1. OZONE LAYER

Ozone is a tri-atomic form of oxygen – it has three oxygen atoms instead of the normal two. It is formed naturally in the upper levels of the Earth's atmosphere by high-energy ultraviolet radiation from the Sun. The radiation breaks down oxygen molecules, releasing free atoms, some of which bond with other oxygen molecules to form ozone. About 90 per cent of all ozone formed in this way lies between 15 and 55 kilometres above the Earth's surface – the part of the atmosphere called the stratosphere. Hence, this is known as the 'ozone layer'. Even in the ozone layer, ozone is present in very small quantities; its maximum concentration, at a height of about 20-25 kilometers, is only ten parts per million.

Ozone is an unstable molecule. High-energy radiation from the Sun not only creates it, but also breaks it down again, recreating molecular oxygen and free oxygen atoms. The concentration of ozone in the atmosphere depends on a dynamic balance between how fast it is created and how fast it is destroyed.

Concentration of Ozone in the atmosphere

Ozone is also present in the lower levels of the atmosphere (i.e. the troposphere), but at even lower concentrations than in the stratosphere. Close to the Earth's surface, most of the Sun's high-energy UV radiation has already been filtered out by the stratospheric ozone layer, so the main natural mechanism for ozone formation does not operate at this low level. However, elevated concentrations of ozone at ground level are found in some regions, mainly as the result of pollution. Burning fossil fuels and biomass, releases compounds such as nitrogen oxides and volatile organic compounds, which react with sunlight to form ozone. This ground-level ozone is a component of urban smog and can cause respiratory problems in humans and damage to plants and plastics, rubber etc.

There is little connection between ground-level ozone and the stratospheric ozone layer. Whereas stratospheric ozone shields the Earth from the Sun's harmful rays, ground-level ozone is a pollutant. Ozone formed due to pollution at the Earth's surface cannot replenish the ozone layer. In addition, though ground-level ozone absorbs some ultraviolet radiation, the effect is very limited.

What is Ultraviolet Radiation?

The Sun emits radiations of varying wavelengths known as the electromagnetic spectrum. Ultraviolet radiation is one form of radiant energy coming out from the Sun. The various forms of energy, or radiation, are classified according to wavelength (measured in nanometers where one nm is a millionth of a millimeter). The shorter the wavelength, the more energetic the radiation. In order of decreasing energy, the principal forms of radiation are gamma rays, x-rays, ultraviolet radiation (UV) rays, visible light, infrared rays, microwaves, and radio waves. Ultraviolet radiation, which is invisible, is so named because of its wavelengths are less than those of visible violet radiations.

Of these, UV-B and C being highly energetic are dangerous to life on earth. UV-A being less energetic is not dangerous. Fortunately, UV-C is absorbed strongly by oxygen and also by ozone in the upper atmosphere. UV-B is also absorbed by ozone layer in the Stratosphere and only 2-3% of it reaches the earth's surface. The ozone layer, therefore, is highly beneficial to plant and animal life on earth by filtering out the dangerous part of sun's radiation and allowing only the beneficial part to reach earth. Any disturbance or depletion of this layer would result in an increase of UV-B and UV-C radiation reaching the earth's surface leading to dangerous consequences.

Ozone Depletion

At any given time, ozone molecules are constantly formed and destroyed in the stratosphere. The total amount, however, remains relatively stable. The concentration of the ozone layer can be thought of as a stream's depth at a particular location. Although water is constantly flowing in and out, the depth remains constant.

While ozone concentrations vary naturally with sunspots, the seasons, and latitude, these processes are well understood and predictable. Scientists have established records spanning several decades that detail normal ozone levels during these natural cycles. Each natural reduction in ozone levels has been followed by a recovery. Recently, however, convincing scientific evidence has shown that the ozone shield is being depleted well beyond changes due to natural processes.

Ozone depletion occurs when the natural balance between the production and destruction of stratospheric ozone is tipped in favour of destruction. An upset in this balance can have serious consequences for life on the Earth, and scientists are finding evidence that the balance has changed. Concentration of Ozone within the protective ozone shield is decreasing, while levels in the air we breathe are increasing.

When very stable man-made chemicals containing chlorine and bromine enter into the atmosphere, and reach the stratosphere, these chemicals are broken down by the high energy solar UV radiation and release extremely reactive chlorine or bromine atoms. These undergo a complex series of catalytic reactions leading to destruction of ozone.

Ozone Concentration

Chlorofluorocarbons (CFCs) are the most important ozone-destroying chemicals. These have been used in many ways since they were first synthesized in 1928. They are stable, non-flammable, low in toxicity, and inexpensive to produce. Over the time, CFCs found uses as refrigerants, solvents, foam blowing agents, aerosols and in other smaller applications. Other chlorine - containing compounds include methyl chloroform, a solvent, carbon tetrachloride, an industrial chemical, Halons, extremely effective fire extinguishing agents, and methyl bromide, an effective fumigant used in Agriculture and grain storage.

No one could imagine that these miracle chemicals could one day turn out to be harmful substances to life on the Earth. It all began when at the first United Nations Environment Conference at Stockholm in 1972, questions were asked about the effect of jet aircrafts on upper atmosphere. It was known that the high temperature jet exhausts contain an appreciable amount of nitrous oxide and it was also known that this substance can catalytically decompose ozone. The conference authorized United Nations Environment Programme (UNEP) to address this issue and focus on the possible damage to the ozone layer by hundreds of supersonic aircrafts that were expected to be in operation by the late 1980s. They were also entrusted with the task of finding out the effect of release of nitrous oxide from fertilizer manufacturing units on the ozone layer. These investigations did not make much headway and were dismissed as false alarms.

In the early 1970s, researchers began to investigate the effects of various chemicals on the ozone layer, particularly CFCs, which contain chlorine. They also examined the potential impacts of other chlorine sources. Chlorine used in swimming pools, industrial plants, sea salt, and volcanoes does not reach the stratosphere. Chlorine compounds from these sources readily combine with water and repeated measurements show that they rain out of the troposphere very quickly. In contrast, CFCs are very stable and do not dissolve in rain. Thus, there are no natural processes that remove the CFCs from the lower atmosphere. Over the time, the CFCs diffuse into the stratosphere.

All of these compounds have atmospheric lifetimes long enough to allow them to be transported by diffusion into the stratosphere. Because they release chlorine or bromine when they break down, they damage the protective ozone layer. The discussion of the ozone depletion process below focuses on CFCs, but the basic concepts apply to all of the Ozone-Depleting Substances (ODS).

The CFCs are so stable that only exposure to strong UV radiation breaks them down. When that happens, the CFC molecule releases atomic chlorine. One chlorine atom can destroy over 100,000 ozone molecules by a catalytic process. The net effect is to destroy ozone faster than it is naturally created. To return to the analogy comparing ozone levels to a stream's depth, CFCs act as a siphon, removing water faster than normal and reducing the depth of the stream.

Large fires and certain types of marine life produce methyl chloride and bromide that does reach the stratosphere. However, numerous experiments have shown that CFCs and other widely-used chemicals produce roughly 85% of the chlorine in the stratosphere, while natural sources contribute only 15%, as per United States Environmental Protection Agency.

Large volcanic eruptions can have an indirect effect on ozone levels. Although Mt. Pinatubo's 1991 eruption did not increase stratospheric chlorine concentrations, it did produce large amounts of tiny particles called aerosols (different from consumer products also known as aerosols). These aerosols increase chlorine's effectiveness at destroying ozone.

The aerosols only increased depletion because of the presence of CFC- based chlorine. In effect, the aerosols increased the efficiency of the CFC siphon, lowering ozone levels even more than would have otherwise occurred. Unlike long-term ozone depletion, however, this effect is short-lived. The aerosols from Mt. Pinatubo have already disappeared, but satellite, ground-based, and balloon based data still show ozone depletion occurring closer to the historic trend.

Antarctic Hole

The term "ozone hole" refers to a large and rapid decrease in the concentration of ozone molecules in the ozone layer, not its complete absence. The Antarctic "ozone hole" occurs during the southern spring between September and November. The British Antarctic survey team first reported it in May 1985. The team found that for the period between September and mid November, ozone concentration over Halley Bay, Antarctica, had declined 40% from levels during the 1960s. Severe depletion has been occurring since the late 1970s. The problem is worst in this part of the globe due to extremely cold atmosphere and the presence of polar stratospheric clouds. The area under the ozone depleted atmosphere increased steadily to more than 20 million sq km in the early 1990s and in the Antarctic spring of 1998, the area of the Ozone hole exceeded 26 million sq kms and also covered some populated areas of the southern hemisphere. The total ozone dropped to about 97 Dobson units on 1 October 1998.

Evolution of the Antarctic Ozone hole (1979 – 1987 October)

In addition, research has shown that ozone depletion occurs over the latitudes that include North America, Europe, Asia, and much of Africa, Australia, and South America. Thus, ozone depletion is a global issue and not just a problem at the South Pole.

Environmental Effects of Ozone Depletion

Ozone acts as a shield to protect the Earth's surface by absorbing harmful ultraviolet radiation. If this ozone becomes depleted, then more UV rays will reach the earth. Exposure to higher amounts of UV radiation could have serious impacts on human beings, animals and plants, such as the following:

Harm to human health:

- More skin cancers, sunburns and premature aging of the skin.
- More cataracts, blindness and other eye diseases: UV radiation can damage several parts of the eye, including the lens, cornea, retina and conjunctiva.
- Cataracts (a clouding of the lens) are the major cause of blindness in the world. A sustained 10% thinning of the ozone layer is expected to result in almost two million new cases of cataracts per year, globally (Environment Canada, 1993).
- Weakening of the human immune system (immunosuppression) Early findings suggest that too

much UV radiation can suppress the human immune system, which may play a role in the development of skin cancer.

Adverse impacts on agriculture, forestry and natural ecosystems:

- Several of the world's major crop species are particularly vulnerable to increased UV, resulting in reduced growth, photosynthesis and flowering. Many agricultural crops are sensitive to the burning rays of the sun, including the world's main food crops, rice, wheat, corn and soyabean.
- Many species of crops like sweet corn, soyabean, barley, oats, cow peas, carrots, cauliflower, tomato, cucumber, peas and broccoli are highly sensitive to UV-B radiation. As a result, food production could be reduced by 10% for every 1% increase of UV-B radiation.
- The effect of ozone depletion on the Indian agricultural sector could be significant.
- Only a few commercially important trees have been tested for UV (UV-B) sensitivity, but early results suggest that plant growth, especially in seedlings, is harmed by more intense UV radiation.

Damage to marine life:

- In particular, plankton (tiny organisms on the surface layer of oceans) are threatened by increased UV radiation. Plankton are the first vital step in aquatic food chains.
- Decreases in plankton could disrupt the fresh and saltwater food chains, and lead to a species shift.
- Species of marine animals in their growing stage, including young fish, shrimp larvae and crab larvae, have been threatened in recent years by the growing UV-B radiation under the Antarctic ozone hole. Loss of biodiversity in our oceans, rivers and lakes could reduce fish yields for commercial and sport fisheries.

Animals:

- In domestic animals, UV over exposure may cause eye and skin cancers.

Materials:

- Wood, plastic, rubber, fabrics and many construction materials are degraded by UV radiation.
- The economic impact of replacing and/or protecting materials could be significant.

Interaction between Ozone Depletion and Climate Change

Both Stratospheric ozone depletion and climate change effects of human activities on the global atmosphere. Global warming is an increase in surface temperature due to build up of radiatively (green house gases) active gases. The ozone depletion is primarily due to a release of gases that catalytically destroy ozone, especially chlorine and bromine, from CFCs and halons photolysed in the stratosphere. Some of these linkages are illustrated schematically in Figure given below:

In 1974, two scientists Mario J. Molina and F. Sherwood Rowland at the University of California United States (US) were struck by the observation of Lovelock that CFCs were present in the atmosphere all over the world more or less evenly distributed in appreciable concentrations. They suggested that these stable CFC molecules could drift slowly upto the stratosphere where they may breakdown into chlorine atoms by energetic UV-B and UV-C rays of the sun. The chlorine radicals thus produced can undergo complex chemical reaction producing chlorine monoxide, which can attack an ozone molecule converting it into oxygen and in the process regenerating the chlorine atom again. Thus the Ozone-destroying effect is catalytic and a small amount of CFC would be destroying large number of ozone molecules. Their basic theory was then put to test by the National Aeronautic Space Authority (NASA) scientists and found to be valid, ringing alarm bells in many countries and laying the foundation for international action.

International Action

The first international action to focus attention on the dangers of ozone depletion in the stratosphere and its dangerous consequences in the long run on life on Earth was initiated in 1977, when in a meeting of 32 countries in Washington D.C. a World Plan of action on Ozone layer was adopted with UNEP as the coordinator.

As experts began their investigation, data piled up and in 1985 in an article published in the prestigious science journal, "Nature" by Dr. Farman, pointed out that although there is overall depletion of the ozone layer all over the world, the most severe depletion had taken place over the Antarctica. This is what is famously called as "the Antarctica Ozone hole". His findings were confirmed by Satellite observations and offered the first proof of severe ozone depletion. These findings stirred the scientific community to take urgent remedial actions. A framework for such actions were designed and agreed in an international convention held in Vienna on March 22, 1985.

This, subsequently, resulted in an international agreement in 1987 on specific measures to be taken in the form of an international treaty known as the Montreal Protocol on Substances that Deplete the Ozone Layer. Under this Protocol the first concrete step to save the Ozone layer was taken up immediately by agreeing to completely phase out chlorofluorocarbons (CFC), Halons, Carbon tetrachloride (CTC) and Methyl chloroform (MCF) as per a given schedule.

Evolution of the Montreal Protocol

The urgency of controlling the Ozone Depleting Substances (ODS) particularly CFCs was slow to pick up. CFCs were so useful that society and the industry were reluctant to give up consuming them. However, even as the nations adopted the Montreal Protocol in 1987, new scientific findings indicated that the Protocol's control measures were inadequate to restore the Ozone Layer. In addition, the developing countries had a special situation as they needed the technology of substitutes as well as financial assistance to enable them to change over to non ODS technologies.

Meanwhile, the report of the scientific panels entrusted with the task of finding the extent of ozone depletion showed that the actual harm to the ozone layer was much more than predicted by theoretical models and the control measures envisaged by the Protocol in 1987 would not stop the process. More urgent action was therefore necessary. Therefore, at the 2nd meeting of the Parties in London in *1990 (London Amendment)*, 54 Parties as well as 42 non-Party countries agreed on a package of measures satisfactory to all. It was agreed in this meeting that the 5 important CFCs and Halons would be phased out by the year 2000 and other minor CFCs and CTC would be controlled and eventually phased out. A special provision was made to fund the developing countries with an annual consumption of ODS of less than 0.3 kg per Capita (also called as Article 5 countries) in their efforts to phase out these harmful chemicals. These countries were also given a grace period of 10 years to phase out ODS.

In 1991, more alarming reports came up to show that the depletion of ozone is continuing in all altitudes except over the tropics. It was recognized that it is not enough to control emissions of CFCs and Halons. Other fluorocarbon chemicals like Hydro chlorofluorocarbons (HCFCs) and Methyl bromide, which are also ozone depleting but with low ODP need to be controlled. The Meeting of Parties at its 4th meeting held in Copenhagen amended the Protocol (*Copenhagen Amendment-1992*) and brought HCFCs, HBFCs and Methyl Bromide as controlled substances. Subsequently, the *Montreal Amendment (1997)* introduced a system for licensing the import and export of new, use, recycled and reclaimed controlled substances in Annexes A, B, C and E. The *Beijing Amendment (1999)* introduced bromochloromethane as controlled substances. The phase out date for this was 1st January 2002. This amendment has also brought the production control of HCFCs for developed countries.

Multilateral Fund

With a view to assist the developing countries in their phase out efforts, a Multilateral Fund has been created. This is known as the Montreal Protocol Multilateral Fund (MPMF). The Fund will finance incremental cost of ODS phase out. The incremental cost include, cost of transfer of technology, purchase of capital equipment and operational costs for switching over to non ODS technologies enabling the developing countries to phase out controlled substances. Enterprises using ODS technology established before 25.7.95 are eligible for funding for conversion to non ODS technology from MPMF.

India being an Article 5 country is entitled to this assistance from Multilateral Fund in its efforts to phase out ODS and switch over to non ODS technologies.

Alternatives to currently used Ozone Depleting Substances

During the last few years intense research has yielded a large number of substitute chemicals as replacements to currently used chlorofluorocarbons (CFCs), Halons, carbon tetra chloride, and methyl chloroform. These are summarised below on end-use basis:

Technology Options for Phaseout in Refrigeration and Air-conditioning Sector

Sub-sector	ODS used	Preferred alternative substitutes
Domestic refrigerators	Refrigerant CFC-12	HFC-134 Isobutane (Drop-in substitutes)
	Foam Blowing Cyclopentane CFC-11	HCFC-141b
Refrigerated Cabinets (Deep Freezer, Ice-cream cabinets, Bottle coolers, Visi coolers)	Refrigerant CFC-12 HC-290 and	HFC-134a Blends of HC-600a
	Foam Blowing CFC-11 Cyclopentane	HCFC-141b
Water Coolers	CFC-12	HFC-134a Blends of HC-290 and HC-600a
	HCFC-22 (for bigger capacity)	HCFC-22
Mobile (car, bus, van, refrigerated trucks, train)	CFC-12	HFC-134a
	HCFC-22 (train)	HCFC-22 (trains only)
Central A/c plants	CFC-11, CFC-12	HFC-134a HCFC-123 HCFC-124
	HCFC-22	HCFC-22 Ammonia
Process Chillers	CFC-12	HCFC-22, Ammonia

Technology Options for Phaseout in Refrigeration and Air-conditioning Sector contd.

Sub-sector	ODS used	Preferred

alternatives /		substitutes
Ice Candy Machines	CFC-12	HCFC-22, HFC-134a
Walk-in Coolers	HFCF-22, CFC-12	HCFC-22 HFC-134a
Room A/C	HFCF-22, CFC-12	HCFC-22
Packaged A/C	HCFC-22	HCFC-22
Shipping	HFCF-22, CFC-12	HCFC-22 HFC-134a

Technology Options for Phaseout in Aerosol Sector

Sub-sector	ODS used	Preferred alternatives / substitutes
Perfumes, shaving foams, insecticides, pharmace-uticals, paints, etc.	CFC-11/12	HAPs (destenched LPG) DME (Di-methyl Ether)
Small, Tiny & Cottage sectors who use contract fillers,		establish common filling facility for a cluster of units and switch to not-in-kind substitutes.
Metered Dose Inhalers	CFC-12	HFC -134a

Technology Options for Phaseout in Foams Sector

Sub-sector	ODS used	Preferred alternatives / substitutes
Flexible PUF Slabtstock	CFC-11	Methylene Chloride
Flexible Moulded PUF	CFC-11	Water blown technology
Rigid PUF General Insulation (other than refrigeration)	CFC-11	HCFC-141b
Thermoware	CFC-11	Current- HCFC-141b Long term - CFC-free systems (water lown)
Integral Skin PUF	CFC-11	HCFC-141b
Thermoplastic Foams - EPE/EPPN Foams - EPS Foams	CFC-11 CFC-12	Hydrocarbons CO_2
Phenolic Foams	CFC-11	Hydrocarbons

Technology Options For Phaseout in Fire Extinguishing Sector

Sub-sector	ODS used	Preferred alternatives / substitutes
Fire Extinguishers	H-1211,	Portable type - ABC powder, CO_2.
	H-1301	Fixed type - FM200, HCFC blend, NAF- SI/SIII

2. INDIA'S COMMITMENT TO THE MONTREAL PROTOCOL

India signed the Montreal Protocol along with its London Amendment on 17-9-1992 and also ratified the Copenhagen, Montreal and Beijing Amendments on 3rd March, 2003. Mindful of the precautionary measures needed for the protection of the Ozone Layer, otherwise its modifications would result into the amount of solar ultraviolet radiation having biological effect that reaches the earth surface and potential consequences for human health, for organisms, eco-systems and material, Government of India as a Party to the Protocol continues its action, measures and adoption of necessary regulations with the sole objective of protection of Ozone Layer. The highlights of various activities and measures taken by the Government in this regard are briefly summarized.

Highlights of activities undertaken by the Ozone Cell during the current year

Keeping in view the geographical distribution of industries consuming Ozone Depleting Substances (ODS) particularly Small and Medium Enterprises (SMEs), the Project Management Unit (PMU), (established for CFC Production phase out) of the Ozone Cell organized series of workshops in various States and Union Territories (UTs) since 2001 to create public awareness on the Montreal Protocol and phase out of ODS. Till date the workshops has been conducted in 33 States and 5 UTs. The list of participants in this workshop includes representatives from the State/UTs Departments of Environment, Industry, Small Industries Services Institute, Pollution Control Board, Association of Refrigeration, Equipment Services Agencies, Association of Refrigerant Gas Sellers, Industries using ODS and regional offices of the Ministry of Environment and Forests. During these workshops, the representatives of the Ozone Cell apprised the participants, the need for the industry to avail funding and technology transfer support from the Multilateral Fund of the Montreal Protocol and convert production of goods using ODS to non ODS. Explanations/clarifications were also offered for accessing the funds available with the Multilateral Fund for changing over to non ODS technology. In the workshop all the resource material published by Ozone Cell as well as copies of ODS Rules notified by the Ministry to comply with various provisions made under the Rules by all the stakeholders in respective States /UTs, were also distributed .

Project Management Unit (PMU)

The Executive Committee of the Multilateral Fund (MLF) of the Montreal Protocol at its 29th Meeting in 1999 approved a project for gradual phase out of CFC production in four plants in India at a cost of US$ 82 million. This project is being implemented by the World Bank (WB). Of this approved amount, US$ 2 million was allocated towards Technical Assistance (TA) for implementation of the project. United Nations Environment Programme-Division of Technology, Industry and Economics (UNEP-DTIE), Paris is assisting the Ozone Cell, Ministry of Environment and Forests, in implementation of the TA component of the project by supporting a Project Management Unit (PMU). UNEP-DTIE, Paris is responsible for providing guidance and supervising the implementation of activities under this component. UNEP in consultation with WB developed a strategic approach for the implementation of the Technical Assistance component.

Initially, the PMU was established under the title of “Project Management Unit for the implementation of the CFC Production Sector Phase Out Project in India” on 22nd February, 2002. Subsequently, to widen the scope of activities under this Society, it was re-registered on 2nd July, 2002 and known as “Project Management Unit for phase out of Ozone Depleting Substances”. The objectives of the PMU include implementation and reviewing of ODS phase out plan, assisting Government of India in its implementation of ODS phase out, production quota system, training, workshops, seminars, public awareness for various stakeholders in the ODS phase out programmes. The Governing Body of the Unit consists of Additional Secretary (MoEF) as President, Joint Secretary (MoEF)-Vice-President, JS&FA (MoEF), representatives from Deptt. of Chemicals and Fertilizers, Ministry of Commerce and Industry, M/s SRF Limited, CII, DGFT, Director (O) and Joint Director (O) as Members. Since its establishment, PMU has taken up various actions and functions. These include the following:-

- Monitor and review implementation of National level public awareness activities;
- Regional plans for networking based on feed back at State level workshop;
- Dissemination of technical information on CFCs and ODS phase out through a bi-monthly bulletin known as Value Added Technology Information Service (VATIS);
- Management Information System (MIS) as a repository of data base of ODS;
- Capacity building of State level nodal officers on various functions and actions;
- Requisite technical audit of CFC producing enterprises as per the time schedule;
- Preparedness of various industries including food processing industry for phasing out of ODS.

Awareness campaigns launched

The objectives of awareness strategy include increasing awareness on the Montreal Protocol, with reference to use of ODS and its harmful effects due to depletion of Ozone Layer. Provisions under ODS Rules (Regulation and Control), 2000 for compliance of phasing out of ODS, providing necessary inputs to stakeholders so that they can effectively manage phaseout of ODS. In order to create awareness among the consuming industries and target users, Ozone Cell has launched an extensive campaign by way of conducting painting, poster, essay writing competitions, and bringing out Special Day Cover and printing and distributing of resource materials i.e. posters, stickers, pamphlets, brochures, booklets, to various target groups since 1998. Prominent advertisements in various national and regional newspapers were also published on the aspects of Ozone Layer Protection coinciding with international ozone day celebrations. In addition to the print media for effective use of electronic media short duration films are being commissioned to telecast the same on prominent channels during mid break news hours.

Since school children are the important target group for creating awareness across the country, school package materials in lucid language has been prepared and will be released on 16th September, 2003.

In order to celebrate International Ozone Day at State level as part of involvement of State Governments in Ozone Layer Protection activities, the celebrations are being conducted in Metropolitan Cities of the States. The International Ozone Day was celebrated in Hyderabad and Bangalore during the years 2001 and 2002 respectively in order to cover the States of Andhra Pradesh and Karnataka. Similarly, this year Ozone Day Celebrations is being made in Mumbai covering all parts of the State through print and electronic media.

The reports of Meeting of Parties and of Meetings of the Executive Committee are sent to industry, Government departments and other stakeholders to inform them of deliberations of these meetings on a regular basis.

Regulatory Measures

Committee on Subordinate Legislation, Rajya Sabha has examined the Ozone Depleting Substances (Regulation and Control) Rules, 2000. Incompliance with certain recommendations of the Committee in order to specify a time limit for completing the process of registration, renewal and cancellation under various provisions of these Rules, necessary amendments to the ODS Rules were notified on 27.8.2003.

It is also proposed to amend the Rules *inter-alia* to extend the time limit for registration of enterprises using ODS in activities specified in Ozone Depleting Substances (Regulation and Control) Rules, 2000 as the same has expired on and after 19-7-2002.

Ratification of all four amendments to the Montreal Protocol

The London Amendment (1990) to the Montreal Protocol mandates to phase out CFCs and Halons by 1.1.2010 with the intermediate reduction schedule of 50% by 1.1.2005. The use of CTC is also to be phased out by 1.1.2010 with in intermediate reduction of 85% by 1.1.2005. HCFCs has been introduced as transitional substances/immediate substitutes to CFCs and can be used till 2040. India ratified this Amendment on 19.6.1992.

The Copenhagen Amendment (1992) to the Montreal Protocol introduced HCFCs, HBFCs and Methyl Bromide as controlled substances. India did not ratify the Copenhagen Amendment immediately on its adoption in 1992 due to several uncertainties such as lack of adequate policy decisions for phasing out of ODS in consumption and production sector. But, ratified the Amendment on 3rd March, 2003.

The Montreal Amendment (1997) to the Montreal Protocol mandates the establishment of licensing system for import and export of new, used, recycled, reclaimed controlled substances by March 1998 or 1.1.2000 whichever is later. Ban on import and export of methyl bromide will not have an impact on India as we do not import or export methyl bromide and control measures for trade in methyl bromide are already included in the Ozone Depleting Substances (Regulation and Control) Rules, 2000. India ratified this Amendment on 3rd March, 2003.

The Beijing Amendment (1999) to the Montreal Protocol introduced control measures applicable to the production of HCFCs for developed countries with a provision of 15% additional allowance to meet the domestic needs of developing countries. India being a producer of HCFC-22 has the advantage of exporting it to develop and developing countries and it is necessary to import HCFC-141b and HCFC-123 as substitute to CFC-11 as these are not produced in the country. Moreover, the technology for manufacturing these two substances are not easily available and the requirements do not attract the industry houses to establish an economically viable production facility. The import of these substances will continue. India ratified this Amendment on 3rd March, 2003.

The Enterprises who are recipients of financial assistance from the Multilateral Fund

The Ministry of Environment and Forests has established an Empowered Steering Committee which is supported by 4 Standing Committees namely (i) Technology and Finance Standing Committee (ii) Standing Committee for Small, Scale, Tiny and Unorganized Industries (iii) Standing Committee on Implementation of ODS phase out projects and (iv) Monitoring and Evaluation Committee. As on 31.8.2003, 349 projects in the consumption and production sector have been approved and funded by the Multilateral Fund. Of these 272 are ODS phase out investment projects while 77 are non investment and support activities. A total amount of about US$ 138 million has been approved by the Executive Committee of the Multilateral Fund Secretariat for the phasing out of 12,405 ODP tons. List of enterprises that have received assistance from the Multilateral Fund, details of disbursement and target phase out of quantum of ODP tons is given at Annexure-I.

Sector wise break-up of the funds approved by the Multilateral Fund for ODS phase-out projects in India is given in the table below:

Sector-wise Approved Projects as on 31.8.2003

Sl.	Sector	No. of Projects	Grant Amount	ODP Tons phased out
1.	Aerosol	22	2,517,452	740.5
2.	Foam	155	35,223,262	5327.5
3.	Halon	15	4,707,881	2,324.0
4.	RAC	50	25,915,964	2,616.0
5.	Solvent	27	14,411,198	1397.4
6.	Production	3	46,000,000	-
7.	Support Activities	77	9,221,588	-
	Total	**349**	**137,997,345**	**12,405.4**

Industries benefited with MLF Funds

Number of enterprises that have benefited from the MLF so far.

SECTOR	No. of Enterprises
Aerosol	**41**
Foam	**399**
Halon	**20**
RAC	**256**
Solvent	**33**
Total	**749**

List of New Projects approved by Montreal Protocol Multilateral Fund during 2002-2003.

Sector	Projects	ODP tons	Approved amount (US$)
Aerosol	Terminal Umbrella Project	132.5	657,130
RAC	1. Subros Limited (Phase-II)	-	1,404,588
	2. Plan for phase out of CFCs in the Refrigeration (Manufacturing)	79.5 291.5	565,000 2,172,971
Solvent	1. Navdeep Eng.	53.9	744,645
	2. Bharat Electronics Ltd.	16.0	164,907
	3. CTC Phase Out Plan for the consumption sector (First Tranche)	—	5475,000

Fiscal Incentives extended for phasing out of ODS

In order to meet the obligation of the Montreal Protocol Government of India is granting full exemption from payment of Customs and Central Excise Duties for import of goods designed exclusively for non-ODS technology. The duty exemption scheme have been followed for MLF projects for about 9 years and for non MLF projects and new investment projects for about 5 years. The maximum number of duty exemption certificates so far have been availed by the small and medium enterprises in ODS consumption sector.

Customs Duty Exemption for projects not eligible for MLF funding is being extended since 1994-95. So far 274 Customs Duty Exemption Certificates involving waiver of duties valued at 93.35 crores have been issued. The Central Excise Duty concession certificates have been issued since 1996-97 and so far 63 certificate have been issued involving duty waiver of Rs. 1.74 crores.

Financial year wise details of customs and excise duty certificates issued so far and are given in Annexure-II.

Sector strategies

For phasing out of production and consumption of ODS the first critical activity that needs to be conducted is a sector survey to get credible data of consumption of ODS. In respect of the solvent sector, the 35th Ex-Com of the Montreal Protocol approved US$ 1,69,500 for preparation of a project UNEP in coordination with World Bank and UNIDO to develop an overall strategy in the solvent sector to cover both the non investment and investment activities to phase out ODS. After due consultations with the above mentioned implementing agencies M/s.S.B. Billimoria and Co. was appointed as Consultant to have the credibility of the data of consumption of ODS in the Solvent Sector. As per the MOU between the UNEP and Ministry the following activities were undertaken:-

- Design, develop and implement awareness campaign to facilitate the phase out of Ozone Depleting Solvents;
- Develop and submit to UNEP a detailed project schedule with milestones.
- Develop and submit to UNEP an outline for the awareness strategy and campaign.
- Conduct the awareness campaign and prepare a detailed report
- Revise and finalise the draft based on the comments received.
- Participate in meeting with relevant partners such as NGOs, industry associations etc

Refrigeration and Air Conditioning Service Sector

Refrigeration and Air Conditioning Service Sector Strategy was also prepared during this year. A large survey covering about 20,000 respondents was carried out in a sample of 411 large cities and towns in the country. Based on this survey, a project for facilitating phaseout of ODS in this sector was prepared with assistance from GTZ, Germany, INFRAS, Switzerland, United Nations Environment Programme and United Nations Development Programme. Technical inputs were obtained from research institutions such as I.I.T., Delhi, National Chemical Laboratory, Pune and industry experts for this study. This project is proposed to be implemented over a period of five years beginning 2004 after approval by Executive Committee during this year.

Chiller Sector

The World Bank has conducted a study on the chiller sector to formulate a ODS phaseout strategy for chillers. Chillers include refrigeration and air conditioning systems of more than 2 TR using CFC-11 and CFC-12 but not using a hermetically-sealed compressor. Tata Energy Research Institute (TERI), now known as "The Energy Research Institute" has compiled information on chillers that exist in the country in close consultation with the World Bank. After in-depth survey of a sample of chillers and collection of information on technical parameters, a national strategy for phasing out of ODS in chiller sector, has been prepared.

CTC Sector Phase out Plan

During this year, a National Plan for phase out of production and consumption of Carbon Tetrachloride (CTC) has been approved by the Executive Committee of the Montreal Protocol in its meeting held during July, 2003 at Montreal for an amount of US$52 million.

List of enterprises identified by UNDP, UNIDO, UNEP and ICMA(Indian Chemicals Manufacturers Association on behalf of the World Bank) under CTC phase out Plan for the consumption sector is at Annexure-III.

Methyl Bromide

Methyl Bromide, a gas, has excellent biocidal properties and is toxic to all forms of life. It has been used as a broad-spectrum fumigant for more than 50 years. It is mainly used :-

a) In agriculture for fumigation of soils to free it from soil insects, nematodes, fungi and some soil weeds prior to planting high value commercial crops like strawberries, tomatoes, tobacco and cut flower. Methyl Bromide is injected in the soil which is then covered with plastic tarf to contain the pesticide until organisms are killed typically within 3 to 4 days.

b) For fumigating stored grains such as rice and wheat to prevent damage by insects like moths, weevils & beetles.

c) For fumigating timbers, wood products, wooden houses to free them from insects like borers and termites.

d) For quarantine and pre-shipment control of pests to prevent insects entering the country or being taken to other countries through infested goods. It is a preferred fumigant for this use as its pest control effect is very quick and it leaves no residues once the fumigation is over and goods are exposed atmosphere.

Very large quantities of Methyl Bromide are used for growing crops like Tomatoes and Strawberries on a commercial scale in developed countries like USA, Europe and more recently in some developing countries in Africa. More recently its use has gone up for growing vegetable crops in China by small farmers. The global consumption of methyl bromide peaked in 1998 to 75200 MT. Its use is now declining.

Methyl Bromide however is a powerful Ozone depleting chemical. Its ODP is a estimated to be 0.61. Although quantity of Methyl Bromide used is less than CFCs, Bro mine generated from methyl bromide has a large more potent ozone depleting effect. The UNEP estimates that methyl bromide emitted after the above uses is responsible for approx. 5 to 10% of current world wide ozone depletion. Methyl bromide has both a natural and an authorpogenic component. It is generated naturally by oceanic biological process. This natural component participates in the natural bromine cycle and thereby helps to maintained the naturally balance of the ozone layer.

Although Ozone depleting properties of methyl bromide was recognized earlier it was listed as a controlled substance under the Montreal Protocol after the Copenhagen amendment of the protocol in

1992 and the control schedules were agreed in 1995 – 1997. Accordingly to this schedule its use will have to be given up by Article 5(1) countries by 1.1.2015 a phased manner. However the quarantine and pre-shipment use of methyl bromide is exempted from the above measures.

India had recently ratified the Copenhagen Amendment of Montreal Protocol. It would be interesting to know how it is going to affect India as far as use of Methyl Bromide is concerned.

India was producing methyl bromide in one plant at Mithapur, Gujrat (capacity 300 MT). The plant never worked at full capacity. It produced maximum about 150 MT. Most of the production was used for manufacture of pharmaceuticals which is feed stock use.

Methyl Bromide is registered as a pesticide in India in the form of a formulation with 2% chloropicrin which is added as a lachrymoratory agent warning against toxic effect from accidental leakages. Due to non availability of chloropicrin this formulation can not be produced any more. The plant has been shut down for about an year.

Methyl Bromide is not used in India in Agriculture or for fumigation of stored grains. For agriculture we use conventional pesticides coupled with integrated pest management techniques. For grain preservation, we have been using the alternative fumigant, phosphine, from the beginning. Methyl bromide is used in India only for quarantine (very small amount) and pre-shipment purpose. The latter use has increased very much in recent years. India is now exporting perishables (vegetables) and durables (wheat, rice) in large quantities and all of it is fumigated in containers just before export. This use has gone up recently very much but accurate data is not available. However it is exempt from Protocol measures. One result of ratifying Copenhagen Amendment will be that the Government of India will have to collect this data and report it annually to the Ozone Secretariat. Otherwise India is not going to be affected much for ratifying Copenhagen and subsequent amendments of Montreal Protocol.

India possibly should now explore the use of alternatives of methyl bromide wherever necessary.

Important Trade issues and the Government stand

The Directorate General of Foreign Trade (DGFT), Ministry of Commerce and Industry under its Exim Policy included CFCs, Halon, CTC and HCFC as restricted items for the purpose of trade since March 1996. Thereafter, export and import of CFCs and Halon were made under license issued by DGFT based on the recommendations of Ozone Cell. The guidelines for recommending issuance of license for export and import of CFCs and Halon were developed during June 1996.

Subsequently, the Ozone Depleting Substances (Regulation and Control) Rules, 2000 vide Rules 4&5 mandated provision of trade with parties and export and import to be made by obtaining license issued by the authority. This was stipulated in in S. No. 2, column -4 of Schedule -V of ODS Rules, 2000.

The Govt. of India has entered into an agreement with the four manufacturing enterprises i.e. M/s SRF Limited, M/s Gujarat Flurochemical Ltd., M/s Navin Fluroine Ltd., M/s Sanmar Chemplast Ltd. for reduction of CFCs production in a specific phased manner. The reduction schedule as agreed to has also been incorporated in Schedule-3 of the ODS Rules, 2000. Further, considering the CFC producing plant are swing plants and the profit margin of HCFC has been taken into account for the determination of the compensation, for survival of these industries, it was decided during July, 1997 not to encourage import of HCFC-22. All other HCFCs which are not produced in India are being imported under license.

Illegal trafficking of ODS

Illegal trade in ODS in the South East Asian Region seems to have occurred since 1996, as the licencing system is under implementation in this region.

Illegal trade in ODS in India is attributed to the following reasons:-

- Imports by Mislabeling / Misdeclaration at various Inland Container Depots(ICDs)
- Infiltration through porous land borders of neighbouring countries of India
- Ship-breakers selling the ODS locally in India by manipulating documents and mis-appropriating ODS placed in the Bonded warehouse, meant for re-exports to Foreign Going Vessels only.

The gravity of the menace of illegal trade in ODS can be gauged by the large quantities of ODS being infiltrated in the country and some of which are being intercepted and seized by the various Enforcement Agencies such as Border Security Force (BSF), Customs Police etc.

Importers have been mis-declaring the consignment as Refrigerant Tubs, Refrigerant Gas, Refrigerant-21/22, Gas Cans etc. and the Customs Authorities are unaware about the illegality of such imports as import is permitted only by actual users against a licence, from a country which is party to the Montreal Protocol. Taking advantage of the lack of background information, it has been observed that importers have brought many consignments in the country and invading the markets with product which is illegally imported and being sold in packing which is banned in the country as per Gas Cylinder Rules,1981.

Capacity building for controlling illegal trade in ODS.

Illegal trade was highlighted as an issue in the Meeting of Parties that took place in Colombo in October 2001. A video was shown highlighting specific instances of illegal transport of ODS across porous borders. To address this issue, there is need to train officers involved in implementation of regulations, especially customs officials and equipping goods entry points with identifiers of ODS.

National Academy of Customs Excise and Narcotics, India was identified as one of the international centres for training customs officers and officers associated with implementation of Ozone Regulations in the South Asian Region and as a first step, a one week intensive international training programme was organised in collaboration with UNEP in November 2001and with funding from technical assistance for CFC production sector phaseout. Officers from five other such similar centres located across the globe participated in this training program. Further it has been noted that implementation of the training activity and increasing cooperation with neighboring countries on this issue, entry of illegal ODS or ODS containing products has significantly reduced. As part of the technical assistance plan of the Project Management Unit (PMU), Customs Officers have been trained in two days workshops held at Lucknow, Chennai, Kolkata and Cochin. Two “Train the trainers“ programmes of one week intensive training has also been organized at National Academy of Customs, Excise and Narcotics (NACEN), Faridabad and Chennai on 4-8 Aug 2003 and 11-14 Aug 2003 respectively to build up a strong team of trainers spread over the country so as to take up training at cutting edge level.

Scientific Assessment of Ozone Depletion

Ozone Depletion is the result of a complex set of circumstances and atmospheric chemistry. According to Scientific Assessment of Ozone Depletion: 2002 reported by scientific assessment panel of WMO and UNEP, with full compliance to the Protocol, recovery of the Ozone Layer is expected by mid century, but the rate will depend upon green house gas abundances causing climate change. The dominant factor in the long term recovery is expected decline in halogen gas abundances.

The Ozone Layer at mid-latitudes remains depleted about 3% in both hemispheres. No trends have been observed in the tropics. The most recent Antarctic Ozone hole 2002 was very atypical. Likely cause is attributed to rare meterology (not change in chemistry). An Arctic “ozone hole” (like in Antarctica) is still considered unlikely. Amount of Artic depletion is higher in colder Arctic winters.

3. HOW CAN YOU HELP THE OZONE LAYER

"Being ozone friendly" means taking individual action to reduce and eliminate impacts on the stratospheric ozone layer caused by the products that you buy, the appliances and equipment that your household or business uses, or the manufacturing process used by your company. Products made with, or containing ozone depleting substances (ODS) such as CFCs, HCFCs, halons, methyl chloroform and methyl bromide can contribute to ozone layer depletion.

The suggestive lists of individual actions to protect the ozone layer are as follows:

Be an Ozone-friendly consumer

Buy products (aerosol spray cans, refrigerators, fire extinguishers, etc.) that are labelled "ozone friendly" or "CFC free". The product labels should indicate that they do not contain ozone depleting substances such as CFCs or halons. Ask for more information from the seller to ensure that the product is ozone friendly. Tell you neighbour that you are the privileged owner of "ozone friendly" products.

Be an ozone-friendly homeowner

Dispose of old refrigerators and appliances responsibly. CFC and HCFC refrigerants should be removed from an appliance before it is discarded. Portable halon fire extinguishers that are no longer needed should be returned to your fire protection authority for recycling. Consider purchasing new fire extinguishers that do not contain halons (e.g. dry powder) as recommended by your fire protection authority.

Be an ozone-friendly farmer

If you use methyl bromide for soil fumigation, consider switching over to effective and safe alternatives that are currently being used in many countries to replace this ozone damaging pesticide. Consider options such as integrated pest management that do not rely on costly chemical inputs. If you don't currently use methyl bromide, don't begin to use it now (you will have to get rid of it in the future).

Be an ozone-friendly refrigeration servicing technician

Ensure that the refrigerant you recover from air conditioners, refrigerators or freezer during servicing is not "vented" or released to the atmosphere. Regularly check and fix leaks before they become a problem. Help to start a refrigerant recovery and recycling programme in your area.

Be an ozone-friendly office worker

Help your company identify which existing equipment (e.g. water coolers, air conditioners, cleaning solvents, fire extinguishers), and what products it buys (aerosol sprays, foam cushions/mattresses) use ozone depleting substances, and develop a plan for replacing them with cost-effective alternatives. Become an environmental leader within your office.

Be an ozone-friendly company

Replace ozone depleting substances used on your premises and in your manufacturing processes (contact your National Ozone Unit to see if you are eligible for financial and technical assistance from the Multilateral Fund). If your products contain ozone-depleting substances, change your product formulation to use alternative substances that do not destroy the ozone layer.

Be an ozone-friendly teacher

Inform your students about the importance of protecting the environment and in particular, the ozone layer. Teach students about the damaging impact of ozone depleting substances on the atmosphere, health impacts and what steps are being taken internationally and nationally to solve this problem. Encourage your students to spread the message to their families.

Be an ozone-friendly community organizer

Inform your family, neighbours and friends about the need to protect the ozone layer and help them get involved. Work with non-governmental organizations to start information campaigns and technical assistance projects to phase out ozone depleting substances in your city, town or village.

Be an ozone-friendly citizen

Read and learn more about the effects of ozone depletion on people, animals and the environment, your national strategy and policies to implement the Montreal Protocol, and what the phase out of ozone depleting substances means to your country. Get in touch with your country's National Ozone Unit and learn how you can get involved on an individual level.

4. OZONE IN OUR ATMOSPHERE

Twenty Questions and Answers about the complex science of ozone depletion.

(Extracts from the report of scientific Assessment of Ozone Depletion: 2002)

Q.1. : What is ozone and where is it in the atmosphere?

Ozone is a gas that is naturally present in our atmosphere. Each ozone molecule contains three atoms of oxygen and is denoted chemically as O_3. Ozone is found primarily in two regions of the atmosphere. About 10% of atmospheric ozone is in the troposphere, the region closest to Earth (from the surface to about 10-16 kilometers (6-10miles)). The remaining ozone (90%) resides in the stratosphere, primarily between the top of the troposphere and about 50 kilometers (31 miles) altitude. The large amount of ozone in the stratosphere is often referred to as the "ozone layer".

Q.2. : How is ozone formed in the atmosphere?

Ozone is formed throughout the atmosphere in multistep chemical processes that require sunlight. In the stratosphere, the process begins with the breaking apart of an oxygen molecule (O_2) by ultraviolet radiation from the Sun. In the lower atmosphere (troposphere), ozone is formed in a different set of chemical reactions involving hydrocarbons and nitrogen-containing gases.

Q.3. : Why do we care about atmospheric ozone?

Ozone in the stratosphere, absorbs some of the Sun's biologically harmful ultraviolet radiation. Because of this beneficial role, stratospheric ozone is considered "good ozone". In contrast, ozone at Earth's surface that is formed from pollutants is considered "bad ozone" because it can be harmful to humans and plant and animal life. Some ozone occurs naturally in the lower atmosphere where it is beneficial because ozone helps remove pollutants from the atmosphere.

Q.4. : Is total ozone uniform over the globe?

No, the total amount of ozone above the surface of Earth varies with location on the time scales that range from daily to seasonal. The variations are caused by stratospheric winds and chemical production and destruction of ozone. Total ozone is generally lowest at the equator and highest neat the poles because of the seasonal wind patterns in the stratosphere.

Q.5. : How is ozone measured in the atmosphere?

The amount of ozone in the atmosphere is measured by instruments on the ground and carried aloft in balloons, aircraft, and satellites. Some measurements involve drawing air into an instrument that contains a system for detecting ozone. Other measurements are based on ozone's unique absorption of light in the atmosphere. In that case, sunlight or laser light is carefully measured after passing through a portion of the atmosphere containing ozone.

Q.6. : What are the principal steps in stratospheric ozone depletion caused by human activities?

The initial step in the depletion of stratospheric ozone by human activities is the emission of ozone-depleting gases containing chlorine and bromine at Earth's surface. Most of these gases accumulate in the lower atmosphere because they are unreactive and do not dissolve readily in rain or snow. Eventually, the emitted gases are transported to the stratosphere where they are converted to more reactive gases containing chlorine and bromine. These more reactive gases then participate in reactions that destroy ozone. Finally, when air returns to the lower atmosphere, these reactive chlorine and bromine gases are removed from Earth's atmosphere by rain and snow.

Q.7. : What emissions from human activities lead to ozone depletion?

Certain industrial processes and consumer products result in the atmospheric emission of "halogen source gases". These gases contain chlorine and bromine atoms, which are known to be harmful to the ozone layer. For example, the chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), once used in almost all refrigeration and air conditioning systems, eventually reach the stratosphere where they are broken apart to release ozone-depleting chlorine atoms. Other examples of human-produced ozone-depleting gases are the "halons", which are used in fire extinguishers and which contain ozone-depleting bromine atoms. The production and consumption of all principal halogen source gases by human activities are regulate worldwide under the Montreal Protocol.

Q.8. : What are the reactive halogen gases that destroy stratospheric ozone?

Emissions from human activities and natural processes are large sources of chlorine-and bromine-containing gases for the stratosphere. When exposed to ultraviolet radiation from the Sun, these halogen source gases are converted to more reactive gases also containing chlorine and bromine. Important examples of the reactive gases that destroy stratospheric ozone are chlorine monoxide (ClO) and bromine monoxide (BrO). These and other reactive gases participate in "catalytic" reaction cycles that efficiently destroy ozone. Volcanoes can emit some chlorine-containing gases, but these gases are ones that readily dissolve in rainwater and ice and are usually "washed out" of the atmosphere before they can reach the stratosphere.

Q.9. : What are the chlorine and bromine reactions that destroy stratospheric ozone?

Reactive gases containing chlorine and bromine destroy stratospheric ozone in "catalytic" cycles made up of two or more separate reactions. As a result, a single chlorine or bromine atom can destroy many hundreds of ozone molecules before it reacts with another gas, breaking the cycle. In this way, a small amount of reactive chlorine or bromine has a large impact on the ozone layer. Special ozone destruction reactions occur in Polar Regions because the reactive gas chlorine monoxide reaches very high levels there in the winter/spring season.

Q.10. : Why has an "ozone hole" appeared over Antarctica when ozone-depleting gases are present throughout the stratosphere?

Ozone-depleting gases are present throughout the stratospheric ozone layer because they are transported great distances by atmospheric air motions. The severe depletion of the Antarctic ozone layer known as the "ozone hole" forms because of the special weather conditions that exist there and nowhere else on the globe. The very cold temperatures of the Antarctic stratosphere create ice clouds called polar stratospheric clouds (PSCs). Special reactions that occur on PSCs and the relative isolation of Polar stratospheric air allows chlorine and bromine reactions to produce the ozone hole in Antarctic springtime.

Q.11. : How severe is the depletion of the Antarctic ozone layer?

Severe depletion of the Antarctic ozone layer was first observed in the early 1980s. Antarctic ozone depletion is seasonal, occurring primarily in late winter and spring (August-November). Peak depletion occurs in October when ozone is often completely destroyed over a range of altitudes, reducing overhead total ozone by as much as two-thirds at some locations. This severe depletion creates the "ozone hole" in images of Antarctic total ozone made from space. In most years the maximum area of the ozone hole usually exceeds the size of the Antarctic continent.

Q.12. : Is there depletion of the Arctic ozone layer?

Yes, significant depletion of the Arctic ozone layer now occurs in some years in the late winter/spring period (January-April). However, the maximum depletion is generally less severe than that observed in the Antarctic and is more variable from year to year. A large and recurrent "ozone hole", as found in the Antarctic stratosphere, does not occur in the Arctic.

Q.13. : How large is the depletion of the global ozone layer?

The ozone layer has been depleted gradually since 1980 and now is about an average of 3 % lower over the globe. The depletion, which exceeds the natural variations of the ozone layer, is very small near the equator and increases with latitude toward the poles. The large average depletion in Polar Regions is primarily a result of the late winter/spring ozone destruction that occurs there annually.

Q.14. : Do changes in the Sun and Volcanic eruptions affect the ozone layer?

Yes, factors such as changes in solar radiation, as well as the formation of stratospheric particles after volcanic eruptions, do influence the ozone layer. However, neither factor can explain the average decreases observed in global total ozone over the last two decades. If large volcanic eruptions occur in the coming decades, ozone depletion will increase for several years after the eruption.

Q.15. : Are there regulations on the production of ozone-depleting gases?

Yes, the production of ozone-depleting gases is regulated under a 1987 international agreement known as the "Montreal Protocol on Substances that Deplete the Ozone Layer" and its subsequent Amendments and Adjustments. The Protocol, now ratified by over 180 nations, establishes legally binding controls on the national production and consumption of Ozone depleting gases. Production and consumption of all principal halogen-containing gases by developed and developing nations will be significantly reduced or phased out before the middle of the 21st century.

Q.16. : Has the Montreal Protocol been successful in reducing ozone-depleting gases in the atmosphere?

Yes, as a result of the Montreal Protocol, the total abundance of ozone-depleting gases in the atmosphere has begun to decrease in recent years. If the nations of the world continue to follow the provisions of the Montreal Protocol, the decrease will continue throughout the 21st century. Some individual gases such as halons and hydrochlorofluorocarbons (HCFCs) are still increasing in the atmosphere, but will begin to decrease in the next decades if compliance with the Protocol continues. By mid-century, the effective abundance of the ozone-depleting gases should fall to values present before the Antarctic "ozone hole" began to form in the early 1980s.

Q.17. : Does depletion of the ozone layer increase ground-level ultraviolet radiation?

Yes, ultraviolet radiation at Earth's surface increases as the amount of overhead total ozone decreases, because ozone absorbs ultraviolet radiation from the Sun. Measurements by ground-based instruments and estimates made using satellite data have confirmed that surface ultraviolet radiation has increased in regions where ozone depletion is observed.

Q.18. : Is depletion of the ozone layer the principal cause of climate change?

No, ozone depletion itself is not the principal cause of climate change. However, because ozone is a greenhouse gas, ozone changes and climate change are linked in important ways. Stratospheric ozone depletion and increases in global tropospheric ozone that have occurred in recent decades both contribute to climate change. These contributions to climate change are significant but small compared with the total contribution from all other greenhouse gases. Ozone and climate change are indirectly linked because ozone-depleting gases, such as the chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons, also contribute to climate change.

Q.19. : How will recovery of the ozone layer be detected?

Scientists expect to detect the recovery of the ozone layer with careful comparisons of the latest ozone measurements with past values. Changes in total overhead ozone at various locations and in the extent and severity of the Antarctic "ozone hole" will be important factors in gauging ozone recovery. Natural variations in ozone amounts will limit how soon recovery can be detected with future ozone measurements.

Q.20. : When is the ozone layer expected to recover?

The ozone layer is expected to recover by the middle of the 21^{st} century, assuming global compliance with the Montreal Protocol. Chlorine and bromine-containing gases that cause ozone depletion will decrease in the coming decades under the provisions of the Protocol. However, volcanic eruptions in the next decades could delay ozone recovery by several years and the influence of climate change could accelerate or delay ozone recovery.

5. Annexure-I

List of enterprises (sector wise) that have received assistance from the Multilateral Fund.

Aerosols

S No	Project Activity	ODP Tonnes to phase out	Funds Approved in US$	Details of Disbursement
1.	Aero Pharma Aerosol Conversion, Maharashtra	36.0	62,250	59,405
2.	My Fair Lady Aerosol Conversion, New Delhi	59.4	128,792	97,780
3.	Aerol Formulations Aerosol Conversion, New Delhi	31.0	78,479	68,659
4.	Texas Enterprises Aerosol Conversion, New Delhi	31.2	79,100	65,097
5.	Ultra Tech Specialty Chemicals Pvt Ltd. Aerosol	30.8	79,100	70,000
6.	Accra Pack India Pvt. Ltd. Aerosol Conversion, Gujarat	92.0	146,550	122,14
7.	Stella Industries Ltd. Aerosol Conversion, New Delhi	105.0	304,168	269,17
8.	Aeropress Aerosol Conversion, Gujarat	59.0	165,952	142,82
9.	Aero pack Products Aerosol Conversion, Maharashtra	26.4	107,875	69,450
10.	Asian Aerosols Pvt. Ltd. Aerosol Conversion, Gujarat	25.0	102,706	83,123
11.	Aerosols D'Asia Pvt. Ltd. Aerosol Conversion, Gujarat	18.0	78,479	67,071
12.	A.A. Attarwala and Co. Pvt. Ltd. Aerosol	30.6	151,703	114,243
13.	Aero Industries Aerosol Conversion, Gujarat	27.6	137,561	117,832
14.	Chem Versa Consultants Ltd. , Maharashtra	18.0	76,076	65,452
15.	SaraChem Pvt. Ltd. Aerosol Conversion, Maharashtra	23.3	100,755	59,441
16.	Spray Products Ltd. Aerosol Conversion, Maharashtra	16.8	73,999	62,511
17.	Sunder Chemical Ltd. Aerosol , Delhi	15.0	67,678	56,275
18.	Maja Cosmetics Pvt. Ltd., Delhi	31.3	141,521	124,535
19.	Midas Care Pharmaceuticals Ltd. Maharashtra	25.2	125,294	108,151
20.	Syncaps Aerosols, Maharashtra	65.5	182,515	94,520
21.	Ruby Aerosol, Delhi	22.2	51,754	41,093
22	Vimsons Aerosol, Gujarat	18.2	75,145	47,995
23.	Terminal Umbrella Project Aerosol Sector	132.5	657,130	-

Foam

S No	Project Activity			
1	Camphor & Allied Products Ltd., Gujarat			
2	Sunpra Ltd., Pune, Maharashtra			
3	Eagle Flasks Industries Ltd., Maharashtra			
4	U-Foam Pvt. Ltd., (A.P)			
5	Bakelite Hylam Ltd., Secunderabad			
6	Alfa Foams , Maharashtra			
7	Blue Star Ltd., Maharashtra			
8	Duroflex Coir Industries P. Ltd., Karnataka			
9	Industrial Foam P. Ltd. , New Delhi			
10	Ishwar Arts, Gujarat			
11	Ishwar Ashish Plastics P. Ltd., Gujarat			
12	Karnataka Consumer Product Ltd.(Kurlon), Karnataka			
13	Madras Polymounds, T.N.			
14	Milton Plastics Ltd., Maharashtra			
15	Milton Polyplast , Maharashtra			
16	Tranquil Rubbers Sales P. Ltd., T.N			
17	Vikram Plastics, Gujarat			
18	Panorama Plastics, Gujarat			
19	Polymate Foams P. Ltd., Karnataka			
21	Polyflex (India) P. Ltd., Karnataka			
22	Real Polymers, New Delhi			
23	Vijayjyot Seats Ltd., Gujarat			
24	Bharat Seats Ltd., Haryana			
25	PUR Polyurethane Products P. Ltd., New Delhi			
26	Pfedo Synthetics (P) Ltd., New Delhi			
27	SDC Polyurethane Products Ltd., Gujarat			
28	Shroff Textiles Ltd., Maharashtra			
29	Harita Grammer Ltd., Karnataka			
30	Punjab Scooters Ltd., Punjab			
31	Amit Polyseats Ltd., U.P			
32	Meenakshi Polymers Pvt. Ltd., Delhi			
33	Beardsell Ltd., T.N.			
34	Asha Handicraft., Maharashtra			
35	Wimco Pen Co., Maharashtra			
36	Lloyd Insulation (India) Ltd., Delhi			
37	Cello Plast., Daman			
38	Cello Thermoware Ltd., Daman			
39	Polyproducts , Gujarat			
40	Kaygee Foams P. Ltd., Maharashtra			
41	Preto Foams, Hyderabad, A.P.	220.0	816,400	280,000
42	Bharat Plastic Products., Daman	20.0	467,829	370,228
43	Inalsa Ltd., New Delhi	20.0	412,450	361,253
44	Mahavir Enterprises, Maharashtra	35.0	371,295	250,679
45	Omkar PUF Insulation, Maharashtra	58.0	414,710	367,000
46	Krishna Fabrications Ltd., Karnataka	19.0	248,487	186,167
47	K.B. Poly Industries P. Ltd., Orrisa	13.0	253,120	162,674
48	Vora Cork Industries, Maharashtra	10.0	113,904	93,376
49	Best Plastronics Pvt. Ltd., New Delhi	35.0	361,600	310,524

50	Bharat Plast, Daman	10.6	80,230	70,897
51	Amar Enterprises, Maharashtra	16.2	135,600	119,943
52	Deccan Engineering Enterprises, A.P.	8.3	72,320	60,698
53	Bharat Cottage Industries, Maharashtra	7.8	68,930	58,954
54	80 Small and medium sized enterprises - group project SMS	290.0	1,586,520	1,404,000
55	Super Urethane Products P. Ltd., Daman	39.1	320,920	247,467
56	Blowkings KFTZ, Maharashtra	17.6	149,160	117,607
57	Delta Foams Engineering Co., Maharashtra	12.0	96,050	69,775
58	Panna International, Gujarat	9.7	54,240	28,630
59	Viral Corporation, Gujarat	11.8	94,920	81,264
60	Ras Polybuild Products P. Ltd., A.P.	17.7	144,640	127,864
61	Alaska Industries., Daman	17.6	144,640	109,630
62	Bluplast Corporation, Maharashtra	10.1	85,880	76,000
63	Reliable Rotomoulders Pvt. Ltd., West Bengal	8.7	71,190	62,231
64	Malanpur Entech Pvt. Ltd., M.P.	18.9	167,240	135,612
65	Nissan Thermoware P. Ltd., Daman	15.4	125,430	110,294
66	K.J. Polymers P. Ltd., Delhi	30.0	144,132	127,197
67	Venus Auto P. Ltd. U.P	21.0	155,093	136,095
68	Shri Krishna polyurethane Industries (P) Ltd., Delhi	19.2	217,949	192,389
69	Sidhi Polymer P. Ltd., Karnataka	7.5	85,033	74,513
70	Legend Interiors, Delhi	9.0	140,120	109,875
71	National Flask Industries Ltd., Gujarat	36.9	230,373	187,684
72	Sintex Industries. Ltd., Gujarat	10.9	71,167	29,39
73	Jayson Industries, Delhi	12.9	100,457	88,060
74	Duab International, Haryana	13.4	118,074	104,490
75	Jaypee Technoplast P. Ltd., Jammu	18.5	158,042	138,894
76	Galaxy FRP Pvt. Ltd., Haryana	18.5	163,633	143,003
77	Ajay Corrugating & Plastics P. Ltd., Gujarat	10.3	91,310	80,805
78	Puff Insulators, Delhi	10.6	93,960	83,150
79	Joti Foam Products P. Ltd., Maharashtra	37.6	196,948	174,003
80	Bansal Plastic Industries, Delhi	20.4	77,777	62,589
81	Baba Insulators, Delhi	14.4	66,778	48,628
82	Shree Nath Plastics, Delhi	13.9	69,348	54,256
83	R.S. Insulators, Delhi	10.3	61,924	43,888
84	P.K. Construction Co., Delhi	10.6	83,814	70,897
85	Ganga Thermoware P. Ltd. U.P.	10.1	89,116	73,476
86	Shivathene Linopack, H.P.	119.0	236,170	192,773
87	Nav Texfeb Pvt. Ltd., U.P.	32.4	185,300	160,421
88	Ashok Metals, Delhi	12.5	76,915	66,479
89	O.K.Industries, Delhi	10.7	74,837	64,215
90	28 small and medium-sized enterprises-group project	105.7	786,044	581,448
91	Devisons P. Ltd., Delhi			
92	Vanvar Plast Products Pvt. Ltd., U.P.			
93	Supertek International, Delhi			
94	Standard Electric Appliances, T.N.			
95	N.D.Plastics, Delhi			
96	Primrose Multiplast Pvt. Ltd., Delhi			
97	Delite Foam and Polymers, Haryana			
98	Reactive Polymers Ltd., Gujarat			
99	National Plastics, Daman			
100	Tokyo Plast International Ltd., Daman			
101	Crystal Electronics and Plastics, U.P.			
102	Mayur Jugs Pvt. Ltd., Delhi			
103	Santech Industries, Punjab			
104	Saddle Poly Products P. ltd., A.P.			
105	24 Small and medium-sized Enterprises			
106	Harjas Plastic and Metal Components Maharashtra			
107	Naorang Plast, Delhi			
108	16 Spray Foam Enterprises			
109	Crown Industries, Gujarat			
110	Evershine Plastic Industries P. Ltd., U.P.			
111	Ramakrishna Moulders, Delhi			
112	Sanjay Industries, West Bengal			
113	Enertech engineering P.Ltd., A.P.			
114	M-Plast, Delhi			
115	Raipur Agencies, Chattishgarh			
116	Pyarelal Coir Products Ltd., U.P.			
117	Alka International Ltd., U.P.			
118	SR Poly Steel P. Ltd., Haryana			
119	Nindra Foams, Delhi			
120	R.H. Industries, Punjab			
121	Pinnacle Inudstries Ltd., M.P.			
122	Coolwels Automobile Engineers, Haryana			
123	Jaiswal Industries, New Delhi			
124	Premium Mouldings & Pressing P. Ltd., Haryana			
125	Sawhney Seating Systems, Haryana			
126	Sun Steering Wheels Ltd., Haryana			
127	Neoplast Ltd., U.P.			
128	Group Project spray and Insitu insulation 14 Enterprises			
129	SR Polymers and Printers, New Delhi			
130	Roome Plastics P. Ltd., Rajasthan			

131	Apollo Steelcrafts, Delhi	13.7	86,925	61,685
132	17 Small and Medium-sized enterprises	55.8	472,046	403,500
133	Solvay Moulding P. Ltd., Dadar & Nagar Havelli	26.1	222,480	108,275
134	Polyrub Industries, Gujarat	12.5	110,687	72,400
135	Prince Plastoware Ltd., Daman	9.4	83,631	70,510
136	Nandadeep Fibrotech P. Ltd. , Maharashtra	11.3	100,034	72,611
137	Lear Insulation Engineering P. Ltd., Maharashtra	10.6	93,301	72,463
138	Essa Aircons Ltd., Daman	13.9	122,986	75,224
139	UNC Plast Industries, Navi Mumbai	11.4	101,256	67,767
140	Poly Glass Fibre Industries P. Ltd., New Delhi	17.1	151,689	92,425
141	Caryaire Equipments India P. Ltd., U.P.	17.0	150,865	86,292
142	Bhatia Plastics, New Delhi	11.1	98,389	56,698
143	Flexo Foam P. Ltd., Haryana	19.4	209,372	72,400
144	Malvika Polymers, Haryana	20.0	222,169	72,400
145	Nu-Foam Rubber Industries P. Ltd., Haryana	15.6	180,970	132,495
146	Sutlej Coach Products P. Ltd., Punjab	18.0	211,862	109,900
147	Viking Engineers P. Ltd., U.P.	13.3	163,737	97,168
148	Oto Industries P. Ltd., Haryana	12.7	157,879	72,400
149	Precision Engineering Tools and Components	22.0	226,319	-
150	Pramukh Polymers	27.0	254,038	-
	Multiple - Subsectors			
151	Enkay Foam P. Ltd., U.P	16.6	183,443	154,979
152	Manali Petro chemicals Ltd., Madras	400.0	700,000	415,247
153	UB Petrochemicals Ltd., Madras	464.0	585,684	476,599
154	Expanded Incorporation, Mumbai	72.0	502,130	479,599
155	Polymermann (Asia) P. Ltd., Mumbai	290.0	435,050	378,108
156	Sectoral Phaseout plan for elimination of CFCs in the foam sector	**162.5**	**5,424,577**	-

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1	Vijay Fire Protection Systems Ltd., Gujarat	292.0	247,642	219,152
2	Nitin Fire Protection Industries Ltd., Maharashtra	212.0	187,374	165,818
3	New Age Industries, Maharashtra	133.0	149,440	131,956
4	Steelage Industries Limited, T.N.	116.0	149,064	85,461
5	Vimal Industrial Safety Equipment Corporation, Baroda	133.0	210,352	186,152
6	Atkins, New Delhi	37.0	61,879	54,021
7	Ashoka Engineering Co., New Delhi	34.0	56,862	50,320
8	Standard Casting Pvt. Ltd., Delhi	64.1	103,960	68,916
9	Bharat Engineering Works, Maharashtra	49.5	82,784	65,509
10	Zenith Fire Services, Maharashtra	36.0	60,206	49,9711
11	New Fire Engineers Pvt. Ltd., Maharashtra	120.0	146,900	130,0001
12	Cascade Counsel Ltd., New Delhi	54.0	90,310	79,9201
13	Kooverji Devshi & Co Pvt. Ltd., Maharashtra	25.5	42,646	37,340
14	Umbrella project for the closure of Two Plants in India - SRF & NFI	**556.0**	**2,834,000**	-

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S No	Project Activity
1	Blue Star Ltd., Maharashtra
2	Subros Ltd., New Delhi
3	Meghdoot Refrigeration Industries, Maharashtra
4	V. Krishna & Co., Maharashtra
5	Friz-Tech. P. Ltd., Maharashtra
6	V. Krishna P. Ltd., Maharashtra
7	Rockwell Devices P. Ltd., A.P.
8	Rabi Run Refrigeration Pvt. Ltd., Karnataka
9	Sethia Appliances P. Ltd., A.P.
10	Seepra Refrigeration P. Ltd., Maharashtra
11	Shakti Fabricators, Punjab
12	Chandra Frig. Co. P. Ltd., New Delhi
13	Supercold Refrigeration Systems., Kerala
14	Murali Refrigeration and Engineering Co., Kerala
15	Godrej-GE Appliances Ltd., Maharashtra
16	Standard Refrigeration Appliances, Maharashtra
17	Polar Enterprises , Maharashtra
18	Refrigerators and Home Appliances P. Ltd., New Delhi
19	Hindustan Refrigeration Industries, New Delhi
20	Refrigeration Components and Accessories, New Delhi
21	Sheetal Engineering Works P. Ltd., Gujarat
22	Videocon Appliances Ltd., Maharashtra
23	Voltas Ltd., A.P.
24	Electrolux - Kelvinator Ltd. (Maharaja International Ltd.), Rajasthan
25	Pranav Vikas India Ltd., Haryana
26	Sanden Vikas India Ltd., Haryana
27	Arkay Industries., Goa
28	Saikrupa Industries, Maharashtra
29	Sarkar Refrigeration Industries., Maharashtra
30	Sidwal Refrigeration , Delhi
31	BPL Refrigeration Ltd., Karnataka
32	Sandeep Refrigeration., Maharashtra
33	Whirlpool of India Ltd., Haryana
34	Fedders Lloyd Corporation Ltd. U.P.
35	Sandlas Air-Com Systems P. Ltd. Punjab
36	Umbrella Project of three commercial refrigeration enterprises, Delhi
37	Nine Enterprises for Commercial Refrigeration
38	Five Enterprises for Commercial Refrigeration

39	Nine Enterprises for Commercial Refrigeration	56.5	816,357	1,100
40	Fourteen Enterprises for Commercial Refrigeration	68.0	1,075,708	1,100
41	Ice-Make Refrigeration	12.4	177,755	1,100
42	Konark Refrigeration Appliances	13.1	206,433	1,100
43	Subros Ltd., New Delhi (Phase-II)	-	1,404,588	-
	Plan for phase out of CFCs in the [a] UNIDO	79.5	565,000	-
44	Refrigeration (Manufacturing) sector [b] UNDP	291.5	2,172,971	-
45	Shriram Industrial Enterprises Ltd. Hyderabad	18.0	685,000	-
46	Kirloskar Copeland Ltd., Karad, Maharashtra	125.5	547,900	515,368
47	Freezeking Industries, New Delhi	35.0	240,500	208,195
48	Godrej G.E. (Compressor), Maharashtra	71.7	2,285,500	-
49	IOC for Sidwal Refrigeration Industries, New Delhi	-	5,847	-
50	IOC for Sarkar Refrigeration, Maharashtra	-	4,955	-
51	IOC for Saikrupa Refrigeration, Maharashtra	-	11,892	-
52	IOC for Aarkay Industries, Goa	-	17,095	-
Solvent				
1	ITI Mankapur, U.P.	36.0	689,481	610,147
2	Hindustan syringes & Medical Devices P. Ltd., Haryana	53.2	481,000	458,702
3	Electronics Research Ltd., Bangalore, Karnataka	17.5	217,436	190,220
4	ITI, Palakkad, Kerala	15.0	266,391	241,396
5	ITI, Bangalore, Karnataka	7.0	121,988	106,976
6	Modi Xerox, U.P.	6.1	147,825	104,834
7	Malhotra Shaving Products Ltd., A.P.	17.0	288,277	255,112
8	Harbans Lal Malhotra & Sons Ltd., West Bengal	16.0	349,056	308,841
9.	Vidyut Metallics Ltd., Maharashtra	19.7	254,761	177,124
10.	Microraj Electronics Pvt. Ltd., A.P.	4.3	96,537	84,865
11	Videocon Group (VCD), Gujarat	7.2	265,525	233,964
12	Excel Industries Ltd., Gujarat	375.0	413,580	366,000
13	Blue Star Ltd., Maharashtra	6.6	85,911	30,200
14	Alpha Drugs India Ltd., Punjab	69.7	169,205	74,099
15	Doctors Organic Chemicals , A.P.	94.6	362,616	126,232
16	Svis Labs Ltd., Ranipet, T.N.	54.2	281,785	217,067
17	Satya Deeptha Pharmaceuticals P. Ltd., Karnataka	27.9	293,950	184,832
18	Sapna Coils Ltd., Maharashtra	22.8	276,877	87,840
19	Engineering Industries, Maharashtra	20.2	269,817	86,184
20	Sapna Engineering, Maharashtra	14.5	271,692	88,088
21	Pradeep Shetye Ltd., Maharashtra	133.9	315,271	-
22	Benzo Chemical Industries, Maharashtra	23.0	154,568	-
23	FDC Limited, Maharashtra	34.1	269,359	-
24	GRD Chemicals Ltd., M.P.	17.9	144,264	-
25	Rishiroop Organics P. Ltd. &	248.8	2,312,473	1,253,339
	Rishiroop Polymers P. Ltd., Gujarat			
26	Chiplun Fine Chemicals Ltd., Maharashtra			
27	Amoli Organics Limited			
28	Navdeep Engineering, Palghar, Maharastra			
29	Bharat Electronics Limited (BEL), Bangalore			
30	CTC Phase out Plan for the Consumption sector (First Tranche)			

6. Annexure –II

Details of Central Excise Duty Exemption Certificates Issued From Financial Year 1996-97 to 2002-03

(Amount in Lakhs of Rupees.)

S.No.	Year	Number of Certificates	Cost of Equipment	Excise Duty Exemption
1	1996-97	4	15.2	4.56
2	1997-98	17	78.81	2.37
3	1998-99	8	61.97	18.59
4	1999-00	12	148.93	44.68
5	2000-01	8	171.37	51.41
6	2002-03	14	327.53	52
Total		**63**	**803.81**	**174.01**

Total Cost of the Equipment Rs.803 Lakhs (Approx)
Total Excise Duty Exemption- Rs. - 174 Lakhs (Approx)
The details are available at www.envfor.nic.in under the link Ozone cell.

Details of Customs Duty Exemption Certificates Issued From Financial Year 1994-95 to 2003-04

(Amount in Rs.)

S. No.	Year	Number of Certificates	Cost of Equipment	MLF Projects	New Project & Expansion Projects
1	1994-95	4	5290582	18,51,704	NIL
2	1995-96	8	31205458	1,12,39,809	NIL
3	1996-97	36	86958614	3,04,35,516	NIL
4	1997-98	33	94145055	3,29,50,771	NIL
5	1998-99	40	441980465	3,87,95,240	11,58,97,923
6	1999-00	40	50900975	15,36,51,882	2,44,98,459
7	2000-01	37	24740264	37,04,562	7,04,65,253
8	2001-02	36	435915710	2,87,57,807	11,91,99,543
9	2002-03	28	455260426	5,27,60,000	6,07,04,464
10	2003-04	12	783202176	45,27,605	19,12,72,940
	Total	***274***	***2409599725***	***35,86,74,896***	***58,20,38,582***

Total Cost of the Equipment Rs. 241 Crores (Approx)
Total Custom Duty Exemption- Rs. - 93.35 Crores (Approx)
The details are available at www.envfor.nic.in under the link ozone cell