UNEP

Training Manual for Customs Officers

Second Edition

Saving the Ozone Layer: Phasing Out Ozone Depleting Substances in Developing Countries

United Nations Environment Programme

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TRAINING MANUAL FOR CUSTOMS OFFICERS
Second Edition

United Nations Environment Programme
Division of Technology, Industry & Economics
OzonAction Programme
15, rue de Milan,
75441Paris CEDEX 09, France

Multilateral Fund for the Implementation of the Montreal Protocol
1800 McGill College Avenue, 27th Floor, Montreal,
Quebec H3A 3JC, Canada

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This publication was produced by the UNEP Division on Technology, Industry and Economics (DTIE) OzonAction Programme as part of UNEP's work programme under the Multilateral Fund for the Implementation of the Montreal Protocol

This project was managed by:

Ms. Sylvie Lemmet, Director
UNEP DTIE, France

Mr. Rajendra Shende, Head
OzonAction Branch, UNEP DTIE, France

Mr. James S. Curlin, Capacity Building Manager
OzonAction Programme, UNEP DTIE, France

Mr. Ruperto De Jesus, Programme Assistant/ Project Coordinator
OzonAction Programme, UNEP DTIE, France

Ms. Mugure Kibe Ursulet, Documentation Assistant
OzonAction Programme, UNEP DTIE, France

With special thanks for the invaluable contribution to this manual:

Mr. Suresh Raj, UNEP Representative
Pacific Islands SPREP Headquarters, Apia, Samoa

This updated edition was researched and written by:

Ms. Brittany Whiting, Global Trade Training Expert
United States of America

And edited by:

Ms. Sabra Ledent,
Ledent Editing, Montreal, Canada

The quality review was undertaken by:

Dr. Janusz Kozakiewicz, Associate Professor
Industrial Chemistry Research Institute, Poland

Mr. Bishnu Tulsie, Chief
Sustainable Development and Environment Officer
Ministry of Planning, Development, Environment and Housing, St. Lucia

Review of specific sections, additional comments or resource materials were provided by:

Mr. Philippe Chemouny, Manager
Montreal Protocol Programme, International Affairs Branch
Environment Canada

Mr. Tom Land, Office of Atmospheric Programs
US Environmental Protection Agency

Mr. Gilbert M. Bankobeza, Senior Legal Officer
UNEP Ozone Secretariat, Kenya

Mr. Hui FU, Technical Attaché
Compliance and Facilitation
World Customs Organisation, Switzerland

Ms. Yukari Kawanaka, Technical Attaché
Ms. Katarina Pirselova, Technical Officer
Mr. Edward Kafeero,
Directorate of Tariff and Trade Affairs
World Customs Organisation, Switzerland

Ms. Yoko Odashima, Deputy Head
WCO ROCB (Asia Pacific Regional Office for Capacity Building)
Thai Customs Department, Thailand

Dr. Ezra Clark, Coordinator
Green Customs Initiative,
UNEP DTIE, France

Mr. Xie Jiaoning, Commissioner of Foreign Affairs
Shanghai Customs College, China

Ms. Nidia Mercedes Pabón Tello, Coordinador Sectorial
Unidad Técnica de Ozono
Ministerio de Ambiente Vivienda y Desarrollo Territorial
Colombia

Mr. Cedric Nelom, National Ozone Officer
National Institute for Environment &
Development in Suriname (NIMOS), Suriname

Major Nicomedes Enad, Chief
Environmental Protection Unit
Enforcement and Security Service
Bureau of Customs, Philippines

Mr. Tharaka Seneviratne, Deputy Director
Tariff Facilitation and Appraisement
Customs Department of Sri Lanka

Mr. David V. Catchpole, Co-chair
Halons Technical Options Committee

Mr. Fareed Busheri, Halons Officer
Mr. Ayman El- Talouny, RMP Officer
UNEP CAP Regional Office for West Asia

Mr. H.S. Kaprwan, Member
Halons Technical Options Committee

Mr. Jonathan Banks, Consultant, Member
Methyl Bromide Technical Options Comité

Ms. Mireille de Beurs
Mr. G.C.M. Koomen
Customs Laboratory
Dutch Tax and Customs Administration
The Netherlands

Ms. Ludgarde Coppens, CAP ROAP
Ms. Artie Dubrie, CAP ROLAC
Mr. Patrick Salifu, CAP ROA
Policy and Enforcement Officers,
UNEP DTIE Regional Compliance Assistance Programme (CAP)

Mr. Liu Ning, Consultant
UNEP CAP ROAP

Design and production of this Manual and supporting materials:

Mr. Benjamin Walker
Touraine Design Studio

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Foreword

Environmental crime is big business – a multi-billion dollar global enterprise. Crime syndicates worldwide earn billions of dollars annually from dumping hazardous waste, smuggling proscribed hazardous materials, and exploiting and trafficking protected natural resources. Illegal international trade in "environmentally-sensitive" commodities such as ozone depleting chemicals is an international problem that threatens our common environment, results in revenue loss for governments, and strengthens criminal organizations. Such illegal trade also undermines the effectiveness of international environmental treaties that have trade components, such as the Montreal Protocol on Substances that Deplete the Ozone Layer.

The criminals who engage in smuggling of controlled ozone depleting chemicals operate in every region, trying to circumvent a country's border controls. This illicit trafficking undermines the substantial hard work, financial resources and time invested by government, companies and individuals to implement this treaty. As part of their compliance with the Montreal Protocol, each nation who is a Party to the treaty has set the necessary policies to regulate trade in these chemicals and established a monitoring and control system at the borders to enforce them. The Customs officers, which this publication is aimed at, are the people who makes this import-export control system work. They are the front line of defence.

The United Nations Environment Programme recognizes this critical role Customs men and women play in each country's "compliance and enforcement chain", and we know that without their vigilance and active participation, the rest of the chain will be less effective. Empowering, building skills and equipping Customs staff are vital if the Montreal Protocol is to be ultimately successful. This is why UNEP, as part of its work under the Multilateral Fund for the Implementation of the Montreal Protocol, has developed this training manual and the course methodology. Using this material, the OzonAction Branch of UNEP's Division on Technology, Industry and Economics and its partners have already built the capacity of nearly 1700 Customs officers from 89 countries to control trade in these chemicals.

This updated version of the manual includes expanded information about other controlled substances, namely hydrochlorofluorocarbons or HCFCs (primarily used as refrigerants), the pesticide methyl bromide, halon fire fighting agents, and the solvents carbon tetrachloride and methyl chloroform.

We hope that this manual helps Customs officials and staff in their daily work and encourages them to see that their traditional role as guardian of the border is now very much also one of protector of the environment.

Achim Steiner,
United Nations Under-Secretary-General
Executive Director, United Nations Environment Programme

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Common abbreviations and acronyms

ARI	Air-Conditioning and Refrigeration Institute (US)
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BLO	Border Liaison Office (UNODC)
CAS	Chemical Abstracts Service
CBD	Convention on Biological Diversity
CCC	Customs Co-operation Council; also known as World Customs Organization (WCO)
CEIT	countries with economies in transition
CEN	Customs Enforcement Network
CFC	chlorofluorocarbon
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CTC	carbon tetrachloride
CWC	Chemical Weapons Convention
DELC	Division of Environmental Law and Conventions (UNEP)
DNA	dezoxyribonucleic acid
EIA	Environmental Investigation Agency
FC	fluorocarbon (= perfluorocarbon)
GHG	greenhouse gas
GWP	global warming potential
HBFC	hydrobromofluorocarbon
HC	hydrocarbon
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
HS	Harmonized Commodity Description and Coding System (known as the "Harmonized System", the international Customs coding system)
iPIC	informal Prior Informed Consent
ISO	International Standards Organization
LMO	living modified organism
MB	methyl bromide
MCF	methyl chloroform
MEA	multilateral environmental agreement
MF	Multilateral Fund for the Implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer
MOP	Meeting of the Parties to the Montreal Protocol
MP	Montreal Protocol
NGO	non-governmental organisation
NOU	National Ozone Unit

ODP	ozone depletion potential
ODS	ozone-depleting substances (= chemicals controlled under the Montreal Protocol)
OPCW	Organisation for the Prohibition of Chemical Weapons
PFC	perfluorocarbon
PIC	Prior Informed Consent
POPs	persistent organic pollutants
QPS	quarantine and pre-shipment
RILO	Regional Intelligence Liaison Office
RMP	Refrigerant Management Plan (strategy to phase out the use of ozone-depleting refrigerants)
ROCB	Regional Office of Capacity Building (WCO)
TCA	1,1,1-trichloroethane (also know as MCF or methyl chloroform)
TPMP	Terminal Phase-Out Management Plan
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP DTIE	UNEP's Division of Technology, Industry and Economics
UNEP ROAP	UNEP's Regional Office for Asia and the Pacific
UNIDO	United Nations Industrial Development Organization
UNODC	United Nations Office on Drugs and Crime
UV	ultraviolet (radiation)
WB	World Bank
WCO	World Customs Organization
WTO	World Trade Organization

Guide to the Reader

Why this training manual?

In 1987 the Montreal Protocol on Substances that Deplete the Ozone Layer, together with the Vienna Convention for the Protection of the Ozone Layer, became the starting point of worldwide co-operation aimed at protecting the stratospheric ozone layer.

All Parties to the Montreal Protocol have committed themselves to eliminating the production and consumption of ozone-depleting substances (ODS), particularly chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), halons, hydrobromofluorocarbons (HBFC), methyl bromide, carbon tetrachloride (CTC), methyl chloroform (TCA) and bromochloromethane.

Most developing countries do not produce or manufacture ODS; they only import them. To guarantee that the Protocol's phase-out target for ODS is met, all the Parties are encouraged to establish an import/export licensing system to help control and monitor the amount of ODS entering or leaving their borders.

The successful implementation of any licensing system depends on properly trained Customs and enforcement officers. They must be able to identify the controlled substances, facilitate their legal entry and curtail their illegal trade.

This training manual provides the guidance and information needed to conduct training programmes for Customs officers in developing countries. It should be used together with the complementary "Country Handbook on ODS Regulations and Import/Export Licensing System", which is produced by each country's National Ozone Unit. This country-specific handbook describes national regulations and the operational details of the licensing system.

How should the training programme be conducted?

The training programme is designed to be implemented in three phases:

- Phase I: Train-the-Customs-trainers
- Phase II: Train-the-Customs-officers
- Phase III: Monitoring and evaluation, and sustaining Customs training.

Countries should schedule Phases I and II closely together in order to maintain the momentum gained during Phase I. Because of the high turnover of officers within the Customs service, the ultimate goal of the training programme is find itself integrated within the national Customs training curricula to ensure that this type of training is maintained for new Customs officers.

What is the scope of the manual?

The training manual is meant to be used for any Montreal Protocol–related Customs training in developing countries which Customs training is approved as part of their Refrigerant Management Plans, Terminal Phase-Out Management Plan or other ODS phase-out plans.

It is designed for multiphase training programmes that follow the train-the-trainers approach. It supports Phase I—train-the-Customs-trainers—and Phase II—train-the-Customs-officers.
The manual focuses on identifying ODS, ODS-containing mixtures, products containing ODS and equipment whose continuous functioning relies on the use of ODS; the various smuggling schemes; and the efforts of the international community in fighting illegal in ODS. Information on ODS substitutes is also included, because ODS are often traded under the names of substitutes.

Special emphasis is placed on CFC and HCFC refrigerants, which account for the majority of ODS consumed in developing countries. Additional information is also included on methyl bromide and carbon tetrachloride, because the illegal trade in these ODS will increase in the coming years as phase-out takes effect.

Who should use the manual?

Implementing and bilateral agencies under the Multilateral Fund for the Implementation of the Montreal Protocol should use the manual to prepare and conduct Phase I (train-the-Customs-trainers) of the training programme for Customs officers. The manual provides generic workshop elements, including concept note, programme agenda, evaluation questionnaire and overheads.

International Customs trainers should use the manual as training material for Phase I of the Customs training programme in conjunction with the "Country Handbook on ODS Regulations and Import/Export Licensing System".

Trained Customs trainers should use the manual as resource document to design a country-specific training module for Phase II of the training programme, which entails training the remaining Customs and enforcement officers in the country.

The final target group of the training programme is Customs trainers, Customs and enforcement officers and other relevant stakeholders involved in the operation of the compliance and enforcement chain of the import/export licensing system for ODS.

What's in the manual?

Chapter 1 introduces the ozone layer, how it benefits living things on earth and the effects of its depletion on human health and the environment. This section also defines and describes ozone-depleting substances and their uses, as well as the link between depletion of the ozone layer and global warming.

Chapter 2 explains the history of the ozone treaties and the phase-out obligations and schedules for Parties to the Protocol and its Amendments, the exempted uses of ODS and the ban on trade with non-Parties to the Montreal Protocol, as well as cross-cutting issues with other international environmental agreements.

Chapter 3 describes the roles of Customs authorities and national stakeholders in enforcing an ODS import/export licensing system and the elements of such a system. It also includes information on dealing with seized ODS and data gathering and reporting.

Chapter 4 provides information on ODS safety for Customs officers and contains a safety checklist for Customs officers responsible for identifying, handling, transporting or storing ODS.

Chapter 5 discusses the illegal trade in ODS, the different smuggling schemes and screening methods to prevent the illegal trade. It also contains a checklist for Customs officers when examining ODS shipments.
Chapter 6 focuses on identifying ODS, ODS-containing mixtures, and ODS-containing products based on names, labelling and packaging, including the Harmonized System Customs codes, CAS, ASHRAE and UN numbers, as well as, to some extent, colour codes.

Chapter 7 describes the various testing methods used to identify ODS, including refrigerant identifiers, the temperature-pressure test, leak detectors and sampling.

Chapter 8 provides local Customs trainers with guidance on how to organise Phase II of the Customs training, which training materials to use and how to be an effective trainer. The chapter also explains the training concept and the roles of the organisers and local trainers.

Chapter 9 lists examples of co-operation at the international, regional and national levels to control the trade and fight the illegal trade in ozone-depleting substances.

The Annexes contain further useful background and resource materials, including generic training materials such as concept notes, agendas and case studies, as well as overheads to be used during the Phase II training. They also include ODS safety cards.

Additional learning tools

Video resources

Six videos are available to complement specific sections of the training manual:

- Video 1: NASA video, "Ozone Creation"
- Video 2: NASA video, "Ozone Destruction"
- Video 3: UNEP video, "Saving the Ozone Layer: Every Action Counts"
- Video 4: UNEP video, "Nothing to Declare: Good Customs to Save the Ozone Layer"
- Video 5: EIA video, "Combating the Illegal Trade in Ozone Depleting Substances: A Guide for Enforcement Officers"
- Video 6: UNEP video, "Ozzy Ozone"

The video icons in the margin indicate which videos can be used to supplement a specific topic discussed in the manual. The videos can be found in the CD ROM that is included in this training manual.

Customs poster

The poster, which complements the manual, can be used to raise awareness among Customs officers. It is also a useful reference tool for Customs officers, because it contains the Customs checklist for examining ODS shipments, describes the different smuggling schemes and includes the Customs Officer's Quick Tool.

Customs Officer's Quick Tool for Screening ODS

This quick tool can be used by Customs officers in the field to access key information on ODS, including names, HS codes, safety information, and producing countries. This tool was developed by UNEP's Compliance Assistance Programme in West Asia.

ODS Trade Names Database

This trade name database provides up-to-date information on ozone-depleting substances, including manufacturers, country of origin, HS codes and ozone depletion potential and green house gas information (http://www.unep.fr/ozonaction/information/tradenames/main.asp). For quick and easy reference, a simplified list of Trade names of ODS chemicals can also be found in the CD ROM that comes with the training manual.

Case studies for Customs officials

The case studies that appear in Annex D.10 can be adapted to each country to include proper names, places and organisations.

Overheads

The overheads in Annex E are an important visual tool for the training.

Demonstration materials

Examples of ODS containers (in particular ODS refrigerant cylinders) and packaging, as well as ODS products and equipment, are available during the training for display and for the practical exercises.

Document display

During the training, a table should be set up that includes reference documents such as information sheets on ODS, the licensing system and regional co-operation efforts. These documents are useful tools and provide additional detailed information on ODS.

Evaluation questionnaire

The questionnaires, once returned to the trainer or to UNEP DTIE, will provide an opportunity to improve the training materials and the organisation of the workshop itself.

Glossary

A list of abbreviations and acronyms appears in the introductory section, and a glossary is included in Annex A.

Knowledge check

Each chapter ends with a set of key questions that will aid the reader in testing his or her knowledge of the issues presented in the relevant chapter.

Internet

This training manual and its components are available in electronic format through the website of UNEP DTIE's OzonAction Branch. They also are available in high-quality desktop publishing formats. UNEP encourages national Customs agencies to translate, adapt or otherwise use the original material. Information about this process is available at http://www.uneptie.org/ozonaction/topics/customs.htm

1 The Ozone Layer and Ozone-Depleting Substances (ODS)

What is ozone?

Ozone is a gas composed of ozone molecules (O_3), which consist of three atoms of oxygen. The oxygen molecules (O_2) in the air we breathe are made up of only two atoms of oxygen. Ozone molecules are created in a photochemical reaction, which can be described in a simplified way as

$$3O_2 - 2O_2 + 2O - 2O_3$$

Oxygen molecules react to form ozone molecules, and at the same time ozone molecules react to form oxygen molecules. If the number of ozone molecules being created is the same as the number of ozone molecules being broken down, the reaction is in dynamic equilibrium. Because this equilibrium is very fragile, any intervention could damage the natural processes of formation and breakdown of ozone, which, in turn, would have serious consequences for life on earth.

What is the ozone layer?

The term ozone layer describes the zone of the highest concentration of ozone molecules in the stratosphere. The layer, which is 10–20 km thick, envelopes the entire globe like a bubble and acts as a filter for the harmful ultraviolet (UV-B) radiation produced by the sun.

Video 1: NASA video, "Ozone Creation"

The stratosphere is that part of atmosphere above the troposphere. It starts at 10–20 km above ground level and continues up to 40–50 km. Figure 1-1 depicts the different layers of the earth's atmosphere.

Stratospheric ozone differs from ground-level ozone. Ground-level ozone is produced

by industry and traffic emissions in combination with specific weather conditions. It is part of photochemical smog, and, as an irritating gas, it may cause human respiratory problems, especially in older people and young children. It also can damage plants.

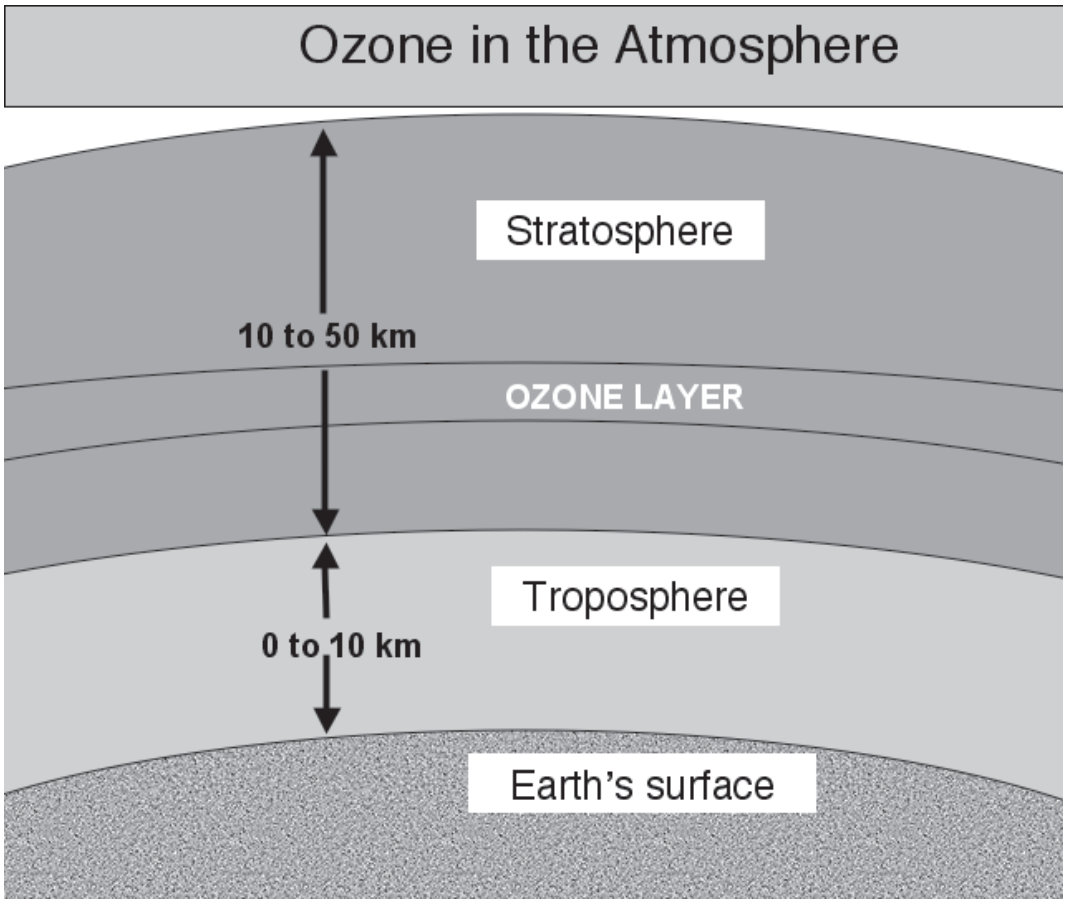


Figure 1-1 The layers of the earth's atmosphere

Why is the ozone layer very important?

The ozone layer is vital to life on earth because it acts as a filter for UV-B radiation, which can have severe impacts on human health and the earth's environment.

If ozone molecules are depleted faster than they can be replaced by the new ozone molecules that nature produces, the result is an ozone deficit. The depletion of the ozone layer leads to a reduction in its shielding capacity and thus greater exposure of the earth's surface to UV-B radiation.

Scientists classify UV radiation into three types or bands - UV-A, UV-B and UV-C. UV-C does not reach the earth's surface. UV-B is partially filtered by the ozone layer. And UV-A is not filtered at all by the ozone layer. However, it is the UV-B radiation that is mainly responsible for damaging human health and the environment.

What are the effects of ozone layer depletion on human health and the environment?

Human health

UNEP video, "Saving the Ozone Layer—Every Action Counts"

Increased exposure to UV-B radiation can suppress the immune system by damaging DNA. The results are higher incidences of infectious diseases, as well as adverse effects on inoculation programmes. UV-B radiation also causes skin cancers - both non-melanoma (the less dangerous) and the virulent cutaneous malignant melanoma. Increased UV-B radiation damages the eyes as well, and a common result is cataracts, which are a major cause of blindness in many countries.

Plants and trees

Ozone layer depletion has serious adverse effects on crops and forests. Ultraviolet radiation changes the chemical composition of several species of plants. Among the crops most vulnerable to UV-B radiation are melons, mustard and cabbage. An increase in UV-B radiation also diminishes the quality of certain types of tomatoes, potatoes, sugar beets and soybeans. The seeds of conifers are adversely affected as well.

Aquatic organisms

UV-B radiation damages aquatic organisms, especially small creatures such as plankton, aquatic plants and fish larvae, shrimp and crabs—all of which form the essential base of the aquatic and marine food web. Thus fisheries are also damaged.

Materials

Common building materials such as paint, rubber, wood and plastics are degraded by UV-B radiation, particularly the plastics and rubbers used outdoors. Damage can be severe in tropical regions, where the effects of UV-B radiation are enhanced by high temperatures and high levels of sunshine. Such damage can run into billions of dollars each year.

Ground-level smog

UV-B radiation increases ground-level smog, especially in cities where vehicle and industry emissions provide the basis for photochemical reactions. These reactions have their own adverse effects on human health and the environment.

How thick is the ozone layer?

The ozone molecules are dispersed in the stratosphere, and therefore the physical thickness of the ozone layer is tens of kilometres. However, the pressure and thus the concentration of molecules in the stratosphere are very small compared with those at ground level. The concentration of stratospheric ozone molecules is so small, then, that if all the ozone molecules were extracted from the stratosphere and spread around the earth at ground level, they would form a layer of ozone gas only a few millimetres thick.

What is the ozone hole?

In the 1970s, scientists discovered that released ozone-depleting substances damage the ozone layer. Between the 1970s and the 1990s, the ozone concentration over Antarctica diminished by up to 70 per cent of the normal concentration. This large-scale phenomenon is often called the ozone hole. In 2006 the Antarctic ozone hole neared a record 29 million km2. The hole becomes larger in the late winter and early spring because of seasonal variations in temperature, which create an environment for efficient destruction of ozone in sunlit regions.

A large and recurring ozone hole similar to that found in the Antarctic stratosphere does not yet appear in the Arctic. However, according to recent observations, the upper atmospheric conditions in the Northern Hemisphere are becoming similar to those in the Antarctic. The loss of the ozone and the greenhouse effect are causing the upper atmosphere to become colder, thereby facilitating ozone destruction. The result could be the formation of an Arctic ozone hole or a "low ozone event" within the next 20 years. Scientists have observed declining ozone concentrations over the whole globe.

If a low ozone event occurs in the Arctic, the millions of people who live in the area will be exposed to higher levels of UV-B radiation. Meanwhile, an Arctic low ozone event could easily be blown south by high-altitude winds and appear over populated areas of the United States, Canada, Europe and Asia. Figure 1-2 shows the area that might be affected by the formation of an Arctic ozone hole. More information on ozone holes can be found at http://www.theozonehole.com/arcticozone.htm and http://ozone.unep.org/Frequently_Asked_Questions/.

Figure 1-2 A depiction of the Arctic ozone hole (Source: The Ozone Hole, http://www.theozonehole.com/arcticozone.htm) - Area that will be affected by formation of Arctic Ozone Hole is above the red line

How is ozone destroyed?

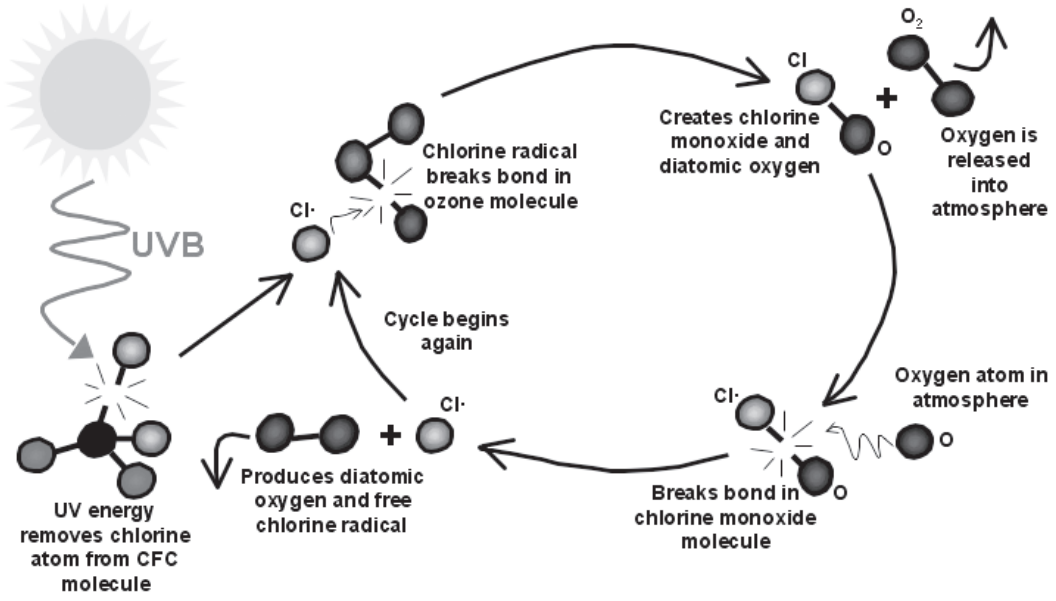
The dynamic equilibrium between creating and breaking down ozone molecules depends on temperature, pressure, energetic conditions and molecule concentrations. The equilibrium can be disturbed by, among other things, other molecules reacting with the ozone molecules and destroying them. If the destroyed ozone molecules are not replaced quickly enough by the new ozone molecules, the equilibrium will be out of balance and the concentration of ozone molecules will be reduced.

Under the Montreal Protocol on Substances That Deplete the Ozone Layer, which entered into force in 1989, ozone-depleting substances (ODS) have been identified and their production and use controlled (ODS are defined more fully in the next section). Their destructive potential is huge because they trigger a photochemical chain reaction when they come in contact with ozone molecules. After one ozone molecule has been destroyed, the ODS are still available to destroy even more ozone molecules.

Video 2: NASA video, "Ozone Destruction"

Because the destructive lifetime of ODS may range from 100 to 400 years, depending on the type, one molecule of ODS could destroy hundreds of thousands of ozone molecules. Figure 1-3 illustrates the process through which chlorofluorocarbons (CFCs), a type of ODS, deplete ozone.

Figure 1-3 How CFCs deplete the ozone



What are ozone-depleting substances?

Ozone-depleting substances (ODS) are chemical substances—basically chlorinated, fluorinated or brominated hydrocarbons—that have the potential to react with ozone molecules in the stratosphere. If a substance is only fluorinated (does not contain chlorine and/or bromine), it is not an ozone-depleting substance. ODS include:

- Chlorofluorocarbons (CFCs)
- Hydrochlorofluorocarbons (HCFCs)
- Halons
- Hydrobromofluorocarbons (HBFCs)
- Bromochloromethane
- 1,1,1-trichloroethane (methyl chloroform)
- Carbon tetrachloride
- Methyl bromide.

The ability of these chemicals to deplete the ozone layer is known as their ozone depletion potential (ODP). Each substance is assigned an ODP relative to CFC-11 whose ODP is defined as 1 (see box). The ODPs of various ozone-depleting substances are listed in Annex B.2.

ODP values of selected ODS	
CFC-11	1.0
CFC-12	1.0
Halon-1301	10.0
Carbon tetrachloride	1.1
Methyl chloroform	0.1
HCFC-22	0.055
HBFC-22B1	0.74
Bromochloromethane	0.12
Methyl bromide	0.6

Global warming potential (GWP) is the contribution of each greenhouse gas (a gas that traps heat in the earth's atmosphere) to global warming relative to carbon dioxide whose GWP is defined as 1. GWP usually refers to a time span of 100 years (GWP 100). Global warming and climate change are discussed in more detail at the end of this chapter.

What are the common uses of ODS?

In most developing countries, the largest sector in which ODS are still used is refrigeration and air-conditioning. CFCs and HCFCs are used as refrigerants for the cooling circuits. But HCFCs, transitional substances, are being phased out worldwide under the Montreal Protocol.

ODS are also used as blowing agents for foam applications, as cleaning solvents in the electronics industry and in dry-cleaning, as propellant in aerosol applications and in metered-dose inhalers (MDIs) used for treating pulmonary diseases, as sterilants in hospitals, as fire-fighting agents, as fumigants for controlling pests and for quarantine and pre-shipment, and for process agent and feedstock applications in chemical manufacturing. ODS can be applied as well as laboratory or analytical reagents.

As refrigerants

ODS are used as refrigerants in refrigeration and air-conditioning and heat pump systems. CFC refrigerants are gradually being replaced by the less ozone-damaging HCFC refrigerants (ODP and GWP > 0), HFC refrigerants (ODP $= 0$, but GWP > 0) and hydrocarbon refrigerants (ODP $= 0$ and GWP very low).

Many domestic refrigerators use CFC-12 as a refrigerant. Commercial refrigeration systems used to display and store fresh and frozen food may use CFC-12, R-502 (a blend of CFC-115 and HCFC-22) or HCFC-22 as a refrigerant. The transport refrigeration and air-conditioning systems used in road and rail transport containers and cargo and passenger ships may contain CFC-11, CFC-12, CFC--114, HCFC-22 or CFC containing the mixtures R-500 (a mixture of CFC-12 and HFC-152a) and R-502 (a mixture of CFC-115 and HCFC-22).
Air-conditioning and heat pump systems for buildings may contain large amounts of HCFC-22, CFC-11, CFC-12 or CFC-114 as refrigerants. CFC refrigerants are often found in the air-conditioning systems of vehicles manufactured before 1994. Many drop-in substitutes for CFC-12 refrigerants are based on mixtures containing HCFC.

In parts of the world where CFCs and HCFCs are being phased out, replacement refrigerants have included hydrofluorocarbons (HFCs) such as R-134a and hydrocarbons (HCs) such as isobutane. HFCs and HCs are not controlled under the Montreal Protocol because they are not ozone-depleting substances (that is, their ODP = 0). CFCs and HCFCs could be smuggled by mislabelling them as HFCs or HCs. Chapter 5 discusses the various smuggling schemes for ODS.

As blowing agent

Before regulatory controls were put in place, CFC-11 was the most common foam-blowing agent for the manufacture of polyurethane, phenolic, polystyrene and polyolefin foam plastics. Foams are used in a wide variety of products and for insulation purposes. Today, CFC-11 is gradually being replaced by HCFC-141b or non-ODS alternatives (HFCs, HCs).

As cleaning solvent

CFC-113 has been used widely as a cleaning solvent in electronic assembly production processes, precision cleaning and general metal degreasing during manufacture. It is also used for dry-cleaning and spot cleaning in the textile industry. Other ozone-depleting solvents are methyl chloroform and carbon tetrachloride, which are being replaced with non-ODS substances.

As propellants

In the mid-1970s, the CFC propellants used in aerosol products accounted for 60 percent of all CFC-11 and CFC-12 used worldwide. By the end of the 1970s, countries were beginning to ban or restrict the use of CFCs in aerosol products. Presently, almost all aerosol products in the world except for medical inhalers (an exempted use) are produced without CFCs.

CFC-11 and CFC-12 were used extensively as aerosol propellants because they are non-flammable, non-explosive and have non-toxic properties. CFC-114 was used to dispense products containing alcohol. CFC-113 has been used in aerosols for cleaning purposes.

Among the products dispensed by aerosols are lacquers, deodorants, shaving foam, perfume, insecticides, window cleaners, oven cleaners, pharmaceutical products, veterinary products, paints, glues, lubricants and oils.

As sterilants

Mixtures of CFC-12 and ethylene oxide are used for medical sterilisation purposes in hospitals and health care facilities. The CFC compound reduces the flammability and explosive risk from ethylene oxide. The most common mixture, 12/88, contains 88 per cent CFC-12 by weight. Ethylene oxide is particularly useful for sterilising objects that are sensitive to heat and moisture, such as catheters and medical equipment, which use fibre optics. Presently, non-ODS replacements are available for sterilants.

As fire extinguishers

Halons and HBFC were largely used as fire extinguishers, but in many instances they have been replaced by HFCs, inert gases, carbon dioxide and water mist.

As fumigant

Methyl bromide has been and is used widely as a pesticide for soil fumigation and in post-harvest applications to protect crops and kill pests. However, non-ODS alternatives (both chemical and non-chemical) have been developed to replace this powerful fumigant. The Montreal Protocol does, however, permit the use of methyl bromide for quarantine and pre-shipment applications (see Chapter 2).

As feedstock and process agents

HCFC and carbon tetrachloride are commonly used as feedstock in chemical synthesis. Carbon tetrachloride, when used as a process agent, facilitates and intended chemical reaction and/or inhibits an unintended one. ODS used for feedstock applications are usually not released to the atmosphere and therefore do not contribute to ozone layer depletion.

For laboratory and analytical purposes

Small quantities of carbon tetrachloride and other ODS are used for chemical reactions and as analytical reagents in laboratories.

How are ODS released into the stratosphere?

ODS are released to the atmosphere in a variety of ways, including through the

- Traditional uses of cleaning solvents, paint, fire extinguishing equipment and spray cans that emit ODS
- Venting and purging during servicing of refrigeration and air-conditioning systems
- Use of methyl bromide in soil fumigation, in post-harvest pest control and for quarantine and pre-shipment applications
- Disposal of ODS-containing products and equipment such as foams and refrigerators
- Leaks in equipment (such as refrigerant circuits, fire extinguishers) and products that contain ODS.

Once released into the atmosphere, ODS are diluted into the ambient air. They can reach the stratosphere through air currents, thermodynamic effects and diffusion. Because of their long lifetimes, most of these released ODS will eventually reach the stratosphere.

When will the ozone layer recover?

According to the 2006 report of the Scientific Assessment Panel, if all parties to the Montreal Protocol and its Amendments comply with their phase-out obligations, the concentration of ozone molecules in the stratosphere will reach "normal" levels over the Antarctic by 2065. This long recovery time takes into account the amounts of CFC-11 and CFC-12 in refrigerators and other equipment that will eventually be released and the increased production of HCFC-22. The length of the recovery period stems in part from the long lifetime of ODS and the chain-type reaction that destroys the ozone molecules. The Antarctic ozone hole is expected to recur regularly for another two decades.

Meanwhile, incidences of skin cancer and eye cataracts are expected to decline towards "normal" levels, with a delay of 20–50 years, by the end of the century. Regardless of their skin type, people of all ages--but especially babies and children--should apply effective skin and eye protection to prevent health damage.

What are the linkages between ozone depletion and global warming?

Most ODS are also powerful greenhouse gases (GHGs), which means they contribute to climate change when released. Such gases trap the outgoing heat from the earth, causing the atmosphere to become warmer. The impacts of global climate change are extremely serious and may include a rise in sea level, displacement of populations, intensified weather patterns, unpredictable effects on agriculture ecosystems and natural disasters.

The Kyoto Protocol to the United Nations Framework Convention on Climate Change, another multilateral environmental agreement, addresses this problem. The Kyoto Protocol, which entered into force on 16 February 2005, sets binding limits on GHG emissions for developed countries. At the same time, it creates incentives for developing countries to control their emissions as their economies grow.

Because ODS are already controlled under the Montreal Protocol and are being phased out, they are not included in the Kyoto Protocol. It controls emissions of carbon dioxide, methane, nitrous oxide, HFCs, PFCs and sulphur hexafluoride.

A complex relationship exists between the science of ozone depletion and the science of climate change. Choosing chemicals to replace ODS (some are ozone depleting, some are global warming gases, and some are both) is also problematic. However, the international community is taking steps to co-ordinate the policies and solutions developed under these two treaties to ensure they are mutually supporting.

In practical terms, it is important that Customs officers understand two things:

- By controlling the legal ODS trade and preventing the illegal ODS trade, Customs officers are also indirectly helping to prevent climate change, because ODS are also greenhouse gases.
- The Montreal Protocol controls the trade in ozone-depleting chemicals. The Kyoto Protocol does not have any trade provisions.

What is being done to save the ozone layer?

Before the 1970s, the world community was not aware that the stratospheric ozone layer was being depleted, with negative effects on human health and the environment. Today, the importance of protecting the ozone layer is recognised in developed and developing countries worldwide. To date, 191 countries and the European Community are Party to the Montreal Protocol. The next chapter focuses on the international efforts and treaties aimed at protecting the ozone layer.

Knowledge check	
1.	What is the ozone layer?
2.	Why is the ozone layer important?
3.	What are the effects of ozone layer depletion?
4.	What is the ozone hole?
5.	What are ozone-depleting substances?
6.	What are the common uses for ODS?
7.	What are ODS substitutes?
8.	Do ODS affect climate change?

2 The International Response to Depletion of the Ozone Layer

The international response to the depletion of the ozone layers consists principally of the 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, which is described in detail in this chapter. The Green Customs Initiative, also described here, provides Customs administrations with linkages to other international multilateral environmental agreements, such as those addressing hazardous waste, and the illegal trade in endangered plants and animals. Regional agreements are listed in the final section of this chapter.

1985 Vienna Convention for the Protection of the Ozone Layer

The Vienna Convention, held under the auspices of the United Nations Environmental Programme (UNEP) in 1985, was the first attempt to provide the framework for co-operative activities aimed at protecting the ozone layer. The convention was signed by 21 states, including the European Community, in March 1985. Parties to the Convention agreed to co-operate in scientific research in order to better understand the atmospheric processes, to share information on ODS production and emissions and to implement preventive measures to control ODS emissions.

1987 Montreal Protocol on Substances that Deplete the Ozone Layer

In 1987 governments adopted the Montreal Protocol to reduce and eventually eliminate emissions of man-made ODS. The Protocol entered into force on 1 January 1989, and today 191 countries and the European Community have committed themselves under the Protocol to phasing out the consumption and production of ODS.

The Protocol lists controlled ODS - five CFCs (Annex A, Group I) and three halons (Annex A, Group II) - and specifies the control measures intended to reduce the production and consumption of these ODS. A controlled substance is defined by the Protocol as "a substance in Annex A, Annex B, Annex C or Annex E to this Protocol, whether existing alone or in a mixture. It includes the isomers of any such substance, except as specified in the relevant Annex, but excludes any controlled substance or mixture which is in a manufactured product other than a container used for the transportation or storage of that substance".

Decisions

Various "decisions" taken since 1989 by the Parties have further refined and elaborated on the Protocol. These decisions are binding for all states party to the Protocol and its Amendments. Many decisions speak directly about controlling the trade in ODS (http://ozone.unep.org/Publications/MP_Handbook/Section_2_Decisions/index.shtml). Decisions appear in the "Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer" (http://ozone.unep.org/Publications/MP_Handbook/index.shtml).

In Decision I/12A (see box), the Parties to the Protocol distinguished between the actual controlled substances (or mixtures containing controlled substances) and products containing those controlled substances. They excluded from consideration as a "controlled substance" any listed substance, whether alone or in a mixture, that is in a manufactured product other than a container used for transportation or storage.

Decision I/12A (an excerpt)
e. examples of use systems to be considered as products for the purposes of Article 1, paragraph 4 are inter alia:
an aerosol can;
a refrigerator or refrigerating plant, air conditioner or air-conditioning plant, heat pump, etc;
a polyurethane prepolymer or any foam containing, or manufactured with, a controlled substance;
a fire extinguisher (wheel or hand-operated) or an installed container incorporating a release device (automatic or hand-operated);

In Decision XIV/7, the Parties further elaborated that "no matter which customs code is allocated to a controlled substance or mixture containing a controlled substance, such substance or mixture, when in a container used for transportation or storage as defined in Decision I/12A, shall be considered to be a 'controlled substance' and thus shall be subject to the phase-out schedules agreed upon by the Parties". The Parties also noted that controlled substances or mixtures containing controlled substances are classified under Customs codes related to their function and sometimes are

wrongly considered to be "products", thereby avoiding any controls resulting from the Montreal Protocol phase-out schedules.

The Protocol controls trade in virgin ODS and provides recommendations for the control of trade in recovered, recycled and reclaimed ODS. Decision IV/24 defines these key terms (see Table 2-1).

Table 2-1 Definitions of used, recovered, recycled and reclaimed ODS based on Decision IV/24

Used ODS	Recovered, recycled or reclaimed ODS.
Recovery	Collection and storage of ODS from machinery, equipment, containment vessels and so forth during servicing or prior to disposal.
Recycling	Re-use of a recovered ozone-depleting substance following a basic cleaning process such as filtering and drying. For refrigerants, recycling normally involves recharge back into equipment; it often occurs on-site.
Reclamation	Re-processing and upgrading of a recovered ozone-depleting substance through mechanisms such as filtering, drying, distillation and chemical treatment in order to restore the substance to a specified standard of performance. It often involves processing off-site at a central facility.

Precautionary principle and evolution of the treaty

The Montreal Protocol is based on the "precautionary principle", which enables the world community to take actions to address a major global environmental problem even before all scientific, economic and technical questions have been fully answered.

To reflect this approach, the Parties to the Protocol have agreed to a procedure that allows the treaty itself to evolve over time to reflect the latest findings on the state of the ozone layer, the science of ozone layer depletion and the progress towards development and implementation of alternative technologies. This evolutionary feature takes the form of regular, comprehensive assessment of the control measures adopted under the Montreal Protocol, followed by amendments or adjustments of the Protocol.

Video 3: Saving the Ozone Layer—Every Action Counts

The legal basis for this assessment process is Article 6 of the Montreal Protocol, which states: "Beginning in 1990, and at least every four years thereafter, the Parties shall assess the control measures provided for in Article 2 and Article 2A to 2I on the basis of available scientific, environmental, technical and economic information" (emphasis added). To undertake these regular assessments, the Parties established three international panels of experts from industry, research academies, governments and non-governmental organizations: Scientific Assessment Panel, Environmental Effects Assessment Panel and Technology and Economic Assessment Panel.

Amendments and adjustments

Over the dynamic history of the Montreal Protocol, four amendments and five adjustments have been adopted to ensure that the Protocol continues to reflect improved scientific and technical understanding (see box). The UNEP Ozone Secretariat maintains a web page (http://ozone.unep.org/Ratification_status/evolution_of_mp.shtml) that reflects decisions taken at all Meetings of the Parties to the Montreal Protocol.

Amendments and adjustments to the Montreal Protocol: Definitions

Amendments to the Montreal Protocol may introduce control measures or new ODS. Each Amendment is binding only after ratification by the Parties. Parties that have not ratified a certain Amendment are considered to be non-Parties—for example, in relation to a new ODS introduced by that Amendment. For further information, see the section "Control of trade with non-Parties" in this chapter. The ratification process is important in instances in which the Protocol bans trade in certain substances with non-Parties.

Adjustments of the Montreal Protocol itself may modify the phase-out schedules of already controlled substances as well as the ODP values of controlled substances based on new scientific assessments. Adjustments are automatically binding for all countries that have ratified the Protocol, or the relevant Amendment, which introduced the controlled substance. Adjustments can change the text of the Protocol. The Parties can also take decisions that only interpret the text.

1990 London Amendment and Adjustments

The 1990 Second Meeting of the Parties in London added to the Protocol additional CFCs, carbon tetrachloride (CTC) and methyl chloroform as controlled substances and introduced control measures for them; accelerated existing and adopted additional control measures for Annex A CFCs and halons for both developing and developed countries; and established a Multilateral Fund to provide developing countries with technical and financial assistance.

1992 Multilateral Fund

The Multilateral Fund for implementation of the Montreal Protocol was created to help developing countries finance the costs of meeting the Protocol requirements and to promote the accelerated phase-out of ODS production and consumption. More specifically, the Multilateral Fund helps to finance the investment projects targeted at phasing out ODS from production and use. The Fund also helps Article 5 countries (see box) implement Country Programmes by establishing National Ozone Units (the government unit/agency that serves as the focal point for designing, monitoring and implementing the national ODS phase-out strategy), establishing a regulatory framework and appropriate laws, organising training and conducting public awareness activities. The implementing agencies of the Multilateral Fund are UNEP, the United Nations Development Programme (UNDP), the United Nations Industrial Development Organization (UNIDO), and the World Bank. Bilateral agencies also provide assistance to developing countries under the Multilateral Fund.

Article 5, non–Article 5 and CEIT countries: Definitions
Article 5 countries are those classified as "developing countries" by the United Nations and using less than 0.3 kg ODP tonnes per capita per year of Annex A–controlled ODS or 0.2 kg ODP tonnes of Annex B–controlled ODS. An ODP tonne equals a

metric tonne of ODS multiplied by a factor of ozone depletion potential.
Non–Article 5 countries or Article 2 countries are all other Parties to the Montreal Protocol, mainly developed countries.

Countries with economies in transition (CEIT) are those states of the former Soviet Union and Central and Eastern Europe that have undergone a process of major structural, economic and social change that has produced severe financial and administrative difficulties for both government and industry. This change has affected the implementation of international agreements such as the phase-out of ODS in accordance with the Montreal Protocol. CEIT include both Article 5 and non–Article 5 countries. These countries may also benefit from using this Customs training manual.

1992 Copenhagen Amendment and Adjustment

The 1992 Fourth Meeting of the Parties in Copenhagen listed methyl bromide, HBFCs and HCFCs as controlled substances; introduced control measures for the production and consumption of methyl bromide and HBFCs, and for HCFC consumption in developed countries; advanced the phase-out schedules for CFCs, halons, carbon tetrachloride and methyl chloroform in developed countries; and set provisions for production and consumption for essential uses of ODS to be approved by the Parties.

1995 Vienna Adjustment

The 1995 Seventh Meeting of the Parties in Vienna introduced both control measures for methyl bromide for developing and developed countries and HCFC consumption controls and HBFC production and consumption controls for developing countries.

1997 Montreal Amendment and Adjustment

The 1997 Ninth Meeting of the Parties in Montreal introduced additional control measures for methyl bromide for developing countries and accelerated those for developed countries. It also introduced a requirement that all Parties establish import/export licensing systems for trade in ODS.

1999 Beijing Amendment and Adjustment

The 1999 Eleventh Meeting of the Parties in Beijing listed bromochloromethane as a controlled substance and introduced production and consumption controls for bromochloromethane, production controls for HCFCs and reporting requirements for methyl bromide used for quarantine and pre-shipment applications.

Obligations of the Parties to the Montreal Protocol and its Amendments

In practice, a Party to the Montreal Protocol is also a Party to each of the Protocol's Amendments it has ratified. Therefore, a country may be a Party to the Protocol, but a non-Party to any Amendment that has not yet been ratified by the country.

Each Party to the Montreal Protocol and its Amendments must comply with certain obligations. The three main obligations are complying with ODS freeze and phase-out schedules, implementing controls on production and consumption, and data reporting.

ODS freeze and phase-out schedules

The freeze and phase-out obligations for Article 5 countries take into account that developing countries usually do not have easy access to alternative technologies, know-how and capital investment. Therefore, their freeze and phase-out schedules become binding after a 10-year grace period unlike those for developed (non–Article 5) countries. The grace period is intended to give Article 5 countries sufficient time to receive the technical and policy support they need to ensure a smooth transition to non-ODS technologies. Developing countries still use most ODS, in particular CFCs, HCFCs, methyl bromide and halons.

Production and consumption

The Montreal Protocol defines production as the amount of controlled substances produced, minus the amount destroyed by technologies to be approved by the Parties and minus the amount entirely used as feedstock in the manufacture of other chemicals.

The amount recycled and reused is not to be considered as "production". The definition of consumption of a controlled substance is production plus imports minus exports (see box), or

consumption = (production + imports) – exports.

Most Article 5 countries import all ODS used in the country.

Base-level consumption (production) of ODS: An explanation

The base level of a country's consumption depends on its past consumption (production) of certain ODS. In most cases, it is defined as the average consumption (production) level for a certain reference period during which consumption (production) data were recorded. For example, the first control measure in developing countries was the 1999 freeze on the consumption (production) of Annex A substances (CFCs). The freeze level was set at the base level, which was defined as a country's average consumption (production) between 1995 and 1997. After the freeze date (1 July 1999), the country's annual consumption (production) could not exceed its freeze level.

Table 2-2 First control measures and final phase-out for ODS in developing countries

Annex	ODS type	First control measure for Article 5 countries	Final phase-out for Article 5 countries
A-I	CFC (five main types)	1999 freeze	2010 phase-out
A-II	Halons	2002 freeze	2010 phase-out
B-I	Other CFCs	2003 reduction 20%	2010 phase-out
B-II	Carbon tetrachloride	2005 reduction 85%	2010 phase-out
B-III	Methyl chloroform	2003 freeze	2015 phase-out
C-I	HCFCs	2013 freeze	2030[a] phase-out
C-II	HBFCs	1996 phase-out	1996 phase-out
C-III	Bromochloromethane	2002 phase-out	2002 phase-out
E	Methyl bromide	2002 freeze	2015 phase-out

[a] An average annual consumption of 2.5 per cent for servicing is allowed for the period between 2030 and 2040

Table 2-2 summarises the first control measures and the final phase-out for the different ODS that apply to developing countries. It does not refer to the different production and use exemptions that may apply.

Data reporting

Under Article 7 of the Protocol, Parties are required to report annually on the production and consumption of ozone-depleting substances. This information measures the progress of phase-out by Parties. Discrepancies have been observed in the data reported for many countries. To ensure accurate reporting, Customs officials can assist in reporting information to the National Ozone Units about trade in ODS and illegal trade.

Exemptions for use and production of ODS

Uses of ODS exempted from the controls of the Montreal Protocol include essential uses, use as feedstock and use as process agents. The production or import of ODS for those uses does not count towards a country's ODS consumption. Countries can also apply for production allowances to satisfy the use of ODS for basic domestic needs. The following sections describe the different types of exemptions.

Essential use

A Party may apply for an exemption from the total phase-out of controlled substances so that it can produce or import ODS for certain essential uses. Applications are approved by the Meetings of the Parties on a case-by-case basis (exempted category). The ODS must be essential to the health, safety or functioning of society, and no acceptable alternative can be available.

A global exemption has been granted for the production and importation of ODS for laboratory and analytical uses (Decision X/19), although certain uses that belong in this category have been excluded from the global exemption since 1 January 2002 (Decision XI/15). If the ozone-depleting substance is to be put to laboratory and analytical uses, specific requirements for containers, labelling and purity must be met.

Quarantine and pre-shipment

Another exemption concerns the use of methyl bromide for quarantine and pre-shipment (QPS) applications. Decision VI/11 clarified the definitions of QPS. Quarantine applications are meant to prevent the introduction, establishment or spread of quarantine pests (including diseases), or to ensure their official control. Official control is that performed by, or authorized by, a national plant, animal or environmental protection or health authority, and quarantine pests are pests of potential importance to the areas endangered thereby and not yet present there, or present but not widely distributed and officially controlled. Pre-shipment applications are those treatments applied directly preceding and in relation to export to meet the phytosanitary or sanitary requirements of the importing or exporting country. Exempted imports of methyl bromide for QPS use may be diverted to the marketplace (for more discussion, see Chapter 5).

Feedstock

Controlled substances used in the manufacture of other chemicals and completely transformed in the process are defined as feedstock. For example, HCFC-22 is commonly used in the production of fluoropolymers. Amounts used as feedstock are

exempted from production and consumption controls under the Montreal Protocol, but they must be reported to the Ozone Secretariat (Decision VII/30).

Process agents

Some ODS (mostly carbon tetrachloride) are used in the production of other chemicals to assist the chemical reaction without being consumed. Only those uses of controlled substances approved by the Montreal Protocol are allowed (Decision XVII/8).

Allowance for production to satisfy basic domestic needs

Unlike non–Article 5 countries, Article 5 countries are allowed a grace period to phase out the use and production of controlled substances in order to meet their domestic needs. However, Article 5 countries may not use this allowance to increase the production of products containing ODS for export.

Exports of controlled substances listed in Annexes A and B of the Montreal Protocol from non–Article 5 Parties to meet the basic domestic needs of Article 5 Parties are permitted. The Seventeenth Meeting of the Parties addressed this issue in Decision XVII/12 and requested that the non–Article 5 Parties request written affirmation from Article 5 countries that the CFCs are needed and that their import will not result in non-compliance.

Control of trade with non-Parties

Article 4 of the Montreal Protocol addresses control of trade with non-Parties. As noted earlier, a non-Party (with regard to a particular ODS) is any country whose government has not ratified, accepted, approved or accessed the Montreal Protocol or one or more of its specific Amendments that have introduced a particular ODS as a controlled substance. As of December 2007, only five countries had not yet ratified any of the ozone treaties: Andorra, Holy See, Iraq, San Marino and Timor Leste. The actual status of ratification for each Party of each Amendment is available on the Ozone Secretariat website, http://ozone.unep.org/Ratification_status/. Table 2-3 lists trade control measures applicable to non-Parties.

Table 2-3 Bans on imports from and exports to non-Parties, by annex to the Montreal Protocol

Annex	Imports	Exports
A	As of 1 January 1990	As of 1 January 1993
B (Non-Party to London Amendment)	As of August 1992	As of August 1993
C I (Non-Party to Copenhagen and Beijing Amendments)	As of 1 January 2004	As of 1 January 2004
C II (Non-Party to Copenhagen Amendment)	As of June 1994	As of June 1995
C III (Non-Party to Beijing Amendment)	Not yet in force	Not yet in force
E (Non-Party to Copenhagen Amendment)	As of November 1999	As of November 2000
Products containing Annex A substances (listed in Annex D)	As of May 1992	No control measures yet

Note: Ratification of the Beijing Amendment is not mandatory for Article 5 Parties. See Table 2-2 for a list of the ODS covered in each annex.

Trade in ODS-containing products (including equipment)

Table 2-4 lists the products (including equipment) containing ODS that appear in Annex D of the Montreal Protocol. Trade in only these ODS-containing products is banned with non-Parties.

Table 2-4 Annex D*: Products containing controlled substances specified in Annex A**

1. Automobile and truck air-conditioning units (whether incorporated in vehicles or not)
2. Domestic and commercial refrigeration and air-conditioning/heat pump equipment*** such as:
    - Refrigerators
    - Freezers
    - Dehumidifiers
    - Water coolers
    - Ice machines
    - Air-conditioning and heat pump units
3. Transport refrigeration units
4. Aerosol products, except medical aerosols
5; Portable fire extinguishers
6. Insulation boards, panels and pipe covers
7. Pre-polymers

* This Annex was adopted by the Third Meeting of the Parties in Nairobi, 21 June 1991 as required by paragraph 3 of Article 4 of the Protocol.

** Though not when transported in consignments of personal or household effects or in similar non-commercial situations normally exempted from customs attention.

*** When containing controlled substances in Annex A as a refrigerant and/or in insulating material of the product.

Source: Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer, 2006.

Trade in ODS technology and equipment

Each Party is also discouraged from exporting to non-Parties the technology for producing and utilizing the controlled substances listed in Annexes A, B, C and E. The exception is the export of products, equipment, plants or technology that improves the containment, recovery, recycling or destruction of controlled substances, promotes the development of alternative substances, or otherwise contributes to the reduction of emissions of the controlled substances listed in Annexes A, B, C and E.

A provision of the Protocol permits non-Parties that are determined by a Meeting of the Parties to be in full compliance with control measures for controlled substances and control of trade with non-Parties and that are complying with data reporting to import and export controlled substances and products containing them as per the rules of the Montreal Protocol.

Control of trade with Parties

Since so few countries are not party to the Montreal Protocol, the issue of trade with Parties ultimately has a direct impact on progress towards eliminating ODS and protecting the ozone layer.

Licensing systems for imports and exports

Article 4B of the Montreal Protocol provides that by 1 January 2000, or within three months of the date of entry into force of this article for it, each Party should establish and implement a system for licensing the import and export of the new, used, recycled or reclaimed substances listed in Annexes A, B, C and E (see Chapter 3 for a fuller description of the implementation of import/export licensing systems).

The licensing system established by each Party will enable the Party to monitor the ODS trade and will provide information for reporting data under Article 7 of the Protocol. The licensing system should also help to prevent the illegal trafficking of ODS.

Many steps are required to implement the licensing system, including the adoption of legislation and regulations. The legislation and regulation adopted should provide the clear guidelines needed to monitor transboundary shipments of ODS.

Once a Party's licensing system is in place, the Party should promote both training and, for the public and government agencies, awareness-raising programmes on the illegal trade in ODS. Co-operation among the Parties and the various stakeholders involved in the licensing system will be critical to controlling and limiting the ODS trade.

As of August 2007, 143 Parties and 26 non-Parties to the Montreal Amendment had established their national import/export licensing systems. However, despite the requirements of Article 4B of the Montreal Protocol, because of some particular local situations or conditions the licensing systems of some countries do not cover all the controlled substances or mixtures containing them. Other countries (mostly developing) decided to license only ODS imports, which enables smugglers to use those countries as stopovers for consignments shipped illegally to other (developed or developing) countries. UNEP is continually following up with these countries to ensure that all ODS and mixtures containing ODS are covered by their national licensing systems in accordance with Article 4B of the Montreal Protocol. The remaining Parties are being encouraged and given the assistance they need to establish their own licensing systems.

Dumping equipment containing ODS or whose functioning relies on ODS

The issue of dumping obsolete ODS equipment has been addressed by a Meeting of the Parties. It made the following recommendations:

- Each Party shall regulate (including labelling) the export and import of products, equipment, components and technology whose functioning relies on ODS or contains ODS as described in Annexes A and B of the Protocol.

- Non–Article 5 Parties shall control the export of used (second-hand) products and equipment whose continued functioning relies on ODS as described in Annexes A and B of the Protocol.

- After the phase-out date for a controlled substance, if a Party is unable to stop production of that substance for domestic consumption, except for essential uses as agreed by the Parties, it shall ban the export of used, recycled and reclaimed quantities of that substance other than for the purposes of destruction.

- Countries that do not want to receive products and equipment containing the controlled substances listed in Annexes A and B of the Montreal Protocol may request to be included in a list of countries maintained by the Ozone Secretariat. Customs officers should be aware whether their country is listed (see http://ozone.unep.org/Data_Reporting/Parties_not_wishing_to_receive_products.asp).

- ODS contained in products or equipment that has been imported into a country shall not count towards the consumption of the importing country.

Individual parties have adopted a wide variety of restrictions on trade through policies and regulations to achieve the reduction in consumption of ODS. These policies and regulations include:

- Agreements with industry to phase out imports
- Product labelling
- ODS import quota systems
- Duty reductions for ODS substitutes and non-ODS technologies
- Excise taxes on ODS
- Quantitative restrictions and a ban on imports of ODS
- Total or partial ban on imports of ODS products or technologies
- Tax exemptions for ODS substitutes.

Green Customs Initiative: Linkage to other international environmental agreements

Other international environmental agreements seeking to improve the environment deal with matters such as global warming, the transboundary movement of hazardous waste, and the illegal trade in endangered plant and animal species as well as living modified organisms (LMOs). Inter-linkages have been established between these agreements and the different convention secretariats or implementing agencies. Through the Green Customs Initiative, these groups have come together to identify significant synergies in implementing Customs training, developing training materials and integrated strategies and providing policy and technical advice.

The Green Customs Initiative offers an integrated approach to providing the information, training and awareness raising that Customs officials require to monitor the trade in commodities of environmental concern. This Initiative is supported by the World Customs Organization (WCO), Interpol, the Organisation for the Prohibition of Chemical Weapons (OPCW), UNEP and the secretariats of six multilateral environmental agreements (MEAs): Basel Convention, Convention on Biological Diversity (CBD), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Ozone Secretariat, Rotterdam Convention and Stockholm Convention. The Initiative has organized integrated Customs training and developed the Green Customs Guide.

The objective of the Green Customs Initiative is to enhance the capacity of Customs officers to detect and act on the illegal trade in environmentally sensitive items covered by the relevant agreements, and to assist them in facilitation of the legal trade in these items. A one-stop site for links to training resources for Customs officers and to the partners in the Initiative is http://www.greencustoms.org. The site complements the information provided on specific MEAs in this manual. The international agreements covered by Green Customs are summarised in the sections that follow.

Basel Convention

The Basel Convention on the "Control of Trans-boundary Movements of Hazardous Wastes and their Disposal" was adopted in 1989 and entered into force on 5 May 1992. The Convention responds to the international community's problems stemming from the worldwide production of hundreds of millions of tonnes of wastes, some of which is moved and dumped in ways that are not environmentally sound. This global environmental treaty strictly regulates the transboundary movements of hazardous wastes and obligates its 170 Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.

Decision VII/31 taken by the 1995 Seventh Meeting of the Parties to the Montreal Protocol had a direct bearing on the Basel Convention. The Parties decided that international transfers of Protocol-controlled ODS that are recovered but not purified to usable purity specifications by international or national standards should occur only if the recipient country has recycling facilities that can process the received controlled substances to these specifications or has destruction facilities incorporating technologies approved for that purpose.

The Basel Convention also developed a Customs training manual, which can be consulted at http://www.basel.int/legalmatters/illegtraffic/trman-e.pdf.

CITES

A treaty in force since 1975, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulates and monitors the international trade in many species of wildlife and plants. Currently, 172 countries are co-operating through a system of permits and certificates, similar to 'eco-labels', to confirm that trade in listed wildlife and plants, including parts and derived products, is legal and does not threaten their survival in the wild. CITES is designed to prevent the further decline of wild populations and to ensure that trade is based on the sustainable use and management of wild and captive populations. So far, the Convention has been the largest and, by some accounts, the most effective international wildlife conservation agreement. Certain good practices may be applied to the Montreal Protocol and vice versa. CITES has also developed its own specific Customs training (available in CD-ROM format).

Rotterdam Convention

International concern about the risks arising from uncontrolled trade in extremely hazardous chemicals and pesticides led to the adoption of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade in which 119 countries actively participate. The Convention, which came into force on 24 February 2004, establishes controls on the trade in hazardous chemicals and aims to empower governments to monitor and control cross-border trade. Because trade is just one avenue for the spread of highly dangerous substances, further agreements are needed to prevent dangerous chemicals such as persistent organic pollutants from being released into the environment where they pose a threat to people and wildlife. The Rotterdam Convention will also develop Customs training in the future.

Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants (POPs) entered into force

on 17 May 2004. POPs are man-made chemicals with the following characteristics: (1) persistent—they remain intact in the environment for long periods; (2) organic—they are carbon-based compounds and mixtures; (3) pollutant—they are introduced into the environment and adversely affect the health of humans, animals and ecosystems. Even low levels of POPs can damage the nervous system, affect the immune and reproductive systems and produce developmental disorders and cancers. Thus these chemicals must be monitored. Obligations relevant to import/export activities cover only intentionally produced POPs. The import or export of POPs included in the Convention is allowed only for the purpose of environmentally sound disposal or for a use permitted under the Convention for the importing party. All other imports or exports are prohibited. The role of the Customs authorities of Parties to the Convention in its implementation is to ensure application of the obligations on international trade under the Convention at the national level and thus participate in national efforts to ensure compliance with the Convention.

Convention on Biological Diversity and its Cartagena Protocol on Biosafety

In its regulatory objective and approach, the Cartagena Protocol, which entered into force on 11 September 2003, is much like the Basel Convention and the Rotterdam Convention. In particular:

- The Biosafety Protocol essentially provides for procedures, such as the advance informed agreement procedure, which applies to the transboundary movements of living modified organisms that are destined for introduction into the environment of the importing Party.
- In addition to the procedure that helps the importing Parties to take informed decisions, the Protocol also requires that shipments of living modified organisms be accompanied by a document that contains information specified in the Protocol or elaborated by a decision of Parties, with a view towards ensuring identification of the content of the shipment as living modified organisms.
- Because living modified organisms are subject to national approval before they are released for domestic use or placed into the market, there is always the possibility that the transboundary movement of unapproved organisms could occur, and thus the issue of illegal transboundary movement as provided for in the Protocol could arise.

The implementation of the procedural rules of the Protocol as well as other provisions such as those on documentation requirements are relevant to the role of Customs. Thus enforcement of these provisions by Customs officers will be of crucial importance.

Organisation for the Prohibition of Chemical Weapons

The Chemical Weapons Convention (CWC), which entered into force on 29 April 1997, is an international treaty that bans the use of chemical weapons and aims to eliminate chemical weapons worldwide, forever. The Convention provides the basis for the Organisation for the Prohibition of Chemical Weapons (OPCW), which monitors the destruction of existing declared stocks of chemical weapons and the facilities used to produce chemical weapons, and checks industrial sites to ensure that chemicals monitored under the Convention are used in accordance with the chemical weapons ban. The OPCW also promotes international co-operation and the exchange of scientific and technical information, so that people and governments can benefit from the peaceful uses of chemistry.

The regional context: Examples of trade agreements

At the regional level, trade agreements may have an impact on the implementation of the Montreal Protocol because Parties are at different stages of adopting the different Amendments to the Montreal Protocol as well as other international conventions such as the Harmonized System. Regional trade agreements also may play a role in whether an individual country may be able to introduce import taxes or other trade restrictions on ODS.

Customs officers will be familiar with the trade agreements in their respective regions and the main flows of goods and products, including the transhipment harbours. Table 2-5 lists trade agreements or associations in different regions.

Table 2-5 Regional trade agreements and associations

Africa
- Agadir Agreement
- Common Market for Eastern and Southern Africa (COMESA)
- Preferential Trade Area for Eastern and Southern African States (PTA)
- Southern Africa Development Community (SADC)
- Southern African Customs Union (SACU)
- East African Co-operation (EAC)
- Economic Community of Western African States (ECOWAS)
- West African Economic and Monetary Union (UEMOA)
- Economic Community of Central African States (UDEAC/CEMAC)
- Indian Ocean Commission (IOC)
-

Asia
- ASEAN Free Trade Agreement (AFTA)
- Asia-Pacific Economic Cooperation (APEC)
- South Asia Free Trade Agreement (SAFTA)
-

Europe and Central Asia
- European Union
- Economic Cooperation Organisation (ECO)
- Central European Free Trade Agreement (CEFTA)
- European Free Trade Association (EFTA)

West Asia
- Unified Economic Agreement (UEA)
- Greater Arab Free Trade Area (GAFTA)
- Gulf Cooperation Council (GCC)
- Framework Co-operation Agreement between GCC states and the European Union
- Facilitation and Development Inter-Arab Trade Agreement

Latin America and Caribbean
- Dominican Republic–Central America Free Trade Agreement (DR-CAFTA)
- Latin American Integration Association (ALADI)
- Andean Community
- Caribbean Common Market (CARICOM)
- Common Market of the South (MERCOSUR)
- North American Free Trade Agreement (NAFTA)
- Central American Common Market (MCCA)
- G-3 Free Trade Agreement

Knowledge check	
1.	What is the Montreal Protocol?
2.	What is the ODS phase-out schedule for Article 5 countries?
3.	What is the difference between ODS and ODS containing products?
4.	What are the exemptions for the use and production of ODS?
5.	Which Parties are considered non-Parties to the Protocol, and what are the consequences of this status with respect to trade in ODS with them?
6.	What are the limits for ODS trade with Parties?
7.	Which substances are covered under the definition of controlled substance?
8.	What does the term consumption mean under the Montreal Protocol?
9.	Is trade in ODS-containing products with non-Parties allowed?
10.	Is trade in ODS-containing products with Parties allowed?
11.	What are the other related international environmental agreements?

3

ODS Import/Export Licensing Systems

As ozone-depleting substances are being phased out to meet the 2010 deadline set in the Montreal Protocol, full implementation and enforcement of the ODS licensing systems will be critical. This chapter describes the role of Customs officers and other stakeholders in an ODS import/export licensing system and the main elements of such a system. A licensing system is mandatory for all Parties to the Montreal Protocol that have ratified its Montreal Amendment. (The "Country Handbook on ODS Regulations and Import/Export Licensing System", available from a country's National Ozone Unit, provides more specific information on that country)

Institutional set-up and the role of stakeholders

This section describes the roles of a country's Customs administration, National Ozone Unit (NOU) and other key groups in the enforcement of national ODS regulations to monitor and control the legal trade in ODS, ODS-containing products or ODS-based equipment, and to prevent their illegal trade.

Customs officers

Systematic monitoring of all ports of entry into a country helps to control legal imports and to prevent illegal imports of ODS through mislabelling or other false documentation. Inspection of imports by dealers known to import ODS for sale or their own use should be mandatory in order to verify compliance with regulations. The environmental agency, licensing agency and Customs administration should aim for compliance by monitoring imports and exports of controlled substances through border and document checks.

As enforcement officers of the borders and all points of entry for cargo, Customs officials are responsible for examining documents and cargo. This initial examination is the simplest way to identify shipments of ODS and to distinguish between legal and illegal shipments of ODS. The following tasks are usually undertaken by Customs officers:

- Verify paperwork. Paperwork can be verified with a supervisor and the environmental protection agency. Customs officers should contact the NOU or appropriate national office when illegal imports are suspected. A checklist for Customs officers is a helpful tool in checking for ODS (see Chapter 5 and Annex B)

- Verify allowances. Customs officers should ask importers to verify possession of sufficient allowances of imported quantities of the ozone-depleting substances in question and to confirm that the specific shipment has been authorised through an import permit.

- Consult the Register of Allowances and Permits. If the Customs officer has no direct online access to the register of import allowances and import permits granted as well as the actual imports of each importer, the officer must contact the NOU or the licensing agency to check the data. Importers must have sufficient allowances granted and valid import permits for specific shipments of ODS.

- Check for mislabelling. Officers should inspect and analyse the goods in question if the shipment papers are suspect or incomplete, if the ozone-depleting substance is labelled as recycled refrigerant, or if there is any other indication of mislabelling.

- Screen for ODS. Trained and authorised Customs officers can screen ODS refrigerants by using refrigerant identifiers, the temperature-pressure method or leak detectors, as described in Chapter 7.

- Undertake chemical analysis. If chemical analysis in an accredited laboratory is required—for example, to prepare court cases—a specially trained and authorised technical expert from the government laboratory should be consulted. Smaller refrigerant cylinders can be transported directly to the laboratory. Mass spectroscopy and gas chromatography are common methods or techniques of analysis.

National Ozone Unit

Usually part of the environmental agency or a department responsible for implementation of the Montreal Protocol, the National Ozone Unit is the central national unit responsible for co-ordinating a country's efforts for ozone protection by facilitating ODS phase-out. As the link to international assistance on this issue, the NOU usually works in close co-operation with one or more Implementing Agencies of the Multilateral Fund and bilateral agencies.

The NOU's main responsibilities include:

- Implementation of the Country Programme and Institutional Strengthening Programme
- Implementation of the Refrigerant Management Plan (RMP), which often includes recovery and recycling programmes and training programmes for refrigeration technicians and Customs officers
- Implementation of the RMP update or the Terminal Phase-out Management Plan

(TPMP) and its related projects and activities
- Preparation of proposals for policies, strategies, laws, regulations, incentives and agreements with the private sector and other measures for national ODS phase-out
- Consultation and co-ordination with stakeholders and organisation of stakeholder meetings as necessary
- Advice and support to industry, the services sector and end users on the different phase-out options for ODS
- Promotion of public awareness programmes
- Data collection and reporting, as required by the Montreal Protocol.

The government officials staffing NOUs are well trained in issues pertaining to the Montreal Protocol, but they may have little knowledge of Customs operations. It is important that NOU officers and Customs officials meet early and regularly, and that each agency has a clear understanding of its role in implementing the ODS import and export controls. Close co-ordination is essential to establishing a successful control regime. In some countries, the Customs administration and the environmental agency have signed a memorandum of understanding to signify high-level co-operation and commitment to controlling the illegal trade in ODS.

Licensing agencies

An agency other than the NOU may serve as the licensing agency, or more than one agency may have the authority to issue licences for different ODS. For example, the ministry of trade may license CFCs, and the pesticide or toxic chemicals board may license methyl bromide. Ultimately, the licensing agency or agencies will grant or deny licences to importers or exporters of ODS.

Ministry of trade, industry or commerce

The ministry of trade, industry or commerce is a key component of the licensing system. This ministry often issues a licence to import goods, and this licence may be one of many required by the licensing system. Under national law, the ministry has certain powers to limit or ban the import or export of certain goods. These powers may include establishing a "negative list" of goods not allowed to enter the country.

Pesticides board

The pesticides board may issue licences for the import of methyl bromide. Depending on national regulations, the pesticides board also may issue a "negative list" to ban the import of specified goods, to ban the use of certain pesticides or prescribe safety precautions or specific modes of use, or to prescribe storage requirements.

Bureau of standards

The bureau of standards may check imports for proper labelling. Under national law, the bureau of standards may have the authority to specify compulsory labelling standards for virgin, recovered, recycled or reclaimed ODS, ODS-based equipment or retrofitted equipment.

Ministry of justice

The ministry of justice or attorney general is another key component of the enforcement aspect of the licensing system. They work in conjunction with other agencies to prosecute illegal trade.

Government laboratory

The government laboratory provides scientific analysis of evidence in cases of suspect ODS shipments. Such evidence is required for court cases. The laboratory's trained staff could take samples when ODS cylinders cannot be transported to the laboratory. Other accredited laboratories may be able to validate evidence.

Police and coast guard

The police and coast guard may be part of the ODS enforcement team. Working in conjunction with other agencies, they can gather intelligence information and conduct inspections of suspicious shipments in co-operation with the Customs administration. They also can enter premises and conduct search and seizure operations if necessary.

Industry and trade representatives or associations

Industry associations may signal the licensing authority that a black market exists for ODS, which diminishes their legal sales. The Customs broker association, air-conditioning and refrigeration technicians association or similar groups may be helpful in ensuring that the licensing system operates effectively. The support and co-operation of industry should be secured by its early involvement. Industries may play a role in how to deal with seized products and ODS. They also could play a role in public awareness raising and providing importers, service technicians and end users with information on ODS. Their network of contacts might be extremely helpful.

National ozone or climate committees

Many developing countries have established national committees to discuss and agree on the appropriate policies, strategies and actions to protect the ozone layer and prevent climate change. These committees, which include relevant stakeholders from the public and private sectors, meet regularly to review progress and make new proposals. An important function of these committees is to serve as a platform for discussion and decision making that ensure the involvement and support of the relevant stakeholders.

General public

The general public is a useful ally in the effective operation of the ODS import/export licensing system. If members of the public are educated about ozone issues, they may be less likely to bring ODS-based refrigerators and air-conditioners into the country unknowingly. As educated consumers, the public can choose to retrofit to ODS alternatives and not to buy old ODS equipment.

Each country may assign these players slightly different responsibilities, but they will all share the common goal of phasing out ODS and enforcing licensing systems. The "Country Handbook on ODS Regulations and Import/Export Licensing System" provides more country-specific information.

Import/export licensing systems

Most developing countries do not produce ODS and so depend fully on ODS imports. Monitoring and controlling the legal trade and preventing the illegal trade in ODS are therefore crucial to gradually phasing out ODS.

ODS import/export licensing systems are mandatory for all Parties that have ratified the Montreal Amendment. A country should establish a licensing system three months after the amendment enters into force for it. Customs officers can check with the NOU to see if their country has ratified the Montreal Amendment.

Maximum quantities allowed

Import/export licensing systems provide for monitoring and controlling the flow of ODS into and out of a country. The systems facilitate the smooth transition towards non-ODS technologies by providing importers, wholesalers and industry with clear signals about the maximum quantities of ODS imports allowed each year until the final phase-out date. Trade controls may apply to

- Ozone-depleting substances
- Products and equipment containing ODS
- Equipment whose functioning relies on the continuous use of ODS.

Licences and permits

Under a licensing system, importers and exporters first apply for a licence/permit to move ODS into or out of a country. These licences allow for an overall reduction in the amount of ODS entering the country (imports minus exports) in order to comply with the phase-out provisions of the Montreal Protocol and its Amendments. They also facilitate the collection of data on the ODS trade and aid in preventing the illegal trade in ODS.

The sections that follow describe the basic elements of an import/export licensing system for ODS. For more information, please refer to UNEP's resource module on ODS Import/Export Licensing Systems (http://www.unep.fr/ozonaction/information/mmcfiles/3197-e.pdf).

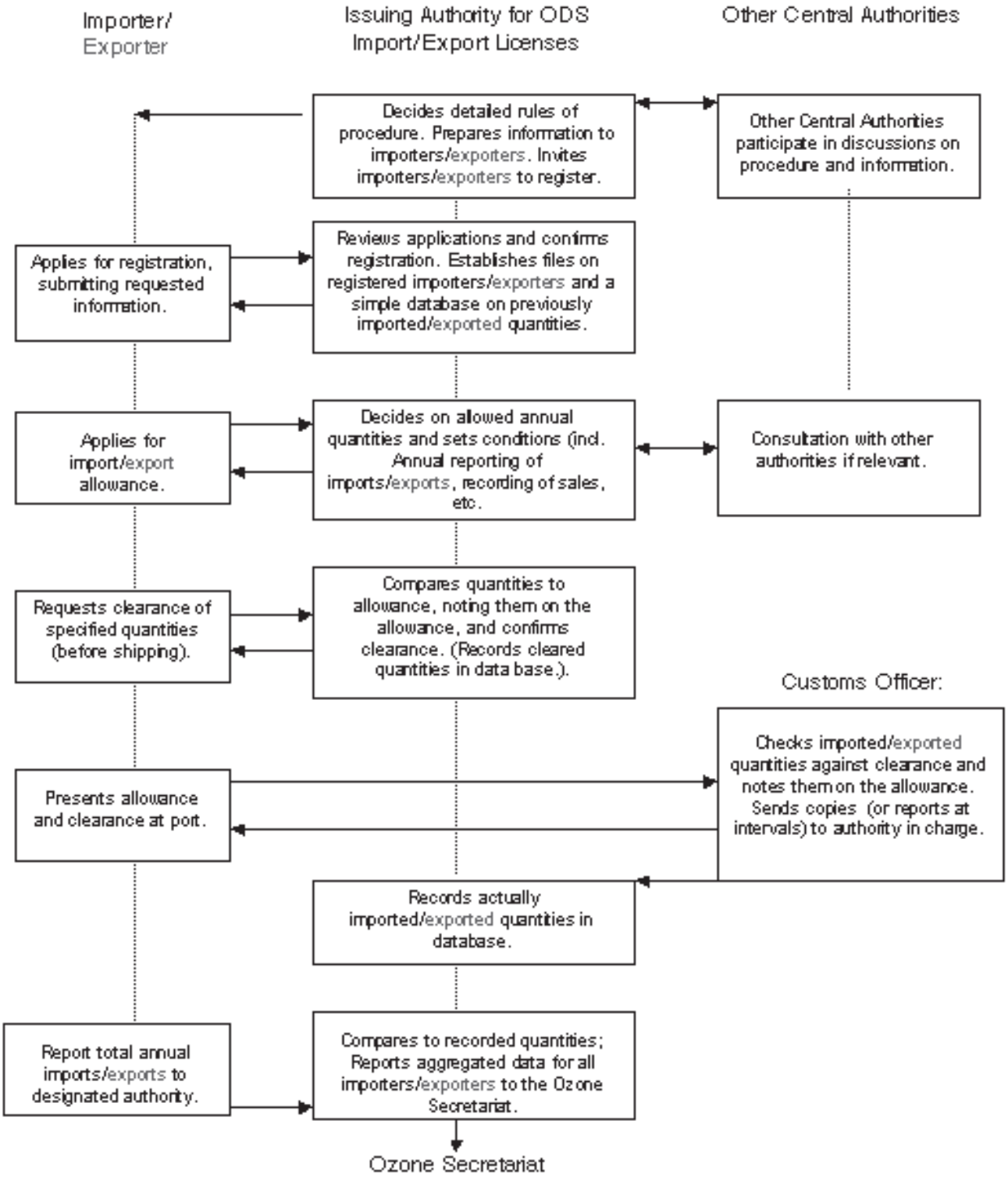
Legal basis, structure and functioning of a licensing system

Adjustments of existing national legislation can provide for the establishment of an import/export licensing system. Customs officers can find more information on their country's licensing system by consulting the "Country Handbook on ODS Regulations and Import/Export Licensing System" or by asking the NOU. The Montreal Protocol calls for licensing systems to include all ODS, including virgin, used (recovered, recycled or reclaimed) ODS and ODS-containing mixtures.

The registration of all ODS importers and exporters is ensured by the government agency in charge of licensing (ODS licensing agency). As noted earlier, certain ODS may be regulated by different government agencies. For example, in many countries the pesticides board controls methyl bromide.

The general structure and functioning of the import/export licensing process are illustrated in Figure 3-1 on the following page. The left-hand column describes procedures to be followed by the importer/exporter and the middle column those to be followed by the authority in charge of issuing the licences. This authority could be the National Ozone Unit, the organisation that serves as the focal point for designing, monitoring and implementing the ODS phase-out Country Programme.

Figure 3-1 General structure and functioning of an import/export licensing process



Source: UNEP ODS Import/Export Licensing System Resource Module, 1998

Additional import restrictions on ODS (quotas, bans)

Imports can also be restricted through quotas or bans. A ban prohibits entirely the importation of a specific ODS. It may also apply to ODS-containing products and ODS-based equipment. A quota can be transformed into a ban once a specific ODS is phased out.

To comply with the phase-out schedule for ODS, a country must define for each type of ODS an annual quota, which is then gradually reduced from year to year. The NOU could work with other agencies to define quota amounts for importers. Importers may apply for import allowances, which are usually granted based on an importer's historic imports. All allowances for a specific ODS must not exceed the importer's annual quota, and the total of all quotas assigned to importers must not exceed the national quota for a given year.

An import permit is issued for the specified quantity of ODS imported. The importer must not exceed the granted allowance for a specific ODS.

Any Party may apply for exemptions to import or produce ODS for essential uses and may use ODS freely for feedstock or for process agent applications approved by the Parties as described in Chapter 2. Customs officers should be aware of such exemptions and how they are translated into import allowances and permits.

Export licensing

The licensing system also allows for monitoring and controlling ODS exports; such exports reduce the calculated ODS consumption of a country. Licensing exports is just as important as licensing imports, because monitoring ODS exports will also prevent illegal exports such as to non-Party countries for a specific ODS. Some countries are using advance notification of exports to recipient countries to alert them to the incoming quantity of ODS. This procedure is now mandatory for non–Article 5 countries that wish to export CFCs to meet the basic domestic need of Article 5 countries.

Transhipments (transit shipments) are not considered to be imports or exports, and they do not count towards a country's ODS consumption. However, transhipments should be closely monitored because ODS may be diverted and sold on the black market (see the section on smuggling schemes in Chapter 5). Transhipments should not be confused with re-exports of previously imported ODS, which are counted against a country's consumption and therefore should be regarded as standard exports and should be licensed. The licensing of transhipments, although not mandatory under the Montreal Amendment, is strongly encouraged in case the country's legal system does not prevent ODS smuggling via transhipments.

Enforcement and penalties

A country's Customs administration, environmental agency and prosecuting agency usually enforce its import/export licensing system. Penalties are used to discourage persons from illegally importing or exporting ODS, ODS-containing products or ODS-based equipment. Such penalties are, however, subject to the national laws related to the import/export licensing system. Customs officers should refer to the "Country Handbook on ODS Regulations and Import/Export Licensing System" for more information on the specific laws and penalties in their country.

Seized ODS and ODS-containing products and equipment

National laws and the provisions of the import/export licensing system prescribe what happens to seized ODS or ODS-containing products. The NOU should be informed of seizures of ODS and decisions taken on what happens to them.

The decision matrix in Table 3-1 in the following page presents options for seized ODS and ODS-based products and equipment. The shaded fields indicate the environmentally preferable options. However, the most appropriate option will depend on the country-specific situation and cost. Seized ODS are often simply destroyed. However, destruction can be undertaken using only those technologies approved by the Parties to the Montreal Protocol. The ODS destruction technologies approved by the Parties must fulfil certain requirements concerning the contents of toxic substances in the off-gases (see Table 3-2).

Table 3-2 Approved destruction technologies for ODS

Thermal oxidation	Plasma destruction
• Liquid injection incineration • Reactor cracking • Gaseous/fume oxidation • Rotary kiln incinerators • Cement kilns • Municipal solid waste incinerator (for foams including ODS)	• Radio frequency plasma destruction technology • Argon plasma arc (for CFCs, HCFCs and halons) • Nitrogen plasma arc, microwave plasma, gas phase catalytic dehalogenation and super-heated steam reactor (for CFCs and HCFCs)

Recording, managing and reporting data

Other important aspects of import/export licensing systems are recording, managing and reporting data. Data reporting is essential to ensure that the Montreal Protocol functions effectively. The National Ozone Unit, ODS licensing agencies, trade statistics agencies and Customs administration usually collaborate on the collection of data. The NOU is in charge of reporting data to the UNEP Ozone Secretariat.

Data collection is handled differently in each country (see the "Country Handbook on ODS Regulations and Import/Export Licensing System" for specific procedures). UNEP's "Handbook on Data Reporting Under the Montreal Protocol" (http://www.unep.fr/ozonaction/information/mmcfiles/2588-e.pdf) also provides guidance.

Those collecting data should keep in mind that the reported data cannot be based solely on Customs statistics, because the Customs codes for ODS (on which Customs statistics are based) are not precise enough. Data received from Customs should be cross-checked with data received from importers/exporters, who must be obligated to report under national legislation.

Table 3-1: Decision matrix: Seized ODS and ODS-based products and equipment

Option	Ozone-depleting substances (e.g., CFC refrigerants, methyl bromide)	Products containing ODS (e.g., aerosol cans, foams, paint)	Equipment containing ODS or whose functioning relies on ODS (e.g., refrigerators, air-conditioners)
Re-exporting to the country of origin or to any Party that wishes and is entitled to legally import the seized goods	Cost for re-export to be borne by importer Goods at risk of being smuggled again If auctioning off and disposal are not possible	Cost for re-export to be borne by importer Goods at risk of being smuggled again If disposal is not possible	Cost for re-export to be borne by importer Equipment at risk of being smuggled again If retrofitting and disposal are not possible
Auctioning off to a licensed importer and deducting the quantity from the importer's allowance	If the import of ODS is not banned Replaces legal imports	If the import of ODS-containing products is not banned Usually no allowances made for imports of products containing ODS This option to be avoided	If the import of ODS-based equipment is not banned Usually no allowances made for imports of equipment based on ODS Increases the country's dependency on ODS This option to be avoided
Mandatory retrofitting of ODS-based equipment by certified service company	Not applicable	Not applicable	Cost of retrofitting to be borne by illegal importer or by licensed importer who bought the equipment from Customs
Disposal or destruction of the seized goods Cost to be borne by illegal importer or Customs Proper waste management practices to be applied	If Montreal Protocol–approved destruction technologies are available If auctioning off or re-export is not possible	Recover ODS before disposal for re-use or disposal (not possible for paints or foams)	Before disposal recover ODS and other working fluids for re-use or proper disposal If retrofitting or re-export is not possible
Long-term storage, an intermediate option that is costly for Customs and requires final solution	If re-export, auctioning or disposal is not possible This option to be avoided	If re-export, auctioning or disposal is not possible This option to be avoided	If re-export, auctioning, retrofitting or disposal is not possible This option to be avoided

Note: ODS contained in imported products or equipment does not count towards a country's ODS consumption

Monitoring and evaluation

The ODS licensing agency will monitor the actual use of import/export licences and should collect data on the functioning and performance of the licensing system, including the incidence of infractions, seizures and penalties and the quantities of imported and seized goods. Based on these data, the agency and the NOU (if different) will evaluate the effectiveness of the licensing system. In consultation with the relevant stakeholders, corrective measures may be introduced.

An effective monitoring system will provide a proper basis for policy decisions, design of regulations, planning of training activities and public awareness campaigns.

Knowledge check	
1.	What is an import/export licensing system designed to do?
2.	Which ODS should be covered by a licensing system?
3.	How are quotas used in the licensing system?
4.	What is the role of Customs officers in the import/export licensing system?
5.	Name at least five stakeholders in an import/export licensing system.

4 Safety and ODS

Ozone-depleting substances include a wide range of chemicals with different chemical and physical properties. Most ODS pose a risk to human health and the environment if handled, stored, transported or used without the proper safety precautions. National safety and transportation regulations must be observed for the handling, storage, use and transport of ODS or any other hazardous substances.

Safety and specific substances

Refrigerants

This section applies to both ODS refrigerants and ODS alternative refrigerants such as R-134a. Hydrocarbons are also used as refrigerants, but different safety measures should be followed for them because of their extreme flammability. See Annex C to this volume for the safety cards on ODS alternatives.

ASHRAE Standard 34-1997 on the "Number Designation and Safety Classification of Refrigerants" classifies commonly used refrigerants according to their toxicity and flammability. The six safety groups defined are A1, A2, A3, B1, B2 and B3. "A" signifies lower toxicity and "B" higher toxicity; "1" signifies no flame propagation, "2" lower flammability and "3" higher flammability. Thus B3, for example, would indicate a refrigerant with high toxicity and high flammability. ASHRAE safety groups for the most common ozone-depleting refrigerants are listed in Annex B.1 of this volume.

Only trained and designated Customs officers should use refrigerant identifiers, the temperature-pressure method or leak detectors to check the contents of refrigerant containers. Local safety regulations must be observed. Chapter 7 addresses the identification of ODS.

When Customs officers inspect the compressors of refrigeration and air-conditioning systems for labels to determine the refrigerant type and charge, the power supply should be disconnected—for example, refrigerators should be unplugged and vehicle motors should be turned off.

Methyl bromide

While inspecting goods, Customs officers may be at risk of exposure to methyl bromide and other fumigants. Methyl bromide is a highly toxic chemical that is invisible and odourless unless an odorant such as chloropicrin has been added. Overexposure to methyl bromide most commonly affects the nervous system. Effects include headache, nausea, vomiting, dizziness, blurred vision, poor co-ordination and twitching. High exposure can be fatal. A respirator may be necessary when working with methyl bromide. Customs officers should never open containers or take samples of methyl bromide.

As the supply of methyl bromide decreases, the illegal trade will increase, along with the incorrect labelling of cylinders to avoid Customs scrutiny. Correctly labelled or not, methyl bromide is likely to be shipped either in low-pressure steel cylinders or in low-pressure tankers with a capacity of greater than 20 tonnes. Trade in small cans of about 1 kg capacity is possible as well, particularly to Article 5 countries.

Because methyl bromide is often used in quarantine and pre-shipment applications, Customs inspectors could be exposed to residual fumigant gas that has not been vented fully or not vented at all, as well as to gas from cylinders containing methyl bromide, correctly labelled or not.

According to a growing number of reports, methyl bromide is being found in fumigated containers arriving at destination ports at levels dangerous to human health. A trained environmental health and safety professional can determine whether methyl bromide is present in excessive concentrations so that Customs officers avoid accidental exposure when inspecting cargo.

Liquid methyl bromide can cause delayed severe blistering burns. When it soaks into clothes or shoes it usually will not be bothersome at first, but severe blistering burns can appear up to a day or two later. Methyl bromide can also pass quickly through the skin into the body where it is poisonous. Anyone on whom liquid methyl bromide has been spilled or splashed should immediately remove all their contaminated clothing, including shoes, and wash themselves thoroughly with soap and water. Goggles should be worn when working with liquid methyl bromide to avoid splashes in the eyes. And the appropriate respiratory protection (self-contained breathing apparatus) should be used when there is a risk that methyl bromide is present at above the threshold limited value (TLV) listed on the safety or materials safety data sheet. The methyl bromide could be from leaking cylinders of correctly labelled methyl bromide, supplies of mislabelled methyl bromide or residual fumigant.

Halons

Halons are most commonly used as fire-fighting agents. They can be stored in a variety of pressurised containers, including hand-held portable extinguishers, small to

large system cylinders, specialised aircraft spherical cylinders or large (1 tonne) transportation cylinders.

Often the cylinders containing halons and other substances are super pressurised from 20 bar to even 100 bar with nitrogen, which increases the need to be vigilant when handling them. Under no circumstances should fittings, valves or safety caps be removed or damaged. Such actions will increase the risk that a cylinder will inadvertently discharge and become airborne, causing serious injury (including death) to nearby personnel or damage to other equipment and the inspection facility.

If a sample of a gas is required for identification, it should be retrieved only by trained, qualified technicians using a suitable anti-recoil device and with the help of the manufacturer's manual.

Elevated temperatures may cause pressure relief valves or other fittings to release halons or gases containing halon vapours into the environment. In addition to the instructions given in the next section for pressurised containers, Customs officers should refer to ASTM International Standard D5631, Handling, Storage and Transportation of Halon 1301.

Halons produce toxic fumes in a fire. Because the gas is heavier than air, it may accumulate in low ceiling spaces, causing a deficiency of oxygen. Customs officers should ensure that the inspection area is adequately ventilated or use artificial respiration. If halons come into contact with the skin or eyes, they may cause frostbite. Thus inspectors should use cold insulating gloves and a face shield.

Carbon tetrachloride

CTC is a colourless liquid with a pungent odour. However, the odour does not provide adequate warning of the presence of harmful concentrations. Ventilation or even artificial respiration may be needed. CTC is harmful to the liver, kidneys, and central nervous system. Inhalation of carbon tetrachloride can produce dizziness, headache, fatigue, nausea, vomiting, stupor and diarrhoea. CTC also irritates the skin, and prolonged contact may cause dryness and cracking. Customs officers should use protective gloves and clothing to avoid exposure.

Safe techniques for handling ODS

Customs officers charged with identifying, handling, transporting, or storing ODS should adhere to the measures established to ensure the officers' safety. A safety checklist appears in Table 4-1.

Sampling for chemical analysis

If chemical analysis in an accredited laboratory is required—for example, to prepare a court case—a specially trained and authorised technical expert from the government Customs laboratory or other designated laboratories should be consulted. Customs officers should not take samples unless they are trained in such procedures. The situation varies by country. In some, Customs officials are mandated to take samples for laboratory purposes, and some Customs administrations have their own laboratories. Smaller cylinders of a suspected ODS can be transported directly to the laboratory.

Pressurised containers

Many ODS and their alternatives are stored in pressurised containers (see Table 4-1). A pressurised container is any device or system designed to hold a liquid, gas or vapour at an internal pressure that exceeds the pressure of the surrounding environment. These containers can present a variety of hazards because of their pressure and contents. All pressurised containers must be stored properly in compliance with local regulations. They also must be secured to prevent them from falling. Accidental contact, vibration or earthquakes could cause a container to rupture or explode. Containers must be transported with protective caps in place. And they must never be rolled or dragged. If a cylinder valve cannot be opened, the valve should never be forced.

Table 4-1 Safety checklist for Customs officers responsible for identifying, handling, transporting or storing ODS

Do's

- Do observe local regulations and industry-recommended procedures for the handling, transport and storage of virgin, recovered, recycled or contaminated ODS
- Do use protective clothing, including safety goggles and cold-insulating gloves, when handling refrigerants and halons. Refrigerants and halons can cause frostbite and other damaging effects to the skin and eyes.
- Do equip storage areas with appropriate fire-extinguishing systems to reduce the risk of fire. CFCs, HCFCs, CTC, methyl bromide and halons are not combustible, but they produce irritating or toxic fumes in a fire.
- Do use electronic leak detectors for refrigerants to inspect storage areas and access valves for leakage.
- Do check the contents of refrigerant cylinders using electronic refrigerant identifiers—but only if trained and authorised to do so under local regulations.
- Do inspect access valves for leaking glands and gaskets. Protective caps should prevent valve damage.
- Do secure storage areas for ODS and ensure that they are only accessible to authorised personnel and protected against theft.
- Do properly label ODS and storage areas and show the appropriate warnings if necessary.
- Do store seized ODS until further legal action determines what will be done with the substances. They should be clearly labelled and safely stored. The "Country Handbook on ODS Regulations and Import/Export Licensing System", available from the country's National Ozone Unit, should detail storage requirements for seized ODS.
- Do disconnect the power supply when inspecting or testing equipment—for example, refrigerators should be unplugged and vehicle motors turned off.
- Do respect local requirements and standards for pressurised vessels with low- and high-pressure refrigerants. In many countries, safety inspections are mandatory.
- Do store and transport ODS cylinders carefully in an upright position (the exception is ISO containers) and avoid dropping them.

Table 4-1 Safety checklist for Customs officers responsible for identifying, handling, transporting or storing ODS

Don't's

- Do not eat, drink or smoke in storage areas or near ODS or ODS-based products or equipment.
- Do not knowingly vent ODS into the atmosphere. Do not dispose of any ODS by using methods other than the recovery, recycling, reclaim, reuse, adequate storage or approved destruction methods.
- Do not handle or store ODS in confined spaces that lack ventilation because some ODS can accumulate in confined spaces. This accumulation increases the risk of inhalation and may cause unconsciousness or suffocation resulting in death. Use a breathing apparatus if appropriate.
- Do not store pressurised ODS cylinders in direct sunlight or near hot surfaces. A rise in temperature will cause a rise in pressure with the risk of bursting.
- Do not take samples of ODS. This task should be carried out by trained, authorised technicians or personnel of accredited government laboratories.
- Do not use open flames in storage areas or near any refrigeration and air-conditioning system to reduce the risk of fire. Do not use the "halide torch method" (flame test) to test leaks.
- Do not handle chemicals or ODS if you are not trained and familiar with the necessary procedures and safety precautions.

International Chemical Safety Cards

International Chemical Safety Cards provide important information on the potential risks of ozone-depleting substances, the preventive measures they require and the first-aid measures needed in case of an accident. However, these safety cards may not reflect in all cases the detailed requirements included in national legislation on the subject. The user should verify that the cards comply with the relevant legislation in the country of use.

The International Chemical Safety Card for CFC-12 containers is reproduced in Table 4-2. Other safety cards are included in Annex C of this volume or can be found at the website of the International Occupational Safety and Health Information Centre (CIS) of the International Labor Organisation (ILO).
http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/index.htm.

DICHLORODIFLUOROMETHANE			0048 March 2002
CAS No: 75-71-8 RTECS No: PA8200000 UN No: 1028	Difluorodichloromethane R 12 CFC 12 CCl_2F_2 Molecular mass: 120.9		
TYPES OF HAZARD/ EXPOSURE	**ACUTE HAZARDS/SYMPTOMS**	**PREVENTION**	**FIRST AID/FIRE FIGHTING**
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
EXPOSURE			
Inhalation	Cardiac arrhythmia. Confusion. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
Skin	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
Eyes	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	
SPILLAGE DISPOSAL		**PACKAGING & LABELLING**	
Ventilation.		UN Hazard Class: 2.2	Special insulated cylinder.
EMERGENCY RESPONSE		**STORAGE**	
Transport Emergency Card: TEC (R)-20G2A		Separated from incompatible materials. See Chemical Dangers. Cool. Ventilation along the floor.	
IPCS International Programme on Chemical Safety		Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission © IPCS 2002 **SEE IMPORTANT INFORMATION ON THE BACK.**	

Table 4-2 Example of an International Chemical Safety Card

Source: International Labor Organisation (ILO) / International Occupational Safety and Health Information Centre (CIS) http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/index.htm.

Knowledge check	
1.	Why should Customs officers take safety precautions when handling ODS?
2.	Why shouldn't Customs officers handle ODS in confined spaces?
3.	How should sampling be conducted?

5

Preventing the Illegal Trade in ODS

The best defence against the illegal trade in ozone-depleting substances is an effective enforcement system. Such a system includes a functioning import/export licensing system, penalties for violations, training and awareness raising by publicising seizures and prosecutions to act as a deterrent, and intelligence and market information. This chapter details trends in the illegal ODS trade, smuggling schemes and screening methods.

Why is there smuggling?

Video 3: UNEP video, "Nothing to Declare: Good Customs to Save the Ozone Layer"

Various factors provide incentives for smuggling ODS. The primary driving force behind the illegal trade in ODS is the high profit margin between the cheap price of ODS on world markets and the rising prices of ODS within national markets with import restrictions. Table 5-1 depicts the price differences in ODS in several regions.

Alternatives to ODS are often more expensive than ODS, or the cost of converting equipment to use the alternative is high, thereby creating a higher demand for ODS and increasing the risk of illegal trade. In the Asia Pacific region, the demand for CFCs in the service sector remains very high. Replacing CFCs with alternative chemicals often requires retrofitting or completely replacing equipment. For example, retrofitting a mobile air-conditioning system to enable it to use HFC-134a in developing countries in Asia can cost between US$100 and US$200. But the cost of acquiring a 30 lb cylinder of CFCs, which contains enough refrigerant to service many such systems, is only about US$50. The financial incentive for continued use of CFCs is clear, and it will persist until all ODS-based equipment reaches its end of life or is finally replaced with newer technology that can function on ODS alternatives. However, the ready availability of illegal ODS inhibits the replacement process by effectively extending the operating life of the equipment being used.

Video 4: EIA video, "Combating the Illegal Trade in Ozone Depleting Substances: A Guide for Enforcement Officers"

Table 5-1 Average prices of ODS and substitutes

ODS	Average price (US$/kg) (2005 Report to 50th Meeting)	Average price (US$/kg) (2006 Report to 52nd Meeting)	Number of countries in which prices increased	Number of countries in which prices decreased	Range (US$/kg) (2006 Report)	Number of countries reporting non-zero data	Data excluded[a] from calculation of average (US$/kg) (2006 Report)
CFC-11	$7.09	$9.05	8	3	$5.00 (Kuwait) to $18.00 (Mexico)	22	$1.65 (Guyana), $36.70 (Brazil)
CFC-12	$8.98	$10.65	12	12	$3.00 (Nepal) to $24.00 (Haiti)	51	$1.95 (Guyana), $250 (Seychelles)
CFC-113	$9.02	$14.04	NA	NA	$8.33 (Barbados), $14.29 (Gabon) and $19.50 (Serbia)	4	$44 (El Salvador)
CFC-114	$9.98	$20.91	NA	NA	$8.33 (Barbados), $19.50 (Serbia), $25.80 (Argentina) and $30 (Cuba)	4	None
CFC-115	$10.94	$6.92	NA	NA	$5.50 (Chile) and $8.33 (Barbados)	2	None
HCFC-22	$5.41	$5.17	11	11	$1.58 (Costa Rica) to $13.10 (Malawi)	54	$0.96 (Guyana), $20 (Honduras) $190 (Seychelles)
HFC-134a	$12.21	$11.99	10	11	$3.00 (Marshall Islands) to $29.63 (St. Kitts/Nevis)	45	$2.61 (Guyana), $240 (Seychelles)
R-502	$14.20	$15.91	3	4	$4.91 (St. Lucia) to $31.00 (Morocco)	26	$3.61 (Guyana), $320 (Seychelles)

Source: "Status/Prospects of Article 5 Countries in Achieving Compliance with the Initial and Intermediate Control Measures of the Montreal Protocol", Document 52/7, 52nd Executive Committee Meeting of the Multilateral Fund for the Implementation of the Montreal Protocol, 23–27 July 2007.

Note: The table, based on data received by the Multilateral Fund Secretariat up to 1 July 2007, indicates that the average prices for CFC-11 and CFC-12 have increased. It also shows that the average prices of HFC-134a and HCFC-22 have decreased, and that these decreases were experienced in more countries than those experiencing increases for HFC-134a. However, consistent with the 2005 data, the average prices of substitutes (such as HFC-134a and R-502) remain higher than for CFC-11 and CFC-12, and HCFC-22 remains much less expensive than CFCs. In some cases, the data may not be representative because the number of countries reporting data is fairly low. NA = not applicable.

[a] All zero $ entries were excluded.

The lifetime of ODS-containing equipment, such as refrigerators and air-conditioners, is often a decade or more. The longer these products remain on the market, the longer the demand for illegal ODS will endure.

Many countries have banned imports of ODS-containing equipment. However, this kind of equipment, such as second-hand cars, is smuggled into developing countries, further increasing the demand for ODS.

Other important factors that maintain the demand for smuggled ODS in the Asia Pacific region, and may apply to other regions as well, include:

- The easy availability of legal ODS (such as CFCs and halons) in the region because it is home to the main producers of these chemicals
- The continued high demand for ODS in some countries, which may be higher than their legal import quotas
- The opportunity to evade the import taxes levied on ODS such as the 30 per cent import tax imposed on CFCs in Thailand
- The fierce competition between companies, along with the limited availability of licences and quotas
- The differential between the price of ODS in legal domestic markets in, for example, India and the low price of CFCs and other ODS on the international market because a supply cartel has maintained inflated prices
- The lack of enforcement of trade restrictions.

The trade restrictions between Parties to the Montreal Protocol and its Amendments and non-Parties are another source of illegal trade. In some countries, ODS have become the second most profitable illegally traded goods after drugs. Illegal trade may account for 10–20 per cent of the world trade in ODS, valued at US$25–$60 million according to the ODS Tracking Feasibility Study referenced in Annex F.

Trends in the illegal trade of ODS

As soon as CFCs and halons were phased out in developed countries in the mid-1990s, the illegal ODS trade exploded, accounting for up to 15 per cent of the world trade in CFCs. By the end of the decade, although the volume of illegal trade in CFCs had declined, halons, to a certain extent, took their place. The central factor in the illegal trade in CFCs and halons was the long operating life of refrigeration, air-conditioning and fire-fighting equipment and the cost of retrofitting. In addition, the ready availability of illegal ODS from stockpiles inhibited the replacement process by effectively extending the operating life of the equipment involved.

The phase-out of ODS will increase the incidence of illegal trade, depending on the market conditions for ODS in particular countries and the demand for those ODS. As countries begin to ban additional ODS, the black market will flourish with those banned goods until the prices of alternative ODS and equipment technology decline. As for equipment, to lessen the demand for banned or soon-to-be-phased-out ODS, many countries have banned the import of equipment that relies on ODS for functioning. Nevertheless, millions of appliances and pieces of equipment owned by businesses and consumers continue to rely on CFCs or HCFCs. Examples are refrigerators, compressors and air-conditioners.

Although the illegal trade in ODS has so far been mainly in CFCs and halons, as the phase-out dates for methyl bromide and hydrochlorofluorocarbons approach, it is likely that the illegal trade in these substances will develop in a similar manner.

For a more thorough background on the illegal trade in ODS, see "Illegal Trade in Ozone Depleting Substances: Is There a Hole in the Montreal Protocol?" at http://www.unep.fr/ozonaction/information/mmcfiles/3617-e-oan-supplement6IllegalTrade.pdf.

HCFCs: History repeating itself?

The phase-out of HCFCs under the Montreal Protocol could be history repeating itself, mirroring the phase-out and explosion of the black market for CFCs. The global production levels of HCFCs are exceeding those of CFCs and increasing rapidly. Although some countries have banned the use of HCFCs in new refrigeration and air-conditioning equipment, other countries have not yet restricted imports of equipment using HCFCs. Thus the market for HCFCs will continue long after their phase-out, resulting in a potentially large black market.

Reports of smuggled HCFCs have surfaced in many countries. The smuggling methods for HCFCs are similar to those for CFCs. In one case, smugglers decanted ODS through a hole in the wall of a bonded warehouse to a nearby uncontrolled warehouse. Smuggling small quantities of ODS across the border, where the Customs presence is smaller, is common in many countries. Many cases of imports of HCFCs, or blends containing HCFCs, that have been misdeclared as non-ODS alternative chemicals have been reported. In other cases, air-conditioning units containing HCFC-22 were illegally imported and exported.

CFCs and HCFCs falsely labelled as HFCs

Customs officers should carefully scrutinise shipments labelled HFC-134a, an ODS alternative, because they may be illegal. Indeed, they should be doubly suspicious of HFC shipments, which are not regulated and are currently one of the most common guises for smuggling. Worldwide, many HFC-134a shipments have proven to be illegal shipments of CFC-12 and HCFC-22 (or mixtures containing HCFCs). Common smuggling methods are misdeclaring ODS as HFC-134a, altering packaging and smuggling large quantities of HCFCs in heat pumps.

Recovered contaminated ODS are also being falsely labelled as virgin refrigerant such as HFC-134a, HCFC-22 or CFC-12. The profits gained from this particular type of smuggling may be high because of the low value of the poor-quality ODS recovered. The use of contaminated mixtures of ODS in equipment will result in its malfunction and damage.

CTC/TCA phase-out

Although carbon tetrachloride and trichloroethane (TCA) are included in most ODS import/export licensing systems, in many countries full implementation remains an issue, presenting a prospect for smuggling.

For many years 1,1,1-trichloroethane, also known as methyl chloroform or TCA, was the solvent of choice to replace chlorinated solvents for general metal cleaning. It was also used in electronic and precision cleaning applications, dry cleaning, aerosols, paints and adhesives. The use of this substance has been banned in almost all developed countries since 1996. Phase-out efforts are currently ongoing in developing countries where consumption is gradually being reduced to achieve the Montreal Protocol target of a 100 per cent ban by January 2015.

Carbon tetrachloride can be used as feedstock to create other chemicals and is completely transformed in the process. Because this use in process agent and feedstock applications is exempted by the Protocol, it may create an opportunity for illicit trade in CTC. Demand for CTC in process agent and feedstock applications is high and the price low.

Testing to identify CTC should be carried out by a laboratory or the national standards institute for positive identification.
The possibilities for illegal trade in CTC include imports for lab/analytical uses, imports for feedstock or process agents and imports under the Customs code of solvents.

Methyl bromide smuggling

The demand for methyl bromide is growing in certain Article 5 countries, and so the existing stockpiles of methyl bromide may be exported or imported illegally to the countries with the highest demand. The transit trade of methyl bromide also presents opportunities for smuggling this highly toxic chemical. Some countries have not yet fully implemented import/export licensing systems that control methyl bromide, thereby further increasing the likelihood of smuggling.

False classification of methyl bromide as an insecticide or pesticide on Customs forms may deter the monitoring or controls in place for ODS. Some countries report zero consumption of methyl bromide, unaware that they are importing methyl bromide or methyl bromide–containing mixtures under the Customs code of pesticide. In many countries, methyl bromide is often controlled by the pesticide board because it is a dangerous good and regulations require it to be marked as such. Licences must be verified for methyl bromide.

Some producers of methyl bromide add small amounts of another chemical, chloropicrin, as a warning indicator to alter its odour. There are three types of formulation with chloropicrin: 98 per cent methyl bromide, 2 per cent chloropicrin; 75 per cent methyl bromide, 25 per cent chloropicrin; and 50 per cent methyl bromide, 50 per cent chloropicrin. Methyl bromide may also be formulated as a mixture with ethylene dibromide or carbon tetrachloride. However, the most common formulation is 98 per cent methyl bromide, 2 per cent chloropicrin. It should be classified under the Customs code of pure methyl bromide and not under the code of methyl bromide–containing mixture or pesticide.

Several countries have reported the smuggling of small quantities of methyl bromide in cans to be used by farmers to fumigate soil. Methyl bromide can also be smuggled in larger containers. In countries where methyl bromide is used—for example, in farming and the cut-flower industries or for disinfestation of structures or products—many projects are under way to adopt ozone-friendly alternatives. Although these projects will have a notable impact on the adoption of alternative technologies, it is possible that the demand for methyl bromide will continue, along with smuggling (described in the next section) until alternatives become more widespread. Meanwhile, there is a good possibility that exempted methyl bromide used for quarantine and pre-shipment applications may be diverted to the marketplace for use in other sectors. Inspections of markets may reveal this diversion.

Smuggling schemes

This section describes the main smuggling schemes and the corresponding methods used to detect the illegal trade in ODS.

Front door smuggling

When an import/export licensing system is not in place, or it is not operating effectively by flagging shipments for further inspection of paperwork, smugglers do not even attempt to disguise shipments of ODS. If there is no enforcement or ODS do not receive any real attention, it is easy for smugglers to import or export illegal goods.

ODS mislabelled or misdeclared as non-ODS

ODS may be imported in mislabelled containers or cylinders, or their cardboard packaging may be mislabelled. Mislabelled CFC refrigerants might be falsely declared and labelled as non-controlled substances such as hydrocarbons (propane, butane) or hydrofluorocarbons (HFC-134a). In some cases, they may be labelled as hydrochlorofluorocarbons (HCFC-22), which are controlled substances but whose first phase-out obligation for developing countries is the freeze in 2013.

An example of this kind of smuggling is depicted in the photos of refrigerant containers seized by Customs authorities in 1997. The CFC-12 containers were declared as a HFC-134a shipment. The small containers hidden in the big main containers held small quantities of HFC-134a. The valves of the small containers became visible only when the main containers were cut open. The main containers were filled with CFC-12.

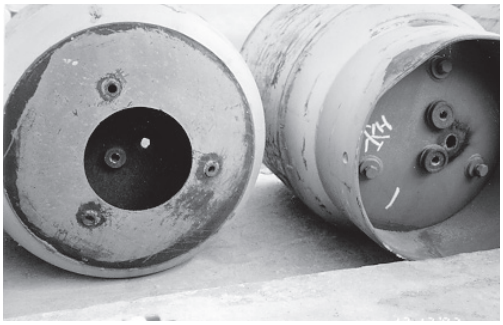


Photo 1. The access points to the main CFC-12 container become visible only after the double-layered container is cut open.

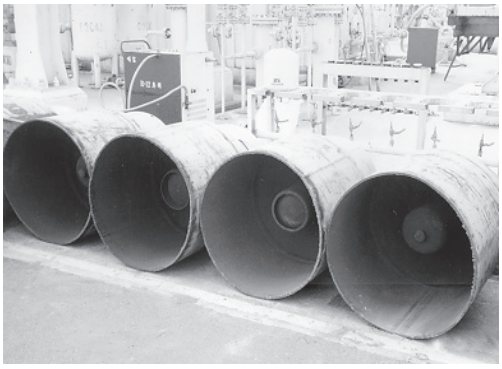


Photo 2 . View of the smallHFC-134a cylinders after removing the CFC-12 refrigerant and cutting open the main containers.

Photo credits : Duncan Brack and Rajendra Shende. Photos taken with the authorisation of the Customs authorities of the country concerned.

Photo 3. View of the seized CFC-12 containers declared and labelled as HFC-134a.

Photo 4. View of the access valves of the small HFC-134a–containing cylinder.

Mislabelling as used (recovered/recycled/reclaimed) ODS

Imports of used (including recovered, recycled and reclaimed) ODS do not count towards a country's ODS consumption. Thus an importer may claim falsely that virgin ODS are used ODS. However, very few used ODS are found in world markets because virgin ODS are often cheaper. Developed countries have already phased out their consumption of specific ODS, and recovered ODS are usually re-used in the country where they were recovered.
The "Country Handbook on ODS Legislation and Import/Export Licensing System"

contains regulations governing the importation of recovered, recycled or reclaimed ODS. Customs officials may also find it useful to check the recycling/reclamation capacity of any country claiming to export recycled/reclaimed ODS.

Concealment and double layering of ODS

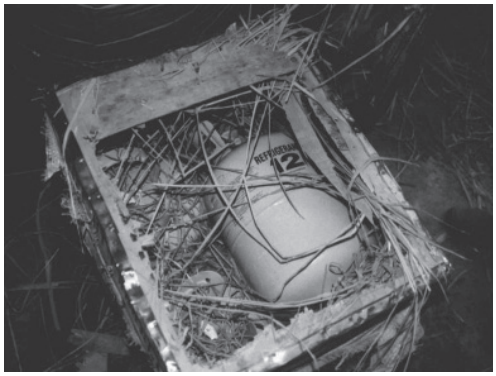


Photo 5. CFC cylinders hidden in tea chests transported by train intercepted by Indian Customs authorities (date unknown).
Photo credit: Environmental Investigation Agency

ODS may be hidden with other cargo or disguised as non-regulated substances. For example, ODS might be transported in propane cylinders, or small quantities might be concealed in cars, trucks or trains—a common method at land points of entry (see photo of R-12 in a tea chest). Small cylinders of CFC refrigerant might be concealed in outer cartons of HCFC or HFC refrigerants (see box for an example of concealed ODS).

An example of concealed ODS

Ninety 30 lb cylinders of CFC-12, a refrigerant, were hidden in a private boat and illegally imported into the United States. The shipment was seized in south Florida by US Customs agents.

Photo 6. Ninety 30 lb cylinders of CFC-12 were hidden on this boat.

Photo 7 . Cylinders hidden in storage compartments within boat.

Photo 8. Back of boat filled with CFC-12 cylinders.

Photo 9. Seized CFC-12 cylinders.

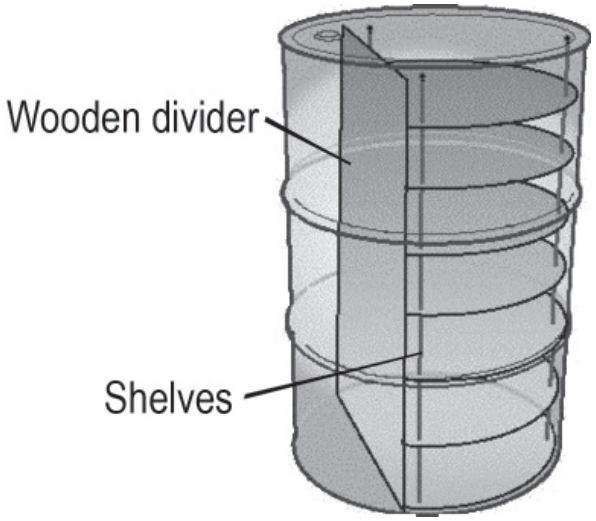
Photo credits: George White, senior special agent, US Customs Service.

Double layering is another method of concealing ODS. Materials listed on the shipping documents are loaded close to the door of the trailer or cargo container and the ODS is hidden behind it. At first glance, the consignment appears to match the paperwork (see photos of seizures in the Philippines).

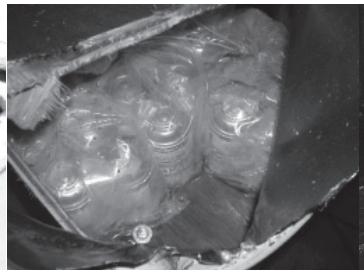
Seizure by Philippines Customs authorities of illegal CFC shipment (February 2005). Photo credits : Environmental Investigation Agency (EIA).

On 3 October 2002, Customs officers at Tokyo Port intercepted a sea freight container arriving from China and seized 18,142 cylinders of CFC-12 (dichlorodifluroromethane) weighing 4,536 kg. The cylinders containing the substance were found concealed in 72 processed metal oil drums (see photos). The consignments were declared as antifreeze. After careful physical and X-ray examination, Customs officers discovered the concealed cylinders. Detailed information on this seizure can be found in a report in the "RILO A/P Monthly Bulletin" (No. 182_Feb_2003) on the World Customs Organization's CEN website, https://195.99.88.100/cen/en. The bulletin is confidential. Authorized Customs officers around the world can access it.

An oil drum with no unusual markings

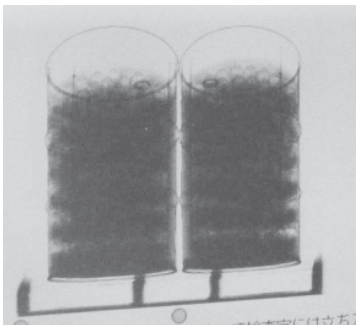


Cut and opened top part of the oil drum

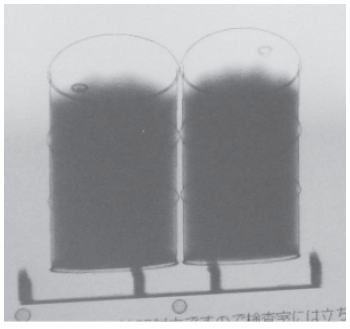


The top shelf was taken off and the cylinders were uncovered

Aspect of concealment re-created after cutting the oil drum vertically.



Oil drums containing cylinders.



Oil drums containing anti-freeze

Photo credits : Japanese Customs

Diverting ODS from transhipment harbours or ODS produced for export

Transhipment of ODS does not count towards a country's ODS consumption, because the ODS are not considered to be entering or leaving the country. However, at transhipment harbours ODS containers may be diverted and replaced by empty ones or their ODS contents may be removed. The ODS are then sold on the black market and false export documents are filed with Customs.

Containers designated for transhipment or for export should be stored separately from other containers in a specifically protected area. Any transhipment of ODS and non-ODS refrigerants should be examined and their contents determined with refrigerant identifiers. ODS produced for export do not affect a country's ODS consumption, because the amount of ODS produced in the country is nullified by the amount of ODS exported. However, only a few developing countries produce ODS.

Under-invoicing

Sometimes shipments are misdeclared by under-invoicing—that is, not declaring the real value of the shipment. This method is used primarily to avoid tax, but by declaring ISO tanks to be partially filled, for example, importers are able to get in material above the import quota.

Free trade zones

Imports and exports of ODS are not controlled by licensing systems in the free trade zones of many countries, because the goods are not technically entering or departing the Customs area. Actually, experience has shown that such duty-free zones are often sources of illegal trade in ODS. The "ODS Tracking Report" provides valuable information on the illegal trade in free trade zones (http://ozone.unep.org/Meeting_Documents/mop/18mop/ODS-Tracking-September-2006-1.pdf).

Declared as equipment

CFCs are often falsely declared as equipment such as refrigeration equipment, compressors or auto parts. A more complex smuggling method is to use the goods returned declaration and load the equipment with CFCs and export and import it for repairs. The equipment is then filled with CFCs at each export and unloaded at each import.

Screening methods

Risk profiling

Because many countries have moved to electronic pre-shipment notification and electronic filing, risk profiling is a more effective tool than ever in combating the illegal trade in ODS. Many countries already have "blacklists" for known importers or exporters who are suspicious. These lists, along with the banned goods or controlled goods list, provide a good starting point for risk profiling.

The Parties to the Montreal Protocol recognise the importance for the ODS trade of monitoring the transboundary movement of ODS and risk profiling. In 2005 the Parties commissioned a feasibility study on developing a system to monitor the transboundary movement of controlled ODS between the Parties. The study report, prepared by the Environmental Investigation Agency (EIA) and Chatham House on behalf of the Ozone Secretariat, recognised the effectiveness of specialised software to assist with risk profiling. For example, eGRID—Global Risk Identification and Detection—is a publicly available software that many countries could use to supplement the risk profiling systems they already have in place.

Intelligence reports

Businesses legally dealing in ODS can be a good source of intelligence on illegal ODS in the marketplace. It is in the best interest of those companies or their business associations to ensure that there are no illegal ODS, because such products undercut their business. For example, a surveillance network created in India by an association of ODS producers to detect illegal ODS in markets passed on the information it collected to enforcement personnel, resulting in more than 150 seizures of ODS.

Customs also may need to survey local markets, importers' storage rooms and servicing workshops in co-ordination with the National Ozone Unit and the local trade or industry association to detect any illegal trade in ODS.

Prior informed consent (PIC), described more fully in Chapter 9, is an important source of information for licensing agencies on licensed ODS shipments. The licensing country notifies the recipient country prior to the arrival of the shipment. This advance information can be a useful tool in screening legal and illegal shipments of ODS.

Screening documentation

Screening for importers not licensed to import ODS refrigerants

Any bona fide importer of non-ODS refrigerants is also likely to be an importer of ODS refrigerants and will thus be a licensed importer. Any import declared as non-ODS by a company whose name does not figure in the list of licensed importers of ODS refrigerants is cause for close examination.

Screening for correct valuation of goods

This type of screening is already conducted by valuation officers for all goods. In some cases in the Philippines and India, illicit trade in ODS was detected when the value of goods was not realistic (alternatives to CFCs may be more expensive than CFCs themselves). An incorrect valuation may thus be an indicator of the illegal trade in ODS.

Screening documentation for consistency of codes and names

Shipping documents such as commercial invoices, packing lists, freight papers, shipping manifests and bills of lading should be checked carefully. The paperwork may contain false CAS or ASHRAE numbers, trade names, Harmonized System (HS) Customs codes or fictitious importers, businesses and addresses. HS Customs codes may not be applied correctly, because the use-related codes are often wrongly attributed to the ODS instead of those based on classification of the actual chemical substance. Customs codes are further discussed in Chapter 6.

Screening by quantity of import

Because trade in refrigerants is profitable only in huge quantities, Customs officers should watch for large shipments. Unusually large imports of non-ODS refrigerants should be closely examined. The same applies to unusually large imports of HCFC refrigerants whose first control measure is the freeze in 2013. Only inspection of the containers will provide certainty about their real contents.

A country's consumption and import data for ODS and non-ODS from the previous two years and the current year's total licensed quantity of ODS imports (such as CFC and HCFC) may serve as a reference.

Screening by producer countries

Screening by ODS-producing countries is a simple method used to identify shipments that may be illegal. Any shipment from an ODS-producing country, even if declared as non-ODS, is cause for close examination. Also, any shipment declared as HCFC or HFC coming from a country that does not produce those substances may be suspicious. For example, a shipment of CFC-12 was declared as HFC-134a. Customs detected the illegal shipment because the country of origin was a CFC producer, but not a HFC producer.

The main countries producing ODS and ODS alternatives are summarised in Tables 5-2 and 5-3, respectively. The list of countries producing ODS should be updated periodically, because several countries are in the process of closing their production plants.

Updated, detailed information on ODS-producing countries and producers is in the UNEP database on the trade names of chemicals containing ODS and their alternatives (http://www.unep.fr/ozonaction/information/tradenames/main.asp). This resource provides the most current information.

Table 5-2 Countries producing ODS

Annex, Montreal Protocol	ODS type	Countries
A-I	CFCs	Argentina, China, Greece, India, Republic of Korea, Spain, United States of America, Venezuela
A-II	Halons	China, Republic of Korea
B-I	CFCs	China
B-II	Carbon tetrachloride	China, Republic of Korea, Romania, Spain, United States of America
B-III	Methyl chloroform	China, France, Japan, United States of America
C-I	HCFCs	Argentina, China, France, Germany, India, Japan, Mexico, Netherlands, Republic of Korea, Russian Federation, United Kingdom, United States, Venezuela
C-II	HBFCs	NONE
C-III	Bromochloromethane	NONE
E-I	Methyl bromide	China, Israel, Japan, United States of America

Source: Article 7 data for 2006 reporting year, only countries with positive production figures, http://ozone.unep.org/Data_Reporting/Data_Access/
Note: More detailed information is available from the UNEP Database.
a HFCs are also used as halon alternatives

Screening by transhipment harbours

Screening for known ODS by transhipment harbours is another useful way to identify ODS smuggling. Customs officers should be aware of the major transhipment harbours in their regions. Any transhipment of ODS and non-ODS refrigerants should be examined and its contents determined with refrigerant identifiers, because it may

have been diverted and often the country of origin is not known.

Screening by recovered, reclaimed or recycled ODS shipments

Any imports or exports of used (recovered, reclaimed or recycled) ODS should be closely examined. It is possible to differentiate virgin from recovered or recycled ODS through laboratory analyses, but not with certainty from reclaimed ODS of similar quality standards as virgin ODS. If the shipment is labelled as reclaimed or recycled, officers should verify that the country of origin has the capacity to reclaim or recycle ODS. For example, China introduced a mandatory label indicating that the ozone-depleting substance is recycled or reclaimed.

Screening by country with reclamation or recycling capacity

Virgin ODS is sometimes deliberately contaminated to make it appear to be reclaimed or recycled ODS. Countries that import reclaimed or recycled ODS should request detailed information from the importer on the origin of the chemicals that are claimed to be reclaimed or recycled, including the name and location of the reclamation or recycling facility.

The import of reclaimed or recycled ODS is an indication of illegal trade if the country does not have a reclamation or recycling capacity, or if the consumption of ODS is already phased out. If this is the case, the refrigerant should be analysed and the origin further investigated. A list of countries with recycling and reclamation capacities may be requested from the Ozone Secretariat
http://ozone.unep.org/Data_Reporting/Reported_Information_on_Reclamation_Facilities.shtml

Refrigerant identifiers or analysers should be used to identify any doubtful refrigerant imports.

Inspection of goods

Physical examination of containers and packaging

If a refrigerant container has been painted, shows signs of tampering or has a paper label, it may be mislabelled. Most gas cylinders have a silk-screened or spray-painted label. If a cylinder has been repainted, a closer examination is warranted.

Refrigerant cylinders containing virgin refrigerants usually have a shrink-wrapped valve. If the shrink wrap is damaged or missing, the cylinder contents should be analysed.

Customs officers should verify that the country of origin is the same on the packaging or container as it is on the shipping documentation.

Screening containers and packaging for consistency of codes and names

ASHRAE numbers, CAS numbers, trade names, product labels and product packaging should be checked for consistency. A smuggler may change one of these numbers without changing the other numbers accordingly. Smugglers have also misspelled trade names or inappropriately used company logos, taglines and trademarks. Or ODS containers may be packaged in non-ODS cardboard boxes. Chapter 6 and Annex B.2 contain lists of ASHRAE numbers, CAS numbers, trade names and HS Customs codes.

Consistency check of ISO container labelling

If a container designed for pressurised gases is labelled as containing liquid refrigerants, its contents should be analysed. CFCs shipped in ISO containers include liquids and compressed gases. IMO 1 containers hold liquid refrigerants such as R-11 and R-113. IMO 5 containers hold compressed gases such as R-12 and R-114.

Consistency check of container type and labelling

Some ODS are gases at room temperature, but are transported and stored as liquefied compressed gases in pressurised cylinders. Other ODS are liquids at room temperature and placed in drums, barrels, bottles or other standard containers.

Table 5-4 lists examples of liquefied compressed ODS gases and ODS that are liquid at room temperature. Their physical state at room temperature is indicated by their International Chemical Safety Cards or can be deducted from the temperature-pressure charts (see Annex B.6).

Table 5-4 Examples of liquefied compressed gases and liquid ODS

Physical state	Temperature-pressure chart	Examples
Liquefied compressed gas	At room temperature, the vapour pressure is above the standard atmospheric pressure at sea level.	R-12, R-13, R-22, R-115, halon 1211, halon 1301, methyl bromide
Liquid	At room temperature, the vapour pressure is below the standard atmospheric pressure at sea level.	R-11, R-113, R-141b, carbon tetrachloride, methyl chloroform

Reusable refrigerant cylinders can be refilled with any type of refrigerant and may contain mislabelled ODS. They should be examined and the refrigerant identified with refrigerant identifiers. Refilled refrigerant cylinders may not have a shrink wrapper and may be leaking. Therefore, leak detectors may be able to detect concealed reusable cylinders that contain ODS.

Consistency check of flammability of refrigerants

Hydrocarbon refrigerants should be marked flammable and CFC refrigerants non-flammable. Any refrigerant cylinder labelled as a HC refrigerant without a warning that it contains flammable gases should be examined.
Refrigerant cylinders containing flammable gases are equipped with left-hand

thread valves. Any cylinder labelled as a HC refrigerant or a flammable gas should be equipped with left-hand thread valves. If not, the contents of the cylinder should be examined.

Check of cylinder valves

Mobile air-conditioning systems have different access valves, depending on the type of refrigerant used. There are no international standards, and the valve types used may differ from region to region.

US manufacturers use standard access valves. Table 5-5 specifies which access valves are used for which type of refrigerant. The table may be useful to check whether the valve type and labelling match.

Table 5-5 : Valve types used in United States for different types of refrigerants

Valve type for US cylinders	Possible refrigerants in MAC sector	Action
¼'' right-hand flare fitting (clockwise)	CFC-12, HCFC	Check labelling and analyse if necessary
½'' right-hand flare fitting (clockwise)	HCFC, HFC-134a	Check labelling and analyse if necessary
Quick fittings	HCFC, retrofitted to non-ODS, non-ODS	Check labelling and analyse if necessary
½'' or other left-hand flare fitting	Hydrocarbon (flammable)	Safety precautions
Damaged tubes may look like a retrofitting, but may not be.	ODS refrigerant, non-ODS refrigerant	Check labelling and analyse if necessary

Note: MAC = mobile air-conditioning.

Suspect especially the ¼'' right-hand flare fitting—the MAC system will contain CFC or HCFC refrigerant. Be careful with left-hand flare fittings; these systems contain flammable gas.

Direct identification and analysis

Any doubtful refrigerant import should be identified or analysed by an authorised government laboratory or by means of electronic refrigerant identifiers/analysers.

Customs checklist

The initial examination of documents is the first instance in which discrepancies might be found. In addition to the checklist in Table 5-6, the Customs Quick Reference Tool in Annex B.1 is a valuable device for quick identification of ODS. The Trade Names Database is another identification tool for ODS and alternatives. Detailed up-to-date information can be found at http://www.unep.fr/ozonaction/information/trade-names/main.asp.

The World Customs Organization Secretariat has prepared Standardized Risk Assessments Model Risk Indicators/Profiles (EC0149E6, enforcement-sensitive) for frontline control and enforcement purposes. In the periodic updates, some risk indicators for

environmental crime (including ODS) are listed. For more information, please visit http://members.wcoomd.org/idxfren.htm, a members-only site.

Table 5-6 Checklist for Customs officers	
✔	Compare the packing list, bill of entry and the country of origin to make sure they match.
✔	Ensure the Customs code on the entry matches the description on the invoice.
✔	Is the valuation of the goods correct/realistic?
✔	Compare the invoice and the bill of lading to the outward bound ship manifest.
✔	Verify the country of origin. Is the country a Party to the Montreal Protocol and its Amendments?
✔	Verify that the importer and place of business actually exist.
✔	Contact the licensing agency to verify that the importer is licensed to import that specific material.
✔	Note the quantity, source and destination of the ODS. These will serve as important clues to illegal imports.
✔	Is the shipping route viable?
✔	Verify with the ODS producer that the container number actually exists. The discovery of fictitious container numbers has led to the disclosure of illegal trade.
✔	Review all the necessary documents. If something does not match, it may be an illegal shipment.
✔	Inspect the merchandise.
✔	Check packaging, size and shape of the container and its label.
✔	Identify the name and description of the chemical, which should match all paperwork.
✔	Seize the material if the importer does not have the import/export licence.
✔	Co-ordinate this seizure with the Customs officer, environmental agency and prosecution agency. Anyone involved with the seizure may be called to testify in court, so take good notes.
✔	Seized material should be stored and disposed of according to national regulations. Chapter 3 details a decision matrix on disposal that may be helpful to Customs.

Knowledge check	
1.	What smuggling schemes are used for ODS?
2.	What is the first thing a Customs officer should verify with respect to a shipment of ODS?
3.	What are the screening methods for paperwork related to an ODS shipment?
4.	What screening methods are used in the physical inspection?

6

Naming, Labelling and Packaging ODS

No uniform international standards govern the naming, labelling or packaging of ozone-depleting substances or ODS-based products and equipment. To effectively combat the illegal trade in ODS, Customs officers must therefore be familiar with many different identifiers or labels.

This chapter describes Harmonized System Customs codes; chemical names; trade names; CAS, ASHRAE and UN numbers; ARI colour codes and the labelling and packaging of ODS. Annex B.2 of this volume lists these "identifiers" for the most commonly used ODS as far as they are specified.

Harmonized System (HS) Customs codes

The World Customs Organization's HS coding system provides uniform codes that are used around the world to facilitate trade. HS Customs codes are the most common way of identifying goods for Customs officers. Thanks to co-operation between the WCO and the UNEP Ozone Secretariat, the 2007 HS update contains new HS codes for ODS-containing mixtures (see Annex B.3).

Overview of HS codes

HS codes are represented with six digits at the international level. The first four digits represent the heading and the next two digits the sub-heading (see box).

HS codes for select ODS	
CFC-12	2903.42
Carbon tetrachloride	2903.14
Methyl chloroform	2903.19
HCFC-22	2903.49
Methyl bromide	-2903.39

In the HS codes listed in Annex B.3 and in the Customs Officer's Quick Tool in Annex B.1, those that contain one or two dashes are international codes that are directly applicable to all the Parties to the HS Convention. Countries that are not party to the HS Convention are also welcome to use the HS codes.

When a HS code contains three dashes, the national authorities of the Parties to the HS Convention may create their own codes under the international code by adding some digits for each of the chemicals or groups of chemicals listed in the table. Again, countries that are not party to the HS Convention are welcome to use these codes.

HS codes for ODS-containing mixtures

ODS that are traded within mixtures, which is common for solvents and refrigerants, are not easily indicated by the HS codes, because the codes for mixtures are generally based on their function. However, for mixtures used in specific applications such as refrigerants, there is no code related to function. The 2007 HS coding system allows for monitoring trade in certain mixtures containing ODS, such as mixtures containing HCFCs. Annex B.5 lists mixtures and their compositions. Each mixture may have several trade names.

HS codes for ODS products

Products designed to use ODS include air-conditioners, refrigerators, freezers, water coolers, ice machines, heat pumps, compressors, cars and car parts, fire extinguishers, dry-cleaning machinery and aerosols. These products may be imported new or used. The Harmonized System does not distinguish between used and new goods, provided that the goods can still be used for their original purposes.

The products primarily earmarked for identification and control are various types of refrigeration and air-conditioning equipment (and fire extinguishers), because they tend to prolong the demand for CFCs (and halons) in the importing country.

Annex B.4 identifies the various chapters and codes relevant to products designed to use ODS. In general, these product classifications are found in Chapters 33, 34, 38, 84, 85, 87, 93, and 94 of the Harmonized System.

CN codes

HS codes extended to eight digits have been applied in the European Community as a Combined Nomenclature (CN) system. Annexes IV and V of EC Regulation 2037/2000, later amended, contain CN codes for ODS and ODS-containing products. However, Annex V is only informative, and certain CN codes listed in Annex V may no longer be valid because that annex was not amended since the regulation entered into force (http://eur-lex.europa.eu/RECH_naturel.do).

Overview of ODS names

Ozone-depleting substances are known under a variety of names and numbers: short chemical and complete chemical names, trade names, CAS numbers, UN numbers and ASHRAE numbers. Annex B.2 lists all of these names and identifying numbers. Chemical and trade names are generally used to describe the contents of a shipment in import/export documents. But they do not directly indicate whether a substance is ozone depleting. Additional identifiers that could be used are CAS numbers and UN numbers, which are described in this section. The Customs Officer's Quick Tool in Annex B.1 provides a quick snapshot of these ODS names.

In the United States and many other countries, US standards are used to label specific refrigerants (ASHRAE number) and refrigerant containers (ARI colour assignments). ASHRAE also provides a system that classifies refrigerants into different safety groups according to their flammability and toxicity.

Chemical names

Chemical names serve as an indication of the molecular structure of a substance and the type, number and position of the atoms contained. Often, it is more practical to use short formulas, which may still indicate the structure of a molecule, or formulas that only indicate the type and number of atoms contained. However, these short formulas are not any more substance-specific. For example, the chemical name for CFC-12 is dichlorodifluoromethane and its chemical formula is CF_2Cl_2.

In these short formulas, "C" stands for carbon atoms, "F" for fluorine atoms, "Cl" for chlorine atoms, "Br" for bromine atoms and "H" for hydrogen atoms. The subscripts indicate the number of each type of atom contained in the molecule. If the substance contains F and either Cl or Br (or both Cl and Br), it is always an ozone-depleting substance. If it contains Br or Cl (or both) but no F, it may be an ODS. However, if it contains F and no Cl or (and) Br, it is not an ODS.

CAS numbers

The CAS registry number (CAS No.) is one assigned by the US Chemical Abstracts Service to identify a chemical. The CAS number is specific for single chemicals and for some mixtures. It contains from five to nine digits separated into three groups by hyphens. The first group, starting from the left, has up to six digits; the second group always has two digits; and the third group always has one digit. For example, the CAS number for CFC-12 is 75-71-8.

This number has no chemical significance other than to identify unambiguously a particular substance, particularly in computerised literature retrieval systems.

UN numbers

The United Nations Substance Identification Number (UN SIN or UN number) is a four-digit international standard number that identifies a particular chemical or group of chemicals. For example, the UN number for CFC-12 is 1028. The UN numbering system provides a unique identification number for many chemical substances. This number is commonly used throughout the world to aid in the quick identification of materials in bulk containers such as rail cars, semi-trailers and intermodal containers.

ASHRAE numbers

The ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) designation for refrigerants is defined in ASHRAE standard 34-1997 on the "Number Designation and Safety Classification of Refrigerants". The number designation for hydrocarbon and halocarbon refrigerants is systematic and allows determination of the chemical composition of the compounds from the refrigerant numbers (see box).

Example of an ASHRAE number: R-123

In R-123 "R" stands for refrigerant; the first digit on the right indicates the number of fluorine atoms (3); the second digit from the right indicates one more than the number of hydrogen atoms (2 – 1 = 1 atom); and the third digit from the right indicates one less than the number of carbon atoms (1 + 1 = 2 atoms). If the third digit from the right is zero, it indicates one carbon atom and can be omitted.

The number of chlorine atoms is found by subtracting the number of fluorine (3) and hydrogen (1) atoms from the total number of atoms, which can be connected to carbon atoms. One carbon atom can be connected to four other atoms; two saturated carbon atoms can be connected to six other atoms. Therefore R-123 contains 6 – 3(F) – 1(H) = 2 chlorine atoms. R-123 stands for dichlorotrifluoroethane or C2HCl2F3 (HCFC-123).

Trade names

Trade names are the names that companies call their products. Examples of trade names are Freon-12, Genetron-11 and Algofrene-11. The ASHRAE number of a certain chemical, such as 11 or 12, often appears in the trade name, indicating that it is, for example, CFC-11 or CFC-12.

Trade names of the commercially relevant ozone-depleting substances are presented in accompanying CD ROM and are on the OzonAction website (http://www.unep.fr/ozonaction/information/tradenames/main.asp) in the database of Trade Names of Chemicals Containing Ozone Depleting Substances and Their Alternatives. The online database allows sorting of the table by trade name, company or chemical name. This valuable tool for Customs officers is regularly updated with the latest information on the trade names of ODS and their alternatives.

ASHRAE safety groups for refrigerants

The ASHRAE safety groups for refrigerants standard classifies commonly used refrigerants by toxicity and flammability. The standard defines six safety groups—A1, A2, A3, B1, B2 and B3—in which "A" signifies lower toxicity, "B" higher toxicity, "1" no flame propagation, "2" lower flammability, and "3" higher flammability. Thus "B3"

signifies a refrigerant with higher toxicity and higher flammability. ASHRAE safety groups for the most common ozone-depleting refrigerants appear in Annex B.1 and are also described in Chapter 4.

Labelling and packaging of ODS

Any legally shipped ODS (or ODS substitute) container will usually have a label that lists at least:

- Chemical name of substance
- Trade name of substance
- ASHRAE, CAS or UN number
- Batch number
- Producer's name
- Safety information (if relevant, such as for methyl bromide).

Missing information may indicate an illegal shipment. The following sections describe various ODS containers.

Disposable containers

ODS are stored, transported and sold in a variety of containers. Some refrigerants and methyl bromide are packaged in disposable containers. Disposables are manufactured in capacities ranging from 1 to 50 lb and should never be refilled. Certain countries, including all those in the European Union, have banned ODS in disposable containers because disposal of the containers creates a serious environmental problem.

Pressurised containers

Some ODS are gases at room temperature and so must be stored in pressurised containers (cylinders); see Chapter 4 for details. Because refrigerants packaged in small cans are expensive, they are usually not imported in huge quantities. Therefore, Customs officers should be suspicious when huge quantities of cans are imported and declared as non-ODS refrigerants.

Pressure-less drums, cans, bottles

Other ODS are liquids at room temperature and can be stored and transported in drums, cans, barrels, bottles and similar containers. Often, cylinders, as well as drums, cans and bottles, are protected by transport packaging as the following photos illustrate.

Note to photos :

Nothing in these photos is intended to suggest that any of the companies whose products are shown is involved in any illegal trading activity.

Photo credits pages 80 - 82: George White, Senior Special Agent, United States Customs Service, USA.

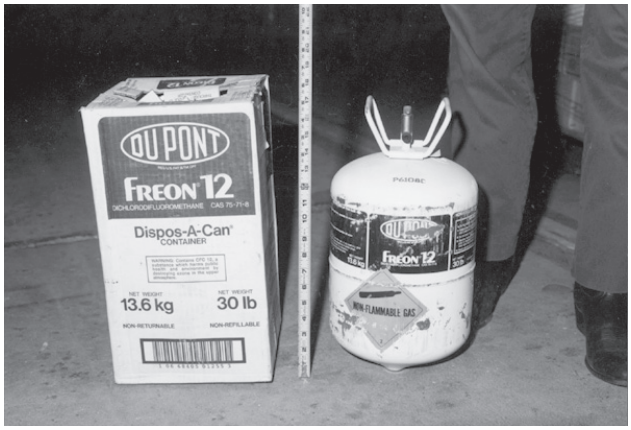


Photo 1 - Cardboard packaging and 30 lb cylinder.

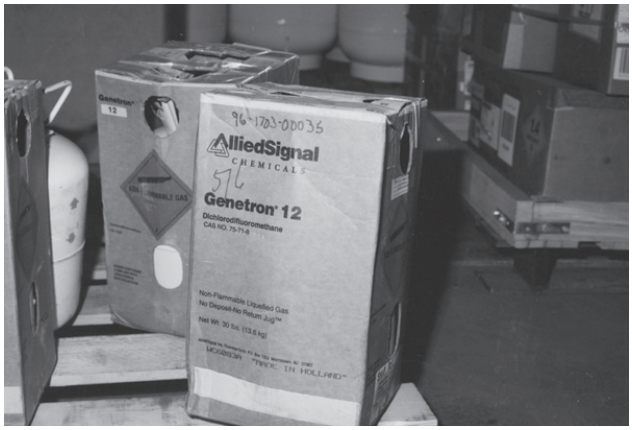


Photo 2 - Cardboard packaging for 30 lb cylinder.

Photo 3 - 1 lb canisters and cardboard packaging.

Photo 4 - Cardboard packaging for 30 lb cylinder.

Photo 5 - Cardboard packaging for 30 lb cylinder, top view.

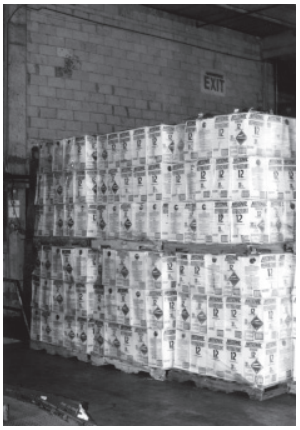


Photo 6 - Pallet of CFC-12.

Photo 7 - Pallet of CFC-12. .

Photo 8 - Traditional reusable cylinders.

Photo 9 - Example of CFC-12 cylinder, dichlorodifluoromethane.

Photo 10 - "Recovered" R-502 (mixture of 49 per cent HCFC-22 and 51 per cent CFC-115) cylinder.

Photo 11 - Various low-pressure containers.

Photo 12 - 50 and 30 lb reusable cylinders; 30 lb disposable cylinder.

Photo 13 - Modern reusable cylinders.

Photo 14 - Various sizes of recoverable containers.

Photo 15 - Stacked ISO containers.

Photo 16 - ISO tanks allow for multimodal transport of large quantities of refrigerants.

Photo 17 - Front end of an ISO tank (see box for example of ISO tank labelling).

Example of ISO (International Standards Organization) tank labelling	
a. CXCU 505808-6	unique container number
b. TARE 2894 KG	weight of container w/o product
TARE 6380 LB	weight of container w/o product
c. MAX PAYLOAD 27586 KG	amount of product
MAX PAYLOAD 60820 LB	amount of product
d. MAX GROSS 30480 KG	tare + max payload
MAX GROSS 67200 LB	tare + max payload
e. CHEMICAL NAME	Trichlorotrifluoroethane R-113

Photo 18 - Barrel of halon 1301 (bromotrifluoromethane).

Photo 19 - Cylinder of halon 1211(bromochloro difluoromethane).

Labelling of products and equipment

Voluntary labelling of ODS-free products

Some countries have introduced voluntary labelling schemes for ozone-friendly technology at the national level (so-called positive labelling). Companies that wish to use such ozone-friendly labels on their products must comply with certain criteria. Currently, no labelling requirement exists for ODS-based technology.

Some major companies have created their own positive labelling schemes in order to gain a competitive advantage. Such labels are company-specific and may indicate "ozone friendly", "CFC-free" or "environmentally friendly".

Equipment labelling

Equipment labelling usually indicates the manufacturer, the power supply, some basic technical data and the type and quantities of the working fluids. Therefore, refrigeration, air-conditioning systems and compressors usually have a label indicating the type and quantity of the refrigerant charge. No international standards specify how retrofitted systems should be labelled. UNEP's "Guidebook for Implementation of Codes of Good Practices" suggests a format for a retrofitting report (http://www.unep.fr/ozonaction/information/mmc/lib_detail.asp?r=1110).

There are also no standards specifying the locations for labelling. Customs officers may therefore have difficulty finding them.

Refrigerator labels

Refrigerator labels are found in various locations. The cardboard box containing the refrigerator may have a label that specifies the refrigerant. The user instructions may also provide this information. Labels are often on the side, the back or sometimes hidden on the ceiling of the cooling compartment, or on the backside of the refrigerator. Quite often, such labels are falsified and do not provide information on the actual refrigerant contained in the compressor. Therefore, the compressor should always be inspected, which may require removing the back cover. The compressor should have a metal label fixed to it, and the ASHRAE name of the refrigerant (such as R-22) should be engraved there. Important: The compressor should never be inspected while the refrigerator is plugged in.

Vehicle air-conditioning labels

Vehicle air-conditioners may have labels under the hood, on the chassis, on equipment in the engine or on the compressor. Important: The motor compartment should never be inspected while the motor is running.

ARI colour codes

The Air-Conditioning and Refrigeration Institute (ARI) colour assignments for refrigerant containers are described in more detail in ARI Guideline N (http://www.ari.org/standardscert/standards/guidelineN.htm). Examples of the colour assignments can be found in Annex B.2 of this volume. Descriptions of colours are only for general reference. More information can be found at http://www.ari.org/.

ARI Guideline N is a voluntary US industry guideline for the uniform assignment of

colours for containers used for new or reclaimed refrigerants that meet ARI Standard 700 purity specifications. Guideline N is also used in some other countries—in particular in Latin America. However, ARI colour codes cannot be used as the main tool for identifying ODS, because ODS cylinders manufactured in countries other than the United States may not follow ARI rules. Colour codes may even vary within a country—for example, the military may have different colour codes for ODS containers than industry.

Although the refrigerant container colour assignments can assist Customs officers in quickly distinguishing refrigerants within containers, a container's colour should not replace positive verification of its contents from nameplates or other identifying markings.

Knowledge check	
1.	What HS codes have been developed to better monitor the ODS trade?
2.	Describe the various ODS names.
3.	Describe the different containers and packaging for ODS.
4.	Describe the location of labelling for refrigerators and vehicle air- conditioners.

7 Identifying ODS and ODS-Containing Products

This chapter describes the different methods available for physically identifying and analysing chemical substances that may be mislabelled ozone-depleting substances or illegal imports of ODS.

ODS can be found in containers and in equipment and products. The kind of container will depend on the type of ODS. For example, liquefied compressed gases are stored in pressurised cylinders. Liquid ODS are placed in pressure-less drums, barrels, bottles or other standard containers used for all types of liquid chemicals.

Random testing or sampling is advised to verify the contents of both large and small containers of all types of gas and chemicals as well as ODS equipment and products.

The following products and equipment also may contain ODS:

- *Vehicle air-conditioning systems*
- *Refrigerators*
- *Freezers*
- *Dehumidifiers*
- *Water coolers*
- *Ice machines*
- *Air-conditioning and heat pump units*
- *Compressors (for refrigeration and air-conditioning equipment)*
- *Aerosol products*
- *Portable fire extinguishers (halon only)*
- *Insulation boards, panels and pipe covers*
- *Foams*
- *Pre-polymers*
- *Insecticides, pesticides and disinfectants (methyl bromide only)*
- *Composite solvents, paints, adhesives, coatings.*

See Chapter 6 for more information on identifying products and equipment that contain ODS. The next section lists the various tools available for identifying ODS and their limitations.

Refrigerant identifiers/analysers

Photo 1. Refrigerant identifier (note that R-134a is not an ODS)

Refrigerant identifiers/analysers are small portable units used to identify certain ODS and non-ODS[1]. The more sophisticated models detect CFCs, HCFCs, HFCs and hydrocarbons. They are also able to analyse the composition of certain refrigerant blends, water content, and purity and to indicate the presence of highly flammable substances. Some manufacturers of refrigerant identifiers (for illustrative purposes only) are Bacharach, Neutronics, Robinair and Yokogawa.

The main function of refrigerant identifiers is to assist servicing technicians in checking the purity of commonly used refrigerants in refrigeration and air-conditioning equipment. However, these identifiers are increasingly being used by Customs officers at checkpoints to examine suspicious ODS shipments that might have been falsely or intentionally declared to be non-ODS chemicals.

Portable identifiers/analysers are connected to the cylinder or equipment; they do not require samples. Therefore, any trained Customs personnel familiar with the use of refrigerant identifiers/analysers can test the refrigerant charge of cylinders and certain stationary and mobile air-conditioning systems.

Access valves for equipment containing ODS vary. Specialised equipment may be needed to test refrigerators, compressors and mobile and stationary air-conditioners, because many of these items have sealed metal valves. The access valve for a vehicle air-conditioner is located on the compressor. Safety precautions should be observed when testing. The thick tube is connected to the valve for low pressure or vapour. The blue valve indicates low pressure. The thin tube is high pressure, and the high-pressure valve is red.

Capabilities and limitations of refrigerant identifiers

The refrigerant identifier utilises non-disperse infrared (NDIR) technology to determine the weight concentrations of selected refrigerant types. The instrument is normally designed for use only on commonly used refrigerants: R-12, R-134a, R-22 and hydrocarbons.

With the introduction of new refrigerant blends that contain refrigerants other than R-12, R-134a, R-22 and hydrocarbons, the instrument might incorrectly identify the composition of the refrigerant blend because of cross-sensitivity issues of the sensing device. Table 7-1 compares the actual composition with the test reading from one refrigerant identifier for some of the approved blends under the Significant New Alternative Policy (SNAP) of the US Environmental Protection Agency (US EPA). The table reveals that if a blend refrigerant containing one or more components other than R-12, R-134a or R-22 is checked by the identifier, it will not correctly identify the blend. In fact, different identifiers will typically display different results. However, if the same identifier is reused on the same blend, it will display the same (incorrect) result. Thus

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[1] This section is adapted from "Towards Full Compliance with the Montreal Protocol: A Tool-Kit of Policy Instruments for National Ozone Units, Factsheet 15—Refrigerant Identifiers" by UNEP's Regional Office for Asia and the Pacific (ROAP) Compliance Assistance Programme and the Department of Industry Works, Thailand, with inputs from the Mobile Air Conditioning Society (MACS), Neutronics Inc. USA, and the US Environmental Protection Agency (see http://www.unep.fr/ozonaction/information/mmcfiles/4766-e-15identifiers.pdf).

the recommended approach is to test a pure sample of the blend with the identifier and record the composition indicated. This information can then be used for future reference when checking other samples with the same identifier.

Table 7-1 Test results from one diagnostic refrigerant identifier

Refrigerant type		% R-12	% R-22	% R-134a	% HC	% R-124	% R-142b
FRIGC	Factory spec			59	2	39	
	Test reading	26	2	69	3		
Freezone[a]	Factory spec			79			19
	Test reading	16		84			
GHGX4 Auto-frost Chill-it	Factory spec		51		4	28.5	16.5
	Test reading	29	57	10	4		
Hot Shot	Factory spec		50		1.5	39	9.5
	Test reading	34	56	7	3.0		
Freeze-12	Factory spec			80			20
	Test reading	13		87			

Source: Ward Atkinson, MACS technical advisor, "Mobile Air Conditioning Society (MACS) Worldwide Report: The Facts and the Myths about Refrigerant Contamination," http://www.macsw.org/.
Note: This table applies only to older model units. Newer models with "Blend ID" software will indicate these SNAP refrigerants by name, and the percentages shown on the display will be significantly different from those shown in this table.
[a] Freezone contains 2 per cent lubricant.

Refrigerant identifiers currently in use, provided through various international agencies, should not be used to identify the composition of refrigerant blends (such as 400 or 500 series refrigerants), because the results reported are misleading and may result in incorrect determination of the refrigerant type. Even newer refrigerant identifiers that can identify US EPA SNAP–approved blend refrigerants should not be used for blends containing components other than R-12, R-134a, R-22 and hydrocarbons without confirmation by a qualified lab using gas chromatography analysis. Although some countries such as the United States have learned to use the refrigerant identifiers to check other refrigerants, the process requires extensive experience and training. For refrigerant blends, Customs officers should carefully check the shipping and other supporting documents for any inconsistencies. To determine the actual composition of the refrigerant blend, and if Customs officers decide it is necessary, the sample should be verified by an accredited laboratory using gas chromatography equipment—officers should not depend on the identifier on the site.

Tips for using a refrigerant identifier

Anyone using a refrigerant identifier should first carefully read the identifier operation manual, which clearly indicates the limitations of use of the refrigerant identifier. The instrument is designed for testing refrigerant vapour and will malfunction if exposed to liquids or samples heavily laden with oil. The sample hose must be connected to the low-pressure side or vapour port. The sample hose must not be connected to the high-pressure side or liquid port.

The filter of the refrigerant identifier must be replaced periodically (after 150 inspections) to ensure proper functioning of the unit. However, replacement frequency will depend on the refrigerant's contaminants such as moisture, acid and compressor oil.

The identifiers currently in use around the world should be used to check only R-12, R-134a, R-22, hydrocarbons and combinations of these materials. If the identifier displays a result indicating a contaminated refrigerant, then it might be a refrigerant blend.

If one shipment is declared as one kind of refrigerant blend, the refrigerant identifier should not be used to confirm the contents of the blend. However, the refrigerant identifier can still be used to ensure that the shipment is not pure R-12 or R-22. If the identifier indicates that the contents of the shipment are a realistic mixture of R-12/R-134a/R-22/HC, then Customs should release the shipment under the name it is declared. If the identifier indicates that the refrigerant is pure or nearly pure R-12 or R-22, the shipment should be stopped.

It has been established through some recent seizure cases that some of the blend manufacturers and importers are intentionally labelling the drop-in blends as R-134a to mislead the technicians and the end users. If a shipment is declared as R-134a but the identifier displays the result as a mixture of R-12/R-134a/R-22/HC, then Customs may have to double-check with the other shipment documents and levy a penalty under the general Customs code. The shipment could be released after correcting its label.

Temperature-pressure test

Photo 2. Conducting a temperature-pressure test.

Smugglers are likely to attempt to smuggle pure, not contaminated, refrigerants. The vapour pressures of pure refrigerants, measured at a certain temperature, are sufficiently distinct for most refrigerants and provide a good indication of the refrigerant type. Exceptions are CFC-12/HFC-134a and CFC-11/HCFC-123, whose vapour pressures are too similar to allow clear identification of the substances.

To measure the pressure, the cylinder/equipment must be connected to a manifold gauge. The pressure and temperature should be measured at the same time. If the cylinder/equipment is stored at a constant temperature, the ambient temperature will be identical to that of the ODS. The location of the access valves is described in the earlier section on refrigerant identifiers/analysers. Using the temperature-pressure relationships in Annex B.6, the type of ODS can be determined.

This method requires a certain level of skill and some specific tools. Because it may show erratic results if not precisely applied, it is generally not recommended that it be used by Customs officers. If nitrogen or other gases are put into the cylinder/equipment, thereby altering the temperature-pressure relationship, the method will not be effective.

Leak detectors

Leak detectors do not identify or analyse a specific refrigerant. Rather, they indicate the presence of certain atoms in the air (such as chlorine or fluorine atoms) that would be present only if the cylinder is leaking. Therefore, leak detectors cannot be used for identification of ODS; they can only indicate that the leaking cylinder contains some ODS or ODS substitute.

New cylinders filled with virgin refrigerant usually do not leak. Refilled containers may leak and can be mislabelled.

For safety reasons, storage areas for refrigerants should be inspected regularly.

Photo 3. Example of leak detector.

The "soap bubble method" is another simple method to locate leaks. This method does not require any testing equipment other than liquid soap.

Chemical analysis for methyl bromide, CTC and other ODS

Methyl bromide, CTC and other ODS are not normally analysed using portable analysis equipment because such a method is not cost-effective. Therefore, these ODS will most likely be identified using laboratory methods of identification.

If a country has an equipped Customs or national laboratory to perform the analysis, the Customs administration should co-ordinate early with the lab on how to send samples and how to take samples if no established procedure exists.

Both mass spectrometers and gas chromatographs are commonly used to analyse chemicals such as methyl bromide, CTC and other ODS. But such equipment is not available in all countries because of the high cost. In addition to the equipment, standards and methodologies for testing for certain chemicals are also needed. The reagents required for testing can be obtained from chemical reagent companies. Staff using this equipment must be highly trained to interpret the results of the analysis.

Chemical analyses of the contents of large containers or tanks (perhaps needed to prepare court cases) require samples taken by specially trained and authorised technicians or personnel of the accredited government laboratory or whatever contracted commercial laboratory is authorised to do so. Smaller refrigerant cylinders can be transported to the laboratory without taking samples.

Customs officers should not take samples of methyl bromide or open methyl bromide containers. Rather, they should send the closed containers of methyl bromide to the specialised laboratory that would be able to either undertake a standard chemical analysis, which is relatively easy for methyl bromide, or conduct an analysis using more sophisticated methods such as infrared or gas chromatography.

As already noted in Chapter 4, Customs officers should not take samples of other ODS as well, unless they are specially trained technicians and authorised to do so. The government laboratory may be able to provide Customs officers with specialised training.

If refrigerant identifiers/analysers are not available at the point of entry, the government laboratory should analyse the contents of any suspicious shipments. The contact information of qualified refrigeration technicians or trained and authorised staff of the government laboratory should be made available to Customs officers should officers need their help in taking samples of refrigerants (see box for a safety precautions checklist for ODS refrigerant testing).

Safety precautions checklist for ODS refrigerant testing

- Only specially trained and authorised technicians or personnel of the accredited government laboratory should take samples for chemical analysis. Local regulations should be respected.
- Only trained and authorised Customs officers should use refrigerant identifiers/analysers and leak detectors and perform the temperature-pressure test. Local regulations should be respected.
- The "halide torch method" (flame test) for leak testing or open flames should be avoided because some substances may produce toxic fumes when on fire.
- When inspecting or testing equipment, personnel should disconnect the power supply—for example, refrigerators should be unplugged and vehicle motors turned off.
- Personnel should respect the safety precautions explained in Chapter 4 and the local safety regulations.

Chemical analysis of ODS contained in foams

Polyurethane (PU) foams, which can contain ODS, are often used in the walls of refrigerators and freezers, as well as in the walls of cold stores. Analysis to determine whether PU foam contains CFCs can only be carried out by a trained professional using a gas chromatograph–mass spectrometer (GC-MS).

Foam must be sampled in a way that does not damage the product, such as a refrigerator or piece of furniture. It is possible, however, to sample the foam in some products, such as some blocks or certain insulated pipes and certain sandwich panels used in cold stores, without inflicting damage. The samples can then be sent to the laboratory for investigation.

Knowledge check	
1.	Which methods can be used to identify ODS contained in pressurised cylinders and non-pressurised containers?
2.	Which products and equipment may contain ODS?
3.	That are the limitations of each of the identification methods?

8 Preparing forPhase II Customs Training

Phase I of the Customs training on dealing with ozone depleting substances—the train-the-Customs-trainers phase in combination with the UNEP Customs training manual and the "Country Handbook on ODS Regulations and Import/Export Licensing System"—provides all the information needed to plan and conduct Phase II of the Customs training—the train-the-Customs-officers phase. The Phase I training includes a specific session on planning Phase II.

The Customs trainers, working closely with the National Ozone Units, will organise Phase II of the training programme. Some countries will conduct Phase I and II training back to back in order to maintain momentum and so that Customs trainers can more easily retain their newly learned knowledge. A five-day mixed approach training agenda is listed in Annex D.

In addition to undertaking Phase I and II training, countries may wish to encourage high-level participation from Customs administrations by offering an executive briefing for Customs executives on ozone-depleting substances, the local import/export licensing system and the important role of Customs. The high-level endorsement of Customs of the import/export licensing system will be vital to the system's success. Annex D.5 of this volume is an agenda for the Customs executive briefing that can be adapted to meet local time constraints.

Including as part of the training a resource person from another country that has already implemented a regional ODS import/export licensing system could be a valuable addition to the training of Customs officers. Regional co-operation is one of the best tools in combating the illegal trade in ODS.

This chapter describes the tools and some useful strategies for the Phase II training. Generic training elements such as agendas, a concept note, an evaluation questionnaire, a participation certificate and overheads can be found in Annex D.

Training tools

Those developing the training materials for Phase II may wish to use the training tools from the Phase I training, as well as adapt them or create new tools such as the desk book for Customs officers.

Desk book for Customs officers

A desk book provides Customs officers with the essential information they need to effectively enforce ODS regulations and prevent illegal trade. The desk book is a condensed version of the "Country Handbook" discussed in Chapter 3 (see box for a sample outline of what could be included in this desk book, with references to where the information can be found in this manual and elsewhere).

Outline, desk book for Customs officers

I. Health and environmental effects of ozone depletion (see Chapter 1 of this volume)

II. Customs officers' role (see Chapter 3)
- Customs checklist (see Chapter 5)
- Customs safety checklist (see Chapter 4)

III. Laws and regulations aimed at stopping ozone depletion (see Chapter 2)
- Montreal Protocol, in particular its trade provisions and related decisions of the Parties (see "Handbook for the Montreal Protocol")
- Import/export licensing system (national laws) (see also Chapter 3)

IV. National background on ODS trade (see "Country Handbook")
- Consumption information (see Ozone Secretariat website)
- List of known importers
- Supplier countries

V. Common smuggling schemes (see Chapter 5)

VI. Identification of ODS (see Chapters 6 and 7 and Annex B)
- HS codes
- ODS names
- CAS, UN, ASHRAE numbers
- Customs Officer's Quick Tool for Screening ODS

Video resources

Trainers could select relevant segments of videos to support their presentations and to help Customs officers visualise the specific subject areas. The videos are contained in the CD ROM that is included in this training manual. They should also be available from the National Ozone Unit. The Environmental Investigation Agency (EIA) video "Combating the Illegal Trade in Ozone Depleting Substances: A Guide for Enforcement Officers" and the UNEP video "Nothing to Declare: Good Customs to Save the Ozone Layer" are particularly good audiovisual materials to present during the training.

Customs poster

Showing the poster that accompanies this manual to Customs officers, government representatives and other stakeholders will help to raise awareness of the illegal trade in ODS. This awareness tool for Customs officers will help them keep in mind the Customs checklist, smuggling schemes, the "quick tool" and useful contacts.

Case studies for Customs inspectors

Generic case studies should be adapted to the conditions in each country to include proper names, places and organisations. They can be used for an interactive group session. If new case studies are prepared, the answers should be prepared as well. The generic case studies can be found in Annex D.10.

Overheads

The overheads included in Annex E can be complemented with other overheads as appropriate. Overheads should not be loaded with too much text. Keywords can guide the presentations.

Demonstration materials

Borrowed demonstration materials such as ODS, refrigerant cylinders and packaging, as well as ODS products and equipment from a local refrigeration servicing company, are useful for display and for the practical exercises. Customs officers should examine the materials for ODS and for indicators of mislabelling.

Document display

Reference documents such as permits, invoices, bills of lading and packing lists can be borrowed from the NOU for display.

Evaluation questionnaire

An adapted version of the evaluation questionnaire in Annex D.9 should be filled out by all participants in the training. This simple feedback mechanism will ensure and improve the quality of the training.

Terminology

The basic terms used in presentations should be clearly defined (see Annex A).

Knowledge check

It is helpful to wrap up each session by asking a set of key questions. In this way, the trainer and the participants can assess the knowledge imparted and fill any gaps in that knowledge.

CD-ROM

Generic training elements such as Powerpoint slides, tables and other background material are contained in the CD-ROM. These can be adapted by the trainers according to their needs. For the latest information, trainers should visit the UNEP OzonAction website.

Internet

This training manual and its components are available in electronic format through the website of UNEP DTIE's OzonAction Branch. They are also available in high-quality desktop publishing formats. UNEP encourages national Customs agencies to translate, adapt or otherwise use the original material. Information about this process is available at http://www.unep.fr/ozonaction/topics/customs.htm.

Monitoring, evaluating and ensuring the sustainability of Customs training

For successful Customs training, the major performance indicators must be monitored on a regular basis. Specific and measurable performance indicators should be defined for Phases I and II of the training programme as well as for continuous Customs operations under the ODS import/export licensing system (see the three boxes for performance indicators). For each of the performance indicators, realistic targets should be defined and corrective measures taken if necessary.

Trainers are encouraged to incorporate the training materials into the national Customs training curricula. All new recruits should learn this material as part of their regular coursework to help ensure the long-term sustainability of the Montreal Protocol and ozone protection efforts. If the curriculum of the Customs training academy does not have any environmental content, Customs officers could be instrumental in efforts to include the UNEP training module in the existing curriculum.

Performance indicators for Phase I training

- Was the "Country Handbook on ODS Regulations and Import/Export Licensing System" used in the training workshop?
- Were the relevant topics covered in the workshop agenda?
- How many Customs trainers and stakeholders were trained?
- Did participants evaluate the training and provide feedback by completing the questionnaire?
- Was a workshop report prepared, including recommendations?
- Was a network of relevant stakeholders created after the training?

Performance indicators for Phase II training

- Were local training materials used in the Phase II training?
- Was a country-specific desk book prepared for Customs officers?
- How many Customs officers were trained?
- Did participants evaluate the training and give feedback by completing the questionnaire provided?
- Is the sustainability of the training programme ensured through the inclusion of a Montreal Protocol–related training module in the ongoing training curricula for Customs personnel?
- To what extent are ports of entry covered by trained Customs officers?
- To what extent are ports of entry equipped with refrigerant identifiers?
- Were workshop recommendations from Phase I implemented in a transparent manner?

Performance indicators for Customs operations under the ODS import/export licensing system

- Were data collected on legal imports of ODS and ODS-based products and equipment?
- How many illegal imports were detected and seized?
- How many suspect shipments were specifically checked for ODS?
- Are refrigerant analysers in use?
- Are co-operative efforts under way with neighbouring countries?
- Are co-operative efforts under way with the relevant stakeholders (network of relevant stakeholders)?

Checklist for workshop preparation

The organisation of a successful training programme is a complex task that requires dedication and organisational skills. Together, the following boxes constitute a non-exhaustive checklist of activities that must be addressed during the preparation of training workshops in general

Design and approach

- Define the overall time frame, objective, scope, target group and approach for Phase II of the training programme.

- Decide whether the training will be designed as a daytime, evening or week-end course, and whether it will be on-the-job training, training as part of ongoing refresher courses, or training integrated in training programmes for new Customs officers. Define the duration of each training programme.

- In planning, take into account the different ports of entry, the number of training workshops to be held and the number of trainees. Determine where the training will be held—that is, will it be held in the capital or in the different ports of entry?

- Consult and co-ordinate with the resource persons, participants and other relevant stakeholders.

- Determine appropriate milestones and deadlines such as recruiting the presenters, selecting the participants, providing the venue, preparing and reproducing the training materials and briefing the media.

- Determine the financial, human and physical resources available, and estimate the resources needed to organise the training. Compromises may be needed to accommodate the required resources within the available funding.

- Define the contents and agenda of the training module, and identify the necessary training materials and tools. Then reproduce the training materials (see Annex D of this manual for examples of generic agendas, a concept note and other training elements)

...continued

Design and approach (continued...)

- In the concept note, summarise the objective, scope, target group, approach and contents of the training programme. Also explain the organisational arrangements and indicate the training location and dates. The concept note is useful for informing presenters and participants about the training programme, and it also can be used as a training announcement and briefing material for the media.

- In planning, consider local habits such as festival seasons or peaks in the workload, as well as the usual working time of the participants, which will differ from country to country. Also consider local traffic conditions.

Participants

- Prepare a register of potential participants and define the criteria for determining which Customs officers should receive priority in training and which should be authorised to use ODS identifier equipment. Select participants who actually carry out inspections. Each port of entry should have at least some trained Customs officers authorised to use the equipment.

- Invite participants well in advance of the training programme. Replace participants who do not confirm their participation with participants from the reserve list. Careful selection of the right participants is crucial for a successful workshop.

- Prior to the training, send participants a preliminary agenda and some background information on the training programme.

- Prepare well in advance the registration form, preliminary list of participants and participation certificates. Have a government representative and the trainer sign the certificates.

- Have each participant complete the registration form with his or her full name, function, contact address, fax and phone numbers, e-mail address and such before the workshop begins.

- During registration, give the participants their training materials, nameplates, badges and other workshop information. Place all papers in one folder.

- Circulate the list of participants during the workshop to verify the contact data.

- Check attendance every workshop day.

- Ensure that participants who successfully attend all workshop days receive a participation certificate at the end of the workshop.

- Add workshop participants to the register of trained officers.

Trainers and local resource persons

- In planning Phase II workshops, contract the appropriate trainers who participated in Phase I of the training programme and define their terms of reference and delivery schedule.
- Invite additional local resource persons as appropriate while respecting the available budget.
- Maintain a database of trainers at the national and regional levels.

Training material

- Prepare the folders containing the workshop information and training materials in advance. Preparation may include photocopying the concept note, training agenda, "Country Handbook" and other documents.

- Distribute the training materials to participants during registration and explain the materials at the beginning of the workshop.

- Display any other reference materials on a separate table, perhaps near the entrance of the classroom.

Media briefing

- Inform local media about the training programme, ensuring they receive the concept note and other relevant information materials. If possible, arrange for radio and TV interviews and invite local newspapers to attend the introductory presentations.

Support personnel

- Plan to have sufficient support personnel available for registration, photocopying, preparation and distribution of documents (such as the list of participants and workshop recommendations), local transport and lunch and coffee arrangements, among other tasks.

Logistics

- Inform all participants and presenters of the logistical arrangements, such as location, travel arrangements, meal arrangements and availability of materials.

- Inform all participants of the lunch arrangements. If possible, arrange for lunch to be served at the training site to save time

Venue

- Prepare the classrooms well in advance and equip them with the necessary equipment such as chairs, tables, overhead projectors, television monitors, video, slide projectors, a screen and extension cables.
- Connect and check all electrical equipment in advance.
- Arrange for a table display of examples of ODS containers and packaging, ODS-containing products and ODS-based equipment, as well as additional reference materials.
- If appropriate, place ODS-related posters on the walls of the classroom.
- Hold the practical, hands-on sessions in a well-ventilated workshop facility equipped with basic tools, power, adapters, extension cables and other necessities. Check the safety of all electric equipment.

Equipment

- Arrange for refrigerant identifiers to be available (even if they must be borrowed) for the practical, hands-on sessions.
- Collect different types of ODS containers and ODS-based equipment—for example, a refrigerator, a stationary air-conditioning unit, an air-conditioned car and compressor—for use in the practical identification exercises.
- Display for discussion purposes products typically found in the local market and potentially containing ODS, such as paints, aerosol cans and solvents.
- Display any products with ODS-free labels.

Evaluation

- Distribute and collect the evaluation questionnaires during the last day of the Phase II workshop. The questionnaires could be modelled on those for Phase I of the training.
- Hold a short feedback session on the effectiveness of the different sessions and how to improve future training.

Follow-up

- Ensure that the NOU monitors and evaluates the results of the training programmes and prepares a follow-up report.
- Apply the performance indicators described in the previous section or define additional ones.

Interactive training techniques

Interactive training programmes include a variety of activities that demand the active involvement of both participants and presenters. The following suggestions can enhance facilitation of sessions; however, not all groups will respond in the same manner to the different techniques. Flexibility is central to working with groups and changing approaches until the one that best meets participants' needs is found.

Various techniques are available to trainers to increase the involvement of and the interaction between workshop participants, including asking key questions, using examples and visual aids and facilitating group work and action planning. It is important to first develop training objectives and define the audience and then decide which tool is most appropriate to meet the programme goals.

When incorporating these interactive tools into a training programme, it is important to ask these questions:

- What are the goals of the programme?
- Why is this information relevant to Customs inspectors?
- How will Customs investigators apply this information on the job?

Asking questions

Asking questions is a way to encourage participants to share ideas and experiences with each other and to foster participant interest in the training content. In designing the programme, the facilitator should be prepared to ask questions that might spark a lively exchange of ideas.

Using examples

As much as possible, trainers should use examples drawn from news articles or actual situations to illustrate points made during the training experience or as a starting point for introducing elements of a presentation.

Using visual aids

Visual aids such as overheads, slides, video presentations and flip charts will enhance the learning experience. Participants often rely on such visual aids to understand key points of the presentation. These materials should highlight the most important concepts and information in the technical sessions and serve as reference material for the participants once they return to their jobs.

Group work

Group work is undertaken by dividing a large group into small discussion groups of four to six persons. In this way, participants can better focus their thinking and reach a consensus on a particular issue. Group work increases participants' involvement and ownership.

The leader selected by each group would take notes and present the group's conclusions to the larger group at a designated time in the schedule—either at the end of the small group discussion session, or after a series of discussion sessions, depending on the size of the groups, the programme topics and the flow of the schedule.

What makes an effective trainer?

The success of any training programme depends on the effectiveness of the trainer, whether training other trainers or Customs officers. The trainer's role is to promote the learning process by taking into account the challenges faced by Customs inspectors at their workplaces and the challenges represented by the material used in the training itself. Although there is no one way to facilitate a programme, some tasks are performed by all effective trainers (see checklist in box)

Checklist for an effective trainer

- Check audio-visual equipment in the classroom before the workshop starts.
- Introduce programme presenters to participants and let the participants introduce themselves.
- Initiate discussions by asking questions and ensuring that participants' questions are addressed in the session or raised again in a subsequent, more appropriate session.
- Highlight examples and participants' concerns that presenters can reference in their sessions.
- Link session content and key points to subsequent or previous sessions.
- Help participants ask questions that they are too afraid or uncomfortable to ask on their own.
- Collect the additional reference materials that presenters agree to locate for participants once they return to their offices after delivering a session.
- Clarify for participants their responsibilities for learning activities once assignments for session activities have been presented to them and they are working in small groups.
- Observe groups and be aware of situations in which participants become confused, disillusioned, fatigued or saturated, so that programme discussions can be clarified, interrupted for a break or shortened.
- Understand and articulate participants' needs to connect with the appropriate people, ensuring that participants are able to leave the programme satisfied and fully empowered to address their challenges.
- Listen to discussions inside and outside the classroom in order to assess how the programme is proceeding and to identify ways in which to address participants' emerging needs or concerns.

Checklist for an effective trainer (continued...)

- Listen to and acknowledge all ideas.
- Praise participants' ideas when appropriate.
- Allow other members of the group to attempt to answer questions raised by participants.
- Write down participants' ideas on a board in front of the group to show that their ideas are valid and valuable.
- Remind participants of points made earlier in the training to demonstrate the relationship among concepts.
- Refer to presenters by name when referencing points they made during their technical discussions so they become familiar to the participants.
- Point out positive behaviours displayed by participants and their effects.
- Reinforce group compliments to an individual and elaborate upon them.
- Ask for examples from the group's own experiences.
- Share own experiences.
- Diffuse arguments and avoid expressing judgement on what may be considered "right" or "wrong" in discussing different options.
- Spend additional time with participants and presenters during breaks and before and after the day's sessions to learn more about their backgrounds, training needs, assessment of training experience and expectations.
- Focus on the participants' concerns and always try to address them.
- Give complete instructions when advising participants on the schedule and activities and explain why requests are important.
- Take notes and fulfil promises to provide assistance or additional information.
- Begin and end sessions on time.
- Give constructive feedback and build behaviours through positive reinforcement.

Knowledge check

1.	Describe the various tools needed for training during Phase II.
2.	Why are monitoring and evaluation of the training programme important?
3.	What are the different interactive training techniques?

9 Fostering Co-operation in Combating the Illegal Trade in ODS

This training manual provides the basic tools needed by Customs officers to control the trade and fight the illegal trade in ozone-depleting substances. Because the trade in these chemicals is international, it is not possible to control it effectively in isolation or simply on a country-by-country basis. As final phase-out approaches for several important ODS, co-operation at all levels—international, regional and national—is necessary to meet the challenges of combating the illegal trade in ODS. Customs training takes place at the country level, but co-ordination and exchange of information are needed at the regional level, because illegal traffickers are benefiting from the lack of enforcement co-ordination among countries. A variety of tools and groups are available at each level to help countries and Customs officers obtain intelligence information on ODS.

International co-operation

World Customs Organization

The World Customs Organization (WCO) was established in 1952 as the Customs Co-operation Council. Its 171 Member Governments are collectively responsible for processing 98 per cent of world trade. The only independent international inter-governmental organisation that specialises in Customs matters, the WCO is internationally acknowledged as the global centre of Customs expertise, and it plays a leading role in the discussion, development, promotion and implementation of modern and secure Customs systems and procedures. It is responsive to the needs of its members and its strategic environment, and its instruments and best-practice approaches are recognised as the basis for sound Customs administration throughout the world.

Customs Enforcement Network

The Customs Enforcement Network (CEN) is a global enforcement system designed

to support and enhance Customs agencies' fight against transnational organised crime. Today, more than 1,800 Customs officers in over 150 countries have access to CEN's database of more than 150,000 seizures. This Internet-based information system for data exchange and communication among Customs services has four main components:

- CEN database of seizures and offences related to 13 commodities (including environment-related seizures). The database has a strong analytical capacity related to modus operandi, trends, concealment methods and routes, among other things.
- CEN Website (CWS). This extremely useful site is continually updated and fed with vital Customs information, such as alerts, intelligence reports and information from other organisations. For more information, visit http://www.wcomd.org (but only authorised persons can access the site). The CEN access form and the procedure for granting access can be downloaded from the website's access page.
- CEN Concealment Picture Database (CPDb). This application aims to illustrate exceptional concealment methods with pictures. X-ray images can be downloaded for training purposes. The CPDb includes a search tool, and it provides a direct link to the CEN database in order to obtain the full details on single cases, where available.
- CEN COMM. This real-time communication system is accessible only to a Closed User Group (CUG) for a certain duration. The users may exchange information in the form of encrypted preformatted messages or plain text e-mail. It is specially designed for regular Customs operations and those involving other law enforcement agencies. Since its launch in September 2004, 15 operations have been run successfully on this system. It has proven secure, cost-effective, multifunctional, flexible, interactive and user-friendly.

For detailed information on CEN and its applications, please contact cis@wcoomd.org.

Regional Intelligence Liaison Offices (RILOs)

RILOs are an intelligence network dedicated to improving the efficiency and effectiveness of Customs enforcement around the world. The RILO programme is organised on three essential and complementary levels: (1) Contact Points in Member administrations, (2) Regional Intelligence Liaison Offices and (3) the WCO Secretariat. The network operates through its 11 regional offices to ensure the collection, treatment, analysis and dissemination of intelligence within its national Contact Points network. Traditionally focusing on illegal trade issues such as intellectual property rights, drugs, cigarettes, alcohol, as well as trafficking of women and children, all of the offices are paying increasing attention to cross-border environmental crime, including endangered species, waste and ODS. In combating the illicit trafficking of ODS and ODS-containing equipment, RILOs play a vital role in co-operation with the national authorities responsible for environmental matters.

Regional Office of Capacity Building (ROCB)

Since its establishment, the ROCB has been playing an important role in implementing the WCO's capacity-building strategy at the regional level. It has conducted numerous capacity-building workshops, seminars and programmes. It also has developed co-operative relationships with the Asian Development Bank, United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and United Nations Conference on Trade and Development (UNCTAD) on regional or sub-regional capacity-building programmes. ROCB works closely as well with UNEP on capacity

building for Customs officers on environmental issues. The ROCB is actively involved in the Green Customs Initiative (GCI), and it promotes the inclusion of the GCI in the regular training curricula of Customs Regional or National Training Centres and the organisation of national or sub-regional Green Customs workshops.

Global Information and Intelligence Strategy and Risk Assessment (SRA) Indicators

Risk management is central to the overall reconciliation of the requirements of enforcement, security and facilitation. Intelligence, in turn, is a key component of risk management. To assist its Members in constructing national information and intelligence systems, the WCO has developed and periodically updated the Global Information and Intelligence Strategy. In 2005 the Standardized Risk Assessment—Model Risk Indicators/Profiles were developed; they include specific indicators for illicit trafficking related to multilateral environmental agreements. The SRA produces risk indicator products that Customs officers can use in their daily work to target goods and conveyances for either physical inspection or post-importation audit, thereby allowing them to operate more efficiently and effectively. These tools have proven to be effective in the collection and analysis of data, the enhancement of international co-operation and the provision of guidelines to Members.

Harmonized System (HS)

The Harmonized System, developed by the WCO, is a multipurpose goods nomenclature covering more than 98 per cent of world trade (also see Chapter 6). The HS is important for monitoring and preventing the illegal trafficking of ODS. Under this system, using codes established at the national and international levels countries can monitor the movement of ODS. The WCO has already introduced subheadings (six-digit level) to this nomenclature for use at the international level to identify certain ODS. It has also recommended the insertion in national statistical nomenclatures of subheadings for other pure ODS (see Annexes B.3 and B.4 of this manual for specific HS classification codes).

The 2007 amendments to the HS include new subheadings for the separate identification of mixtures containing ODS and a new code for methyl bromide. A new WCO recommendation also suggests additional subheadings at the national level to facilitate the monitoring and controlling of the international trade in ODS (see Annex B.3 for details).

World Trade Organization (WTO)

The WTO, which has 151 member countries, is the only international organisation dealing with the rules of trade between nations. The goal of the WTO is to help producers of goods and services, exporters and importers conduct their businesses. Many provisions take environmental concerns specifically into account.

The preamble of the Marrakesh Agreement Establishing the World Trade Organization includes among the objectives of the organisation optimal use of the world's resources, sustainable development and environmental protection. The WTO pursues these objectives in concrete terms through a range of provisions within the WTO's rules. Among the most important are umbrella clauses (such as Article 20 of the General Agreement on Tariffs and Trade) that allow countries to take actions to protect human, animal or plant life or health and to conserve exhaustible natural resources. Thus the WTO rules do not prevent individual countries from introducing bans or

restrictions on trade in ODS or ODS-containing products.

Beyond the broad principles, agreements on specific subjects also take environmental concerns into account.

International Criminal Police Organisation (Interpol)

Interpol facilitates, co-ordinates and encourages police co-operation as a means of combating international crime. Its worldwide network links the police forces of Interpol's 186 member countries. Interpol, which dates from 1914, is headquartered in Lyon, France. Beginning in 1992, Interpol became actively involved in fighting environmental crime through its working groups on pollution crime and wildlife crime. Each working group is headed by a specialised police officer with extensive experience in the field.

Interpol's EcoMessage is a standardised method of reporting and cataloguing environmental crime data. The database, located at Interpol's General Secretariat, can be accessed and cross-referenced. EcoMessage is being used mostly in the enforcement of CITES, but it can be used in other areas of trade as well. The Ecomessage system uses a simple form to transmit the details of a particular crime to Interpol. When Interpol receives environmental crime reports via Ecomessage, the standardized design of the communication permits

- Speedy and methodical entry of the report's details in a format compatible with the Interpol database
- Efficient cross-referencing of the data against other entries in the computerised database
- Organised and meaningful extraction of that data in a way that facilitates applications such as criminal intelligence analysis.

A government's environmental ministry or agency may have various enforcement authorities. Customs is often the agency that intercepts and seizes contraband consignments of waste shipments. Water police and coast guard authorities may be involved if the case concerns pollution on surface waters. National and local police departments also are often involved in environmental law enforcement, as are attorneys general and other government agencies.

Any of these agencies may gather the information required for an Ecomessage report. However, when the information is gathered it should be brought to the Interpol National Central Bureau (NCB) of the reporting country. The NCB is usually found in the international relations department of the national police. For help with locating an NCB, contact either the pollution crime or wildlife crime intelligence officer or the country's national police agency.

Regional co-operation

Communication at the regional level either formally through the RILO or Interpol or informally through regional networks will provide access to valuable intelligence information on the illegal trade in ODS.

Many regions have instituted both formal and informal methods of exchanging information and pursuing co-operation on ODS. Licensing systems for ODS vary from country to country, but through regional co-operation countries can obtain information for better implementation and enforcement of their licensing systems. The follow-

ing sections provide examples of how countries are using communication and intelligence information to combat the illegal trade in ODS and comply with the Montreal Protocol.

Regional Partners Forum on Combating Environmental Crime

UNEP continually seeks opportunities to build co-operation with like-minded organisations interested in curbing the illegal environmental trade. After a meeting of such partners in August 2005 convened by UNEP's Regional Office for Asia and the Pacific (ROAP), UNEP established a Regional Partners Forum on Combating Environmental Crime. As part of that forum, UNEP ROAP facilitates mutual consultation on policy and matters of common interest between partners, exchange of information, technical co-operation, co-ordination activities on combating environmental crimes in the region and regionalisation of Green Customs Initiative.

Building on its initial success, the forum now includes RILO for Asia and the Pacific (RILO A/P), WCO's Asia Pacific Regional Office for Capacity Building (WCO ROCB), the United Nations Office on Drugs and Crime's Regional Centre for East Asia and the Pacific, Interpol's Liaison Office for South Asia, the Basel Convention Regional Centre for South-East Asia (BCRC-SEA), TRAFFIC Southeast Asia, WildAid, the Environmental Investigation Agency and UNEP ROAP. Further development of the co-operation between partners has led to more regular meetings, information exchanges, co-ordination of capacity building and enforcement activities. In February 2007, a secretariat was established in Bangkok to promote the activities of the Partners Forum.

UNODC Border Liaison Office (BLO) Project

The Cross Border Law Enforcement Cooperation in East Asia Project developed by the United Nations Office on Drugs and Crime (UNODC) aims to improve the effectiveness of law enforcement officers in border areas through implementing modern border control techniques, such as investigation, intelligent networks and interdiction techniques, and strengthening cross-border co-operation by means of liaison structures and regular operational co-operation. From 1999 to 2005, UNODC signed a memorandum of understanding with six countries to establish 42 Border Liaison Offices, with more than 240 border liaison officers working at high-risk borders. Together, the BLOs pursued more than 500 cases, which resulted in huge seizures of illegal drugs.

UNEP could benefit from the intelligence network of UNODC, because the border liaison officers might assist in seizing other illegal ODS. In fact, UNODC is already co-operating with UNEP ROAP to combat environmental crime, especially through the Regional Partners Forum to identify one or two hotspots where ODS smuggling occurs frequently. One example is the border between Vietnam and Cambodia, where the BLO has been very successful.

Asia Pacific Region

Project Sky Hole Patching

In September 2006, Project Sky Hole Patching began as a regional effort to curb the illegal trade in ODS and dangerous waste in the Asia Pacific region. The project monitors the suspicious movement of ODS and dangerous commodities across several Customs territories in the region. Partners in Project Sky Hole Patching include Customs and environmental authorities, RILO A/P, UNEP ROAP, the Compliance Assis-

tance Programme of UNEP DTIE, Basel Convention Regional Centres and other key international organisations. This effort is useful for identifying hotspots and areas in the ODS supply chain where illegal trade is occurring.

Twenty Customs and environmental authorities from 18 countries are participating in the project. It has raised the awareness of regional Customs authorities and enhanced mutual understanding and co-operation between Customs officers in the member countries. It also has strengthened the links between Customs and environmental authorities and other stakeholders and raised the awareness of frontline Customs officers. The timely exchange of information has enabled Customs and environmental agencies to monitor the movement of ODS in Asia and other regions as well. Seizures of illegal ODS have been reported by China, India, Fiji, Japan, Singapore, Thailand and other countries since September 2006.

"Information Sheet on Licensing"

Using information provided by each country through a desk study questionnaire, in 2005 UNEP ROAP produced the "Information Sheet on Licensing" by country. The information sheet lists registered importers and exporters and whether a particular substance or equipment can be imported from or exported to another country. NOUs can use this information in the licensing process while executing controls at the border or investigating possible illegal trade.

Informal Prior Informed Consent mechanism

Prior Informed Consent, a tool of many environmental conventions, is being used by the member countries of the South Asia/South East Asia and the Pacific Regional Network of Ozone Officers to better manage the import and export of CFCs in the their regions and to effectively implement national licensing systems for ODS. The mechanism is being piloted on a voluntary basis. In 2006 National Ozone Unit agreed that when they issued import/export licences they would informally consult the list of the registered importers/exporters provided by the network countries and inform the relevant NOU of the import/export licence that had been issued. The mechanism is intended to help member countries to implement effective licensing systems so they do not exceed their maximum allowable annual consumption levels as part of their phase-out strategies or as proscribed by the Montreal Protocol.

In 2007 the Informal Prior Informed Consent (iPIC) mechanism contributed greatly to helping countries control the ODS trade. Ozone officers from countries such as China, Iran, Indonesia, Malaysia, Pakistan, Singapore and the European Community actively exchanged information and denied some applications for licences from non-registered companies or over-quota applications. The UNEP Regional Office for West Asia has also supported the mechanism.

Bilateral and multilateral discussions

Dialogues among neighbouring countries improve control at the border, and bilateral discussions between importing and exporting countries often solve discrepancies in data. The Tehran dialogue and the trilateral meeting between Kyrgyzstan, Kazakhstan and China are good examples.

Tehran Dialogue

In 2004 authorities from Customs, commerce and NOUs in Afghanistan, Iran and Pakistan gathered in Tehran to discuss co-operative strategies for controlling ODS imports and exports among the three countries. The result of the meeting was a joint

communiqué on future co-operation in exchanging information, building capacity and reviewing issues in the dialogue on a regular basis.

Trilateral Meeting: Kyrgyzstan, Kazakhstan, China

In 2005 UNEP's Compliance Assistance Programme and the Ministry of Environment of Kyrgyzstan organised a trilateral meeting between China, Kazakhstan and Kyrgyzstan as an initial step towards fostering cross-border co-operation, creating solutions to monitoring ODS traffic and supporting the ODS phase-out programmes in the region. A follow-up meeting was organised in October 2006.

North America

The member countries of the North American Free Trade Agreement (NAFTA)—Canada, Mexico and the United States—have co-operated on various aspects of the trade in ODS, such as exchanging information (including on policy) and training. The Commission on Environmental Cooperation (CEC), the environmental arm of NAFTA, has initiated an online training course for Customs officers located on the borders on enforcing ODS regulations (see http://www.enselearning.com/downloads/cec/main/cec_ods_intro_e.asp).

Latin America and Caribbean (LAC) Region

At the 51st Meeting of the Montreal Protocol, the Executive Committee approved a project for the Latin American Customs Enforcement Network—Preventing Illegal Trade of ODS in the LAC Region. The project is aimed at encouraging regional co-operation among countries in the South and Central Latin America networks, controlling the transboundary movement of ODS through efficient enforcement of import/export controls, and enhancing compliance with Montreal Protocol phase-out requirements. The project will establish better communications channels for the informal exchange of information at the national level between Customs and ozone officers and within the Latin America region. The project also will develop common tools for data management, reporting and collaboration. It will utilise the framework of the ODSONET/South America and Central Latin America for developing practical regional co-operation between Customs and other involved enforcement officers, agencies and ozone officers in Latin America in order to deter the illegal trade in ODS. Implemented in partnership with Environment Canada, this project will benefit from the participation of 20 countries in the region.

Recently, a workshop was held in the region on the monitoring and control of ODS and related technologies. A key element of the workshop was working with the regional agencies of CARICOM and the Caribbean Customs Law Enforcement Council. As a result of the meeting, the English-Speaking Caribbean Network of Ozone Officers will continue discussions with CARICOM, member states, international agencies and other entities for the establishment of a regional mechanism on sustainable compliance with CFC management post-2010. In addition, the establishment of a regional clearinghouse on the ODS trade was recommended. The Caribbean Customs Law Enforcement Council (CCLEC) volunteered to investigate this proposal within the context of its work programme and advise UNEP/ROLAC (Regional Office for the Latin America and the Caribbean) accordingly. It was also recommended that countries seek prior notification from the exporting country to allow cross-checking, verification and approval of goods before shipment.

National co-operation: Educating stakeholders and exchanging information

Interagency co-operation at the national level is vital to an effective import/export licensing system. Formal agreements or memoranda of understanding between the NOU and Customs agencies are recognition of the importance of interagency co-operation. Interagency co-operation agreements have been formalised in the Philippines, Thailand, Fiji and Malaysia.

Other initiatives that may help to prevent the illegal trade in ODS are educating stakeholders, as well as pursuing co-operation and the exchange of information at the national, regional and international levels.

Educating stakeholders

Customs agencies should educate importers, wholesalers and the public that the illegal importation of ODS is unlawful, and so it may result in prosecution and penalties. This information should be accompanied by an explanation of why such import restrictions are necessary. Educational posters displayed in strategic locations will reach the general public. Simply asking the question "Are you carrying any ozone-depleting substances?" at the port of departure and at the port of entry may help to reduce smuggling as well.

Publicity

When a seizure is made or a smuggler is convicted, publicity of the case can act as a notable deterrent for other would-be smugglers. Holding a press conference and inviting the media to cover the seizure or prosecution send out the message that an enforcement network is monitoring and controlling this trade and that these smugglers will be caught and punished.

Exchanging information

By exchanging information at the national, regional and international levels and establishing a database of relevant data, Customs posts can better track the routes of illegal shipments, become acquainted with the major transhipment harbours in the region and the existing smuggling schemes, and check whether exports from a specific country of origin match with the imports into the country of destination.

A

Annexes

Annex A: Glossary

Adjustment	Changes to the Montreal Protocol that affect the phase-out timetable for existing controlled substances as well as the ozone depletion potential (ODP) values of controlled substances based on new research results. Adjustments are automatically binding for all countries that have ratified the Protocol, or the relevant amendment, which introduced the controlled substance. Adjustments can change the text of the Protocol. In addition, the Parties can take "decisions", which do not change the text but interpret the text.
Amendment	Significant changes to the Montreal Protocol, such as adding new substances to the list of controlled substances, or new obligations. Parties are not bound by these changes to the Protocol unless and until they ratify the amendment. Amendments have to be ratified in the chronological order in which they were agreed. Countries that have not ratified a certain amendment are considered to be a non-Party to new substances or obligations introduced by that amendment.
Annex A substance	One of the ozone-depleting substances (ODS) listed in Annex A of the Montreal Protocol: Group I: CFCs 11, 12, 113, 114, 115 Group II: halons 1211, 1301, 2402
Annex B substance	One of the ozone-depleting substances listed in Annex B of the Montreal Protocol: Group I: 10 "other CFCs" (most of them not in commercial use) Group II: carbon tetrachloride Group III: 1,1,1-trichloroethane (methyl chloroform)
Annex C substance	One of the ozone-depleting substances listed in Annex C of the Montreal Protocol: Group I: 40 HCFCs (some 5–10 in commercial use) Group II: 33 HBFCs (most of them not in commercial use) Group III: bromochloromethane (added by Beijing Amendment in 1999)
Annex D product	Product included in the list of products containing controlled substances specified in Annex A of the Montreal Protocol. These products may not be imported from countries that are not Parties to the Protocol. Under the Montreal Protocol, the term product means also equipment.
Annex E substance	Ozone-depleting substance listed in Annex E of the Montreal Protocol: methyl bromide.
ARI colour assignments	Voluntary industry guideline (ARI Guideline N) for the uniform assignment of colours for containers used for new or reclaimed refrigerants that meet ARI Standard 700 purity specifications. ARI is the Air-Conditioning and Refrigeration Institute.
Article 5 countries	Developing countries that are party to the Montreal Protocol with an annual calculated level of consumption of less than 0.3 kg per capita of the controlled substances in Annex A and less than 0.2 kg per capita of the controlled substances in Annex B. These countries are permitted a 10-year grace period for most substances, compared with the phase-out schedule for developed countries.
ASHRAE number	Number that applies to refrigerants and is defined in ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) Standard 34-1997 on the "Number Designation and Safety Classification of Refrigerants". The number designation of hydrocarbon and halocarbon refrigerants is systematic and allows determination of the chemical composition of the compounds from the refrigerant numbers.
Beijing Amendment	Refers to amendments produced by the Eleventh Meeting of the Parties, which introduced HCFC production controls, the listing of bromochloromethane as a controlled substance, and the reporting of methyl bromide uses for the exempted quarantine and pre-shipment applications.
bromochloro-methane	Ozone-depleting substance (CH2BrCl) with an ODP of 0.12 that is controlled under the Montreal Protocol. It has been used as a fire-extinguishing agent.

carbon tetrachloride (CTC)	Ozone-depleting chlorocarbon solvent (CCl_4) with an ODP of approximately 1.1 that is controlled under the Montreal Protocol. It is considered toxic and a probable human carcinogen as classified by the International Agency for Research on Cancer. Its use is strictly regulated in most countries, and it is utilised primarily as a feedstock material for the production of other chemicals.
CAS number	Number assigned by the US Chemical Abstracts Service to identify a chemical. The CAS registry number (CAS No.) is specific for single chemicals and for some mixtures. It contains from five to nine digits separated into three groups by hyphens. For example, the CAS No. for CFC-12 is 75-71-8.
cataract	Damage to the eye in which the lens is partly or completely clouded, impairing the vision and sometimes causing blindness. Exposure to ultraviolet radiation can cause cataracts.
chlorofluorocarbons (CFCs)	Family of ozone-depleting organic chemicals composed of chlorine, fluorine and carbon. These fully halogenated substances are commonly used in refrigeration, foam blowing, aerosols, sterilants, cleaning solvents and a variety of other applications. CFCs have the high potential to destroy ozone molecules in the stratosphere and are one of the main causes of ozone depletion.
consumption	As defined in the Montreal Protocol for ODS, production plus imports minus exports. Most Article 5 countries are importing all ODS used in the country.
controlled substance	Substance in Annex A, B, C or E of the Montreal Protocol, whether existing alone or in a mixture. It includes the isomers of any such substance, except as specified in the relevant annex, but excludes any controlled substance or mixture that is in a manufactured product other than a container used for the transportation or storage of that substance.
Copenhagen Amendment	Refers to amendments produced by the Fourth Meeting of the Parties to the Montreal Protocol in Copenhagen in 1992 whereby controls on Annex C and E substances were added. At this meeting, the phase-out schedules for Annex A and B substances were also accelerated.
"Country Handbook"	"Country Handbook on ODS Regulations and Import/Export Licensing System," which discusses the national regulations and the operational details of the licensing system. Available from National Ozone Units.
essential use	Designation given to particular ODS exemptions. Countries may request essential use exemptions on behalf of individual enterprises if the specific substance is necessary for the health, safety or functioning of society and no acceptable alternative is available. The Meetings of the Parties decide on such requests on a case-by-case basis. A global exemption has been granted for laboratory and analytical uses. Exempted use of a controlled substance does not count towards a country's consumption.
feedstock	Controlled substances that are used in the manufacture of other chemicals and are completely transformed in the process. For example, HCFC-22 is commonly used in the production of fluoropolymers. Amounts used as feedstock are exempted from controls (exempted category) and must be reported.
global warming	Along with climate change, a phenomenon caused by emissions of greenhouse gases that trap the outgoing heat from the earth, causing the atmosphere to become warmer. Greenhouse gases include carbon dioxide, nitrous oxide, methane, CFCs, HCFCs and halons.
global warming potential (GWP)	Relative contribution of each greenhouse gas to global warming relative to carbon dioxide, whose GWP is defined as 1. The GWP usually refers to a time span of 100 years (GWP 100).
greenhouse gas	Gas that traps heat in the earth's atmosphere, thereby contributing to global warming.

ground-level ozone	Type of ozone produced by vehicle and industry emissions that provide the basis for photochemical reactions. Ground-level ozone has adverse effects on human health and the environment.
halons	Ozone-depleting brominated chemicals related to CFCs that are used in fire fighting and have very high ODPs.
Harmonized Commodity Description and Coding System	Multipurpose international product nomenclature developed by the World Customs Organization (WCO). It comprises about 5,000 commodity groups; each identified by a six-digit code, and is arranged in a legal and logical structure, supported by well-defined rules to achieve uniform classification. The system is used by more than 200 countries and economies as a basis for their Customs tariffs and for the collection of international trade statistics.
hydrobromo-fluorocarbons (HBFCs)	Family of ozone-depleting hydrogenated chemicals related to halons, but with lower ODPs. At present, these substances are very seldom used.
hydrocarbon (HC)	Non-ozone-depleting chemical compound consisting of one or more carbon atoms surrounded only by hydrogen atoms. Examples of hydrocarbons are propane (C3H8, HC-290), propylene (C3H6, HC-1270) and butane (C4H10, HC-600). HCs are commonly used as a substitute for CFCs in aerosol propellants and refrigerant blends. They have an ODP of 0. Hydrocarbons are volatile organic compounds, and their use may be restricted or prohibited in some areas. Although they are used as refrigerants, their highly flammable properties normally restrict their use to low-concentration components in refrigerant blends.
hydrochloro-fluorocarbons (HCFCs)	Family of ozone-depleting hydrogenated chemicals related to CFCs that contain hydrogen as well as chlorine, fluorine and carbon. The hydrogen reduces their atmospheric lifetime, making HCFCs less damaging than CFCs in the longer term.
hydrofluorocarbons (HFCs)	Family of non-ozone-depleting chemicals that can be substituted for CFCs and HCFCs. HFCs contain hydrogen, fluorine and carbon, but no chlorine, and therefore do not deplete the ozone layer. However, they have a high global warming potential.
ISO container	Container used for bulk liquid shipments (ISO refers to the International Standards Organization). These containers provide the flexibility of using various transportation modes such as truck, rail or ship.
London Amendment	Refers to amendments decided by the Second Meeting of the Parties, whereby controls on Annex B substances were added. At this meeting, the phase-out schedules for Annex A substances were also accelerated and the Interim Multilateral Fund was established to assist developing countries in their efforts to phase out ODS.
methyl bromide (MB, also known as bromomethane)	Ozone-depleting chemical composed of carbon, hydrogen and bromine that is used mainly as an agricultural pesticide and fumigant and has a significant ODP.
methyl chloroform (also abbreviated as MCF or TCA)	Also known as 1,1,1-trichloroethane, an ozone-depleting chemical composed of carbon, hydrogen and chlorine that is used as a solvent and blowing agent and has an ODP that is about a tenth that of CFC-11.
Montreal Adjustment	Refers to the adjustment decided by the Nineteenth Meeting of the Parties in Montreal with regard to HCFCs. The adjustment tackles the advanced schedule for the phase out of HCFCs for both developed and developing countries.
Montreal Amendment	Refers to amendments decided by the Ninth Meeting of the Parties in Montreal, whereby, among other things, requirements for import and export licensing systems were introduced. At the same meeting, the phase-out schedules for methyl bromide were accelerated.
Montreal Protocol on Substances that Deplete the Ozone Layer	Signed in 1987 in Montreal, the protocol to the Vienna Convention that commits Parties to taking concrete measures to protect the ozone layer by freezing, reducing and phasing out the production and consumption of controlled substances.

National Ozone Unit	Organisation that serves as the focal point for designing, monitoring and implementing the ODS phase-out Country Programme. Often, the NOU is located in the ministry of environment and may also serve as the licensing entity.
Non–Article 5 (Article 2) countries	Parties to the Montreal Protocol that are not Article 5 countries (mainly developed countries).
Non-Party	Any country whose government has not ratified, accepted, approved or accessed the Montreal Protocol or one or more of its specific amendments.
ODS-containing products and equipment	Products and equipment that contain ozone-depleting substances, including equipment whose continual functioning relies on the use of ODS.
ozone-depleting substances (ODS)	Chemicals that contain chlorine, fluorine or bromine atoms. ODS include CFCs, HCFCs, halons, carbon tetrachloride, methyl chloroform, hydrobromofluorocarbons, bromochloromethane and methyl bromide. They have ozone-depleting potentials greater than 0 and can deplete the stratospheric ozone layer.
ozone depletion	Process by which stratospheric ozone molecules are destroyed by man-made chemicals, leading to a reduction in their concentration.
ozone depletion potential (ODP)	Measure of a substance's ability to destroy stratospheric ozone, based on its atmospheric lifetime, stability, reactivity and content of elements that can attack ozone, such as chlorine and bromine. All ODPs are based on the reference measure of 1 for CFC-11.
ozone layer	Term used to describe the presence of ozone molecules dispersed in the stratosphere. The stratosphere is that part of the earth's atmosphere that lies above the troposphere. It starts at 10–20 km above ground level and continues up to 40–50 km. The ozone layer acts as a filter against the ultraviolet radiation (UV-B) produced by the sun and, in doing so, protects life on earth from the damaging effects of increased UV-B exposure.
ozone molecule	Molecule containing three atoms of oxygen, and whose presence in the stratosphere constitutes the ozone layer.
Party	Country that has signed and ratified the Montreal Protocol and its amendments. Being a Party means in practice that a country may be a Party not only to the Montreal Protocol, but also to each of the amendments ratified by the country. Therefore, a country may be a Party to the Montreal Protocol, but a non-Party to a particular amendment to the Protocol.
perhalogenated hydrocarbon	Chemical compound consisting of one or more carbon atoms surrounded only by halides. Examples of perhalogenated hydrocarbons are all controlled substances in Groups I and II of Annexes A and B of the Montreal Protocol.
phase-out	Stage reached at which the production and consumption of a controlled ODS is 0. In this context, ODS consumption refers to national production plus imports minus exports.
process agent	Controlled substances used in the production of other chemicals (such as a catalyst or an inhibitor of a chemical reaction) without being consumed as feedstock. Some uses of process agents are exempted under the Montreal Protocol. For further information, visit the Ozone Secretariat website, http://www.unep.org/ozone.
reclaiming or reclamation	Re-processing and upgrading of a recovered controlled substance through mechanisms such as filtering, drying, distillation or chemical treatment in order to restore the substance to a specified standard of performance. Reclamation often involves processing off-site at a central facility.
recovery	Collection and storage of controlled substances from machinery, equipment, containment vessels and such during servicing or prior to disposal.

recycling	Re-use of a recovered controlled substance after a basic cleaning process such as filtering and drying. For refrigerants, recycling normally involves recharge back into equipment, and it often occurs on-site.
retrofitting (refrigeration and air-conditioning equipment)	Procedure undertaken when replacing ODS refrigerants in existing refrigeration, air-conditioning and heat pump plants with non-ODS refrigerants. Retrofitting usually requires modifications such as changing a lubricant, or replacing an expansion device or compressor. Drop-in replacements do not require major modifications, and their use does not fall under "retrofitting".
stratosphere	Region of the upper atmosphere between the troposphere and the mesosphere, extending from about 10–20 km up to 40–50 km above the earth's surface.
ultraviolet radiation	Radiation from the sun with wavelengths between visible light and X-rays. UV-B (280–320 nm) is one of three bands of UV radiation. Increased exposure to UV-B radiation can damage human health and the environment.
UN number	Four-digit international standard number (United Nations Substance Identification Number, or UN SIN) that identifies a particular chemical or group of chemicals. For example, CFC-12's UN number is 1028.
Vienna Adjustments	Refers to adjustments decided by the Seventh Meeting of the Parties with regard to HCFCs and methyl bromide. The adjustments tackled the problem of non-compliance and slightly advanced the phase-out schedules for HCFCs.
Vienna Convention	The 1985 international agreement that set a framework for global action to protect the stratospheric ozone layer. This convention is implemented through its Montreal Protocol.

B

Annex B
ODS Information

Annex B1: **Customs Officer's Quick Tool for Screening ODS**

Annex B2: **Controlled ODS and their identifiers**

Annex B3: **HS classification codes for mixtures containing ODS**

Annex B4: **HS classification codes for equipment relying on ODS for its functioning**

Annex B5: **ODS containing blends and their composition**

Annex B6: **Temperature - pressure chart for refrigerant identification**

Ozone Depleting Substances ODS

Name/Group	Chemical name	Formula	ASHRAE # for refrigerants only	ASHRAE[1] safety group	CAS[2] #	UN[3] #	HS code
Annex A, Group I (CFCs)							--2903.40
CFC-11	Trichlorofluoromethane	$CFCl_3$	R-11	A1	75-69-4	1017	--2903.41.00
CFC-12	Dichlorodifluoromethane	CF_2Cl_2	R-12	A1	75-71-8	1028	--2903.42.00
CFC-113	Trichlorotrifluoroethanes	C_2F3Cl_3	R-113	A1	76-13-1		--2903.43.00
CFC-114	Dichlorotetrafluoroethanes	$C_2F_4Cl_2$	R-114	A1	76-14-2	1958	--2903.44.10
CFC-115	Chloropentafluoroethane	$CClF_2CF_3$	R-115	A1	76-15-3	1020	--2903.44.90
Annex A, Group II (Halons)							--2903.40
Halon-1211	Bromochlorodifluromethane	CF_2BrCl	R-12B1		353-59-3	1974	--2903.46.10
Halon-1301	Bromotrifluromethane	CF_3Br	R-13B1		75-63-8	1009	--2903.46.20
Halon-2402	Dibromotetrafluroethane	$C_2F_4Br_2$	R-114B2		124-73-2		--2903.46.90
Annex B, Group I (Other CFCs)							--2903.45
CFC-13	Chlorotrifluoromethane	CF_3Cl	R-13	A1	75-72-9		--2903.45.10
CFC-111	Pentachlorofluoroethane	C_2FCl_5	R-111		354-56-3		--2903.45.15
CFC-112	Tetrachlorodifluoroethane	C_2F2Cl_4	R-112		76-12-0		--2903.45.20
Annex B, Group II							--2903.10
Tetrachlormethane or carbon tetrachloride		CCl_4		B1	56-23-5	1864	--2903.14.00
Annex B, Group III							--2903.19
1,1,1-trichloroethane or methyl chloroform		$C_2H_3Cl_3$	R-140a		71-55-6	2831	--2903.19.10
Annex C, Group I (HCFCs)							--2903.49
HCFC-22	Chlorodifluoromethane	CHF_2Cl	R-22		75-45-6	1018	--2903.49.11
HCFC-123	Dichlorotrifluoroethanes	$C_2HF_3Cl_2$	R-123		306-83-2		--2903.49.19
HCFC-124	Chlorotetrafluoroethanes	C_2HF_4Cl	R-124		2837-89-0		--2903.49.19
HCFC-141	Dichlorofluoroethanes	$C_2H_3FCl_2$			1717-00-6		--2903.49.19
HCFC-141b	1,1-dichloro-1-fluoroethane	CH_3CFCl_2	R-141b		1717-00-6		--2903.49.15
HCFC-142	Chlorodifluoroethanes	C_2H_3F2Cl			75-68-3		--2903.49.19
HCFC-142b	1-chloro-1,1-difluoroethane	CH_3CF_2Cl	R-142b		75-68-3		--2903.49.19
Annex C, Group II (HBFCs)							--2903.49
HBFC-22B1	Bromodifluoromethane	CHF_2Br					--2903.49.30
Annex C, Group III							--2903.49
Bromochloromethane		CH_2BrCl					--2903.49.80
Annex E, Group I							--2903.39
Methyl bromide (or Bromomethane)		CH_3Br			74-83-9	1062	--2903.39.11
The most popular ODS containing blends (Refrigerants)							
R-500	CFC-12 / HFC-152a		R-500		**		--3824.71.00
R-502	HCFC-22 / CFC-115		R-502		**	1973	--3824.71.00
R-401A (MP-39)	HCFC-22/HFC-152a/HCFC-124		R-401A		**		--3824.74.00
R-406A	R-22/R-600a/R-142b (55/04/41)						--3824.74.00
R-408A (FX 10)	HCFC-22/HFC-143a/HFC-125		R-408A		**		--3824.74.00
R-409A (FX 56)	HCFC-22 / HCFC-124/HCFC-142b		R-409A		**		--3824.74.00
R-415B	R-22/R-152a (25/75)						--3824.74.00

Non-Ozone Depleting Substances							
Name/Group	Chemical name	Formula	ASHRAE # for refrigerants only	ASHRAE[1] safety group	CAS[2] #	UN[3] #	HS code
Hydroflourocarbons (HFCs)							--2903.39
HFC-134a	1,1,1,2-Tetrafluoroethane	CF_3CH_2F	R-134a	A1	811-97-2	3159	--2903.39.90
HFC-152a	1,1-Difluoroethane	CHF_2CH_3	R-152a	A2	75-37-6		--2903.39.90
HFC-125	Pentafluoroethane	CF_3CHF_2	R-125	A1	354-33-6		--2903.39.90
HFC-143a	1.1.1-trifluoroethane	CF_3CH_3	R-143a	A2	420-46-2		--2903.39.90
HFC-32	Difluoromethane	CH_2F_2	R-32	A2	75-10-5		--2903.39.90
HFC-23	Trifluoromethane	CHF_3	R-23	A1	75-46-7		--2903.39.90
HFC-245fa	1,1,1,3,3-Pentafluoropropane	$CF_3CH_2CHF_2$	R-245fa	A1	460-73-1		--2903.39.90
Hydrofluorocarbons blends (HFCs)							
R-404A	R143a/125/134a		R-404A	A1/A1	**		--3824.78.00
R-507A	R143a/125		R-507A	A1	**		--3824.78.00
R-407A	R32/125/134a		R-407A	A1/A1	**		--3824.78.00
R-407B	R32/125/134a		R-407B	A1/A1	**		--3824.78.00
R-407C	R32/125/134a		R-407C	A1/A1	**		--3824.78.00
R-410A	R32/125		R-410A	A1/A1	**		--3824.78.00
R-508A	R23/116		R-508A	A1/A1	**		--3824.78.00
R-508B	R23/116		R-508B	A1/A1	**		--3824.78.00
Halogen-free Refrigerants							
R-717	Ammonia	NH_3	R-717	B2	7664-41-7	1005	--2814.10.00
R-744	Carbon dioxide	CO_2			124-38-9		--2811.21.00
R-600	Butane	$CH_3CH_2CH_2CH_3$			106-97-8		--2901.10.90
R-600a	Iso-Butane	C_4H_{10}	R-600a	A3	75-28-5	1969	--2901.10.90
R-290	Propane	C_3H_8	R-290	A3	74-98-6	1978	--2711.12.19

1- ASHRAE Safety Groups (ASHRAE: American Society for Heating Refrigeration & Air-conditioning Engineers):			
A1	Lower Toxicity & No Flammability	B1	Higher Toxicity & No Flammability
A2	Lower Toxicity & Lower Flammability	B2	Higher Toxicity & Lower Flammability
A3	Lower Toxicity & Higher Flammability	B3	Higher Toxicity & Higher Flammability

2- CAS #: Chemical Abstract Service Number

3- UN #: United Nations Number for some Chemicals

** CAS # for blend is combined of the CAS # of its components
(Example: R-500 CAS # is: 75-71-8 / 75-37-6 which CAS # for both CFC-12 & HFC-152a)

Most popular refrigerants trade names

ARCTON - ASAHIFRON - ASAHIKLIN - FORANE - FREON - GENETRON - ISCEON - SOLKANE - SUVA - FLORON

DANGER SYMBOLS


Toxic


Flammable


Explosive


Oxidizing


Corrosive


Irritant


Environmentally Dangerous


Health Hazard


Pressurized Gas

List of main producing countries for ODS

Group	Producing Countries
Chlorofluorocarbons (CFCs)	CHINA, INDIA, NETHERLANDS, BRAZIL, REP. OF KOREA, ITALY, SPAIN, MEXICO & VENEZUELA
Halons	CHINA, & REP. OF KOREA
Carbon tetrachloride (CCl_4)	INDIA, BRAZIL, UKRAINE & ROMANIA
Methylchloroform (CH_3CL_3)	JAPAN, USA, FRANCE & CHINA
Hydrochlorofluorocarbon (HCFCs)	USA, FRANCE, JAPAN, CHINA, NETHERLANDS, UK, SPAIN, INDIA & RUSSIAN FEDERATION
Methyl Bromide	USA, ISRAEL, JAPAN, FRANCE, CHINA

Classification of ODS containing products with accordance to HS

Product	**HS code/codes**
A/C Systems	8415.10, 8415.20, 8415.81, 8415.83
AC components	8415.90
Refrigerators & Freezers	84.18, 84.19, 85.09
Compressors	8414.30
Vehicles	CHAPTER 87
Fire Extinguishers	8424.10
Ins. boards & pipe covers	3917, 3920, 3921, 3925, 3926
PRE-POLYMERS	3901 – 3911

United Nations Environment Programme

Prepared by: Compliance Assistance Programme (CAP)

Regional Office for West Asia

Quality reviewed by: Dr. Janusz Kozakiewicz

Annex B.2: Controlled ODS and their identifiers

This list contains the ozone depleting substances (ODS) controlled under the Montreal Protocol and its amendments. It was compiled from UNEP's "Handbook for the International Treaties for the Protection of the Ozone Layer", an information paper of the UNEP Ozone Secretariat on the use of HS codes for pure ODS, the "ARI Guideline N" for colour assignments for refrigerant containers, the "ASHRAE standard 34-1997" on number designation and safety classification of refrigerants as well as other sources.

It also contains the different labelling information such as formulas, ASHRAE numbers for refrigerants, CAS numbers, UN numbers, HS codes and ARI colour assignments for refrigerants containers. The ASHRAE safety groups are defined in Chapter 4 on safety related issues. The ODP values are included as reference.

Name /Group	Chemical name	Formula	ASHRAE #	CAS #	UN #	HS code	ARI colour assign-ments for refrigerant containers	ASHRAE safety group	ODP
	Halogenated derivatives of hydrocarbons					2903			
Annex A Group I (CFC)	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens					-2903.4			
CFC-11	Trichlorofluoromethane	$CFCl_3$	R-11	75-69-4	1017	- -2903.41	Orange	A1	1.0
CFC-12	Dichlorodifluoromethane	CF_2Cl_2	R-12	75-71-8	1028	- -2903.42	White	A1	1.0
CFC-113	Trichlorotrifluoroethanes	$C_2F_3Cl_3$	R-113	76-13-1		- -2903.43	Dark purple (violet)	A1	0.8
CFC-114	Dichlorotetrafluoroethanes	$C_2F_4Cl_2$	R-114	76-14-2	1958	- -2903.44	Dark blue (navy)	A1	1.0
CFC-115	Chloropentafluoroethane	$CClF_2CF_3$	R-115	76-15-3	1020	- -2903.44		A1	0.6
Annex A Group II (Halon)	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens					-2903.4			
Halon-1211	Bromochlorodifluoromethane	CF_2BrCl	R-12B1	353-59-3	1974	- -2903.46			3.0
Halon-1301	Bromotrifluoromethane	CF_3Br	R-13B1	75-63-8	1009	- -2903.46			10.0
Halon-2402	Dibromotetrafluoroethane	$C_2F_4Br_2$	R-114B2	124-73-2		- -2903.46			6.0
Annex B Group I (CFC)	Other derivates perhalogenated only with fluorine and chlorine					- - 2903.45			
CFC-13	Chlorotrifluoromethane	CF_3Cl	R-13	75-72-9		- - 2903.45	Light blue (sky)	A1	1.0
CFC-111	Pentachlorofluoroethane	C_2FCl_5	R-111	354-56-3		- - 2903.45			1.0
CFC-112	Tetrachlorodifluoroethane	$C_2F_2Cl_4$	R-112	76-12-0		- - 2903.45			1.0
CFC-211	Heptachlorofluoropropane	C_3FCl_7		422-78-6		- - 2903.45			1.0
CFC-212	Hexachlorodifluoropropane	$C_3F_2Cl_6$		3182-26-1		- - 2903.45			1.0
CFC-213	Pentachlorotrifluoropropane	$C_3F_3Cl_5$		2354-06-5		- - 2903.45			1.0

Name /Group	Chemical name	Formula	ASHRAE #	CAS #	UN #	HS code	ARI colour assign-ments for refrigerant containers	ASHRAE safety group	ODP
CFC-214	Tetrachlorotetrafluoropropane	$C_3F_4Cl_4$		29255-31-0		- - -2903.45			1.0
CFC-215	Trichloropentafluoropropane	$C_3F_5Cl_3$		1599-41-3		- - -2903.45			1.0
CFC-216	Dichlorohexafluoropropane	$C_3F_6Cl_2$		661-97-2		- - -2903.45			1.0
CFC-217	Chloroheptafluoropropane	C_3F_7Cl		422-86-6		- - -2903.45			1.0
Annex B Group II	Saturated chlorinated derivatives of acyclic hydrocarbons					-2903.1			
	Tetrachlormethane or carbon tetrachloride	CCl_4		56-23-5	1864	- -2903.14		B1	1.1
Annex B Group III	Other					- -2903.19			
	1,1,1-trichloroethane or methyl chloroform	$C_2H_3Cl_3$ [1]	R-140a	71-55-6	2831	- -2903.19			0.1
Annex C Group I (HCFC)						- -2903.49			
HCFC-21	CHFCl2		R-21			- - -2903.49			0.04
HCFC-22	CHF2Cl		R-22	75-45-6	1018	- - -2903.49	Light green		0.055
HCFC-31	CH2FCl		R-31			- - -2903.49			0.02
HCFC-121 [3]	Tetrachlorofluoroethanes	C_2HFCl_4				- - -2903.49			0.01-0.04
HCFC-122 [3]	Trichlorodifluoroethanes	$C_2HF_2Cl_3$				- - -2903.49			0.02-0.08
HCFC-123	Dichlorotrifluoroethanes	$C_2HF_3Cl_2$	R-123	306-83-2		- - -2903.49	Light blue-grey		0.02-0.06
HCFC-123	2,2-dichloro-1,1,1-trifluoroethane	$CHCl_2CF_3$				- - -2903.49			0.02
HCFC-124	Chlorotetrafluoroethanes	C_2HF_4Cl				- - -2903.49			0.02-0.04
HCFC-124 [3]	2-chloro-1,1,1,2-tetrafluoroethane	$CHFClCF_3$	R-124	2837-89-0		- - -2903.49	Deep green (DOT green)		0.022

Name /Group	Chemical name	Formula	ASHRAE #	CAS #	UN #	HS code	ARI colour assign-ments for refrigerant containers	ASHRAE safety group	ODP
HCFC-131	<<<<Trichlorofluoroethanes	$C_2H_2FCl_3$				- - -2903.49			0.007-0.05
HCFC-132	Dichlorodifluoroethanes	$C_2H_2F_2Cl_2$				- - -2903.49			0.008-0.05
HCFC-133	Chlorotrifluoroethanes	$C_2H_2F_3Cl$				- - -2903.49			0.02-0.06
HCFC-141	Dichlorofluoroethanes	$C_2H_3FCl_2$				- - -2903.49			0.005-0.07
HCFC-141b [3]	1,1-dichloro-1-fluoroethane	CH_3CFCl_2	R-141b	1717-00-6		- - -2903.49			0.011
HCFC-142	Chlorodifluoroethanes	$C_2H_3F_2Cl$				- - -2903.49			0.008-0.07
HCFC-142b	1-chloro-1,1-difluoroethane	CH_3CF_2Cl	R-142b			- - -2903.49		A2	0.065
HCFC-151	Chlorofluoroethanes	C_2H_4FCl				- - -2903.49			0.003-0.005
HCFC-221	Hexachlorofluoropropanes	C_3HFCl_6				- - -2903.49			0.015-0.07
HCFC-222	Pentachlorodifluoropropanes	$C_3HF_2Cl_5$				- - -2903.49			0.01-0.09
HCFC-223	Tetrachlorotrifluoropropanes	$C_3HF_3Cl_4$				- - -2903.49			0.01-0.08
HCFC-224	Trichlorotetrafluoropropanes	$C_3HF_4Cl_3$				- - -2903.49			0.01-0.09
HCFC-225	Dichloropentafluoropropanes	$C_3HF_5Cl_2$				- - -2903.49			0.02-0.07
HCFC-225ca [3]	1,1-dichloro-2,2,3,3,3-pentafluoropropane	$CF_3CF_2CHCl_2$	R-225ca			- - -2903.49			0.025
HCFC-225cb [3]	1,3-dichloro-1,2,2,3,3-pentafluoropropane	CF_2ClCF_2CHClF	R-225cb			- - -2903.49			0.033
HCFC-226	Chlorohexafluoropropanes	C_3HF_6Cl				- - -2903.49			0.02-0.10
HCFC-231	Pentachlorofluoropropanes	$C_3H_2FCl_5$				- - -2903.49			0.05-0.09
HCFC-232	Tetrachlorodifluoropropanes	$C_3H_2F_2Cl_4$				- - -2903.49			0.008-0.10

Name / Group	Chemical name	Formula	ASHRAE #	CAS #	UN £#	HS code	ARI colour assignments for refrigerant containers	ASHRAE safety group	ODP
HCFC-233	Trichlorotrifluoropropanes	$C_3H_2F_3Cl_3$				- - -2903.49			0.007-0.23
HCFC-234	Dichlorotetrafluoropropanes	$C_3H_2F_4Cl_2$				- - -2903.49			0.01-0.28
HCFC-235	Chloropentafluoropropanes	$C_3H_2F_5Cl$				- - -2903.49			0.03-0.52
HCFC-241	Tetrachlorofluoropropanes	$C_3H_3FCl_4$				- - -2903.49			0.004 -0.09
HCFC-242	Trichlorodifluoropropanes	$C_3H_3F_2Cl_3$				- - -2903.49			0.005-0.13
HCFC-243	Dichlorotrifluoropropanes	$C_3H_3F_3Cl_2$				- - -2903.49			0.007-0.12
HCFC-244	Chlorotetrafluoropropanes	$C_3H_3F_4Cl$				- - -2903.49			0.009-0.14
HCFC-251	Trichlorotetrafluoropropanes	$C_3H_4FCl_3$				- - -2903.49			0.001-0.01
HCFC-252	Dichlorodifluoropropanes	$C_3H_4F_2Cl_2$				- - -2903.49			0.005-0.04
HCFC-253	Chlorotrifluoropropanes	$C_3H_4F_3Cl$				- - -2903.49			0.003-0.03
HCFC-261	Dichlorofluoropropanes	$C_3H_5FCl_2$				- - -2903.49			0.002-0.02
HCFC-262	Chlorodifluoropropanes	$C_3H_5F_2Cl$				- - -2903.49			0.002-0.02
HCFC-271	Chlorofluoropropanes	C_3H_6FCl				- - -2903.49			0.001-0.03
Annex C Group II (HBFC)	Derivates of methane, ethane or propane halogenated only with fluorine and bromine					- -2903.49			
		$CHFBr_2$				- - -2903.49			1.0
HBFC-22B1	Bromodifluoromethane	CHF_2Br	R-22B1			- - -2903.49			0.74
		CH_2FBr				- - -2903.49			0.73
		C_2HFBr_4				- - -2903.49			0.3 - 0.8
		$C_2HF_2Br_3$				- - -2903.49			0.5 - 1.8
		$C_2HF_3Br_2$				- - -2903.49			0.4 - 1.6
		C_2HF_4Br				- - -2903.49			0.7 - 1.2
		$C_2H_2FBr_3$				- - -2903.49			0.1 - 1.1
		$C_2H_2F_2Br_2$				- - -2903.49			0.2 - 1.5
		$C_2H_2F_3Br$				- - -2903.49			0.7 - 1.6
		$C_2H_3FBr_2$				- - -2903.49			0.1 - 1.7
		$C_2H_3F_2Br$				- - -2903.49			0.2 - 1.1
		C_2H4Br				- - -2903.49			0.07 - 0.1
		C_3HFBr_6				- - -2903.49			0.3 - 1.5
		$C_3HF_2Br_5$				- - -2903.49			0.2 - 1.9
		$C_3HF_3Br_4$				- - -2903.49			0.3 - 1.8
		$C_3HF_4Br_3$				- - -2903.49			0.5 - 2.2

Name / Group	Chemical name	Formula	ASHRAE #	CAS #	UN £#	HS code	ARI colour assignments for refrigerant containers	ASHRAE safety group	ODP
		$C_3HF_5Br_2$				- - -2903.49			0.9 - 2.0
		C_3HF_6Br				- - -2903.49			0.7 - 3.3
		$C_3H_2FBr_5$				- - -2903.49			0.1 - 1.9
		$C_3H_2F_3Br$				- - -2903.49			30.2 - 5.6
		$C_3H_2F_4Br_2$				- - -2903.49			0.3 - 7.5
		$C_3H_2F_5Br$				- - -2903.49			0.9 - 1.4
		$C_3H_3FBr_4$				- - -2903.49			0.08 - 1.9
		$C_3H_3F_2Br_3$				- - -2903.49			0.1 - 3.1
		$C_3H_3F_3Br_2$				- - -2903.49			0.1 - 2.5
		$C_3H_3F_4Br$				- - -2903.49			0.3 - 4.4
		$C_3H_4FBr_3$				- - -2903.49			0.03 - 0.3
		$C_3H_4F_2Br_2$				- - -2903.49			0.1 - 1.0
		$C_3H_4F_3Br$				- - -2903.49			0.07 - 0.8
		$C_3H_5FBr_2$				- - -2903.49			0.04 - 0.4

Name / Group	Chemical name	Formula	ASHRAE #	CAS #	UN #	HS code	ARI colour assignments for refrigerant containers	ASHRAE safety group	ODP
		$C_3H_5F_2Br$				- - -2903.49			0.07 - 0.8
		C_3H_6FBr				- - -2903.49			0.02 - 0.7
Annex C Group III	Derivates of methane, ethane or propane, halogenated only with bromine and chlorine					- -2903.49			
	Bromochloromethane3	CH_2BrCl				- - -2903.49			0.12
Annex E Group I	Fluorinated, brominated or iodinated derivates of acrylic hydrocarbons					-2903.3			
MB	Methyl bromide	CH_3Br		74-83-9	1062	- -2903.39			0.6

Notes:

1. This formula does not refer to 1,1,2-trichloroethane.
2. Identifies the most commercially viable substances with ODP values listed against them to be used for the purposes of the Protocol.
3. Bromochloromethane was introduced by the Beijing Amendment.

HS codes: Codes that contain one or two dashed are international codes, and they are directly applicable. When a code contains three dashes, the national authorities may create their own codes under the cited international code, for each one of the chemicals or group of chemicals listed.

Annex B3 : HS classification codes for mixtures containing ODS*

Mixtures containing ozone-depleting substances, subheading 3824.7 was amended in 2007 as follows:

- Mixtures containing halogenated derivatives of methane, ethane or propane:

3824.71 - - Containing chlorofluorocarbons (CFCs), whether or not containing hydrochlorofluorocarbons (HCFCs), perfluorocarbons (PFCs) or hydrofluorocarbons (HFCs)

3824.72 - - Containing bromochlorodifluoromethane, bromotrifluoromethane or dibromotetrafluoroethanes

3824.73 - - Containing hydrobromofluorocarbons (HBFCs)

3824.74 - - Containing hydrochlorofluorocarbons (HCFCs), whether or not containing perfluorocarbons (PFCs) or hydrofluorocarbons (HFCs), but not containing chlorofluorocarbons (CFCs)

3824.75 - - Containing carbon tetrachloride

3824.76 - - Containing 1,1,1-trichloroethane (methyl chloroform)

3824.77 - - Containing bromomethane (methyl bromide) or bromochloromethane

3824.78 - - Containing perfluorocarbons (PFCs) or hydrofluorocarbons (HFCs), but not containing chlorofluorocarbons (CFCs) or hydrochlorofluorocarbons (HCFCs)

3824.79 - - Other

The above-mentioned amendment was adopted by the Harmonized System (HS) Contracting Parties under the auspices of the World Customs Organization (WCO) and came into force on 1 January 2007.

The codes presented above can apply only if there is no specific code higher in HS hierarchy (i.e. of lower number) assigned to particular function of the mixture. E.g. mixtures containing carbon tetrachloride, if used as solvents, will be classified under "Composite solvents" code. Fortunately, refrigerant blends do not have their own code related to function, so codes mentioned above will apply.

* Except for the code 382.78 which relates to non-ODS mixtures used as replacements for ODS and ODS-containing mixtures

Annex B.4: HS classification codes for equipment that may rely on ODS for its functioning

HS classification of air-conditioners

Primarily under Chapter 84. Nuclear reactors, boilers, machinery and mechanical appliances; parts hereof.

84.15 Air conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity, including those machines in which the humidity cannot be separately regulated.

84.15.10 - Window or wall types, self-contained or "split-system"

84.15.20 - Of a kind used for persons, in motor vehicles

- Other:

8415.81 - Incorporating a refrigerating unit and a valve for reversal of the cooling/heat cycle (reversible heat pumps)

8415.82 - Other, incorporating a refrigerating unit

8415.83 - Not incorporating a refrigerating unit

84.15.90 - Parts

Might also be found in:

9406.00 - Prefabricated buildings. (includes air-conditioners as built in equipment)

HS classification of refrigerators, freezers, water coolers, ice machines & heat pumps is primarily under Chapter 84.

Mainly

84.18: Refrigerators, freezers and other refrigerating or freezing equipment, electric or other; heat pumps other than air conditioning machines of heading 84.15.

Might also be found under:

84.15 Air conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity, including those machines in which the humidity cannot be separately regulated.

84.19 Machinery, plant or laboratory equipment, whether or not electrically heated (excluding furnaces, ovens and other equipment of heading 85.14), for the treatment of materials by a process involving a change of temperature such as heating, cooking, roasting, distilling, rectifying, sterilising, pasteurising, steaming, drying, evaporating, vaporising, condensing or cooling, other than machinery or plant of a kind used for

domestic purposes; instantaneous or storage water heaters, non-electric.

85.09 *Electro-mechanical domestic appliances, with self-contained electric motor, other than vacuum cleaners of heading 85.08.*

87.16 *Trailers and semi-trailers; other vehcles, not mechanically propelled; parts thereof.*

HS Classification of Compressors

Primarily under Chapter 84.

Mainly:

84.14 *Air or vacuum pumps, air or other gas compressors and fans, ventilating or recycling hoods incorporating a fan, whether or not fitted with filters.*

8414.10 - *Vacuum pumps*

8414.20 - *Hand- or foot-operated air pumps*

8414.30 - *Compressors of a kind used in refrigerating equipment*

8414.40 - *Air compressors mounted on a wheeled chassis for towing*

8414.90 - Parts

Might also be found under:

84.11 *Turbo-jets, turbo-propellers and other gas turbines.*

84.12 *Other engines and motors.*

84.15 *Air conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity, including those machines in which the humidity cannot be separately regulated.*

84.18 *Refrigerators, freezers and other refrigerating or freezing equipment, electric or other; heat pumps other than air conditioning machines of heading 84.15.*

84.24 *Mechanical appliances (whether or not hand-operated) for projecting, dispersing or spraying liquids or powders; fire extinguishers, whether or not charged; spray guns and similar appliances; steam or sand blasting machines and similar jet projecting machines.*

84.25 *Pulley tackle and hoists other than skip hoists; winches and capstans; jacks.*

84.30 *Other moving, grading, levelling, scraping, excavating, tamping, compacting, extracting or boring machinery, for earth, minerals or ores; pile-drivers and pile-extrac-*
tors; snow-ploughs and snow-blowers.

See also Chapter 87.

HS Classification of Cars and Car Parts

Chapter 87.
Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof.

87.01 *Tractors (other than tractors of heading 87.09).*

87.02 *Motor vehicles for the transport of ten or more persons, including the driver.*

87.03 *Motor cars and other motor vehicles principally designed for the transport of persons (other than those of heading 87.02), including station wagons and racing cars.*

87.04 *Motor vehicles for the transport of goods.*

87.05 *Special purpose motor vehicles, other than those principally designed for the transport of persons or goods (for example, breakdown lorries, crane lorries, fire fighting vehicles, concrete-mixer lorries, road sweeper lorries, spraying lorries, mobile workshops, mobile radiological units).*

87.08 *Parts and accessories of the motor vehicles of headings 87.01 to 87.05.*

HS Classification of Fire Extinguishers

Also Chapter 84.

84.24 *Mechanical appliances (whether or not hand-operated) for projecting, dispersing or spraying liquids or powders; fire extinguishers, whether or not charged; spray guns and similar appliances; steam or sand blasting machines and similar jet projecting machines.*

8424.10 *Fire extinguishers, whether or not charged*
(Preparations and charges fall in heading 38.13)

HS Classification of Dry Cleaning Machinery

Also Chapter 84.

84.50 *Household or laundry-type washing machines, including machines which both wash and dry.*

84.51 *Machinery (other than machines of heading 84.50) for washing, cleaning, wringing, drying, ironing, pressing (including fusing presses), bleaching, dyeing, dressing, finishing, coating or impregnating textile yarns, fabrics or made up textile articles and machines for applying the paste to the base fabric or other support used in the manufacture of floor coverings such as linoleum; machines for reeling, unreeling, folding, cutting or pinking textile fabrics.*

8451.10 - Dry-cleaning machines

HS Classification of Aerosols

Under several HS headings, depending on intended use. For instance:

33.05 Preparations for use on the hair.

33.07 Pre-shave, shaving or after-shave preparations, personal deodorants, bath preparations, depilatories and other perfumery, cosmetic or toilet preparations, not elsewhere specified or included; prepared room deodorisers, whether or not perfumed or having disinfectant properties.

34.03 Lubricating preparations (including cutting-oil preparations, bolt or nut release preparations, anti-rust or anti-corrosion preparations and mould release preparations, based on lubricants) and preparations of a kind used for the oil or grease treatment of textile materials, leather, furskins or other materials, but excluding preparations containing, as basic constituents, 70 % or more by weight of petroleum oils or of oils obtained from bituminous minerals.

38.08 Insecticides, rodenticides, fungicides, herbicides, anti-sprouting products and plant-growth regulators, disinfectans and similar products, put up in forms or packings for retail sale or as preparations or articles (for example, sulphur-treated bands, wicks and candles, and fly-papers).

38.14 Organic composite solvents and thinners, not elsewhere specified or included; prepared paint or varnish removers.

38.24 Prepared binders for foundry moulds or cores; chemical products and preparations of the chemical or allied industries (including those consisting of mixtures of natural products), not elsewhere specified or included.

93.04 Other arms (for example, spring, air or gas guns and pistols, truncheons), excluding thos of heading 93.07. (Aerosol spray cans containing tear gas).

Annex B.5: ODS containing blends & their compositions

Zeotrope mixtures								
Refrigerant number (Trade name)	Component 1		Component 2		Component 3		Component 4	
R401a (MP 39)	HCFC-22	53%	HFC1-52a**	13%	HCFC-124	34%		
R401b (MP 66)	HCFC-22	61%	HFC-152a**	11%	HCFC-124	28%		
R401c (MP 52)	HCFC-22	33%	HFC-152a**	15%	HCFC-124	52%		
R402a (HP 80)	HFC-125**	60%	HC-290**	2%	HCFC-22	38%		
R402b (HP 81)	HFC-125**	38%	HC-290**	2%	HCFC-22	60%		
R403a (69S)	HC-290**	5%	HCFC-22	75%	FC-218**	20%		
R403b (69L)	HC-290**	5%	HCFC-22	56%	FC-218**	39%		
R405a (G2015)	HCFC-22	45%	HFC-152a**	7%	HCFC-142b	42.5%	C318	5.5%
R406a (GHG-12)	HCFC-22	55%	HC-600a**	4%	HCFC-142b	41%		
R408a (FX55)	HFC-125**	7%	HFC-143a**	46%	HCFC-22	47%		
R409a (FX56)	HCFC-22	60%	HCFC-124	25%	HCFC-142b	15%		
R409b (FX 57)	HCFC-22	65%	HCFC-124	25%	HCFC-142b	10%		
R411a (G2018A)	HC-1270**	2%	HCFC-22	88%	HFC-152a**	11%		
R411b (G2018B)	HC-1270**	3%	HCFC-22	94%	HFC-152a**	3%		
R412a (TP5R)	HCFC-22	70%	FC-218**	5%	HCFC-142b	25%		
R414b (Hotshot)	HCFC-22	50%	HCFC-124	39%	HCFC-142b	9.5%	HC-600a**	1.5%

Azeotrope mixtures				
Refrigerant number	Component 1		Component 2	
R500	CFC12	74%	HFC152a**	26%
R501	HCFC22	75%	CFC12	25%
R502	HCFC22	49%	CFC115	51%
R503	HFC23**	40%	CFC13	60%
R504	HFC32**	48%	CFC115	52%
R505	CFC12	78%	HCFC31	22%
R506	HCFC31	55%	CFC114	45%
R507	HCFC124	50%	HFC143a**	50%
R509	HCFC22	44%	FC218**	56%

Unnamed mixtures								
Trade Name	Component 1		Component 2		Component 3		Component 4	
FX-20	HFC-125**	45%	HCFC-22	55%				
FX-10	HCFC-22	60%	HCFC-142b	40%				
Di36	HCFC-22	50%	HCFC-124	47%	HC-600a**	3%		
Daikin Blend	HFC-23**	2%	HFC-32**	28%	HCFC-124	70%		
FRIGC	HCFC-124	39%	HFC-134a**	59%	HC-600a**	2%		
Free Zone	HCFC-142b	19%	HFC-134a**	79%	Lubricant	2%		
GHG-HP	HCFC-22	65%	HCFC-142b	31%	HC-600a**	4%		
GHG-X5	HCFC-22	41%	HCFC-142b	15%	HFC-227ca	40%	HC-600a**	4%
NARM-502	HCFC-22	90%	HFC-152a**	5%	HFC-23**	5%		
NAF-S-III****	HCFC-22	82%	HCFC-123	4.75%	HCFC-124	9.5%	C10H16	3.75%
NAF-P-III****	HFC-134a**	10%	HCFC-123	55%	HCFC-124	31%	HC	4%

Methyl bromide containing mixtures with chloropicrin				
Trade Name	Component 1		Component 2	
Terr-O-Gas; Dowfume MC-33;	Methyl bromide	67%	Chloropicrin**	33%
50-50 Preplant Soil Fumigant; Agro-bromo 50; Agrogas 50; Bromofifty; Mebrom 50/50; Picbrom 50; TRI-CON 50/50	Methyl bromide	50%	Chloropicrin**	50%
Agrobromo 98; Brom O Gas; Methyl bromide 98 (M-B-R 98); Metabrom 98; Sanibrom S Biocide Technical ; Terr-O-Gas 98;	Methyl bromide	98%***	Chloropicrin**	2%

* A more extensive list of trade names for mixtures and pure substances is included in Annex B.6
** Not ozone depleting substances
*** Should be classified under the customs code of pure methyl-bromide according to the WCO clarification
*** * A halon alternative

Annex B.6 : ODS containing blends & their compositions (°C/°F/psi)

Temp °C	Temp °F	R-11 VP	R-12 VP	R-113 VP	R-114 VP	R-500 VP	R-502 VP	R-22 VP	R-123 VP	R-134a VP	R-404A (FX-70) LP	R-408A (FX-10) LP	R-409A (FX-56) LP	R-409A (FX-56) VP	R-407C LP	R-407C VP
-45.6	-50	**28.9**	**15.4**		**27.1**	**12.8**	**0.2**	**6.2**	**29.2**	**18.7**	0.6	**1.6**	**12.4**	**17.2**	**2.9**	**11.4**
-42.8	-45	**28.7**	**13.3**		**26.6**	**10.3**	1.9	**2.7**	**29.0**	**16.9**	2.7	1.1	**9.7**	**15.2**	0.4	**8.5**
-40	-40	**28.4**	**11.0**		**26.0**	**7.6**	4.1	0.5	**28.9**	**14.8**	5.0	3.3	**6.8**	**13.1**	2.5	**5.2**
-37.2	-35	**28.1**	**8.4**		**25.4**	**4.6**	6.5	2.6	**28.7**	**12.5**	7.6	5.6	**3.5**	**10.7**	4.8	**1.5**
-34.4	-30	**27.8**	**5.5**	**29.3**	**24.6**	**1.2**	9.2	4.9	**28.4**	**9.8**	10.4	8.2	0.0	**8.1**	7.3	1.3
-31.7	-25	**27.4**	**2.3**	**29.2**	**23.8**	**1.2**	12.1	7.4	**28.1**	**6.9**	13.4	11.0	2.0	**5.1**	10.1	3.6
-28.9	-20	**27.0**	0.6	**29.1**	**22.9**	3.2	15.3	10.1	**27.8**	**3.7**	16.8	14.1	4.1	**1.9**	13.1	6.1
-26.1	-15	**26.5**	2.4	**28.9**	**21.8**	5.4	18.8	13.2	**27.4**	**0.1**	20.5	17.5	6.5	0.8	16.5	8.8
-23.3	-10	**26.0**	4.5	**28.7**	**20.6**	7.8	22.6	16.5	**27.0**	1.9	24.5	21.2	9.0	2.8	20.1	11.9
-20.6	-5	**25.4**	6.7	**28.5**	**19.3**	10.4	26.7	20.0	**26.5**	4.1	28.8	25.2	11.8	4.9	24.0	15.2
-17.8	0	**24.7**	9.1	**28.2**	**17.8**	13.3	31.1	23.9	**25.9**	6.5	33.5	29.5	14.8	7.2	28.3	18.9
-15	5	**23.9**	11.8	**27.9**	**16.2**	16.4	35.9	28.2	**25.3**	9.1	38.6	34.2	18.1	9.7	33.0	22.9
-12.2	10	**23.1**	14.6	**27.6**	**14.4**	19.7	41.0	32.8	**24.6**	11.9	44.0	39.3	21.7	12.5	38.0	27.3
-9.4	15	**22.1**	17.7	**27.2**	**12.4**	23.3	46.5	37.7	**23.7**	15.0	49.9	44.8	25.5	15.4	43.5	32.0
-6.7	20	**21.1**	21.0	**26.8**	**10.2**	27.2	52.5	43.0	**22.8**	18.4	56.2	50.7	29.6	18.7	49.3	37.2
-3.9	25	**19.9**	24.6	**26.3**	**7.8**	31.5	58.8	48.7	**21.8**	22.1	63.0	57.0	34.0	22.2	55.7	42.7
-1.1	30	**18.6**	28.4	**25.8**	**5.2**	36.0	65.6	54.9	**20.7**	26.0	70.3	63.7	38.7	26.0	62.5	48.7
1.7	35	**17.2**	32.5	**25.2**	**2.3**	40.8	72.8	61.5	**19.5**	30.3	78.1	71.0	43.8	30.1	69.8	55.2
4.4	40	**15.6**	36.9	**24.5**	0.4	46.0	80.5	68.5	**18.1**	35.0	86.4	78.7	49.2	34.5	77.6	62.1
7.2	45	**13.9**	41.6	**23.8**	2.0	51.6	88.7	76.0	**16.6**	40.0	95.2	87.0	54.9	39.2	86.0	69.5
10	50	**12.0**	46.7	**22.9**	3.8	57.5	97.4	84.0	**15.0**	45.4	104.7	95.8	61.0	44.3	94.9	77.5
12.8	55	**10.0**	52.0	**22.2**	5.8	63.9	106.6	92.5	**13.1**	51.1	114.7	105.1	67.6	49.8	104.5	86.0
15.6	60	**7.8**	57.7	**21.0**	7.9	70.6	116.4	101.6	**11.2**	57.3	125.3	115.1	74.5	55.6	114.6	95.1
18.3	65	**5.4**	63.7	**19.9**	10.1	77.8	126.7	111.2	**9.0**	63.9	136.6	125.6	81.8	61.9	125.4	104.8
21.1	70	**2.7**	70.2	**18.7**	12.6	85.4	137.6	121.4	**6.6**	71.0	148.6	136.8	89.5	68.6	136.9	115.2
23.9	75	0.0	76.9	**17.3**	15.2	93.4	149.1	132.2	**4.0**	78.6	161.2	148.7	97.7	75.8	149.1	126.2
26.7	80	1.5	84.1	**15.8**	18.0	101.9	161.2	143.6	**1.2**	86.6	174.6	161.2	106.4	83.4	162.1	137.8
29.4	85	3.2	91.7	**14.3**	20.9	111.0	174.0	155.7	0.9	95.1	188.8	174.4	115.5	91.5	175.8	150.2
32.2	90	4.9	99.7	**12.5**	24.1	120.5	187.4	168.4	2.5	104.2	203.7	188.4	125.2	100.2	190.2	163.4
35	95	6.8	108.2	**10.6**	27.5	130.5	201.4	181.8	4.2	113.8	219.4	203.1	135.3	109.4	205.5	177.4
37.8	100	8.8	117.1	**8.6**	31.1	141.1	216.2	195.9	6.1	124.1	235.9	218.7	146.0	119.2	221.6	192.1
40.6	105	10.9	126.5	**6.4**	35.0	152.2	231.7	210.7	8.1	134.9	253.4	235.0	157.2	129.6	238.5	207.8
43.3	110	13.2	136.4	**4.0**	39.1	164.0	247.9	226.3	10.3	146.3	271.7	252.1	169.0	140.6	256.4	224.4
46.1	115	15.6	146.7	**1.4**	43.4	176.3	264.9	242.7	12.6	158.4	290.9	270.2	181.4	152.3	275.1	241.9
48.9	120	18.3	157.6	0.7	48.0	189.2	282.7	259.9	15.1	171.1	311.1	289.1	194.4	164.7	294.7	260.5
51.7	125	21.0	169.0	2.2	52.8	208.8	301.4	277.9	17.7	184.5	332.3	308.9	208.0	177.8	315.2	280.1
54.4	130	24.0	180.9	3.7	58.0	217.0	320.8	296.8	20.6	198.7	354.5	329.7	222.3	191.6	336.7	300.9
57.2	135	27.1	193.5	5.4	63.4	231.9	341.2	316.5	23.6	213.6	377.8	351.5	237.2	206.3	359.2	322.9
60	140	30.4	206.5	7.2	69.0	247.4	362.6	337.2	26.8	229.3	402.2	374.3	252.9	221.8	382.6	346.2
62.8	145	34.0	220.2	9.2	75.0	263.7	385.0	358.8	30.2	245.7	427.7	398.1	269.3	238.2	407.0	370.8
65.6	150	37.7	234.5	11.2	81.3	280.7	408.4	381.5	33.8	263.0	454.4	423.0	286.4	255.5	432.4	396.9

VP = Vapour Pressure, LP = Liquid Pressire
Bold Numerals = PSI below 1 atmosphere

Annex C
International Chemical Safety Cards

C

These safety cards may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

The following safety cards are included in this annex:

Source: International Labor Organisation (ILO)
International Occupational Safety and Health Information Centre (CIS)
Web site:
http://www.ilo.org/public/english/protection/safework/cis/products/icsc/index.htm

Annex C.1 : TRICHLOROFLUOROMETHANE : CFC-11

CAS No: 75-69-4
RTECS No: PB6125000

Trichloromonofluoromethane
Fluorotrichloromethane
CFC 11
R 11
CCl_3F
Molecular mass: 137.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep drums, etc., cool by spraying with water.
INHALATION	Cardiac arrhythmia. Confusion.Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE. Dry skin.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL : Ventilation.

SAFE STORAGE : Separated from incompatible materials. See Chemical Dangers. Cool.

PHYSICAL STATE; APPEARANCE : Colourless gas or highly volatile liquid, with characteristic odur.

PHYSICAL DANGERS : The gas is heavier than air. The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases (hydrogen chloride ICSC 0163, phosgene ICSC 0007, hydrogen fluoride ICSC 0283, carbonyl fluoride ICSC 0633). Reacts with powders of aluminium, zinc, magnesium and lithium shavings; granular barium.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : On loss of containment this liquid evaporates very quickly displacing the air and causing a serious risk of suffocation when in confined areas.

EFFECTS OF SHORT TERM EXPOSURE : The liquid may cause frostbite. The substance may cause effects on the cardiovascular system and central nervous system, resulting in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.

EFFECTS OF LONGTERM EXPOSURE: The liquid defats the skin.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000 ppm (Ceiling value); A4; (ACGIH 2004).
MAK: 1000 ppm; 5700 mg/m3; Peak limitation category: II(2); Pregnancy risk group: C; (DFG 2004).

PHYSICAL PROPERTIES :	
Boiling point: 24°C	Vapour pressure, kPa at 20°C: 89.0
Melting point: -111°C	Relative vapour density (air = 1): 4.7
Relative density (water = 1): 1.49	Relative density of the vapour/air-mixture at 20/C (air = 1): 4.4
Solubility in water, g/100 ml at 20°C: 0.1	Octanol/water partition coefficient as log Pow: 2.53

ENVIRONMENTAL DATA : This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The occupational exposure limit value should not be exceeded during any part of the working exposure. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Freon 11, Frigen 11, Halon 11 are trade names. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Annex C.2 : DICHLORODIFLUOROMETHANE : CFC-12

CAS No: 75-71-8	Difluorodichloromethane
RTECS No: PA8200000	R 12
UN No: 1028	CFC 12
	CCl_2F_2
	Molecular mass: 120.9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep drums, etc., cool by spraying with water.
INHALATION	Cardiac arrhythmia. Confusion. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL : Ventilation.

SAFE STORAGE : Separated from incompatible materials. See Chemical Dangers. Cool. Ventilation along the floor.

PACKAGING & LABELLING : Special insulated cylinder. UN Hazard Class: 2.2

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G2A

PHYSICAL STATE; APPEARANCE : Colourless compressed liquified gas with characteristic odur.

PHYSICAL DANGERS : The gas is heavier than air. The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases (hydrogen chloride ICSC 0163, phosgene ICSC 0007, hydrogen fluoride ICSC 0283, carbonyl fluoride ICSC 0633). Reacts violently with metals such as zinc and powdered aluminium. Attacks magnesium and its alloys.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : On loss of containment this liquid evaporates very quickly displacing the air and causing a serious risk of suffocation when in confined areas.

EFFECTS OF SHORT TERM EXPOSURE : Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system and central nervous system, resulting in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000 ppm as TWA A4 (ACGIH 2001).
MAK: 1000 ppm; 5000 mg/m3; IV, C (DFG 2001).

PHYSICAL PROPERTIES :	
Boiling point: -30°C	Solubility in water, g/100 ml at 20°C: 0.03
Melting point: -158°C	Vapour pressure, kPa at 20°C: 568
Relative density (water = 1): 1.5	Relative vapour density (air = 1): 4.2
	Octanol/water partition coefficient as log Pow: 2.16

ENVIRONMENTAL DATA : This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding.
Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.
Freon 12, Frigen 12, Halon 122 are trade names.

Annex C.3 : CHLOROTRIFLUOROMETHANE : CFC-13

CAS No: 75-72-9
RTECS No: PA6410000
UN No: 1022

CFC 13
Monochlorotrifluoromethane
Trifluoromethyl chloride
(cylinder)
$CClF_3$
Molecular mass: 104.5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Heating will cause rise in pressure with risk of bursting.	NO contact with hot surfaces.	
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Confusion. Dizziness. Headache.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.
EYES	(See Skin).	Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION			

SPILLAGE DISPOSAL : Ventilation. NEVER direct water jet on liquid. In case of large spillage, personal protection: complete protective clothing including self-contained breathing apparatus.

SAFE STORAGE : Fireproof if in building.

PACKAGING & LABELLING : UN Hazard Class: 2.2

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G2A

PHYSICAL STATE; APPEARANCE : Colourless liquified gas with characteristic odur.

PHYSICAL DANGERS : The gas is heavier than air. The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : The substance decomposes on burning or on contact with hot surfaces producing toxic and corrosive fumes including hydrogen chloride, hydrogen fluoride and phosgene. Incompatible with certain metal powders (aluminium, zinc, beryllium).

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : On loss of containment this gas can cause suffocation by lowering the oxygen content of the air in confined areas.

EFFECTS OF SHORT TERM EXPOSURE : The substance may cause effects on the cardiovascular system, resulting in impaired functions. Exposure could cause lowering of consciousness. See Notes.

EFFECTS OF LONGTERM EXPOSURE: The liquid defats the skin.

OCCUPATIONAL EXPOSURE LIMITS : TLV not established. MAK: 1000 ppm, 4300 mg/m3; Peak limitation category: II(8); Pregnancy risk group: IIc; (DFG 2004).

PHYSICAL PROPERTIES :	
Boiling point: -81.4°C	Solubility in water : none
Melting point: -181°C	Relative vapour density (air = 1): 3.6
Relative density (water = 1): 1.3	

ENVIRONMENTAL DATA : This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Physician should give special attention to the drugs used in treatment because of the effects of the substance on cardiac rhythm. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Arcton 13, FCC 13, Freon 13, Frigen 13, Genetron 13 and Isceon 13 are trade names.
Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.

Annex C.4 : CHLORODIFLUOROMETHANE : HCFC-22

CAS No: 75-45-6
RTECS No: PA6390000
UN No: 1018

Monochlorodifluoromethane
Methane, chlorodifluoro-
HCFC 22
R 22
$CHClF_2$
Molecular mass: 86.5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Cardiac arrhythmia. Confusion. Drowsiness Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL : Ventilation.

SAFE STORAGE : Fireproof. Cool. Ventilation along the floor.

PACKAGING & LABELLING : Special Insulated Cylinder; UN Hazard Class: 2.2

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G2A

PHYSICAL STATE; APPEARANCE : Colourless compressed liquified gas.

PHYSICAL DANGERS : The gas is heavier than air. The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases (hydrogen chloride ICSC 0163, phosgene ICSC 0007, hydrogen fluoride ICSC 0283, carbonyl fluoride ICSC 0633). Attacks magnesium and its alloys.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : On loss of containment this gas can cause suffocation by lowering the oxygen content of the air in confined areas.

EFFECTS OF SHORT TERM EXPOSURE : Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system and central nervous system, resulting in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes..

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000 ppm as TWA A4 (ACGIH 2001).
MAK: 500 ppm, 1800 mg/m3, IV, C (DFG 2001).

PHYSICAL PROPERTIES :	
Boiling point: -41°C	Vapour pressure, kPa at 20°C: 908
Melting point: -146°C	Relative vapour density (air = 1): 3.0
Relative density (water = 1): 1.21	Auto-ignition temperature: 632°C
Solubility in water, g/100 ml at 25°C: 0.3	Octanol/water partition coefficient as log Pow: 1.08

ENVIRONMENTAL DATA : This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Freon 22, Frigen 22, Halon 22 are trade names.

Forane (R) 141b
Material Safety Data Sheet
Arkema Inc.

1 PRODUCT AND COMPANY IDENTIFICATION

Fluorochemicals
Arkema Inc.
2000 Market Street
Philadelphia, PA 19103

EMERGENCY PHONE NUMBERS:
Chemtrec: (800) 424-9300 (24hrs) or (703) 527-3887
Medical: Rocky Mountain Poison Control Center
(866) 767-5089 (24Hrs)

Information Telephone Numbers	Phone Number	Available Hrs
Product Information	800-245-5858	8:00 am - 5:30 pm (Eastern)

Product Name	Forane (R) 141b
Product Synonym(s)	A list of applicable products can be found in Section 16.
Chemical Family	Hydrochlorofluorocarbons
Chemical Formula	CH3CCl2F
Chemical Name	1,1-dichloro-1-fluoroethane (HCFC - 141b)
EPA Reg Num	
Product Use	Foam blowing agent, solvent, aerosol

2 COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name	CAS RegistryNumber	Typical %	OSHA
1,1-Dichloro-1-fluoroethane (HCFC-141b)	1717-00-6	100%	Y

The substance(s) marked with a "Y" in the OSHA column, are identified as hazardous chemicals according to the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200)

This material is classified as hazardous under Federal OSHA regulation.

The components of this product are all on the TSCA Inventory list.

3 HAZARDS IDENTIFICATION

Emergency Overview
Clear, colorless liquid and vapor with faint ether odor
WARNING!
VAPOR REDUCES OXYGEN AVAILABLE FOR BREATHING.
HARMFUL IF INHALED AND MAY CAUSE HEART IRREGULARITIES, UNCONSCIOUSNESS OR DEATH. NON-FLAMMABLE VOLATILE LIQUID WHICH MAY CAUSE EYE IRRITATION OR DRYING OF THE SKIN. MAY DECOMPOSE ON CONTACT WITH FLAMES OR EXTREMELY HOT METAL SURFACES TO PRODUCE TOXIC AND CORROSIVE PRODUCTS.

Potential Health Effects

Skin contact and inhalation are expected to be the primary routes of occupational exposure to this material. Prolonged or repeated contact removes oils from the skin and may dry skin causing irritation, redness and rash. High vapor concentrations are irritating to the eyes and respiratory tract and may result in central nervous system (CNS) effects such as headache, dizziness, drowsiness and, in severe exposure, loss of consciousness and death. The dense vapor of this material may reduce the available oxygen for breathing. Prolonged exposure to an oxygen-deficient atmosphere may be fatal. Inhalation may cause an increase in the sensitivity of the heart to adrenaline, which could result in irregular or rapid heartbeats. Medical conditions aggravated by exposure to this material include heart disease or compromised heart function.

Forane (R) 141b
Material Safety Data Sheet
Arkema Inc.

4 FIRST AID MEASURES

IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Get medical attention.

IF ON SKIN, flush the area with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Get medical attention if irritation develops and persists.

IF SWALLOWED, do NOT induce vomiting. Give water to drink. Get medical attention immediately. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Do not give adrenaline, epinephrin or similar drugs following exposure to this product.

5 FIRE FIGHTING MEASURES

Fire and Explosive Properties

Auto-Ignition Temperature	1022 F / 550 C		
Flash Point	none	Flash Point Method	TCC
Flammable Limits- Upper	15.5		
Lower	7.4		

Extinguishing Media

Use water spray, water fog, carbon dioxide, or dry chemical

Fire Fighting Instructions

Cool fire exposed containers well after the fire is out to prevent possible explosions. Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand NIOSH approved or equivalent). Fire fighting equipment should be thoroughly decontaminated after use.

Fire and Explosion Hazards

May decompose on contact with flames or extremely hot metal surfaces to produce toxic and corrosive products. Some mixtures of HCFCs and/or HFCs, and air or oxygen may be combustible if pressurized and exposed to extreme heat or flame. Container may explode if heated due to resulting pressure rise.

6 ACCIDENTAL RELEASE MEASURES

In Case of Spill or Leak

Use Halogen leak detector or other suitable means to locate leaks or check atmosphere. Keep upwind. Evacuate enclosed spaces and disperse gas with floor-level forced-air ventilation. Exhaust vapors outdoors. Do not smoke or operate internal combustion engines. Remove flames and heating elements.

7 HANDLING AND STORAGE

Handling

Do not get in eyes, on skin or clothing. Avoid breathing vapor or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Keep away from heat, sparks and flame. Emptied container retains vapor and product residue. Observe all labeled safeguards until container is destroyed. Do not reuse this container. Do not cut or weld on or near this container.

Storage

Although this material is stable in long-term storage in carbon steel containers, it may gradually decompose

7 HANDLING AND STORAGE

in the presence of ferric chloride. The presence of excess levels of moisture, especially as a separate layer, should be avoided since it may lead to corrosion of carbon steel and formation of ferric chloride. It is recommended that containers be raised above floor or ground during extended storage periods to prevent container corrosion due to standing water. Prior to putting a storage system into service for this product, or after maintenance, ensure that the system is dry and oxygen-free. Purging the system with dry nitrogen is recommended. In addition, containers previously exposed to hydrogen chloride (for example, from impurities in chlorinated blowing agents or solvents), should be thoroughly cleaned first.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls

Investigate engineering techniques to reduce exposures below airborne exposure limits. Provide ventilation if necessary to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

Eye / Face Protection

Where there is potential for eye contact, wear chemical goggles and have eye flushing equipment available.

Skin Protection

Wear appropriate chemical resistant protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine appropriate type glove material for given application. Wear face shield and chemical resistant clothing such as a rubber apron when splashing may occur. Rinse contaminated skin promptly. Wash contaminated clothing and clean protective equipment before reuse. Wash skin thoroughly after handling.

Respiratory Protection

Avoid breathing vapor or mist. When airborne exposure limits are exceeded (see below), use NIOSH approved respiratory protection equipment appropriate to the material and/or its components. Consult respirator manufacturer to determine appropriate type equipment for given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where exposure limit may be significantly exceeded, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR § 1910.134.

Airborne Exposure Guidelines for Ingredients

Exposure Limit		Value
1,1-Dichloro-1-fluoroethane (HCFC-141b)		
Arkema 8-hour TWA	-	500 ppm
WEEL TWA	-	500 ppm

-Only those components with exposure limits are printed in this section.
-Skin contact limits designated with a "Y" above have skin contact effect. Air sampling alone is insufficient to accurately quantitate exposure. Measures to prevent significant cutaneous absorption may be required.
-ACGIH Sensitizer designator with a value of "Y" above means that exposure to this material may cause allergic reactions.
-WEEL-AIHA Sensitizer designator with a value of "Y" above means that exposure to this material may cause allergic skin reactions.

Forane (R) 141b
Material Safety Data Sheet
Arkema Inc.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance/Odor	Clear, colorless liquid and vapor with faint ether odor
pH	NA
Specific Gravity	1.25 @ 50 F/ 10 C
Vapor Pressure	10 psia @ 68 F / 20 C
Vapor Density	4.0
Melting Point	NA
Freezing Point	-154 F / -103.5 C
Boiling Point	89.6 F / 32 C
Solubility In Water	Slight
Percent Volatile	100
Molecular Weight	116.9

10 STABILITY AND REACTIVITY

Stability

This material is chemically stable under specified conditions or storage, shipment and/or use. See HANDLING AND STORAGE section of this MSDS for specified conditions.

Incompatibility

Avoid contact with hydrochloric acid, alkali or alkaline earth metals, finely powdered metals (aluminum, magnesium, zinc) and strong oxidizers since they may react or accelerate decomposition.

Hazardous Decomposition Products

Thermal decomposition products include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide, chlorine and carbonyl halides. FOR ADDITIONAL IMPORTANT INFORMATION SEE SECTION 16.

11 TOXICOLOGICAL INFORMATION

Toxicological Information

Single exposure (acute) studies indicate:
Oral - Practically Non-toxic to Rats (LD50 >5,000 mg/kg)
Dermal - No More than Slightly Toxic to Rats (LD50 >2,000 mg/kg)
Inhalation - Practically Non-toxic to Rats (4-hr LC50 61,647 ppm)
Eye Irritation - Non-irritating to Slightly Irritating to Rabbits
Skin Irritation - Non-irritating to Rabbits (4-hr and 24-hr exposures)

No skin allergy was observed in guinea pigs following repeated exposure. Inhalation of high concentrations produces a transient anesthetic effect in rodents. As with many other halogenated hydrocarbons, inhalation followed by intravenous injection of epinephrine to simulate human stress reactions resulted in heart sensitization in dogs and monkeys. Repeated inhalation studies resulted in minor changes in body weight and slight changes in blood chemistry in rats. Repeated inhalation of vapor produced no evidence of nervous system toxicity or behavioral effects in rats. Long-term inhalation caused an increase in the incidence of benign, non life-threatening tumors of the testes in rats. No birth defects were noted in the offspring of rabbits exposed by inhalation during pregnancy; signs of maternal toxicity were noted. No birth defects were noted in the offspring of rats exposed by inhalation during pregnancy; toxic effects were noted in the mothers and their offspring. In a reproduction study, reductions in litter size, total litter weight and growth rate were observed in rats exposed by inhalation for 2-generations. Delayed sexual maturity of male offspring from exposed parents may have been related to the lower growth rate. Generally, no genetic changes were observed in tests using bacteria, animal cells or animals. Metabolism studies in rats exposed by inhalation show that this material is not metabolized or accumulated in the body to any significant extent.

12 ECOLOGICAL INFORMATION

Ecotoxicological Information

This material is slightly toxic to Daphnia magna (48-hr EC50 31.2 mg/l), rainbow trout (24-hr LC50 83.5 mg/l) or algae (EC50 67.8 mg/l). It is practically non-toxic to zebra fish (96-hr LC50 126 mg/l).

Chemical Fate Information

This material is not readily biodegradable (24% after 28-days). Based on its log Pow of 2.3, bioaccumulation is considered unlikely.

13 DISPOSAL CONSIDERATIONS

Waste Disposal

Recover, reclaim or recycle when practical. Dispose of in accordance with federal, state and local regulations. Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

14 TRANSPORT INFORMATION

DOT Name	NOT REGULATED
DOT Technical Name	
DOT Hazard Class	
UN Number	
DOT Packing Group	PG
RQ	
DOT Special Information	Not regulated when shippped by ground, water, or air.

15 REGULATORY INFORMATION

Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370)

Immediate (Acute) Health	Y	Fire	N
Delayed (Chronic) Health	N	Reactive	N
		Sudden Release of Pressure	N

The components of this product are all on the TSCA Inventory list.

Ingredient Related Regulatory Information:

SARA Reportable Quantities	CERCLA RQ	SARA TPQ
1,1-Dichloro-1-fluoroethane (HCFC-141b)	NE	

SARA Title III, Section 313

This product does contain chemical(s) which are defined as toxic chemicals under and subject to the reporting requirements of, Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372. See Section 2

1,1-Dichloro-1-fluoroethane (HCFC-141b)

16 OTHER INFORMATION

Forane (R) 141b
Material Safety Data Sheet
Arkema Inc.

Revision Information

Revision Date	09 AUG 2005	Revision Number 12
Supercedes Revision Dated	25-OCT-2004	

Revision Summary

Revised section 8.

Key

NE= Not Established NA= Not Applicable (R) = Registered Trademark

This MSDS applies to the following grades:
Forane 141b
Forane 141b - SG
Forane 141b - HP

NFPA
HEALTH = 2
FLAMMABILITY = 1
INSTABILITY = 0

Miscellaneous

HCFC-141b may gradually decompose in the presence of ferric chloride. Decomposition products include hydrogen chloride which has a corrosive effect on steel, and vinylidene chloride and 1-chloro-1-fluoroethylene which can form carbonyl halides (including phosgene) in the presence of oxygen.

Use a high quality or inhibited HCFC-141b, avoid moisture, store in a clean container.

Consult the Data Sheet "Forane 141b - Storage and Handling to Prevent Decomposition".

*Disclaimer: Since there is no ILO/ICSC safety card available for HCFC 141b, UNEP has included a material safety data sheet [MSDS] for this substance from a commercial supplier, Arkema Inc. The inclusion of this MSDS in this document is for information purposes only and does not constitute as an endorsement by UNEP of either the company or this product. UNEP would like to thank Arkema Inc. for permitting the reproduction of this MSDS.

Annex C.6 : 2,2-DICHLORO-1,1,1-TRIFLUOROETHANE

CAS No: 306-83-2
RTECS No: KI1108000

HCFC 123
$C_2HCl_2F_3$ / $CHCl_2CF_3$
Molecular mass: 152.9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible.	NO open flames.	In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Confusion. Dizziness. Drowsiness. Unconsciousness.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN		Protective gloves.	Rinse skin with plenty of water or shower.
EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION	(See Inhalation).		Rest.

SPILLAGE DISPOSAL : Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.

SAFE STORAGE : Keep in a well-ventilated room.

PHYSICAL STATE; APPEARANCE : Colourless liquid with characteristic odur.

PHYSICAL DANGERS : The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : The substance decomposes on heating producing phosgene, hydrogen fluoride and hydrogen chloride.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C.

EFFECTS OF SHORT TERM EXPOSURE : The substance irritates the eyes. The substance may cause effects on the central nervous system and cardiovascular system, resulting in narcosis and cardiac disorders.

EFFECTS OF LONG TERM EXPOSURE : The substance may have effects on the liver.

OCCUPATIONAL EXPOSURE LIMITS : TLV not established.

PHYSICAL PROPERTIES :	
Boiling point: 28°C	Solubility in water, g/100 ml at 25°C: 0.21
Melting point: -107°C	Vapour pressure, Pa at 25°C: 14
Relative density (water = 1): 1.5	Relative vapour density (air = 1): 6.4

ENVIRONMENTAL DATA : This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer. It is strongly advised not to let the chemical enter into the environment because it persists in the env ronment. Avoid release to the environment in circumstances different to normal use.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area.

Annex C.7 : 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE CFC - 113

CAS No: 76-13-1
RTECS No: KJ4000000

Trichlorotrifluoroethane
CFC 113
R 113
$C_2Cl_3F_3$ / $Cl_2FCCClF_2$
Molecular mass: 187.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep drums etc cool by spraying with water.
INHALATION	Cardiac arrhythmia. Confusion. Drowsiness Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL : Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus.

SAFE STORAGE : Separated from metals and alloys. See Chemical Dangers. Cool. Ventilation along the floor.

PHYSICAL STATE; APPEARANCE : Colourless volatile liquid with characteristic odour.

PHYSICAL DANGERS : The gas is heavier than air. The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases (hydrogen chloride ICSC 0163, phosgene ICSC 0007, hydrogen fluoride ICSC 0283, carbonyl fluoride ICSC 0633). Reacts violently with powdered metals causing fire and explosion hazard. Attacks magnesium and its alloys.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK : On loss of containment this liquid evaporates very quickly displacing the air and causing a serious risk of suffocation when in confined areas.

EFFECTS OF SHORT TERM EXPOSURE : The substance is irritating to the eyes. The substance may cause effects on the cardiovascular system and central nervous system, resulting in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.

EFFECTS OF LONG TERM OR REPEATED EXPOSURE : Repeated or prolonged contact with skin may cause dermatitis.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000 ppm as TWA; 1250 ppm as STEL; A4 (not classifiable as a human carcinogen); (ACGIH 2004). MAK: 500 ppm, 3900 mg/m3; Peak limitation category: II(2); Pregnancy risk group: IIc; (DFG 2004).

PHYSICAL PROPERTIES :
Boiling point: 48°C
Melting point: -36°C
Relative density (water = 1): 1.56
Solubility in water, g/100 ml at 25°C: 0.02
Vapour pressure, kPa at 20°C: 36
Relative vapour density (air = 1): 6.5
Auto-ignition temperature: 680°C
Octanol/water partition coefficient as log Pow: 3.30

ENVIRONMENTAL DATA : The substance is toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Freon 113, Frigen 113, Halon 113 are trade names. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Annex C.8 : CHLOROPENTAFLUOROETHANE CFC - 115

CAS No: 76-15-3
RTECS No: KH7877500
UN No: 1020
EC No:

1-Chloro-1,1,2,2,2-pentafluoroethane
Fluorocarbon 115
CFC 115
C_2ClF_5 / $CClF_2$-CF_3
Molecular mass: 154.5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Heating will cause rise in pressure with risk of bursting. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Suffocation (see Notes).	Ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
EYES	See Skin.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION			

SPILLAGE DISPOSAL : Ventilation. NEVER direct water jet on liquid. (extra personal protection: chemical protection suit including self-contained breathing apparatus).

PACKAGING & LABELLING : Symbol R: S: UN Hazard Class: 2.2

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G39

SAFE STORAGE : Fireproof if in building. Cool.

PHYSICAL STATE; APPEARANCE : Colourless, odourless, compressed liquified gas.

PHYSICAL DANGERS : The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic fumes including hydrogen chloride and hydrogen fluoride.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT TERM EXPOSURE : Rapid evaporation of the liquid may cause frostbite.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000 ppm; 6320 mg/m3 as TWA (ACGIH 1997).
MAK not established.

PHYSICAL PROPERTIES :	
Boiling point: -39°C	Solubility in water : none
Melting point: -106°C	Vapour pressure, kPa at 20°C: 797
Relative density (water = 1): 1.3	Relative vapour density (air = 1): 5.3
	Octanol/water partition coefficient as log Pow: 2.4

ENVIRONMENTAL DATA : This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Arcton 115, Freon 115, Frigen 115, Genetron 115, Kaltron 115, and Refrigerant R 115 are trade names.

Annex C.9 : BROMOCHLORODIFLUOROMETHANE Halon 1211

CAS No: 353-59-3
RTECS No: PA5270000
UN No: 1974
EC No:

Freon 12 B 1
R 12 B 1
Halon 1211
$CBrClF_2$
Molecular mass: 165.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Heating will cause rise in pressure with risk of bursting. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
INHALATION	Drowsiness. Unconsciousness..	Ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
EYES	ON CONTACT WITH LIQUID: FROSTBITE.	Face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION			

SPILLAGE DISPOSAL : Ventilation. Do NOT let this chemical enter the environment.

PACKAGING & LABELLING : Symbol R: S: UN Hazard Class: 2.2

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G39

SAFE STORAGE : Fireproof if in building.

PHYSICAL STATE; APPEARANCE : Liquified compressed gas with characteristic odour.

PHYSICAL DANGERS : The gas is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : The substance decomposes on contact with open flames or very hot surfaces, producing toxic gases including phosgene, hydrogen fluoride, hydrogen chloride, hydrogen bromide.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : On loss of containment this liquid evaporates very quickly causing supersaturation of the air with serious risk of suffocation when in confined areas.

EFFECTS OF SHORT TERM EXPOSURE : Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system, resulting in cardiac disorders.

OCCUPATIONAL EXPOSURE LIMITS : TLV not established.

PHYSICAL PROPERTIES : Boiling point: -4°C Melting point: -160.5°C Relative density (water = 1): 5.7	Solubility in water, g/100 ml at 25°C: none Octanol/water partition coefficient as log Pow: 2.1

ENVIRONMENTAL DATA : This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Do NOT use in the vicinity of a fire or a hot surface, or during welding.

Annex C.10 : BROMOTRIFLUOROMETHANE Halon 1301

CAS No: 75-63-8
RTECS No: PA5425000
UN No: 1009
EC No:

Trifluorobromomethane
Fluorocarbon-1301
Bromofluoroform
$CBrF_3$
Molecular mass: 148.9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Heating will cause rise in pressure with risk of bursting. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Dizziness. Headache. Unconsciousness.	Ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
EYES	Redness. See Skin.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION			

SPILLAGE DISPOSAL : Ventilation. NEVER direct water jet on liquid. (extra personal protection: chemical protection suit including self-contained breathing apparatus).

PACKAGING & LABELLING : Symbol R: S: UN Hazard Class: 2.2

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-644.

SAFE STORAGE : Fireproof if in building. Cool.

PHYSICAL STATE; APPEARANCE : Colourless compressed liquified gas.

PHYSICAL DANGERS : The gas is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic fumes including hydrogen bromide and hydrogen fluoride. Attacks plastic, rubber, and coatings.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT TERM EXPOSURE : The substance irritates the eyes. Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000 ppm; 6090 mg/m3 as TWA (ACGIH 1997).
MAK: 1000 ppm; 6100 mg/m3; IV (1995)

PHYSICAL PROPERTIES :	
Boiling point: -58°C	Solubility in water : none
Melting point: -168°C	Vapour pressure, kPa at 20 C: 1434
Relative density (water = 1): 1.5	Relative vapour density (air = 1): 5.1
	Octanol/water partition coefficient as log Pow: 1.86

ENVIRONMENTAL DATA : This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Flugex 13B1, Freon 13B1, Halon 1301, Khladon 13B1, and Refrigerant 13B1 are trade names.

Annex C.11 : CARBON TETRACHLORIDE

CAS No: 56-23-5
RTECS No: FG4900000
UN No: 1846
EC No: 602-008-00-5

Tetrachloromethane
Tetrachlorocarbon
Tetra
CCl_4
Molecular mass: 153.8

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep drums etc cool by spraying with water.
INHALATION	Dizziness. Drowsiness. Headache. Nausea. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	MAY BE ABSORBED! Redness. Pain.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
EYES	Redness. Pain.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION	Abdominal pain Diarrhoea. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL : Collect leaking liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

PACKAGING & LABELLING : T Symbol N Symbol R: 23/24/25-40-48/23-52/53-59 S: (1/2-)23-36/37-45-59-61
UN Hazard Class: 6.1 UN Pack Group: II Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Marine pollutant.

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-61S1846 NFPA Code: H 3; F 0; R 0

SAFE STORAGE : Separated from food and feedstuffs, metals (see Chemical Dangers). Ventilation along the floor.

PHYSICAL STATE; APPEARANCE : Colourless liquid with characteristic odour.

PHYSICAL DANGERS : The vapour is heavier than air.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride ICSC0163, chlorine fumes ICSC0126, phosgene ICSC0007). Reacts with some metals such as aluminium, magnesium, zinc causing fire and explosion hazard.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK : A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT TERM EXPOSURE : The substance is irritating to the eyes. The substance may cause effects on the liver, kidneys and central nervous system, resulting in unconsciousness. Medical observation is indicated.

EFFECTS OF LONG TERM EXPOSURE : Repeated or prolonged contact with skin may cause dermatitis. This substance is possibly carcinogenic to humans.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 5 ppm as TWA, 10 ppm as STEL; (skin); A2 (suspected human carcinogen); (ACGIH 2004). MAK: 0.5 ppm, 3.2 mg/m3; Peak limitation category: II(2); skin absorption (H); Carcinogen category: 4; Pregnancy risk group: D; (DFG 2004).

PHYSICAL PROPERTIES :	
Boiling point: 76.5°C	Solubility in water, g/100 ml at 25°C: 0.1 poor
Melting point: -23°C	Vapour pressure, kPa at 20°C: 12.2
Relative density (water = 1): 1.59	Relative vapour density (air = 1): 5.3
	Octanol/water partition coefficient as log Pow: 2.64

ENVIRONMENTAL DATA : The substance is harmful to aquatic organisms. This substance may be hazardous in the environment; special attention should be given to its impact on the ozone layer.

NOTES : Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, Emergency Response.

Annex C.12 : TRICHLOROETHANE Methyl Chloroform

CAS No: 71-55-6
RTECS No: KJ2975000
UN No: 2831
EC No: 602-013-00-2

Methyl chloroform
Methyltrichloromethane
alpha-Trichloroethane
$C_2H_3Cl_3$ / CCl_3CH_3
Molecular mass: 133.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible under specific conditions. Heating will cause rise in pressure with risk of bursting. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep drums etc cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
INHALATION	Headache. Dizziness. Drowsiness. Nausea. Ataxia. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	Dry skin. Redness.	Protective gloves.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
EYES	Redness.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION	Diarrhoea. Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL : Ventilation. Collect leaking and spilled liquid in sealable, suitable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus.

PACKAGING & LABELLING : Xn Symbol N Symbol R: 20-59 S: (2-)24/25-59-61 Note: F UN Hazard Class: 6.1 UN Pack Group: III Do not transport with food and feedstuffs. Marine pollutant.

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-61S2831 NFPA Code: H2; F1; R0

SAFE STORAGE : Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials. See Chemical Dangers. Cool. Dry. Ventilation along the floor.

PHYSICAL STATE; APPEARANCE : Colourless liquid with characteristic odour.

PHYSICAL DANGERS : The vapour is heavier than air.

CHEMICAL DANGERS : The substance decomposes on heating or on burning producing toxic and corrosive fumes including phosgene and hydrogen chloride. Reacts violently with aluminium, manganese and their alloys, alkalis, strong oxidants, acetone and zinc. Attacks natural rubber. Mixtures of 1,1,1-trichloroethane with potassium or its alloys are shock sensitive. Reacts slowly with water releasing corrosive hydrochloric acid.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK : A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT TERM EXPOSURE : The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the heart, central nervous system and liver, resulting in cardiac disorders and respiratory failure. Exposure at high levels may result in death. Medical observation is indicated.

EFFECTS OF LONG TERM EXPOSURE : The liquid defats the skin. The substance may have effects on the liver.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 350 ppm as TWA, 450 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued (ACGIH 2004). MAK: 200 ppm, 1100 mg/m3; Peak limitation category: II(1); skin absorption (H); Pregnancy risk group: C; (DFG 2004).

PHYSICAL PROPERTIES :	
Boiling point: 74°C	Relative vapour density (air = 1): 4.6
Melting point: -30°C	Flash point: see Notes
Relative density (water = 1): 1.34	Auto-ignition temperature: 537°C
Solubility in water: none	Explosive limits, vol% in air: 8-16
Vapour pressure, kPa at 20°C: 13.3	Octanol/water partition coefficient as log Pow: 2.49

ENVIRONMENTAL DATA : The substance is harmful to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to air quality and ground water contamination.

NOTES : Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions.
The substance burns only in excess oxygen or if a strong source of ignition is present. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Aerothene, Algylen, Trichloran, Chlorylen, Genklene, Chlorothene NU, Chlorothene VG, and Solvent 111 are trade names. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Annex C.13 : METHYL BROMIDE

CAS No: 74-83-9
RTECS No: PA4900000
UN No: 1062
EC No: 602-002-00-2

Bromomethane
Monobromomethane
(cylinder)
CH_3Br
Molecular mass: 94.9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with aluminium, zinc, magnesium or pure oxygen.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with - use appropriate extinguishing agent.
EXPLOSION	Risk of fire and explosion on contact with aluminium, zinc or magnesium.		In case of fire: keep cylinder cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
INHALATION	Dizziness. Headache. Abdominal pain. Vomiting. Weakness. Hallucinations. Loss of speech. Incoordination. Laboured breathing. Convulsions.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.
SKIN	MAY BE ABSORBED! Tingling. Itching. Burning sensation. Redness. Blisters. Pain. ON CONTACT WITH LIQUID: FROSTBITE. (Further see Inhalation).	Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
EYES	Redness. Pain. Blurred vision. Temporary loss of vision.	Safety goggles, face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION			

SPILLAGE DISPOSAL : Evacuate danger area! Consult an expert! Ventilation. NEVER direct water jet on liquid. Personal protection: complete protective clothing including self-contained breathing apparatus.

PACKAGING & LABELLING : T Symbol N Symbol R: 23/25-36/37/38-48/20-68-50-59 S: (1/2-)15-27-36/39-38-45-59-61 UN Hazard Class: 2.3

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20S1062 NFPA Code: H 3; F 1; R 0

SAFE STORAGE : Fireproof if in building. Separated from strong oxidants, aluminium and cylinders containing oxygen. Cool. Ventilation along the floor.

PHYSICAL STATE; APPEARANCE : Colourless and odourless compressed liquified gas.

PHYSICAL DANGERS : The gas is heavier than air.

CHEMICAL DANGERS : The substance decomposes on heating and on burning producing toxic and corrosive fumes including hydrogen bromide, bromine and carbon oxybromide. Reacts with strong oxidants. Attacks many metals in presence of water. Attacks aluminium, zinc and magnesium with formation of pyrophoric compounds, causing fire and explosion hazard.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK : The substance can be absorbed into the body by inhalation and through the skin, also as a vapour!

EFFECTS OF SHORT TERM EXPOSURE : The substance irritates the eyes, the skin and the respiratory tract. Inhalation of the substance may cause lung oedema (see Notes). Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system, kidneys and lungs. Exposure to high concentrations may result in death. The effects may be delayed.

EFFECTS OF LONG TERM EXPOSURE : The substance may have effects on the nervous system, kidneys, heart, liver and lungs.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1 ppm as TWA; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2004). MAK: skin absorption (H); Carcinogen category: 3B; (DFG 2004).

PHYSICAL PROPERTIES :	
Boiling point: 4°C	Solubility in water, g/100 ml at 25°C: 1.5
Melting point: -94°C	Auto-ignition temperature: 537°C
Relative density (water = 1): 1.7	Explosive limits, vol% in air: 10-16
	Relative vapour density (air = 1): 3.3
	Octanol/water partition coefficient as log Pow: 1.19

ENVIRONMENTAL DATA : This substance may be hazardous in the environment; special attention should be given to fish, mammals, plants, soil organisms.

NOTES : Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. The odour warning when the exposure limit value is exceeded is insufficient. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Bromo-O-gas, Dowfume, Embafume, Halon 1001, Haltox, Meth-o-gas, Terabol and Terr-o-Gas 100 are trade names. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Annex C.14 : TETRAFLUOROETHANE

CAS No: 811-97-2
RTECS No: KI8842500
UN No: 3159

HFC 134a
(cylinder)
$C_2H_2F_4$
Molecular mass: 102.03

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with hot surfaces.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Dizziness. Drowsiness. Dullness.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.
EYES		Safety goggles.	
INGESTION			

SPILLAGE DISPOSAL : NEVER direct water jet on liquid. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.

PACKAGING & LABELLING : UN Hazard Class: 2.2

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G2A

SAFE STORAGE : Fireproof. Keep in a well-ventilated room.

PHYSICAL STATE; APPEARANCE : Compressed liquified gas with characteristic odour.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

EFFECTS OF SHORT TERM EXPOSURE : Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system and cardiovascular system, resulting in cardiac disorders.

OCCUPATIONAL EXPOSURE LIMITS : TLV not established. MAK: 1000 ppm, 4200 mg/m3; Peak limitation category: II(8); Pregnancy risk group: C; (DFG 2004).

PHYSICAL PROPERTIES :	
Boiling point: -26°C	Solubility in water : none
Melting point: -101°C	Vapour pressure, kPa at 20°C: 630
	Relative vapour density (air = 1): 3.5
	Octanol/water partition coefficient as log Pow: 1.06

ENVIRONMENTAL DATA : This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

NOTES : Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, Emergency Response.

Annex C.15 : ISOBUTANE

CAS No: 75-28-5
RTECS No: TZ4300000
UN No: 1969
EC No: 601-004-00-0

2-Methylpropane
1,1-Dimethylethane
Trimethylmethane
C_4H_{10} / $(CH_3)_2CHCH_3$
Molecular mass: 58.1

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Extremely flammable.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with water spray.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding) if in liquid state.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
INHALATION	Shortness of breath. Suffocation.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
EYES		Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL : Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. NEVER direct water jet on liquid. (Extra personal protection: filter respirator for organic vapours of low boiling compounds).

PACKAGING & LABELLING : F+ Symbol R: 12 S: (2-)9-16 Note: C UN Hazard Class: 2.1

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-501 NFPA Code: H1; F4; R0

SAFE STORAGE : Fireproof. Cool.

PHYSICAL STATE; APPEARANCE : Colourless compressed liquified gas with characteristic odour.

PHYSICAL DANGERS : The gas is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS : Reacts with strong oxidants, acetylene, halogens and nitrogen oxides causing fire and explosion hazard.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT TERM EXPOSURE : Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system, resulting in impaired functions and respiratory failure. Exposure at high level may result in death.

OCCUPATIONAL EXPOSURE LIMITS : TLV not established. MAK: 1000 ppm; 2350 mg/m3; IV (1998)

PHYSICAL PROPERTIES :	
Boiling point: -12°C	Relative vapour density (air = 1): 2
Melting point: -160°C	Flash point: Flammable Gas
Relative density (water = 1): 0.6 (when liquid)	Auto-ignition temperature: 460°C
Solubility in water, g/100 ml at 20°C: none	Explosive limits, vol% in air: 1.8-8.4
Vapour pressure, kPa at 20°C: 304	Octanol/water partition coefficient as log Pow: 2.8

NOTES : Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. The measures mentioned in section PREVENTION are applicable to production, filling of cylinders, and storage of the gas.

Annex C.16 : CYCLOPENTANE

CAS No: 287-92-3
RTECS No: GY2390000
UN No: 1146
EC No: 601-030-00-2

Pentamethylene
C_5H_{10}
Molecular mass: 70.1

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
INHALATION	Dizziness. Headache. Nausea. Unconsciousness. Weakness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
EYES	Redness.	Safety goggles or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION	Abdominal pain. Diarrhoea. Dizziness. Nausea. Sore throat.	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL : Evacuate danger area! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: self-contained breathing apparatus.

PACKAGING & LABELLING : F Symbol R: 11-52/53 S: (2-)9-16-29-33-61 UN Hazard Class: 3 UN Pack Group: II

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-30S1146 or 30GF1-I+II NFPA Code: H 1; F 3; R 0

SAFE STORAGE : Fireproof.

PHYSICAL STATE; APPEARANCE : Colourless liquid.

PHYSICAL DANGERS : The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS : On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride ICSC0163, chlorine fumes ICSC0126, phosgene ICSC0007). Reacts with some metals such as aluminium, magnesium, zinc causing fire and explosion hazard.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation of its vapour.

INHALATION RISK : A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT TERM EXPOSURE : The substance and the vapour in high concentrations irritates the eyes and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. Exposure far above the OEL may result in unconsciousness.

EFFECTS OF LONG TERM EXPOSURE : Repeated or prolonged contact with skin may cause dermatitis.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 600 ppm as TWA; (ACGIH 2004).

PHYSICAL PROPERTIES : Boiling point: 49°C Melting point: -94°C Relative density (water = 1): 0.8 Solubility in water : none Relative vapour density (air = 1): 2.4	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.6 Flash point: -37°C c.c. Auto-ignition temperature: 361°C Explosive limits, vol% in air: 1.1-8.7 Octanol/water partition coefficient as log Pow: 3.0

NOTES : Card has been partly updated in October 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Annex C.17 : n-PENTANE

CAS No: 109-66-0
RTECS No: RZ9450000
UN No: 1265
EC No: 601-006-00-1

Amyl hydride
C_5H_{12} / $CH_3(CH_2)_3CH_3$
Molecular mass: 72.2

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking. NO contact with strong oxidants.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums etc cool by spraying with water.
INHALATION	Dizziness. Drowsiness. Headache. Nausea. Unconsciousness. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
SKIN	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
EYES		Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION	(Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Rest. Refer for medical attention.

SPILLAGE DISPOSAL : Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in dry sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. (Extra personal protection: self-contained breathing apparatus).

SAFE STORAGE : Fireproof. Separated from strong oxidants. Cool. Well closed.

PHYSICAL STATE; APPEARANCE : Colourless liquid with characteristic odour.

PHYSICAL DANGERS : The vapour is heavier than air and may travel along the ground; distant ignition possible, and may accumulate in low ceiling spaces causing deficiency of oxygen.

CHEMICAL DANGERS : Reacts with strong oxidants (e.g., peroxides, nitrates and perchlorates), causing fire and explosion hazard. Attacks some forms of plastics, rubber and coatings.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

INHALATION RISK : A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT TERM EXPOSURE : Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system.

EFFECTS OF LONG TERM OR REPEATED EXPOSURE : Repeated or prolonged contact with skin may cause dermatitis.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 600 ppm; (ACGIH 1999). MAK: 1000 ppm; 2950 mg/m3; (1995)

PHYSICAL PROPERTIES :	
Boiling point: 36°C	Vapour pressure, kPa at 18.5°C: 53.3
Melting point: -129°C	Relative vapour density (air = 1): 2.5
Relative density (water = 1): 0.63	Auto-ignition temperature: 309°C
Solubility in water, g/100 ml at 20°C: none	Octanol/water partition coefficient as log Pow: 3.39
Explosive limits, vol% in air: 1.5-7.8	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.8
	Flash point: -49°C c.c.

ENVIRONMENTAL DATA : The substance is harmful to aquatic organisms.

NOTES : High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Skellysolve A is a trade name.

Annex C.18 : PROPANE

CAS No: 74-98-6
RTECS No: TX2275000
UN No: 1978
EC No: 601-003-00-5

n-Propane
(cylinder)
C_3H_8 / $CH_3CH_2CH_3$
Molecular mass: 44.1

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Extremely flammable.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding) if in liquid state. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
INHALATION	Drowsiness. Unconsciousness.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
EYES	ON CONTACT WITH LIQUID: FROSTBITE.	Face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION			

SPILLAGE DISPOSAL : Evacuate danger area! Consult an expert! Remove all ignition sources. Ventilation. NEVER direct water jet on liquid. (Extra personal protection: self-contained breathing apparatus.)

PACKAGING & LABELLING : EU classification F+ Symbol R: 12 S: (2-)9-16 UN classification UN Hazard Class: 2.1

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20S1978 NFPA Code: H1; F4; R0

SAFE STORAGE : Fireproof. Cool.

PHYSICAL STATE; APPEARANCE : Odourless, colourless compressed liquified gas.

PHYSICAL DANGERS : The gas is heavier than air and may travel along the ground; distant ignition possible, and may accumulate in low ceiling spaces causing deficiency of oxygen. As a result of flow, agitation, etc., electrostatic charges can be generated.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.

INHALATION RISK : On loss of containment this liquid evaporates very quickly displacing the air and causing a serious risk of suffocation when in confined areas.

EFFECTS OF SHORT TERM EXPOSURE : Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system.

EFFECTS OF LONG TERM OR REPEATED EXPOSURE : Repeated or prolonged contact with skin may cause dermatitis.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000 ppm as TWA; (ACGIH 2005). MAK: 1000 ppm, 1800 mg/m3; Peak limitation category: II(4); Pregnancy risk group: IIc; (DFG 2005).

PHYSICAL PROPERTIES :	
Boiling point: -42°C	Vapour pressure, kPa at 20°C: 840
Melting point: -189.7°C	Relative vapour density (air = 1): 1.6
Relative density (water = 1): 0.5	Auto-ignition temperature: 450°C
Solubility in water, g/100 ml at 20°C: 0.007	Octanol/water partition coefficient as log Pow: 2.36
Explosive limits, vol% in air: 2.1-9.5	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.8
	Flash point: -104°C c.c.

NOTES : Check oxygen content before entering area. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death.

Annex D
Elements of Customs Training Programme

Annex D.1: Generic concept note for Customs Training

1. Background

Upon the discovery that CFCs and other man-made substances are leading to a depletion of the ozone layer, the international community negotiated the Vienna Convention for the Protection of the Ozone Layer in 1985. Following this, the Montreal Protocol on Substances that Deplete the Ozone Layer was negotiated in 1997 with the objective of reducing and finally phasing out the use of ozone-depleting substances (ODS). [Name of Country] acceded to the Vienna Convention and its Montreal Protocol on [Date], ….Amendment on [Date], ……Amendment on [Date], etc .

In most developing countries, the largest remaining sector in which ODS are used is the refrigeration and air-conditioning (RAC) servicing sector. In [Year], [Name of Country] consumed approximately [XX] metric tonnes of ODS which corresponds to [XX] ozone-depleting potential (ODP) tonnes. The RAC sector consumed [XX] metric tonnes of ODS, which translates to [XX] ODP tonnes. This is [XX]% of [Country Name]'s total consumption in ODP tonnes in [Year].

Since [Name of Country] does not produce ODS, its consumption depends solely on imports and exports. In addition, appliances containing CFCs are imported into the country either already assembled (e.g. refrigerators, air-conditioning units), or in parts for local assembly.

Any abrupt non-availability of ODS refrigerants will adversely impact on important sectors of the local economy. It is therefore essential for users of ODS, in particular CFCs to be able to reduce and subsequently phase-out their consumption in a coordinated, planned and cost-effective manner in compliance with the commitments under the Montreal Protocol.

The Refrigerant Management Plan (RMP) of [Name of Country] was approved by the [XX] Meeting of the Executive Committee of the Multilateral Fund to be implemented by [Name of Implementing Agency]. The RMP is a comprehensive approach to phase out the use of ODS in [Name of Country]'s RAC sector.

[Name of Implementing Agency]'s role is to coordinate the implementation of the following training elements of the RMP in cooperation with the National Ozone Unit (NOU):

1. Training programme on good practices in refrigeration, and
2. Training programme for Customs officers and other stakeholders, e.g. environmental inspectors on control and monitoring of ODS imports and exports.

One of the [Name of Country]'s obligations is to establish an import / export licensing system for ODS. The [Name of Government Agencies] are the agencies, which will manage this licensing system. But it is also necessary to enforce the licensing system. Therefore, the ability of Customs, trade and standards officers to enforce controls over trade in ODS and ODS products / equipment is important for a successful and planned ODS phase-out.

2. Objectives

The main objective of this training programme is to provide the Customs, environmental, trade and standards officers in [Name of Country] with the skills necessary to monitor and control the imports and exports of CFCs and other ODS as well as products / equipment relying on ODS . The detection and prevention of illegal trade is part of this effort. This will be achieved by:

1. Increasing awareness of ozone depletion issues.
2. Introducing the different types of ODS being used in the sector and for which applications they are used.
3. Introducing the provisions and phase-out schedules of the Montreal Protocol and its amendments.
4. Providing an understanding of the national RMP.
5. Providing an overview on the newly established licensing system for ODS and its implications for Customs officers and other stakeholder agencies.
6. Presenting the revised Customs codes which allow for the identification of ODS and ODS products / equipment containing them.
7. Refining and optimizing the establishment of the operational details of the monitoring and control system for ODS.
8. Providing an overview of Customs regulations and monitoring and control systems for ODS in other countries in the region.
9. Training on the use of identification equipment for ODS refrigerants and their substitutes.
10. Designing the concept, agenda, strategy and the time schedule for the training of the remaining Customs officers in the country.

3. Expected results

The immediate result will be the availability of trained Customs trainers and key stakeholders and the development of a training approach and recommendation for the subsequent Phase II training of Customs and enforcement officers in [Name of Country].

A Montreal Protocol related training module will be included in the ongoing training programmes for new Customs officers and will also be integrated in the refresher courses for experienced officers. Thus the sustainability of the training programme will be ensured.

The long-term result is to enhance awareness of ozone depletion issues among Customs authorities and other relevant stakeholders as well as the achievements of the objectives as stated in Section 2.

In addition, synergies for the enforcement of other relevant international environmental agreements such as the Basel Convention, CITES, Rotterdam Convention and the Kyoto Protocol will be created. The success of most international environmental agreements will depend on the continued support of the world's Customs authorities and other key stakeholders.

4. Participants

The train-the-trainers workshop is designed for approximately 20-30 participants. Half of them will be selected from the Customs training section and other relevant Customs sections. The other half should include the main stakeholders involved in the implementation and enforcement of the licensing system who will partly function as local resource persons. These key stakeholders should be drawn from the following participant groups and organizations:

- Customs trainers from the training unit,
- Customs officers from various ports of entry and Customs sections (computer and data processing unit, document processing unit, administration unit, enforcement officers),
- Enforcement officers from police, coast guard, maritime authority, military,
- Ozone officer of the NOU,
- Local legal consultant who prepared the "Country Handbook",
- Prosecutors & Judges
- Local refrigeration expert to support practical session,
- Private sector representatives including importers, shipping agencies, Customs brokers, wholesalers,
- Bureau of Standards,
- Bureau of Statistics,
- Pesticides board,
- Ministry responsible for agriculture and pesticides,
- Government laboratory responsible for chemical analysis,
- Ministry responsible for trade and industry issues,
- Ministry responsible for financial issues and import duties,
- Ministry responsible for environmental protection,
- Environmental protection agency/Inspectorate ,
- Ministry responsible for legal affairs and prosecution,
- Industry and trade associations,
- National committee on climate change and ozone layer protection ,
- Non-governmental organizations,
- National training institutes and academies,
- National institutes of science and research,
- Media and general public (during opening, closing and awareness sessions), and
- Any other agencies whose input and involvement will be necessary for the implementation of the licensing system.

The participants of Phase II of the training programme will be the remaining Customs and enforcement officers in the country including representatives from [Name of Organisations].

5. Methodology

The training programme will be implemented in three phases:

Phase I: Train-the-trainers workshop for Customs and other enforcement officers

The train-the-trainers workshop for Customs and other enforcement officers in [Name of Country] is the [Number of Workshop] is intended to develop local skills to conduct further training of enforcement personnel in the country to help ensure compliance with the national import/export licensing system.

The design of the programme requires that an ODS import/export licensing system and related ODS regulations are in place before the train-the-trainers workshop starts. The establishment of such licensing system was made mandatory by Montreal Amendment to the Montreal Protocol.

The preparation of the workshop requires the development of the " [Name of Country] Handbook on ODS Legislation and Import / Export Licensing System" by the NOU and a local legal consultant. The Country Handbook complements the UNEP Training Manual for Customs Officers: "Saving the Ozone Layer: Phasing Out Ozone Depleting Substances in Developing Countries" by providing country-specific information and data. It will be used at the workshop for discussion with Customs officers and other stakeholders on possible improvements of enforcement of ODS import/export licensing system.

The train-the-trainers workshop is usually conducted by experienced trainer with assistance from local NOU and local legal and technical experts.

The project preparation follows a participatory approach and will involve a number of local resource persons. Some case studies on smuggling schemes will be presented to test participants' knowledge of what they had learned throughout the workshop and four small working groups will be created during the break-out session in order to discuss specific topics. Each group will prepare a report with their findings and recommendations.

During group discussions, the participants will, inter alia, discuss how to prevent illegal trade in ODS in the country, plan Phase II and III of the training programme and will prepare detailed recommendations from the workshop , and a tentative concept note, agenda and implementation schedule for Phase II .

A practical hands-on session is included in the programme to identify different types of refrigerants using the digital refrigerant identifier. ODS and non-ODS cylinders and packaging labels will be checked. Refrigerant identifiers, leak-detectors as well as ODS, examples of ODS packaging and ODS products / equipment will be available for demonstration purposes.

Wrap-up sessions will be held at the end of every day and the participants will conduct a workshop evaluation and agree a final set of recommendations.

Each participant will receive a "Certificate of Participation" from the Government of [Name of Country] and become registered at the end of the workshop. It is proposed that this training and certification should become mandatory for all Customs and enforcement officers.

The workshop report will be disseminated to all participants and members of the contact group on Customs training. It will also be placed on UNEP's homepage at: http://www.unep.fr/ozonaction

Phase II: Subsequent training of the remaining Customs and enforcement officers in the country

The remaining Customs and enforcement officers in the country will be trained by the trained Customs trainers who have participated in the Phase I training. Phase II of the training programme will take into account the recommendations from the train-the-trainers workshops and be based on the "UNEP Customs Training Manual".

A certain number of experienced Customs officers may receive training on ozone-related issues as part of the continuous Customs re-training programme.

The Customs department will be expected to incorporate a Montreal Protocol training module on control and monitoring of ODS in its curriculum to ensure that future Customs officers are trained on this aspect. This will be done within the ongoing training activities of the Customs department.

The NOU, the Customs department and the local legal consultant will be responsible for the implementation of Phase II training and for reporting of progress to [Name of Implementing Agency].

Phase III: Monitoring & evaluation

The NOU will co-ordinate, monitor and follow-up on the Phase I and II training and report progress in project implementation to [Name of Implementing Agency].

After completion of Phase II of the training programme, the NOU will evaluate the results of the training programme and prepare a follow-up & evaluation report. This report will be submitted to [Name of Implementing Agency].

6. Content and structure of the train-the-trainers workshop

The training materials and the workshop agenda are designed to ensure that the objectives set out for the training programme are achieved (see Section 2).

The workshop agenda includes the following sessions:

Session 1: Ozone layer depletion,
Session 2: International response,
Session 3: National obligations and response,
Session 4: National import / export licensing system,
Session 5: Checking papers, forms and permits,
Session 6: Related international conventions,
Session 7: Global & regional context,
Session 8: Role of Customs officers and other key stakeholders,
Session 9: Illegal trade with ODS and ODS-based products,

Session 10: Identification of ODS and ODS-based products ,
Session 11: Practical exercises on identification of ODS,
Session 12: Safe handling, transport and storage of ODS,
Session 13: Breakout Session on effective operation of ODS import / export licensing system and enforcement of ODS regulations,
Session 14: Action planning for Phase II andIII of the Customs training, and
Session 15: Workshop evaluation.

Time will also be allocated for discussions among the participants and the presenters on the further implementation of the RMP and the implementation of Phase II and III of the training programme.

Each day a discussion session will be held to draw conclusions and make recommendations for adoption during the last day of the workshop.

7. Follow-up

This training programme is part of the [Name of Country]'s RMP. As such it will be accompanied by other training and policy related activities as defined in the RMP.

The NOU will establish a monitoring mechanism to ensure that the objectives of the training programme are met and will produce a follow-up report on the status of implementation of the training programme.

The NOU will consider and, as far as possible, implement the workshop recommendations as adopted by the workshop participants. The recommendations should also be communicated to the relevant decision-makers and politicians.

Annex 1: List of national agencies and stakehers with responsibility for ozone protection matters

(A short description of the role and responsibilities of each agency or stakeholder should be included).

Annex D.2: Generic agenda for Phase I training (3 days)

Day 1

8:30 Registration of participants

9:00 Opening ceremony and media briefing
* Welcome address and workshop objectives by Ozone Officer (10 min)
* UNEP DTIE's OzonAction Programme (10 min)
* The training team and workshop approach (5 min)
* Statements of special guests (5 min each)
* Workshop address by Customs representative (5 min)
* Workshop opening by Government representative (10 min)
* Answers and questions by the media (10 min)

10:00 Break

10:15 Introduction
* Expected output of the training programme for Customs officers
* Training materials and display
* Self-introduction of participants including questions & answers

10:45 Session 1: Ozone layer depletion
* Environmental and human health consequences
* UNEP video: Every Action Counts
* Ozone layer science
* Discussion

11:15 Break

11:30 Session 2: International response
* International response
* the Montreal Protocol and its Amendments
* Phase-out schedule and strategies for Article 2 and Article 5 countries
* Discussion

12:00 Session 3: National obligations and response (NOU)
* Overview of national ODS consumption pattern
* National phase-out obligations
* National response
* Refrigerant Management Plan
* Discussion

13:00 Lunch

14:00 Session 4: National import/export licening system (Legal Consultant, NOU)
* Institutional framework
* National ODS regulations
* Structure of national import/export licensing system
* Institutional arrangements and procedures to manage the system
* Import quotas and application for permits and allowances
* Information to importers, exporters , wholesalers and end-users

* *Handling of seized ODS and ODS-containing equipment and goods*
* *Enforcement and penalties*
* *Forms introduced by the licensing system*
* *Discussion*

15:45 Break

16:00 Session 5: Checking papers, forms and permits

* *Logistics and data management*
* *Application forms, permit forms, freight papers, retrofit certificates etc.*
* *Practical exercise on checking freight papers and permits*
* *Discussion*

17:00 Wrap-up sessions and workshop recommendations

Day 2

9:00 Session 6: Green Customs Initiative and Related international conventions:

* *Green Customs Initiative*
* *Partners and related international conventions:*
    * *CITES (endangered species)*
    * *Montreal Protocol on Substances that Deplete the Ozone Layer*
    * *Basel Convention (hazardous waste)*
    * *Rotterdam Convention (prior informed consent)*
    * *Stockholm Convention (persistent organic pollutants)*
    * *World Customs Organisation*
    * *Cartagena Protocol on Biosafety (CBD)*
    * *Organisation for the Prohibition of Chemical Weapons (OPCW)*
    * *Interpol*
* *UNEP (DRC, DELC, DTIE)*
* *Common features related to the control of trade and synergies for Customs authorities for effective enforcement*
* *Discussion*

9:45 Session 7: Global and regional context

* *Global production and trade with ODS and ODS-containing products*
* *Transhipment harbours, production, disposal, reclaim facilities in the region*
* *Regional and global trade agreements*
* *Implementation of revised HS codes 2007 in the region (Customs representative)*
* *Impact on trade and economy (trade representative)*
* *Discussion*

10:15 Break

10:30 Session 8: Role of Customs officers and other key stakeholders

* Key players in monitoring and control imports / exports of ODS and ODS-containing equipment and goods (Customs, coast guard, police, court, chemistry laboratory, importers/wholesalers, end-users, prosecutors, judges, NOU etc)
* Reporting legal and illegal trade with ODS and ODS-containing products
* Enforcing ODS legislation
* Checklist for Customs officers
* Discussion

11:00 Session 9: Illegal trade with ODS and ODS*based products

* Legal and illegal trade with Parties and non-Parties
* Detecting legal and illegal trade at local, regional and international level
* Trade with recycled, recovered, reclaimed or contaminated refrigerants
* Causes and trends of illegal trade
* Methods of smuggling
* Prevention of illegal trade
* Case study on illegal trade
* Discussion

12:30 Lunch

13:30 Session 10: Identification of ODS and ODS*based products

* Harmonised System codes for pure ODS and ODS-containing mixtures
* Common trade names for ODSs, including CFCs, HCFCs, methyl bromide, halons, solvents, foams, aerosols etc.)
* CAS numbers, ASHRAE numbers, UN numbers etc.
* Examples of labelling for ODS
* Examples of labelling of ODS-containing equipment and goods
* Detection of mislabelled ODS containers, cylinders etc.
* Identification of ODS-containing equipment and goods
* Use of refrigerant identifiers (theory)
* Discussion

13:30 Session 11 : Safe handling, transport and storage of ODS

* ODS Chemical information relevant to Customs officers
* Safe handling of ODS and ODS-containing products
* Safe transport and storage of ODS and ODS-containing products
* Safe sampling of ODS
* who is allowed to take samples and to use refrigerant identifiers
* Discussion

14:00 Session 12: Practical hands-on session on identification of ODS

* Examples of ODS containers and cylinders and ODS-containing equipment and goods
* Hands-on work with ODS refrigerant identification equipment if available
* Identification of ODS-containing equipment and goods

14:45 Break

15:00 Session 13: ODS identification exercise (in 4 groups)

Part A: Identification of contents of refrigerant cylinders based on information contained in shipment documentation – followed by presentation on the results by group reporters

Part B: *Identification of the same cylinders using refrigerant identifier - followed by presentation of the results by group reporters and explanations given by the international trainer*

17:00 Wrap-up session and workshop recommendations

Day 3

9:30 Introduction to break-out Session 14: Effective operation of ODS import / export licensing system and enforcement of ODS regulations

In addition to two key topics, participants may suggest 2 additional topics of interest:

* *Topic 1: How to effectively operate ODS import / export licensing systems*
* *Topic 2: How to effectively enforce ODS regulations*
* *Topic 3: Action planning for Phase II and III of the Customs training*
* *Topic 4: To be suggested by participants*

9:45 Break-out session 14: Effective operation of ODS import / export licensing system and enforcement of ODS regulations

* *Group moderators will co-ordinate the break-out sessions.*

11:15 Break

* *Group moderators will ensure the preparation of a short report and presentation of their findings including the group recommendations.*

11:45 Break-out session 14: Presentation of findings of the group work to the plenary

* *Hand-over of reports to the lead consultant*
* *Presentation of group recommendations to the plenary (10 min per group)*
* *Discussion and adoption of group recommendations (5 min per group)*
* *Feedback on the break-out session*

13:00 Lunch

15:00 Session 15: Workshop evaluation

* *Completion of evaluation questionnaires*
* *General feedback and comments from participants and organisers*

15:45 Break

16:00 Closing session and media briefing

* *Conclusions and outlook by Ozone Officer (10 min)*
* *Closing statement by UNEP DTIE's OzonAction Programme (5 min)*
* *Closing remarks by the training team (5 min)*
* *Hand-over of participation certificates (15 min)*
* *Closing remarks by Customs representative (5 min)*
* *Conclusions on synergies on co*operation between related Conventions (5 min)*
* *Closing of workshop by Government representative (10 min)*
* *Answers and questions by the media (10 min)*

Note: A site visit may be organised on a voluntary basis outside the official workshop hours, e.g. as an "Open Door" initiative after the workshop or in the evening if this is feasible. Alternatively, a short slide show could be prepared by Customs.

Annex D.3: Generic agenda for Phase II workshop (1 day)-if time allows –include Practical Session on identification of ODS based on documentation and using identifiers

8:45 Registration of participants

9:00 Introduction
* Expected output of the training programme for Customs officers
* Training materials and display

9:15 Session 1: Ozone layer depletion
* UNEP video: Every Action Counts
* Environmental and human health consequences
* Ozone layer science
* Discussion

10:00 Session 2: International & national response
* International response
* The Montreal Protocol and its Amendments
* Related international conventions
* Overview of national ODS consumption pattern
* National phase-out obligations
* National response
* Refrigerant Management Plan
* Discussion

11:00 Session 3: National import/export licensing system
* Institutional framework
* National ODS regulations
* Structure of national import/export licensing system
* Institutional arrangements and procedures to manage the system
* Role of Customs officers and other key stakeholders
* Import quotas and application for permits and allowances
* Information to importers, wholesalers and end*users
* Handling of seized ODS and ODS-containing equipment and goods
* Enforcement and penalties
* Forms introduced by the licensing system
* Customs obligations to other agencies (e.g. reporting)
* Discussion

12:30 Lunch

13:30 Session 4: Global and regional context
* Global production and trade with ODS and ODS-based products
* Transhipment harbours, production, disposal, reclaim facilities in the region
* Discussion

13:45 Session 5: Illegal trade with ODS and ODS-based products
* Combating Illegal Trade in ODS video (15 minutes)
* Legal and illegal trade with Parties and non-Parties
* Detecting legal and illegal trade at local, regional and international level
* Trade with recycled, recovered, reclaimed or contaminated refrigerants
* Causes and trends of illegal trade

* Methods of smuggling
* Prevention of illegal trade
* Checklist for Customs officers
* Discussion

15:00 Session 6: Local case studies on illegal trade

15:30 Break

15:45 Session 7: Identification of ODS and ODS-based products

* Harmonized System codes for pure and mixed ODS
* Common trade names for ODS
* CAS numbers, ASHRAE numbers, UN numbers etc.
* Examples of labelling for ODS and colour codes
* Examples of labelling of ODS-containing equipment and goods
* Detection of mislabelled ODS containers, cylinders etc.
* Identification of ODS-containing equipment and goods
* Use of refrigerant identifiers (theory)
* Discussion

16:45 Session 8: Safe handling, transport and storage of ODS

* ODS chemical information relevant to Customs officers
* Safe handling of ODS and ODS-containing products
* Safe transport and storage of ODS and ODS-containing products
* Safe sampling of ODS
* who is allowed to take samples and to use refrigerant identifiers
* Discussion

17:15 Session 9: Practical exercises on identification of ODS

* Examples of ODS containers and cylinders and ODS-containing equipment and goods
* Hands-on work with CFC detection equipment if available
* Identification of ODS-containing equipment and goods

18:00 Session 10: Workshop evaluation

* General feedback and comments from participants and organisers
* Hand-over of participation certificates

Annex D.4: Generic agenda for 5-day combined Phase I & II mixed training approach

Day 1

8:30 Registration of participants

9:00 Opening ceremony and media briefing

* Welcome address and workshop objectives by Ozone Officer (10 min)
* UNEP DTIE's OzonAction Programme (10 min)
* The training team and workshop approach (5 min)
* Statements of special guests (5 min each)
* Workshop address by Customs representative (5 min)
* Workshop opening by Government representative (10 min)
* Answers and questions by the media (10 min)

10:00 Break

10:15 Introduction

* Expected output of the training programme for Customs officers
* Training materials and display
* Self-introduction of participants including questions & answers

10:45 Session 1: Ozone layer depletion

* Environmental and human health consequences
* UNEP video: Every Action Counts
* Ozone layer science
* Discussion

11:15 Break

11:30 Session 2: International response

* International response - the Montreal Protocol and its Amendments
* Phase-out schedule and strategies for Article 2 and Article 5 countries
* Discussion

12:00 Session 3: National obligations and response (NOU)

* Overview of national ODS consumption pattern
* National phase-out obligations
* National response - Refrigerant Management Plan
* Discussion

13:00 Lunch

14:00 Session 4: National import/export licensing system (Legal Consultant, NOU)

* Institutional framework
* National ODS regulations
* Structure of national import/export licensing system
* Institutional arrangements and procedures to manage the system
* Import quotas and application for permits and allowances
* Information to importers, exporters , wholesalers and end-users
* Handling of seized ODS and ODS-containing equipment and goods
* Enforcement and penalties
* Forms introduced by the licensing system
* Discussion

15:45 Break

16:00 Session 5: Checking papers, forms and permits

* Logistics and data management
* Application forms, permit forms, freight papers, retrofit certificates etc.
* Practical exercise on checking freight papers and permits
* Discussion

17:00 Wrap-up sessions and workshop recommendations

Day 2

9:00 Session 6: Green Customs Initiative and Related international conventions:

* Green Customs Initiative
* Partners and related international conventions:
    * CITES (endangered species)
    * Montreal Protocol on Substances that Deplete the Ozone Layer
    * Basel Convention (hazardous waste)
    * Rotterdam Convention (prior informed consent)
    * Stockholm Convention (persistent organic pollutants)
    * World Customs Organisation
    * Cartagena Protocol on Biosafety (CBD)
    * Organisation for the Prohibition of Chemical Weapons (OPCW)
    * Interpol
* UNEP (DRC, DELC, DTIE)
* Common features related to the control of trade and synergies for Customs authorities for effective enforcement
* Discussion
* Discussion

9:45 Session 7: Global and regional context

* Global production and trade with ODS and ODS-containing products
* Transhipment harbours, production, disposal, reclaim facilities in the region
* Regional and global trade agreements
* Implementation of revised HS codes 2007 in the region (Customs representative)
* Impact on trade and economy (trade representative)
* Discussion

10:15 Break

10:30 Session 8: Role of Customs officers and other key stakeholders

* Key players in monitoring and control imports / exports of ODS and ODS-containing equipment and goods (Customs, coas guard, police, court, chemistry laboratory, importers/wholesalers, end-users, prosecutors, judges, NOU etc)
* Reporting legal and illegal trade with ODS and ODS-containing products
* Enforcing ODS legislation
* Checklist for Customs officers
* Discussion

11:00 Session 9: Illegal trade with ODS and ODS-based products

* Legal and illegal trade with Parties and non-Parties
* Detecting legal and illegal trade at local, regional and international level

* Trade with recycled, recovered, reclaimed or contaminated refrigerants
* Causes and trends of illegal trade
* Methods of smuggling
* Prevention of illegal trade
* Case study on illegal trade
* Discussion

12:30 Lunch

13:30 Session 10: Identification of ODS and ODS-based products

* Harmonised System codes for pure ODS and ODS-containing mixtures
* Common trade names for ODSs, including CFCs, HCFCs, methyl bromide, halons, solvents, foams, aerosols etc.)
* CAS numbers, ASHRAE numbers, UN numbers etc.
* Examples of labelling for ODS
* Examples of labelling of ODS-containing equipment and goods
* Detection of mislabelled ODS containers, cylinders etc.
* Identification of ODS-containing equipment and goods
* Use of refrigerant identifiers (theory)
* Discussion

13:30 Session 11 : Safe handling, transport and storage of ODS

* ODS Chemical information relevant to Customs officers
* Safe handling of ODS and ODS-containing products
* Safe transport and storage of ODS and ODS-containing products
* Safe sampling of ODS - who is allowed to take samples and to use refrigerant identifiers
* Discussion

14:00 Session 12: Practical hands-on session on identification of ODS

* Examples of ODS containers and cylinders and ODS-containing equipment and goods
* Hands-on work with ODS refrigerant identification equipment if available
* Identification of ODS-containing equipment and goods

14:45 Break

15:00 Session 13: ODS identification exercise (in 4 groups)

Part A: Identification of contents of refrigerant cylinders based on information contained in shipment documentation – followed by presentation on the results by group reporters

Part B: Identification of the same cylinders using refrigerant identifier - followed by presentation of the results by group reporters and explanations given by the international trainer

17:00 Wrap-up session and workshop recommendations

Day 3

9:30 Introduction to break-out Session 14: Effective operation of ODS import / export licensing system and enforcement of ODS regulations

In addition to two key topics, participants may suggest 2 additional topics of interest:

* Topic 1: How to effectively operate ODS import / export licensing systems
* Topic 2: How to effectively enforce ODS regulations
* Topic 3: Action planning for Phase II and III of the Customs training
* Topic 4: To be suggested by participants

9:45 Break-out session 14: Effective operation of ODS import / export licensing system and enforcement of ODS regulations

* Group moderators will co-ordinate the break-out sessions.

11:15 Break

* Group moderators will ensure the preparation of a short report and presentation of their findings including the group recommendations.

11:45 Break-out session 14: Presentation of findings of the group work to the plenary

* Hand-over of reports to the lead consultant
* Presentation of group recommendations to the plenary (10 min per group)
* Discussion and adoption of group recommendations (5 min per group)
* Feedback on the break-out session

13:00 Lunch

15:00 Session 15: Workshop evaluation

* Completion of evaluation questionnaires
* General feedback and comments from participants and organisers

Day 4

8:30 Briefing on day's activities and approach
Review of Workshop recommendations for Phase II and Preparation of an Agenda

9:00 BREAK

9:15 Selection of Slides for use in Phase II training and Preparation of PowerPoint Presentation

10:30 Briefing of trainers on Phase II training

11:30 LUNCH

13:30 Closure and Wrap-up

Day 5

One-day training for "New" Group Customs Officers
Final contents to be determined by the Trained Trainers.

7:30 Registration of Participants

8:00 Welcoming Ceremony

* Invocation
* Welcome address and workshop objectives (by the NOO)

8:30 Introduction:

* Self-introduction of participants including questions & answers

9:30 Session 1: Customs Role in the Control of Goods and Services under Multilateral Environment Agreements (MEA)

10:05 Session 2: International and National Response

* The Montreal Protocol and its Amendments
* Phase-out schedule and strategies for Article 2 and Article 5 countries
* Impact of the Protocol
* National response – Key Elements of the Refrigerant Management Plan
* Data Reporting
* Q&A

10:50 Session 3: National import/export licensing system

* National ODS regulations
* Structure of national import/export licensing system
* Institutional arrangements and procedures to manage the system
* Import quotas and application for permits and allowances
* Information to importers, wholesalers and end-users
* Handling of seized ODS and ODS-containing equipment and goods
* Enforcement and penalties
* Forms introduced by the licensing system
* Q&A

11:40 Session 4: Role of Customs officers and other key stakeholders

* Key players in monitoring and control imports / exports of ODS and ODS-containing equipment and goods (Customs, coast guard, police, court, chemistry laboratory, importers/wholesalers, end*users, NOU etc)
* Reporting legal and illegal trade with ODS and ODS-containing products
* Enforcing ODS legislation
* Checklist for Customs officers
* Implementation of revised HS codes in the region
* Q&A

12:30 LUNCH

13:15 Session 5: Checking Papers, Forms and Permits

* Application forms, permit forms, freight papers, retrofit certificates etc.
* Q&A

13:30 Session 6:
Trade and identification of ODS and ODS-containing Equipment and Goods

* Detecting legal and illegal trade at local, regional and international level: Common trade names for ODSs, including CFCs, HCFCs, methyl bromide, halons, solvents, foams, aerosols etc.)

HS Codes, CAS numbers, ASHRAE numbers, UN numbers etc.
* Trade with recycled, recovered, reclaimed or contaminated refrigerants
* Causes and trends of illegal trade
* Methods of smuggling
* Prevention of illegal trade
* Case study on illegal trade (Honeywell)
* Examples of labelling for ODS and colour codes
* Examples of labelling of ODS-containing equipment and goods
* Detection of mislabelled ODS containers, cylinders etc.
* Identification of ODS-containing equipment and goods
* Use of refrigerant identifiers (theory)
* Q&A

14:30 Session 7: Demonstration on identification of ODS

* Examples of ODS containers and cylinders and ODS-containing equipment and goods
* Demonstration of CFC detection equipment
* Q& A

15:00 Session 8: Health and Safety

* ODS Chemical information relevant to Customs officers
* Safe handling of ODS and ODS-containing products
* Safe transport and storage of ODS and ODS-containing products
* Safe sampling of ODS
* who is allowed to take samples and to use refrigerant identifiers

15:30 Session 9: Workshop evaluation

* Completion of evaluation questionnaires
* General feedback and comments from participants and organisers
* Wrap-up and Workshop Recommendations

16:00 Closing session and Presentation of Certificates

* Conclusions and outlook (Ozone Officer)
* Closing statement by UNEP DTIE's OzonAction Programme
* Closing remarks by UNEP Trainer
* Hand*over of participation certificates
* Closing remarks by Customs representative
* Closing of workshop by Government representative
* Answers and questions by the media

Annex D.5: Generic Agenda for Customs Executive Briefing for High Level Awareness Raising

(TO BE EXECUTED PREFERABLY BEFORE the Train-the-Trainers workshop)

This Agenda can be modified to run longer than the two hours that is proposed here, based on the time available of the Customs executives.

(15 mins) Introduction and Purpose
- *Purpose of the Customs Executive Briefing*
- *Introduction of Attendees*

(30 mins) Ozone Layer Depletion and the Montreal Protocol:
- *Video*
- *Interlinkages with other conventions*
- *Questions and Answers*

(15 mins) National obligation and Response
- *Phase out time line*
- *Regulatory response*

(20 mins) Role of Customs in Identifying Illegal trade of ODS:
- *Combating increasing illegal trade during ODS phase out*
- *Regional examples of illegal trade interdiction*

(20 mins) Customs Strategy Session:
- *National and Regional cooperation and communication strategy*

(15 mins) Formalizing Cooperation:
- *Discuss MOU between Customs and Ministry of Environment*
- *Next Steps*

(5 mins) Closing

Annex D.6: Generic break-out session during the Train-the-Trainers Workshop

National Train-the -Trainers Workshop for Customs Officers

Organised by the
United Nations Environment Programme
and
Government of [Country]

[City], [Country], [Date]

Working session

Purpose of the Assignment:
By discussing with your colleagues and resource persons, you will have a chance to identify ways to effectively enforce and operate the ODS regulations and import/ export licensing system, and plans of future trainings of Customs officers in your region organized locally. The expected outcome of the working session is a set of recommendations to be presented to the plenary for acceptance.

Instructions:
1. The training team will propose 3 topics for the mini groups. Topics will be selected during introduction to working session.

2. 8-10 participants maximum will join each group on "first comes – first is served" basis.

3. Each group is to identify 1) the group leader to co-ordinate the group work and for the time management, 2) the group secretary to take notes and to fill in the report form and 3) the spokesperson (Reporter) that will present your recommendations. The group may as well identify only one person to undertake all those duties.

4. The questions posed for each topic are not mandatory to be answered. They are just given in order to help in discussion in working groups. You may as well wish to discuss the problems you consider the most important. Also consider the information presented during the program sessions as you work through your assignment. Time available as per agenda.

5. One report from each group should be presented to the plenary and submitted to the workshop facilitator after each presentation. The report should contain suggested recommendations from the group. Plan at least 15 minutes for completion of the report at the end of the working session.

6. Present your findings and recommendations to the class. Each team will have maximum 10 minutes for presentation.

Working Session:

Topic 1:
How to effectively operate ODS import/export licensing system in [Country] ?

Possible questions for consideration:

1) How can the system be best implemented?

2) Should there be a verification process for licenses?

3) How will the system be evaluated?

4) What are the difficulties with operation of the system?

5) How is communication accomplished in the system? How is information shared among relevant agencies?

6) Other questions ...

Topic 2:
How to effectively enforce ODS legislation by the Customs in [Country]

Possible questions for consideration:

1) Agency strategies for detecting illegal ODS

2) How is evidence gathered?

3) What is the process for seized ODS (storage, monitoring)?

4) How can bribes be discouraged?

5) Are the penalties strict enough?

6) Are there sufficient resources and equipment to enforce ODS regulations?

7) What about regional co-operation? How are enforcement efforts co-ordinated with other countries in your area?

8) How is intelligence gathering conducted for ODS?

9) Should your country start an ODS taskforce with scheduled meetings for information exchange and strategic planning?

Topic 3: Action planning for further Customs training on ODS in [Country]

Questions for Consideration:

(a) For planning of the next phase of the training :

1) How many officers to train?

2) How many courses to hold?

3) Who will designate the trainer to a particular course?

4) Which documents should be included in participant's portfolio?

5) Should the agendas of the courses be adjusted to local situation?

6) Who will monitor the progress in training (UNEP, NOU, ...)?

(b) For monitoring of effectiveness of the next phase of training :

1) Who will monitor the effect?
2) How the monitoring will be executed?
3) Who will be reported about the effect?

Topic 4:
To be suggested by participants (possibilities are listed below)

- Data reporting and Customs use of data
- How to identify suspicious ODS shipments during docment checking and goods inspection
- How to deal with ODS mixtures or similar chemicals
- How to encourage Customs officers to report ODS seizures to Customs Enforcement Network, Ozone Secretariat or Interpol EcoMessage
- How to establish a communication and coordination mechanism between Customs and environment agencies
- How to improve risk analysis and profiling on ODS smuggling
- Regional and international Customs and environment intelligence cooperation on suspect ODS shipments

Annex D.7: Generic break-out session report form

WORKING SESSION REPORT FORM

ONLY ONE REPORT PER GROUP SHOULD BE PREPARED AND PRESENTED
Your findings and recommendations will be part of the workshop results and be included in the workshop report if accepted by the plenary. They will guide the further proceedings with implementation and enforcement of the ODS import/export licensing system in your country and preparation of the next phase of the Customs training programme.

Please write in ink and use the other side of this sheet if you need more writing space.

You may prefer to write your recommendations on the transparencies for presentation to the plenary

Mini Group Number :

Topic:

Recommendations
Actions to be taken (what is to be done, who will be responsible, when the implementation is expected to start and how long it would take): 1. 2. 3. . . . .

Thank you for returning this form to the workshop facilitator.

Logo of Government of [Country]

Logo of [Training Institute]

CERTIFICATE OF PARTICIPATION

Government of [Country]

UNEP DTIE's OzonAction Programme

[Training Institute]

certify that

Mr./Ms._____

has participated in the

National Training Workshop for Customs Officers on Substances Depleting the Ozone Layer

[City], [Country], [Date]

This training is part of the Refrigerant Management Plan of [Country] for the phaseout of ozone-depleting substances and funded by the Multilateral Fund for the Implementation of the Montreal Protocol.

_____	_____	_____
Government of [Country]	UNEP DTIE	[Training Institute]

Annex D.9: Generic evaluation questionnaire

National Train-the -Trainers Workshop for Customs Officers

Organised by the United Nations Environment Programme and Government of [Country]

[City], [Country], [Date]

Evaluation

Please complete this questionnaire and indicate your personal evaluation by ticking the appropriate boxes (1 represents poor and 5 represents excellent):

1. What is your overall evaluation of the workshop?
   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

2. Was communication between participants possible and useful?
   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

3. Was the composition of the audience adequate?
   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

4. As far as the contents of the presentation are concerned, did you find them adequate in providing the background for discussions?
   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

5. How did you find the working session?
   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

6. How did you find the practical exercises?
   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

7. Please give additional comments about the workshop, if any.

PLEASE INDICATE YOUR NAME, ORGANISATION AND POSITION AND RETURN THE COMPLETED QUESTIONNAIRE BEFORE LEAVING:

Name: _____

Organisation: _____

Position: _____

Annex D.10: Generic case studies for Customs inspectors

These are case studies that should be adapted to each country to include the proper names of organisation and places. Other case studies developed by the trainer may also be discussed.

1. You are reviewing a paperless entry for a large shipment of gas cylinders on a ship that has just left Europe. The shipment is to be entered in at one port, but the consignee is in another area of the country. You notice that one of the country code numbers (on the entry documents) is from a known smuggling country. Whom do you call and what do you do?

2. You notice that several shipments of CFCs have been manifested in Transit (T&E Bond) from one location to another within your country to a neighbouring country. You have noticed this pattern before, and you question how much of this product is needed there. You also notice that company utilises a local address. Who do you call and what you do?

3. You receive a telephone call from a Customs Investigator in a neighbouring country. She tells you that there is a suspicious shipment of supposedly "recycled Halon" headed to your country by vessel from (Country X). She said the shipment is suspicious because it was originally destined for Toronto, but is now scheduled to go by rail from your country to two other cities in her country. Whom do you call, what do you do?

4. An informant tells you that he can introduce you to a man who sells large quantities of Chinese CFCs wholesale. He tells you that a shipment of these CFCs is due to arrive this week from a major port. Whom do you call, and what do you do?

5. You have been working on an Environmental Crimes Task Force with the Prosecutor's Office . You have received information from an Agent, that an unnamed corporation with an extensive shipping record is shipping Freon into your country. Whom do you call and what do you do?

6. You are a Coast Guard Officer. During a ship search, you overhear a crewman telling another crew member about the last ship he was on and that that ship routinely carried CFC cylinders in a special hold. You are able to get the crewman's name but little else. Whom do you call, and what do you do?

7. You receive a request from an Investigator with another country's Custom Service about shipments of CFCs that have supposedly been destined for your country. The information is sketchy, but the shipments have allegedly been made over a long period of time. Whom do you call and what do you do?

8. You have noticed that every week Freon gas cylinders are being routinely shipped from a neighbouring country to a hospital in your country. Another load has just been entered electronically. Whom do you call and what do you do?

9. A Customs officer from Sri Lanka informed your office that a containerized shipment of used goods/scrap papers from Maldives destined for the Philippines via Singapore will be arriving within two (2) weeks. The shipper is based in Nairobi, Kenya with trading business at Maldives. What will you do? Whom do you call?

10. A shipment of HCFC-22 was apprehended for misdeclaration:

a. HCFC-22 - 224 cyl. (13.6 kg/cyl.)
b. CFC-12 - 2,076 cyl. (13.6 kg/cyl.)

The importer requested for its re-exportation, what is your recommendation? What is your basis?

11. A shipment of refrigerants was assigned to you for examination.

Consignee	-	Britches Trading
Supplier	-	Stand Long Enterprises, Tainan, Taiwan
Port of Loading	-	Shanghai, China
Bill of Lading	-	2x20 HCFC-22 (chlorodifluoromethane) 2,300 UN Class 2.2 UN No. 1018
Invoice	-	31, 280 kgs of HCFC-22 (US$ 1,40/kgs)
Packing List	-	Final partial shipment 1-2,300 HCFC-22 Chlorodifluoromethane N.W. 31,280 kgs
Import Clearance	-	62,560 kgs HCFC-22 (PSIC)

Said shipment was selected RED under valuation screen.

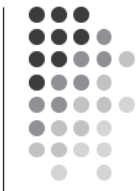
What courses of action should be taken?

Annex E
Overheads

1. Customs Training and ODS
2. Workshop Objectives
3. Workshop Objectives 2
4. Who should use the Manual ?
5. Ozone Science
6. Ozone and the Atmosphere
7. Formation of Ozone
8. UV radiation releases chlorine from CFCs
9. Destruction of ozone by CFC
10. Effects of ozone depletion
11. List of ODS with ODP
12. CFC chemical structure
13. HCFC Chemical structure
14. Uses of ODS
15. International Response
16. Amendments and Adjustmenst to the Montreal Protocol
17. Phase-out schedule for ODS
18. Exemptions for use & production of ODS
19. Trade with Parties
20. Related Conventions
21. Green Customs Initiative
22. Ban on Trade with non-Parties
23. National Response
24. Key enforcement players in the ODS licensing system
25. Role of Customs Officers in enforcing ODS regulations
26. Customs Checklist
27. ODS Safety
28. Safety checklist for customs officers
29. Safety checklist 2
30. Safety checklist don'ts
31. ODS Names
32. HS tarif classification
33. Trade & chemical names
34. ASHRAE & UN number
35. ODS Testing Methods
36. Portable refrigerant identifiers/analysers
37. Temperature/pressure method
38. Laboratory analysis
39. ODS Smuggling
40. Motives for ODS smuggling
41. ODS producing countries
42. Smuggling Schemes
43. Screening methods
44. Screening Documentaion
45. Inspection of Goods
46. List of ODS products
47. Exemples of trade in ODS equipment
48. Examples of smuggling schemes
49. Exemples of smuggling schemes 2
50. Taiwan : Double layered cylinder with small HFC cylinder
51. Taiwan : Large CFC compartement only accessible after cutting the cylinder
52. ISO tanks – may be declared partially filled to avoid duties
53. Smuggling CFCs in Compressors or Other Equipment
54. India/Nepal border : CFCs filled in local size cylinders of 105kg
55. HFC cardboard pckaging may contain CFC cylinders
56. Small CFC canisters – Easy to smuggle in private cars or baggage
57. Miami : CFC cylinders were smuggled in private boat
58. Examples of Seizures and Fines
59. Means to Curb Illegal Trade in ODS
60. Examples of Regional Cooperation
61. Models of Regional Cooperation
62. Customs Training
63. Training Tools
64. Jamaica ODS Licencing system : lessons learned
65. Jamaica ODS Licencing System : Results

Customs Training on ODS

Workshop objectives



- Increasing awareness of ozone depletion issues
- Introducing the different types of ODS being used and for which applications are they used
- Introducing the provisions & phase-out schedules of the Montreal Protocol & its amendments
- Providing an understanding of the national RMP
- Providing an overview on the established ODS licensing system & its implications for Customs officers and other stakeholder agencies

Workshop objectives 2

- Present revised customs codes for ODS & ODS containing equipment
- Refine & optimize the monitoring & control system for ODS
- Provide an overview of customs regulations & ODS monitoring & control systems in other countries in the region
- Training in the use of identification methods for ODS& products/equipment containing ODS
- Design the concept, agenda, strategy & time schedule for the training of the remaining customs officers

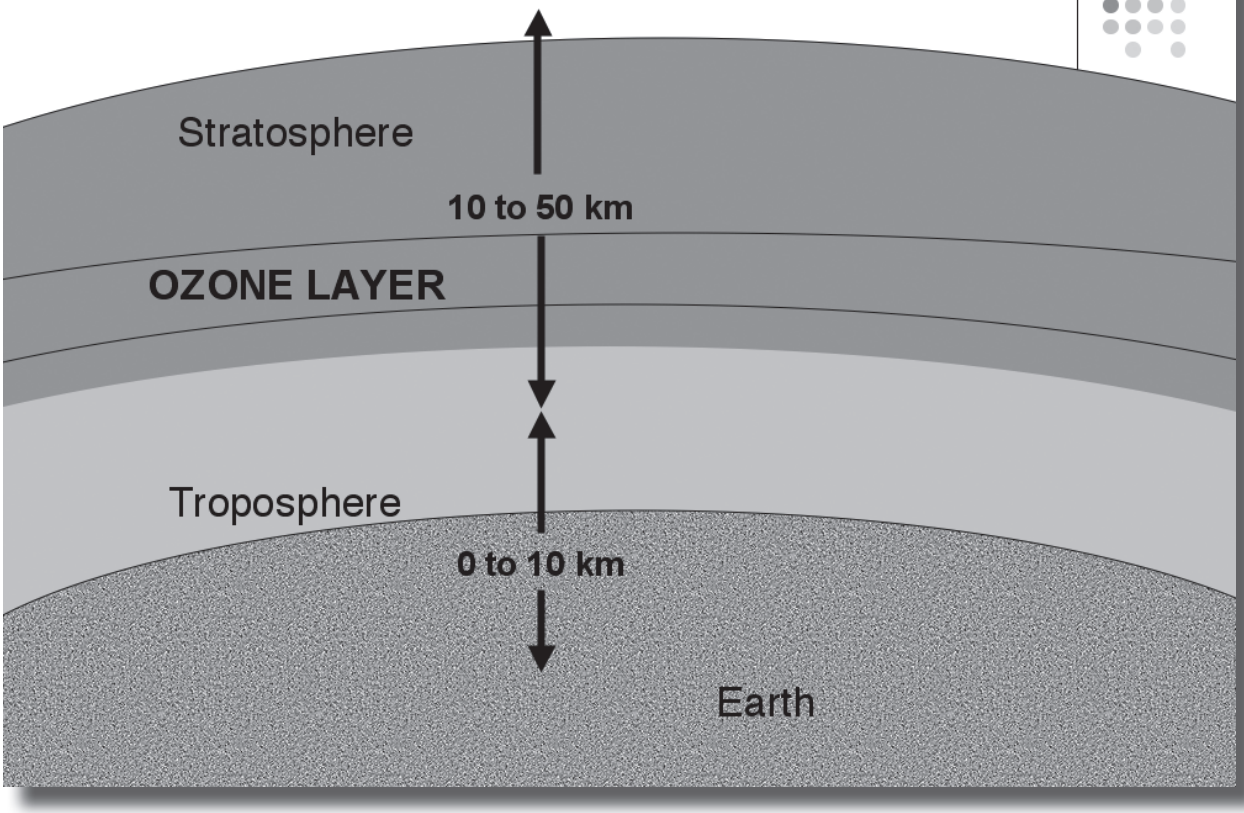
Who should use the manual?

- Implementing & bilateral agencies under the Multilateral Fund
- International customs trainers
- Trained customs trainers; As a resource to prepare Phase II training
- Customs trainers, customs & enforcement officers & other relevant stakeholders involved in the operation & enforcement of the import/export licensing system for ODS

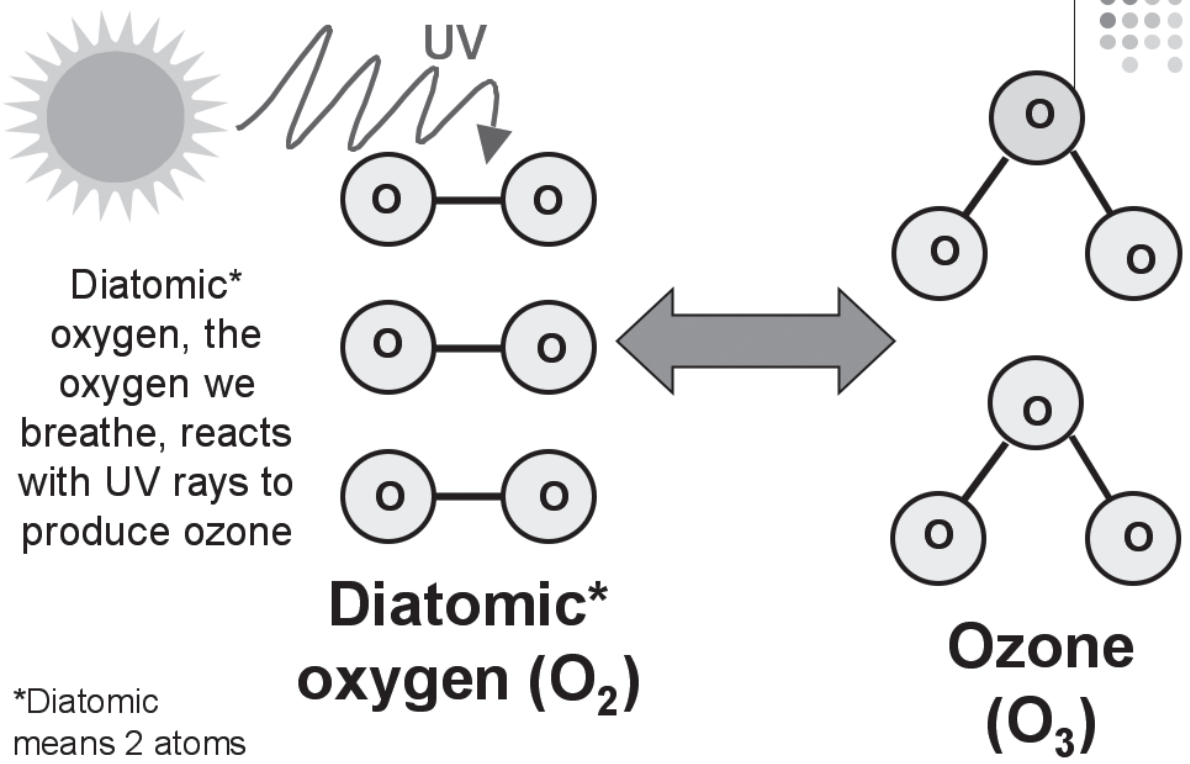
Ozone Science

Ozone creation & ozone destruction

Ozone in the atmosphere



Formation of ozone



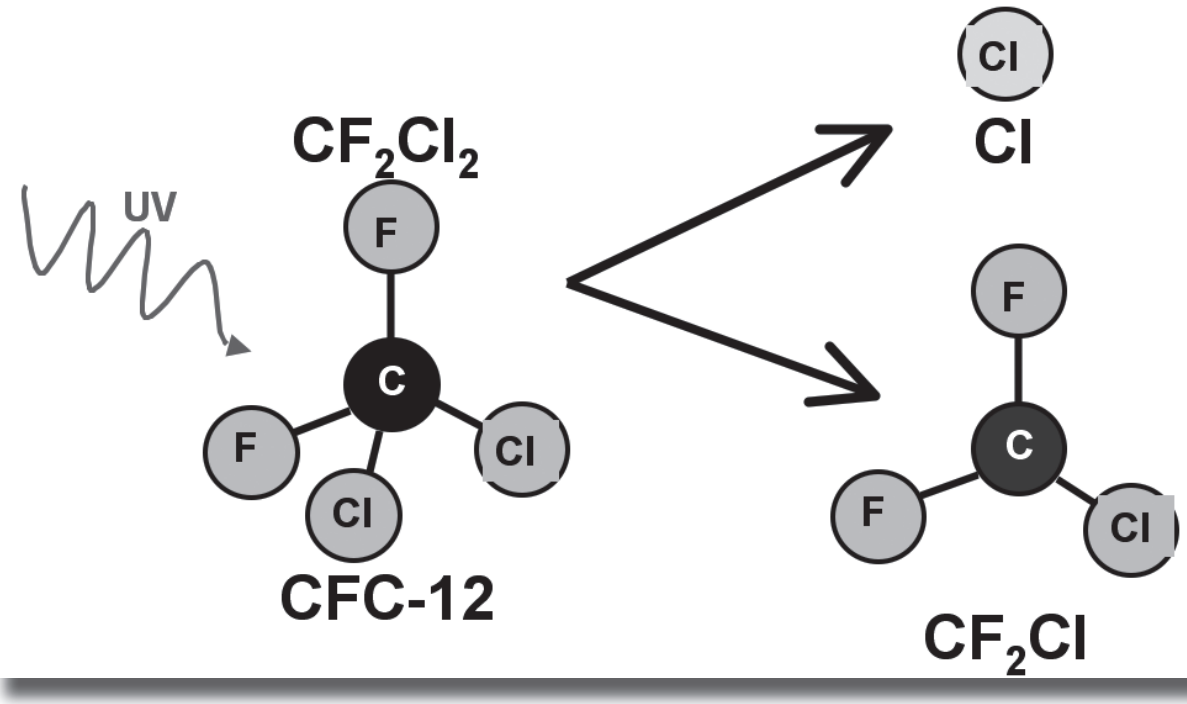
Diatomic* oxygen, the oxygen we breathe, reacts with UV rays to produce ozone

Diatomic* oxygen (O_2)

Ozone (O_3)

*Diatomic means 2 atoms

UV radiation releases chlorine from CFCs



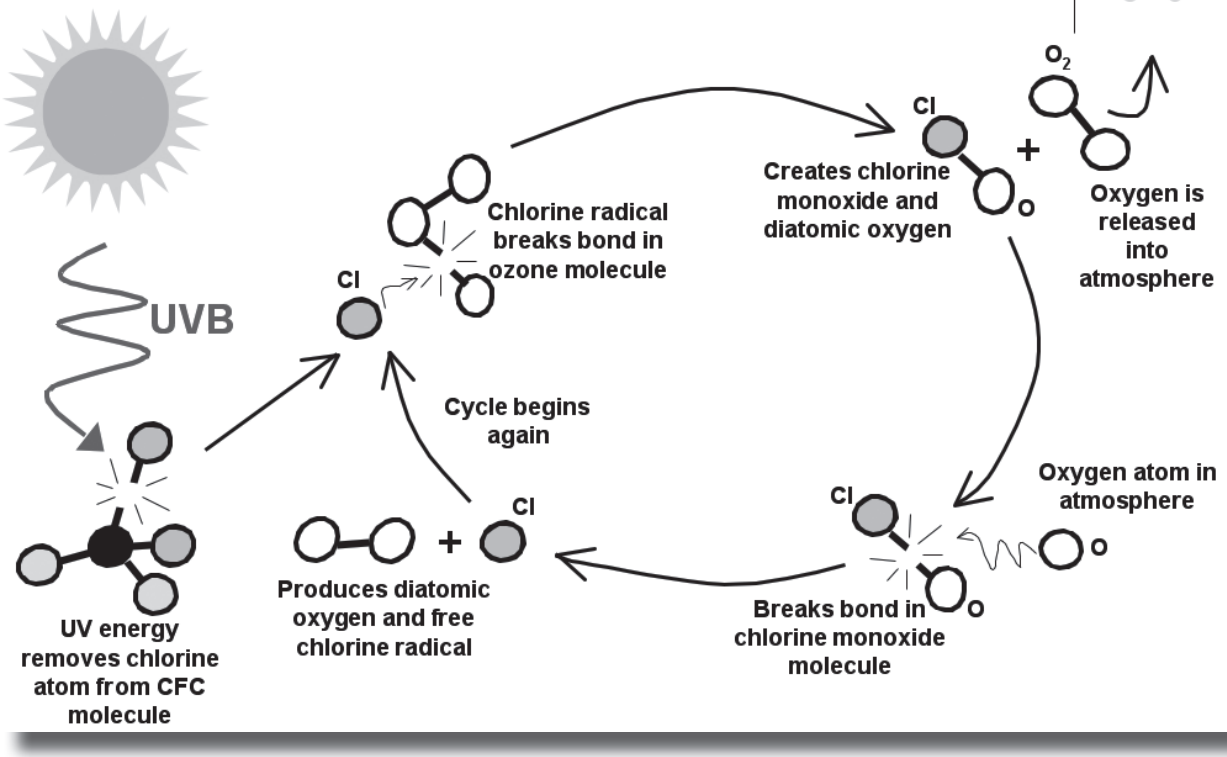
CF_2Cl_2

CFC-12

Cl

CF_2Cl

Destruction of Ozone by CFCs



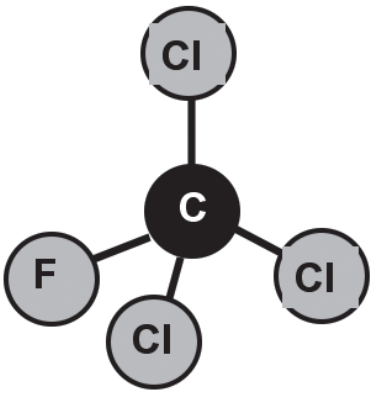
Effects of ozone layer depletion

- Human health
  - Damages DNA which suppresses immune system resulting in increase in infectious diseases
  - Skin cancer
  - Eye cataracts
- Plants & trees
  - Reduces crop production, damage to seeds
  - Reduces quality of crops
- Aquatic organisms
  - Damages plankton, aquatic plants, fish larvae, shrimp, & crab
  - Affects marine food chain, damage to fisheries result
- Materials
  - Paints, rubber, wood, & plastic degraded, especially in tropical regions
  - Damages could be in billions of US dollars

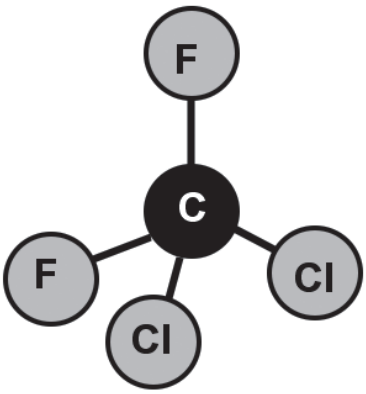
List of ODS with ODP

• Chlorofluorocarbons (CFCs)	ODP from 0.6-1.0
• Halons	ODP from 3.0-10.0
• Carbon Tetrachloride	ODP of 1.1
• Methyl chloroform	ODP of 0.1
• Hydrochlorofluorocarbons (HCFCs)	ODP from 0.001-0.11
• Hydrobromofluorocarbons (HBFCs)	ODP from 0.02-1.0
• Bromochloromethane	ODP of 0.12
• Methyl Bromide	ODP of 0.6

CFC chemical structure

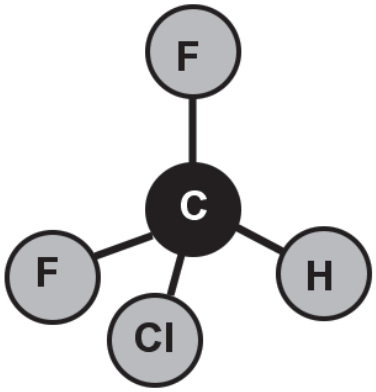


CFC-11

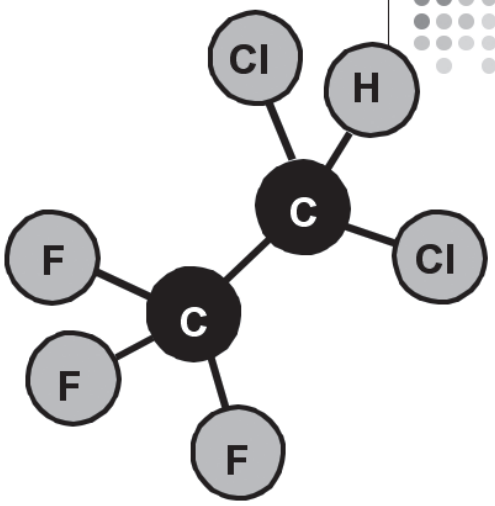


CFC-12

HCFC Chemical Structure



HCFC-22



HCFC-123

Uses of ODS

- **Refrigerants:** CFC-12, HCFC-22, CFC-containing blends, HCFC-containing blends – in domestic, commercial, & transport refrigerators; air-conditioning & heat pump systems; motor vehicle air-conditioners
- **Blowing agents:** CFC-11 or HCFC-141b foam blowing agent for the manufacture of polyurethane, phenolic, polystyrene & polyolefin foam plastics
- **Cleaning solvents:** CFC-113, HCFC-141b, methyl chloroform, carbon tetrachloride for electronic assembly production processes, precision cleaning & general metal degreasing. Also for dry cleaning & spot cleaning in textile industry
- **Propellants:** CFC-11, -12, -113, -114, HCFC-22 for aerosols like deodorants, shaving foam, perfume, window cleaners, lubricants & oils
- **Sterilants:** Mixtures of CFC-12 & ethylene oxide used for medical sterlisation
- **Fire extinguishers:** Halons, HCFCs & HBFCs
- **Fumigants:** methyl bromide, pesticide for soil, structures and products fumigation & pre-shipment & quarantine applications
- **Feedstock:** HCFC & carbon tetrachloride are used as feedstock for chemical synthesis
- **Process agent :** almost exclusively carbon tetrachloride
- **Laboratory& analytical uses:** all ODS

International Response

Montreal Protocol

Amendments & Adjustments to the Montreal Protocol

- **Adjustments**
  - May modify the phase-out schedules of already controlled substances as well as ODP values of controlled substances based on new research results.
  - Automatically binding for all countries that have ratified the Protocol, or the relevant amendment, which introduced the controlled substance.
- **Amendments**
  - May introduce control measures or new ODS
  - Countries, which have not ratified a certain amendment are considered a non-Party with regard to a new ODS introduced by that amendment.

Phase-out schedule for ODS

Annex	ODS type	First control measure for Article 5 countries	Final phase-out for Article 5 countries Consumption & production Consumption=production+imports - exports
A-I	CFC (5 main types)	1999 freeze	2010 phase-out
A-II	Halons	2002 freeze	2010 phase-out
B-I	Other CFCs	2003 reduction 20%	2010 phase-out
B-II	Carbon tetrachloride	2005 reduction 85%	2010 phase-out
B-III	Methyl chloroform	2003 freeze	2015 phase-out
C-I	HCFCs	2016 freeze	2040 phase-out (consumption only)
C-II	HBFCs	1996 phase-out	1996 phase-out
C-III	Bromochloromethane	2002 phase-out	2002 phase-out
E	Methyl bromide	2002 freeze	2015 phase-out

Exemptions for use & production of ODS

- **Essential use**: An exemption from the total phase-out of controlled substances can be granted for certain essential uses upon application, if approved by the Meetings of the Parties on a case-by-case basis (exempted category)
- **Feedstock**: Controlled substances that are used in the manufacture of other chemicals and that are completely transformed in the process.
- **Process agents**: Some ODS are used in the production of other chemicals e.g. as a catalyst or an inhibitor of a chemical reaction without being consumed. Only those uses of controlled substances approved by the Montreal Protocol are allowed.
- **Production to satisfy basic domestic needs**: Article 5 countries are allowed a grace period compared with non-Article 5 countries to phase-out the use and production of controlled substances in order to meet their domestic needs.

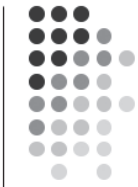
Trade with Parties

- MOP recommended that **each Party adopt legislation to regulate (including labelling) export and import** of products, equipment, components & technology whose functioning relies on ODS or contains ODS as described in Annexes A & B of the Protocol; *Dec. VII/32*
- MOP recommended that **Non-Article 5 Parties adopt appropriate measures to control, in cooperation with the importing Article 5 Parties, the export of used products and equipment**, other than personal effects, **whose continuing functioning relies on supply of substances listed in Annexes A and B of the Montreal Protocol**; *Dec. IX/9*
- MOP requested **Parties** to **establish a system requiring validation and approval of imports of any used, recycled or reclaimed ozone-depleting substances** before they are imported. Importers should sufficiently demonstrate to approving authorities that the ozone-depleting substances have indeed been previously used; ; *Dec. VIII/20* and
- **Countries which do not want to receive products & equipment** containing controlled substances from Annex A and B of the Montreal Protocol may request to be included on a list of countries maintained by the Ozone Secretariat. *Dec. X/9* Customs officers should be aware whether their country is listed or not.

Related Conventions

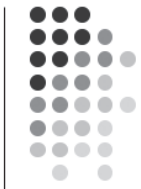
- Basel Convention
- Convention on International Trade in Endangered Species
- Rotterdam Convention
- Stockholm Convention
- Convention on Biological Diversity and Cartagena Protocol on Biosafety

Green Customs Initiative



- Objective to enhance customs officers' capacity to detect and act on illegal trade in environmentally sensitive items
- Integrated customs training
- Developed manual for capacity building on Green Customs
- Website for training resources
- Supported by WCO, Interpol, CITES, Basel, Rotterdam, and Stockholm Conventions, Convention on Biological Diversity, Organization for the Prohibition of Chemical Weapons, OzonAction Branch, Ozone Secretariat, UNEP DELC

Ban on Trade with non-Parties



- **Non-party**: any country whose government has not ratified, accepted, approved or accessed the Montreal Protocol or one or more of its amendments
- **1990** Ban on all **imports** of Annex A substances from any Non-Party states.
- **1993** Ban on **exports** of Annex A controlled substances to non-Party states from Party states

Countries that have not yet ratified <u>any</u> ozone treaties: Andorra, Holy See, Iraq, San Marino, Timor Leste

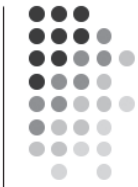
National Response

ODS Import/Export
Licensing System

Key enforcement players in the ODS licensing system

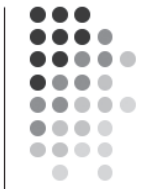
- Customs officers
- National Ozone Unit
- Licensing agencies
- Ministry of Trade, Industry or Commerce
- Food & Drug Administration
- Pesticide board
- Attorney General
- Ministry of Justice
- Police & Coast Guard
- Bureau of Standards
- Industry & trade representatives & associations
- General Public
- Government laboratories
- National ozone & climate committees
- Other law enforcement agencies

Role of Customs Officers in enforcing ODS regulations



- Enforcement of ODS licensing system
- Training of customs officers in identification of ODS & ODS based products
- Awareness raising on ODS regulations among importers & exporters
- Checking and inspecting shipments, trucks & vessels
- Detecting illegal trade with ODS & ODS-based products
- Using refrigerant identifiers & analysers
- Cooperating with other stakeholders involved in monitoring ODS trade
- Reporting legal & illegal trade as well as seizures to the NOU
- Seizing illegal imports including storage & disposal
- Supporting other enforcement agencies, e.g. in providing evidence for court cases
- Refer to customs checklist for identification of ODS & ODS-based products

Customs Checklist



- ✓ Compare the packing list, bill of entry, & the country of origin to ensure they match.
- ✓ Ensure the customs code on the entry matches the description on the invoice.
- ✓ Compare the invoice & the bill of lading to the outward bound ships manifest.
- ✓ Verify the country of origin. Is the country a party to the Montreal Protocol & its amendments?
- ✓ Verify that the importer & place of business actually exist.
- ✓ Contact the licensing agency to verify that the importer is licensed to import that specific material.
- ✓ Note the quantity, source, & destination of the ODS. These will serve as important clues that may provide indicators to prohibit illegal importations.
- ✓ Verify that the container number actually exists. Discovery of fictitious container numbers have led to the disclosure of illegal trade.
- ✓ Review all the necessary documents, if there is something that doesn't match, it may be an illegal shipment.
- ✓ Inspect the merchandise.
- ✓ Check packaging, size, & shape and label on container.
- ✓ Identify the name & description of the chemical, which should match ALL paperwork.
- ✓ Seize the material if the importer does not have the import/export license.
- ✓ Coordinate this seizure with the customs officer, environment agency, & the prosecution agency. Anyone involved with the seizure may be called to testify in court, so take good notes.

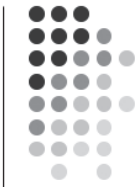
ODS Safety

Safety checklist for customs officers

Dos

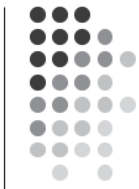
- Do observe local regulations & industry recommended procedures for the handling, transport & storage of virgin, recovered, recycled or contaminated refrigerants.
- Do use protective clothing, including safety goggles & cold-insulating gloves when handling refrigerants. Refrigerants can cause frostbite & other damaging effects to the skin & eyes.
- Do equip storage areas with appropriate fire extinguishing systems to reduce the risk of a fire. CFCs refrigerants are not combustible, but produce irritating or toxic fumes in a fire.
- Do use electronic leak detectors to inspect storage areas & access valves for leakage.
- Do check the contents of refrigerant cylinders using the temperature/pressure method or electronic refrigerant identifiers, but only if you are trained & authorised to do so under local regulations.

Safety checklist 2



- Do inspect access valves for leaking glands & effective gaskets. Protective caps should prevent valve damage. Do secure storage areas for ODS & ensure that they are only accessible by authorised personnel & that they are protected against theft.
- Do properly label ODS & storage areas & show appropriate warnings if necessary.
- Do store seized ODS until further legal action determines what will be done with the substances. They should be clearly labelled & stored. The Country Handbook on ODS Regulations should detail storage requirements for seized ODS.
- Do disconnect the power supply when inspecting or testing equipment, e.g. refrigerators should be unplugged & vehicle motors turned off.
- Do respect local requirements & standards for pressure vessels with low & high pressure refrigerants. In many countries, safety inspections are mandatory.
- Do store & transport ODS cylinders carefully in an upright position (this does not apply to ISO containers) & prevent dropping them.

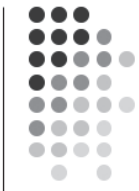
Safety checklist don'ts



Don'ts

- Do not eat, drink, or smoke in storage areas or near ODS or ODS products/equipment.
- Do not vent ODS into the atmosphere knowingly. Do not dispose of any ODS by using methods other than R &R, reclaim, reuse, adequate storage or approved destruction methods.
- Do not handle or store ODS in confined spaces which lack ventilation since some ODS can accumulate in confined spaces. This increases the risk of inhalation & may cause unconsciousness or suffocation resulting in death. Use breathing protection if appropriate.
- Do not store ODS cylinders in direct sun light or near hot surfaces. A rise in temperature will cause an increased pressure with the risk of bursting.
- Do not take samples of ODS, this should be done by trained & authorised technicians or personnel of accredited Government laboratories.
- Do not use open flames in storage areas or near any refrigeration & air-conditioning system to reduce the risk of fire. Do not use the "halide torch method" (flame test) for leak testing.
- Do not handle chemicals or ODS if you are not trained & familiar with the necessary safety precautions.

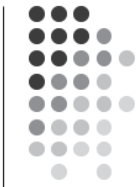
ODS Names



HS tariff classification

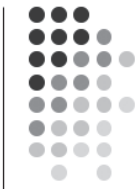
- Structure of the HS codes (based on chemical contents or application)
- HS codes for ODS
- HS codes for ODS-containing products
- New HS codes (2007) for ODS and ODS-containing mixtures
- National codes (see National Handbook on ODS Regulations & Import/Export Licensing System)

Trade & chemical names



- Trade names
  - The names companies give their products, e.g. Brom O Gas
  - See Annex B of UNEP's Customs Training Manual
- Chemical names
  - Different names and formulas can be used
  - Chemical names, e.g. methyl chloroform or 1,1,1-trichlorethane
  - See Annex B of UNEP's Customs Training Manual

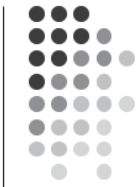
ASHRAE & UN numbers



- ASHRAE number
  - American Society of Heating, Refrigerating, & Air-conditioning Engineers
  - Letter R (for refrigerant) + Number designation for refrigerants based on their chemical structure, e.g. R-12
- UN number
  - United Nations Substance Identification Number (UNSIN or UN number)
  - A four digit international standard number which identifies a particular chemical or group of chemicals, e.g. CFC-12's UN number is 1028

See Customs Quick Reference Tool for details

ASHRAE designations for single components



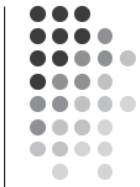
R-134a

- One less than the number of carbon atoms (i.e., there are 1+1 = 2 carbon atoms)
- One more than the number of hydrogen atoms (i.e., there are 3-1 = 2 hydrogen atoms)
- Number of fluorine atoms (i.e., there are 4 fluorine atoms)
- The "a" indicates an isomer (i.e., a different arrangement of the same atoms) of R-134

*R-134a is an ODS alternative

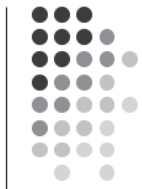
ODS Testing Methods

Portable refrigerant identifiers/analysers



- Some identifiers may:
  - Detect R-11, R-12, R-22, R-134a (non-ODS), R-500, R-502, hydrocarbons & air;
  - Detect composition of certain mixtures;
  - Detect purity & water content;
  - Be connected to a computer or printer;
  - Saves several test results;
  - Uses infrared optical technology to identify refrigerant type; and
  - Costs US$ 900-3,000

Temperature/pressure method



- Be careful when testing, frostbite & other injury could occur. Safety gloves & masks should be worn.
- Place thermometer with cylinder & wait until the cylinder contents have reached the approximate temperature of the warehouse. For cylinders which are in direct sunlight, allow to cool in shaded area for 1-2 hours.
- Take temperature reading.
- Attach hose to container & open valve to get true reading (PSI)* on gauge.
- After obtaining reading, close valve & remove hose.
- Compare temperature & PSI readings to PSI chart. Refer to temperature/pressure chart in Annex B e.g. for a temperature of 21 degrees Celsius, the PSI should be 70.2 for CFC-12.
- Smugglers can change the pressure of the container by adding other gases, like nitrogen.
- If you suspect something, send the cylinder for laboratory analysis.

* PSI=pounds per square inch

Temperature/pressure method is not recommended due to its low certaininty and other drawbacks

Laboratory analysis

- Laboratories use more extensive techniques for testing (gas chromatography, infrared analysis) than field equipment.
- Laboratory testing can identify specific compounds.
- What size containers can be sent directly to the laboratory?
- Check with the lab to see who can take samples.
- Should be conducted by a professional.

ODS Smuggling

Motives for ODS smuggling

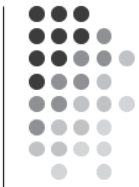
- Existing stock of ODS in global market
- ODS alternatives are often more expensive
- Conversion or modification of equipment, e.g. refrigerators, for ODS alternatives can be costly
- Long life of equipment containing ODS (Refrigerators & AC, Foaming lines, Dry-cleaning machines)

ODS producing countries

Countries that reported non-zero production between 2001 and 2006 (includes countries whose production was for exempt uses such as feedstock uses)

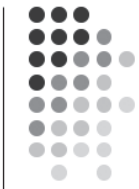
ODS producing countries		
Annex	ODS type	Countries
A-I	CFCs	Argentina, China, Democratic People's Republic of Korea, Germany, Greece, India, Italy Japan, Mexico, Netherlands, Republic of Korea, Russian Federation[1], Spain, United Kingdom, United States, Venezuela
A-II	Halons	China, France, Republic of Korea
B-I	CFCs	China, Italy, Netherlands, United States of America
B-II	Carbon tetrachloride	Brazil, China, Czech Republic, Democratic People's Republic of Korea, France, Germany, India, Italy, Japan, Netherlands, Republic of Korea, Romania, Russian Federation, Spain, United States
B-III	Methyl chloroform	China, Democratic People's Republic of Korea, France, Japan, United States
C-I	HCFCs	Argentina, Canada, China, France, Germany, Greece, India, Italy, Japan, Mexico, Netherlands, Republic of Korea, Russian Federation, Spain, United Kingdom, United States, Venezuela
C-II	HBFCs	United Kingdom of Great Britain and Northern Ireland, United States of America
C-III	Bromochloromethane	United States of America
E-I	Methyl bromide	China, France, India, Israel, Japan, Romania, Ukraine, United States

Smuggling Schemes



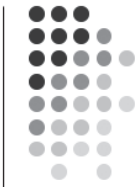
- Front Door Smuggling
- Mislabelling as non-ODS (HC and HFC-134a)
- Mislabelling as recovered/used/recycled ODS
- Concealment & double layering of ODS
- Diverting ODS from transhipment harbours or ODS produced for export—free trade zones
- Declared as equipment

Screening methods



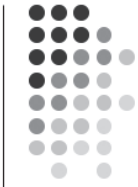
- Risk Profiling- eGRID
- Intelligence Reports
- Screening documentation
- Inspection of Goods

Screening Documentation



- Screening for importers which are not licensed to import or export ODS
- Screening documentation for consistency of codes & names
- Screening by quantity of import/export
- Screening by country of origin
- Screening by transhipment harbour
- Screening by recovered or recycled ODS shipments
- Screening by countries with recycling capacity

Inspection of Goods



- Physical examination of containers & packaging
- Screening containers & packaging for consistency of codes & names
- Check consistency of ISO container labelling
- Consistency check of container type & labelling
- Consistency check on flammability of refrigerants
- Check cylinder valves
- Direct identification & analysis

List of ODS products

- Automobile & truck air-conditioning units (whether incorporated in vehicles or not)
- Domestic & commercial refrigeration & air-conditioning / heat pump equipment, e.g.:
  - Refrigerators,
  - Freezers,
  - Dehumidifiers,
  - Water coolers,
  - Ice machines, and
  - Air-conditioning & heat pump units
- Aerosol products, except medical aerosols
- Portable fire extinguisher
- Insulation boards, panels and pipe covers
- Pre-polymers (i.e. polyol blends used to produce polyurethane foam)

Examples of trade in ODS equipment

- From Europe to Africa: Export of 3 million second hand CFC refrigerators exported
- From Japan to Caribbean & Africa: Export of second hand vehicles with CFC based air-conditioning
- From Europe to Africa: Export of second hand vehicles filled with white and brown goods and waste - often the doors are welded.
- **If equipment was produced before 1996 in a developed country, it is likely to contain CFCs, unless a retrofit has occurred.**

Examples of smuggling schemes

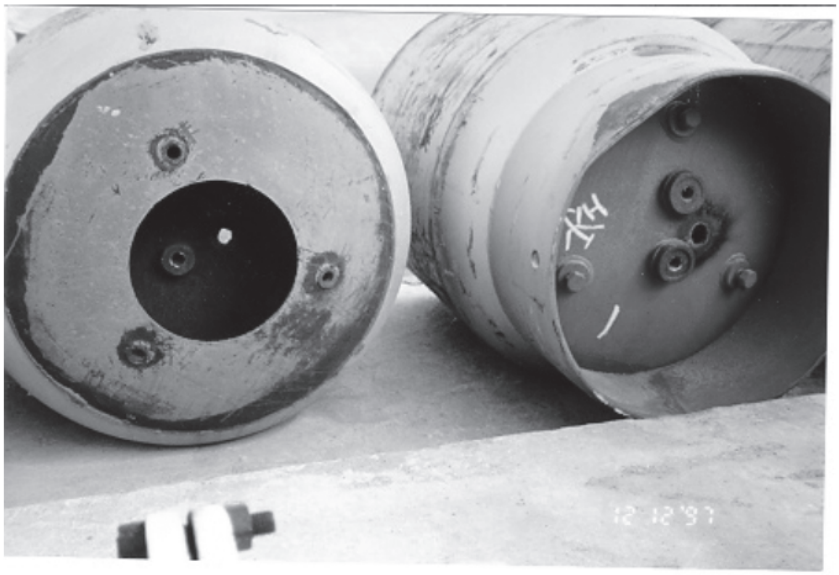
- Asia: Returning migrant workers are accompanied by containers with ODS
- Malaysia: CFCs were smuggled into the country and sold as HFC to the clients
- From Venezuela to USA: 37 tons of CFC were smuggled as refrigerant charge of specifically designed refrigeration units (1999)
- From Greece, Italy, Spain to Pakistan: ISO containers were declared to be partially filled to avoid payment of taxes and duties

Examples of smuggling schemes 2

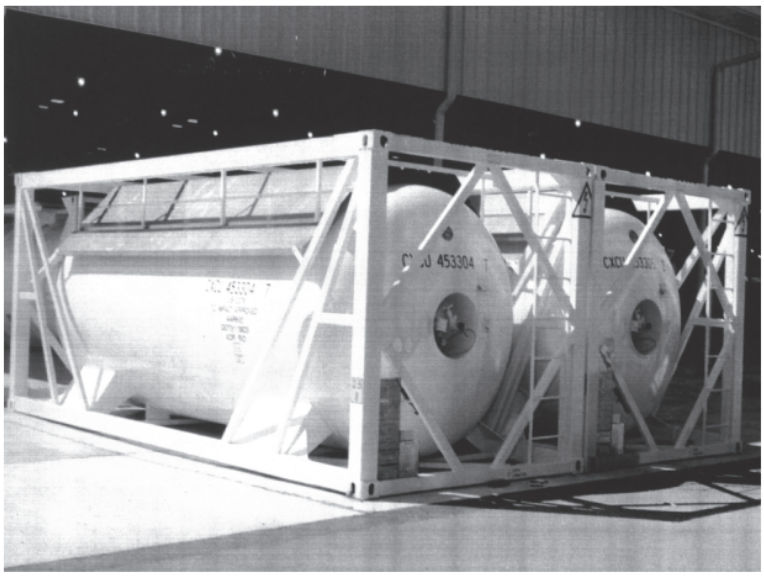
- China to Malaysia: Counterfeit CFCs were produced in China using European trade name - only the access valves were different
- Dubai, Singapore, United Arab Emirates: Trans-shipment harbors
- Nepal: Letters of credit issued for 368 tons despite the ceiling of 26 tons per year under the licensing system
- Bangladesh: Imports raised from 181 tons in 1994 to 832 tons in 1997 resulting in artificially high base line level

Taiwan: Double layered cylinder with small HFC cylinder

Taiwan: Large CFC compartment only accessible after cutting the cylinder



ISO tanks - may be declared partially filled to avoid duties



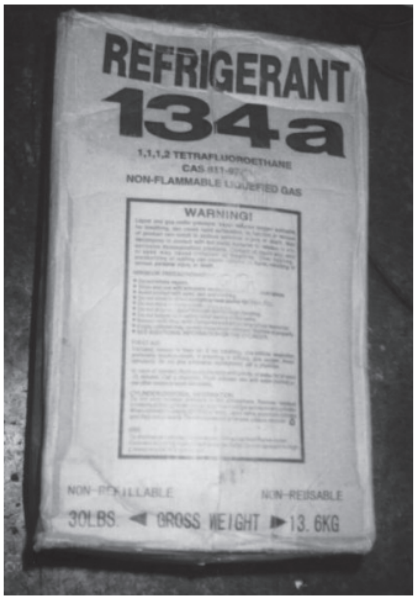
Smuggling CFCs in Compressors or Other Equipment

- Venezuela Scheme:

  Compressor which needed only 3-4 kilograms of CFCs to operate over a lifetime was modified to hold 2,500 kilograms of CFCs.
- Equipment went out for repair to Venezuela and was returned to the USA. Refrigerant was removed and this scheme was used again and again

India / Nepal border: CFCs filled in local size cylinders of 105 kg

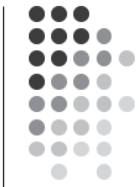
HFC cardboard packaging may contain CFC cylinders



Small CFC canisters --Easy to smuggle in private cars or baggage

Miami: CFC cylinders were smuggled in private boat

Examples of Seizures & Fines

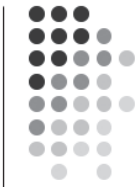


- USA in 1999: 662 seizures of 1000 tons ODS, 133 criminal cases, 87 convictions, 48 years of imprisonment, 38 million US$ fines
- Canada: seizure of 30 lbs cylinder ODS illegally imported from Jamaica, 5000 CN$ and 30 hours of community work

Means to Curb Illegal Trade in ODS

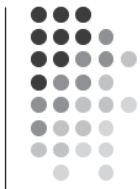
- Effective ODS licensing system
- Effective inter-agency communication
- Routine communication between customs on the border and NOU or ODS licensing agency
- Training for Customs officers
- Yearly review of customs statistics vs. other data on ODS
- Provide ODS identifiers for customs
- Enforcement and penalties for illegal ODS trade

Examples of Regional Cooperation



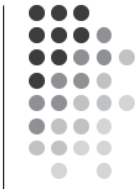
- Information exchange on ODS shipments, including transit trade—PIC mechanism
- Regional Workshops
- Routine communication between customs, police, & environmental authorities in the region (RILOs, Interpol EcoMessage)

Models of Regional Cooperation



- Project Sky Hole Patching
  - Monitor suspicious movements of ODS and dangerous waste
  - Customs, NOUs, RILO A/P, UNEP ROAP, CAP & Basel Convention Regional Center
- NAFTA Commission on Environmental Cooperation
  - Information exchange & developing online training for enforcement officials

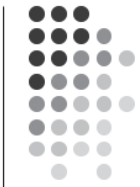
Customs Training



Training Tools

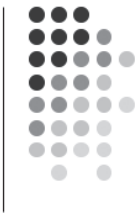
- Deskbook for customs officers
- Country handbook
- UNEP customs training manual
- Videos
- Case studies
- Slides
- Examples of ODS, ODS-containing products & ODS alternatives
- Customs poster
- Customs Quick Tool
- Trade name database
- WWW

Jamaica ODS licensing system: lessons learned



- Half-day training module for new customs recruits
- Consultation of senior customs officers
- Agreed method of visiting major ports of entry
- Public information campaign
- Licensing system built upon existing procedures and methods.

Jamaica ODS Licensing System: Results



- Illegal import of appliances based on ODS reduced from 89 in 2000 to 41 in 2002 - by more than 50%.
- No illegal import of ODS was detected during the project implementation which may be explained with Jamaica‘s long coast line. The protection of the coastline would require police support, investigation techniques, contraband enforcement methods and exchange of intelligence information at regional level.

Annex F
Further References & Websites

Annex F: Further references & websites

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2. *Allied Signal, Quimobasicos and the Frio Banditos: A Case Study of the Black Market in CFCs, Ozone Action, Inc., 1996*
3. *An Unwelcome Encore: The Illegal Trade in HCFCs, Environmental Investigation Agency, 2006*
4. *ARI Guideline N*
5. *ARI Guideline K*
6. *ASHRAE Standard 34-1997 on "Number Designation and Safety Classification of Refrigerants"*
7. *Contraband Cool (news video), Canadian Broadcast Corporation, 19/9/97*
8. *Customs Guide: Controls concerning ozone depleting substance/illegal trade in ozone depleting substance (draft), European Union*
9. *Deadly Complacency: US CFC Production, the Black Market, and Ozone Depletion, Ozone Action, Inc., 1995*
10. *Elements for Establishing Policies, Strategies and Institutional Framework for Ozone Layer Protection, UNEP, 1995*
11. *Fact Sheet No.2 Steps in Preventing Illegal Trade of ODS, "Toward Full Compliance with the Montreal Protocol: A Tool-Kit of Policy Instruments for National Ozone Units", UNEP Compliance Assistance Programme*
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13. *Guidebook for Implementation of Codes of Good Practices – Refrigeration Sector, UNEP, 1998*
14. *Guidelines for Recovery & Recycling Systems – Refrigeration Sector, UNEP, 1999*
15. *Handbook for the International Treaties for the Protection of the Ozone Layer, UNEP Ozone Secretariat, 2000*
16. *Handbook on Data Reporting under the Montreal Protocol, UNEP, 1999*
17. *Information Paper on Montreal Protocol Control Schedule and its Evolution, UNEP, 2000*
18. *Information Paper on Separate Identification of Montreal Protocol Pure*

Ozone-Depleting Substances under the Harmonised System, UNEP, 2000
19. Information Paper on Trade Names for Refrigerants, UNEP, 2000
20. Inventory of Approved Projects, Access Database, Multilateral Fund Secretariat, 2000
21. Monitoring Imports of Ozone-Depleting Substances: A Guidebook, UNEP/SEI/SIDA, 1996
22. Operation Frio Tejas: Ozone –Depleting Substances Information and Identification Reference Guide, US Customs Service
23. Ozone Depleting Substances Regulations: A Refresher Course for Canada Customs Inspectors, Environment Canada
24. ODS Tracking: Feasibility Study on developing a system for monitoring the transboundary movement of controlled ozone-depleting substances between the Parties, Chatham House and Environmental Investigation Agency, 2006
25. Policies, Procedures, Guidelines and Criteria, UNEP Ozone Secretariat, 2000
26. Protecting the Ozone Layer and the Illegal Importation of Chlorofluorocarbons (CFCs) (video), US Environmental Protection Agency, 1997
27. Refrigerant Reference Guide, National Refrigerants, Inc. (USA), 2000
28. Regulations to Control Ozone-Depleting Substances - A Guidebook, UNEP, 1996
29. Report of the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee, UNEP 1998
30. Resource Module on ODS Import/Export Licensing Systems – Policy Design and Setting Up of Legislation, UNEP/SEI, 1998
31. Saving the Ozone Layer: Every Action Counts (video & booklet), UNEP 1996
32. Arctic Ozone Hole – Millions at Risk, Solcomhouse article
33. Training Manual on Good Practices in Refrigeration, UNEP, 1994
34. Training Manual on Chillers and Refrigerant Management, UNEP, 1994

Websites

ARI - Air-conditioning & Refrigeration Institute
http://www.ari.org/

ASHRAE - American Society of Heating Refrigerating & Air-conditioning Engineers, Inc.
http://www.ashrae.org/

Basel Convention Secretariat
www.basel.int

CAS - Chemical Abstracts Service
http://info.cas.org/

CEC - Commission on Environmental Cooperation
http://www.cec.org/

EIA - Environmental Investigation Agency
http://www.eia-international.org/

Environment Canada's Stratospheric Ozone Web Site
http://www.ec.gc.ca/ozone/en/index.cfm

Green Customs Initiative
http://www.greencustoms.org/

International Chemical Safety Cards
http://www.cdc.gov/niosh/ipcs/icstart.html#language

International Occupational Safety and Health Information Centre (CIS)
http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/index.htm

Interpol
http://www.interpol.int/

NASA's Visible Earth catalogue
http://visibleearth.nasa.gov/

Ozone Secretariat
http://ozone.unep.org/index.asp

The Ozone Hole
http://www.theozonehole.com/arcticozone.htm

Total Ozone Mapping Spectrometer (TOMS) Multmedia Images of the Ozone Hole
http://toms.gsfc.nasa.gov/multi/multim.html

Trade names of chemical products containing ozone depleting substances and their alternatives
http://www.unep.fr/ozonaction/information/tradenames/main.asp

United Nations Office on Drugs and Crime
http://www.unodc.org

UNEP DTIE OzonAction Branch
http://www.unep.fr/ozonaction

United States Environmental Protection Agency's Ozone Depletion Home Page
http://www.epa.gov/ozone/index.html

World Bank Montreal Protocol Home Page
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/

World Customs Organisation
http://www.wcoomd.org/

World Trade Organisation
http://www.wto.org/

Annex G OzonAction Programme

G

About the OzonAction Programme

Under the Montreal Protocol on Substances that Deplete the Ozone Layer, countries worldwide are taking specific, time-targeted actions to reduce and eliminate the production and consumption of man-made chemicals that destroy the stratospheric ozone layer, Earth's protective shield.
The objective of the Montreal Protocol is to phase out ozone depleting substances (ODS), which include CFCs, halons, methyl bromide, carbon tetrachloride, methyl chloroform, and HCFCs. One hundred ninety one governments have joined this multilateral environmental agreement and are taking action.
The UNEP DTIE OzonAction Branch assists developing countries and countries with economies in transition (CEITs) to enable them to achieve and sustain compliance with the Montreal Protocol. With our programme's assistance, countries are able to make informed decisions about alternative technologies and ozone-friendly policies.
The Branch has the distinction of implementing more than 1,000 projects and services that benefit of more than 100 developing countries and 17 CEITs, plus other services that assist another 40 developing countries.

OzonAction has three areas of work:

- Assisting developing countries in UNEP's capacity as an Implementing Agency of the Multilateral Fund for the Implementation of the Montreal Protocol, through a Compliance Assistance Programme (CAP).
- Assiting CEITs in UNEP's capacity as an Implementing Agency of the Global Environment Facility.
- Specific partnerships with bilateral agencies and Governments. The Governments of the Czech Republic, Finland, Italy, the Netherlands, Norway and Sweden have also provided bilateral support to UNEP over and above their contribution to the Multilateral Fund to undertake specific projects.

UNEP's partnerships under the Montreal Protocol contriute to the realisation of the Millennium Development Goals and implementation of the Bali Strategic Plan.

For more information about these services please contact:

Mr. Rajendra Shende, Head,
OzonAction Branch
UNEP Division of Technology, Industry and Economics
15, rue de Milan
75441 Paris CEDEX 09, France
Tel: (33) 1 44 37 14 50
Fax: (33) 1 44 37 14 74
Email: ozonaction@unep.fr
Web: http://www.unep.fr/ozonaction/index.asp

Annex H
Useful contacts and addresses

Implementing Agencies

Mr. Rajendra Shende
Head, OzonAction Branch
UNEP DTIE
15, rue de Milan
75441 Paris CEDEX 09, France
Tel: (33) 1 44 37 14 50
Fax: (33) 1 44 37 14 74
Email: ozonaction@unep.fr
Web: http://www.unep.fr/ozonaction

Mr. Sidi Menad Si Ahmed
Director
Multilateral Environmental Agreements Branch
Program Development and Technical
Cooperation Division, UNIDO
Vienna International Centre
Wagramerstr. 5 P.O. Box 300
A-1400 Vienna, Austria
Tel: +43 1 26026-3782
Fax: +43 (1) 2692669
Email: S.Si-Ahmed@unido.org
Web: http://www.unido.org

Dr. Suely Machado Carvalho
Chief
Montreal Protocol Unit
UNDP
304 East 45th Street
9th floor, Room 970,
New York 10017
United States of America
Tel.: (1 212) 906-6687
Fax: (1 212) 906-6947
Email: suely.carvalho@undp.org
Web: www.undp.org/chemicals

Mr. Steve Gorman
GEF Executive Coordinator and
POPs/MP Team Leader
The World Bank
Environment Department
Room MSN-MC4-419
1818 H Street NW
Washington D.C. 20433
United States of America
Phone: (1 202) 473 5865
Fax: (1 202) 522 3258/6
Email: sgorman@worldbank.org
Web : http://www.worldbank.org/

Multilateral Fund Secretariat
Ms. Maria Nolan, Chief Officer
Multilateral Fund Secretariat
27th Floor, Montreal Trust Building
1800 McGill College Avenue
Montreal, Quebec H3A 6J6, Canada
Tel: (1-514) 282 1122
Fax: (1-514) 282 0068
Email: secretariat@unmfs.org
Web: http://www.multilateralfund.org/

UNEP Ozone Secretariat
Mr. Marco Gonzalez Executive Secretary
Ozone Secretariat
United Nations Environment Programme
United Nations Avenue, Gigiri
P.O. Box 30552
Nairobi 0010
Kenya
Tel: (254 20) 762 3850/51
Fax: (254-20) 762 46 91/92/93
Email: marco.gonzalez@unep.org
Web: http://ozone.unep.org/index.asp

United States Environmetal Protection Agency

U.S. EPA
Mail Code 6205J
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460-0001
USA
Tel 1 301-614-3396
Fax 1 202-565-2155
Web: http://www.epa.gov/ozone/index.html

World Customs Organization

Mr. Hui Fu
Technical Attaché
Compliance and Facilitation
30 Rue du Marche
B-1210 Bruxelles, Belgium
Tel (32-2) 209-9245
Fax: (32-2) 209-9493
Web: http://www.wcoomd.org

Regional Intelligence Liaison Office (RILO)

RILO Asia and the Pacific
10th Floor, East Wing, Jia 10,
Guang Hua Road. Chao Yang District,
Beijing, China 100026
Tel: 86 10 6539 6346
Fax: 86 10 6539 6349
e-mail: rilo-ap@customs.gov.cn

RILO Middle East
P.O.Box 22631, Riyadh 114416, Saudi Arabia
Tel: 966 1 478 78 89 Fax: 966 1 478 58 87
E-mail: rilo_riyadh@yahoo.com

RILO Eastern and Southern Africa
Times Towers, 9th Floor, Haile Selassie Avenue,
P.O. Box 72236-00200, Nairobi, Kenya
Tel: 254 20 340 414
Fax: 254 20 317 964 / 254 20 241 317
E-mail: rilo.esa@kra.go.ke

RILO Central Africa
Directorate General of Customs
P.O box:4049 Douala Cameroon
Tel:(00237)3010464
Fax:(00237)3010510
e-mail: rilobrlr@yahoo.com

RILO Western Africa
Rue René Ndiaye angle Carde, B.P. 4033,
Dakar, Senegal
Tel: 221 8 22 11 85
Fax: 221 8 22 55 69
E-mail: brlrdakar@sentoo.
sn or i.seck@sentoo.sn

RILO North Africa
Administration des douanes et impôts indirects,
Boulevard Hassan II, B.P. 1799, Rabat, Morocco
Tel: 212 37 71 78 38 /37 57 94 42
Fax: 212 37 71 78 38
E-mail: brlr.rilo.naf@douane.gov.
ma or a.lakbir@douane.gov.ma

RILO Eastern and Central Europe,
Room 4388, 12 Swietokrzyska Str, 00-916
Warsaw, Poland
Tel: 48 22 8 26 91 89
Fax: 48 22 8 27 67 97
E-mail: agnes@rilo-waw.pl

RILO South America
Dirección nacional de aduanas, Plaza Sotomayor, 60, Valparaiso, Chile
Tel: 56 32 200 645
Fax:56 32 233 163
E-mail: rilosa@aduana.cl

JOINT INTELLIGENCE OFFICE (JIO),
CARIBBEAN CCLEC - CARIBBEAN CUSTOMS LAW ENFORCEMENT COUNCIL
4 Manoel Street, P.O. Box 1030,
Castries - St. Lucia
Tel:1 758 453 2556 / 1 758 453 7705
Fax: 1 758 453 2563
e-mail: cclec@candw.lc

RILO CIS (Commonwealth of Independent States)
Central Enforcement Department of the Federal Customs Service,
Novozavodskaya Street, 11/5, 121087 Moscow, Russia
Tel: 007 495 449 86 86
Fax: 007 495 449 86 90/86
Email: rilo-moscow@gubk.customs.ru

Keep in mind ...

Much of the Montreal Protocol's success can be attributed to its ability to evolve over time to reflect the latest environmental information and technological and scientific developments. Through this dynamic process, significant progress has been achieved globally in protecting the ozone layer.

As a key agency involved in the implementation of the Montreal Protocol, UNEP DTIE's OzonAction Programme promotes knowledge management in ozone layer depletion through collective learning. There is much that we can learn from one another in enforcing import & export controls of ozone depleting substances.

This updated Customs training manual reflects the latest developments of the Montreal Protocol and its Amendments and the latest information available concerning the Harmonised Customs Codes for pure substances and mixtures as well as other relevant issues that have arisen in the past years. This is a result of the various experiences gained and the knowledge developed and exchanged throughout the years by all the different parties involved.

We encourage you to continue sharing with the OzonAction Programme your experiences as well as new issues of concern related to Customs training, illegal trade in ODS and the enforcement of the licensing system to control trade in ODS in your country so that we can inform others involved in these issues about the lessons learned and the innovative approaches to take. The more we share such information, the better are the chances to prevent illegal trade.

Send us an email, fax or letter about your experiences and successes in combating illegal trade in ODS. We will consider it as an important part of collective learning.

Based on the feedback and information received, UNEP will update this training manual, particularly the electronic version available from the OzonAction website, to reflect the latest developments.

We count on your enthusiasm and active participation. Let us learn collectively to protect the ozone layer.

Mr. Rajendra Shende, Head
UNEP DTIE OzonAction Branch, France

About the UNEP Division of Technology, Industry and Economics

The UNEP Division of Technology, Industry and Economics (DTIE) helps governments, local authorities and decision-makers in business and industry to develop and implement policies and practices focusing on sustainable development.

The Division works to promote:

> sustainable consumption and production,
> the efficient use of renewable energy,
> adequate management of chemicals,
> the integration of environmental costs in development policies.

The Office of the Director, located in Paris, coordinates activities through:

- **The International Environmental Technology Centre** - IETC (Osaka, Shiga), which implements integrated waste, water and disaster management programmes, focusing in particular on Asia.
- **Sustainable Consumption and Production** (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
- **Chemicals** (Geneva), which catalyzes global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
- **Energy** (Paris), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
- **OzonAction** (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
- **Economics and Trade** (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies.

UNEP DTIE activities focus on raising awareness, improving the transfer of knowledge and information, fostering technological cooperation and partnerships, and implementing international conventions and agreements.

For more information, see **www.unep.fr**

An essential tool in building the capacity of Customs officers, The Training Manual for Customs Officers provides the necessary guidance and information to effectively monitor and facilitate the legal trade in ozone depleting substances and to combat their illegal trade. It presents information on the international policy context and an overview of the technical issues, including information on chemicals and products traded and how these may be smuggled. The manual is intended to be used in conducting training programmes for Customs officers as well as serving as a stand-alone reference document.

Now in its second edition, this version takes into account the developments in international trade and provides new material to reflect changes in the Montreal Protocol, Harmonised System codes, licensing systems and other relevant information since its original publication in 2001.

www.unep.org

United Nations Environment Programme
P.O. Box 30552 Nairobi, Kenya
Tel.: +254-(0)20-762 1234
Fax: +254-(0)20-762 3927
E-mail: uneppub@unep.org

UNEP

For more information, contact:

UNEP DTIE
OzonAction Branch

15 rue de Milan
75441 Paris CEDEX 09
France
Tel: +33 1 4437 1450
Fax: +33 1 4437 1474
E-mail: uneptie@unep.fr
www.unep.fr/ozonaction

DTI/0905/PA