.1999(R)	10.06.1999(R)	29.10.2003(R)
Tunisia			25.09.1989(Ac)	25.09.1989(Ac)	15.07.1993(Ac)	02.02.1995(Ac)	19.10.1999(R)	16.05.2005(Ac)
Turkey			20.09.1991(Ac)	20.09.1991(Ac)	13.04.1995(R)	10.11.1995(R)	24.10.2003(R)	24.10.2003(R)
Turkmenistan			18.11.1993(Ac)	18.11.1993(Ac)	15.03.1994(Ac)	28.03.2008(Ac)	28.03.2008(Ac)	28.03.2008(Ac)
Tuvalu			15.07.1993(Ac)	15.07.1993(Ac)	31.08.2000(At)	31.08.2000(At)	31.08.2000(At)	04.10.2004(At)
Uganda		15.09.1988	24.06.1988(Ac)	15.09.1988(R)	20.01.1994(R)	22.11.1999(Ac)	23.11.1999(Ac)	27.07.2007(Ac)
Ukraine	22.03.1985	18.02.1988	18.06.1986(At)	20.09.1988(At)	06.02.1997(R)	04.04.2002(R)	04.05.2007(R)	04.05.2007(R)
United Arab Emirates			22.12.1989(Ac)	22.12.1989(Ac)	16.02.2005(Ac)	16.02.2005(Ac)	16.02.2005(Ac)	16.02.2005(Ac)
United Kingdom of Great Britain and Northern Ireland	20.05.1985	16.09.1987	15.05.1987(R)	16.12.1988(R)	20.12.1991(R)	04.01.1995(R)	12.10.2001(R)	12.10.2001(R)
United Republic of Tanzania			07.04.1993(Ac)	16.04.1993(Ac)	16.04.1993(Ac)	06.12.2002(R)	06.12.2002(R)	06.12.2002(R)
United States of America	22.03.1985	16.09.1987	27.08.1986(R)	21.04.1988(R)	18.12.1991(R)	02.03.1994(R)	01.10.2003(R)	01.10.2003(R)
Uruguay			27.02.1989(Ac)	08.01.1991(Ac)	16.11.1993(R)	03.07.1997(Ac)	16.02.2000(Ac)	09.09.2003(Ac)
Uzbekistan			18.05.1993(Ac)	18.05.1993(Ac)	10.06.1998(Ac)	10.06.1998(Ac)	31.10.2006(R)	31.10.2006(R)

Vanuatu			21.11.1994(Ac)	21.11.1994(Ac)	21.11.1994(At)	21.11.1994(At)		
Venezuela (Bolivarian Republic of)		16.09.1987	01.09.1988(Ac)	06.02.1989(R)	29.07.1993(R)	10.12.1997(R)	13.05.2002(R)	22.12.2006(R)
Viet Nam			26.01.1994(Ac)	26.01.1994(Ac)	26.01.1994(Ac)	26.01.1994(Ac)	03.12.2004(R)	03.12.2004(R)
Yemen			21.02.1996(Ac)	21.02.1996(Ac)	23.04.2001(Ac)	23.04.2001(Ac)	23.04.2001(Ac)	
Zambia			24.01.1990(Ac)	24.01.1990(Ac)	15.04.1994(R)	11.10.2007(Ac)	11.10.2007(Ac)	11.10.2007(Ac)
Zimbabwe			03.11.1992(Ac)	03.11.1992(Ac)	03.06.1994(R)	03.06.1994(R)		
	Vienna Convention	Montreal Protocol	Vienna Convention	Montreal Protocol	London Amendment	Copenhagen Amendment	Montreal Amendment	Beijing Amendment
Total	28	46	195	195	192	189	175	156

Notes

R: Ratification Ac: Accession At: Acceptance Ap: Approval Sc: Succession

* Entry into force is after ninety days following the date of ratification/accession/acceptance/approval for new Parties after the treaty enters into force.

Vienna Convention (22.9.1988);

Montreal Protocol (1.1.1989);

London Amendment (10.8.1992);

Copenhagen Amendment (14.6.1994);

Montreal Amendment (10.11.1999);

Beijing Amendment (25.2.2002).

APPENDIX F

Action plan prepared under Country Program, Pakistan for Phasing out ODS.

Item	Action 1996-2000	Action 2001-2005	Action 2006-2010
Country Programme	Complete elaboration and commence to implement.	Reassess and adjust, then continue	Reassess, continue and complete.
Legal System	Establish legal system for ODS management and implement	Improve related regulations and system, and continue	Continue
Bans	Ban on new enterprises producing refrigerators, air conditioning equipment, and foam material using ODS Ban on import of products using or containing ODS (special cases in halon extinguishers excluded)	Ban on creating or enlarging cleaning lines using ODS Ban on uncontrolled release of ODS during servicing	Ban on import of ODS or products using or containing ODS
Investment control	Ban on investment in building new plants using ODS. Strict control of investments in new, enlarged, or technically reformed enterprises consuming ODS	Continue	Continue
Financial incentives	Reduction of import tariffs on equipment and materials required for implementation of ODS phase out projects	Continue	Continue
Taxation	Feasibility study on related tariff and tax policies, practice inclined tax policies on ODS	Inclined policies on the sale of ODS and their substitutes, ODS products and their substitutes.	Continue
Awareness, education and technical information exchange	Carry out awareness and education on ozone layer protection through public media, so as to upgrade the environmental	Continue awareness and education, hold technical workshops and public meetings Announce new policies in advance of their	Continue

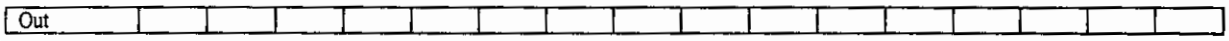
	awareness of the public Communicate key points of national ozone policy to the public Issue special bulletins on the harmful effects of ozone layer depletion	introduction Inform consumers about the premature obsolescence of refrigerators and refrigerant and air conditioning equipment based on ODS	
Exclusive sales and quotas of ODS	Investigate thoroughly ODS consumption status and their input channels, monitor and control ODS sales networks, and establish exclusive ODS sales systems	Define consumption quotas to users, control the quotas and supplies according to the quotas	Continue
Recycle/recovery of ODS	Establish networks and sites for recycle/recovery and operate them	Continue activity from the previous period Establish networks and sites for halon recovery and storage, recover halons in fire extinguishing devices in non-essential cases and use them in essential devices	Continue activity from the previous period
Monitoring	Develop a monitoring system for ODS imports within the general administration of Customs Define and divide responsibilities for supervision and management of technical substitution projects among environmental protection agencies and various sectors and industries, and commence monitoring activities Determine the phase out plan, start a reward and punishment strategy Report regularly on the progress of ODS phase out	Continue activity from the previous period.	Continue activity from the previous period.

APPENDIX G

Phase out schedule of Controlled Substances in Pakistan prepared in the Country Program for the period 1995-2010.

ODP in Tonnes

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Substance																
Annex A Group I																
CFC-11	695	764	840	924	1016	1117	1228	1350	1485	1633	1796	1974	2171	2388	2625	2887
CFC-12	1191	1315	1453	1606	1774	1960	2166	2393	2644	2921	3228	3566	3940	4353	4810	5314
CFC-113	2	2	3	3	3	4	4	4	5	5	6	6	7	8	9	9
CFC-115	2	2	2	2	3	3	3	3	4	4	5	5	6	6	7	7
Subtotal	1887	2082	2296	2532	2793	3081	3398	3748	4134	4559	5029	5547	6118	6748	7444	8210
Protocol Phase Out Schedule	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	1044	313	313	313	0
Planned Phase Out			350	210	196	188	200	197	147	100	100	100	100	100	50	50
Early phase Out		2088	1738	1528	1332	1144	944	747	600	500	400	300	200	100	50	0
Annex A Group II																
H-1211	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
H-1301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Protocol Phase Out Schedule	21	21	21	21	21	21	21	21	21	21	21	11	11	11	11	0
Planned phase Out			1	1	2	2	2	3								0
Early Phase Out		21	20	19	17	15	13	10	10	10	10	10	10	10	10	10
Annex B Group I																
Annex B Group II																
CTC	620	682	749	823	905	994	1093	1201	1320	1451	1594	1752	1925	2116	2326	2556
Protocol Phase Out Schedule				907	907	907	907	907	907	907	136	136	136	136	136	0
Planned Phase Out Schedule						100	173	150	100	100	100	100	50	26	0	0
Early Phase Out					907	807	634	484	384	284	184	84	34	8	8	8
Annex B Group III																
MCF	14	16	17	19	21	23	25	27	30	33	36	40	44	48	53	58
Protocol Phase Out Schedule				21	21	21	21	21	21	21	14	14	14	14	14	6
Planned Phase Out						3	3	3	2	2	2	2	2	1	1	
Early Phase					21	18	15	12	10	8	6	4	2	1	0	0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APPENDIX H

Proposed Actions (Overall) for implementing the Action Plan and Suggested Time-Frame prepared under Country Programme Update.

Objective	Action	Year
Strengthen import quota system	Enhance import quota system to include CTC Include CFC-113 in existing CFC quota system and implement a ban. Enhance import quota system to include virgin halon Implement a quota system for TCA and a ban.	2003-2004
Achieve annual reduction targets per Montreal Protocol Obligations	Implement ongoing MLF projects by 2004. Implement 2003 sector phase out plans which target the manufacturing sectors (foam and refrigeration)	2003-2005
Achieve annual reduction targets per Montreal Protocol Obligations	Deliver technical assistance and training activities to SMEs and residual users in servicing and CTC sectors per sector phase out plans	2003-2009
Ban the import of virgin halon 1211 and 1301 over and beyond levels established through the Montreal Protocol	Regulatory measures and technical assistance activities to ban virgin halon over the quota to be established and to encourage use of recycled halon until manufacturers and end-users can choose alternatives and to provide sufficient halon for critical uses.	2003-2004
Ban on new CFC-based installations	Regulatory action to prevent start-up of new enterprises once	2004
Ban of CFC-based manufacturing and of CFC-containing products and components.	A combination of regulatory measures and technical assistance Funding to remaining CFC-consuming enterprises	2007
Ban on the import of CTC and TCA	Combination of regulatory measures, public awareness, and technical assistance, as well as direct assistance to select enterprises.	2009

Annex A, Group I ban	Combination of regulatory measures, public awareness, and technical assistance	2010

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