UNEP

Training Manual for Customs and Enforcement Officers

Third Edition

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

United Nations Environment Programme

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The reviewers listed in this guide have reviewed one or more interim drafts of this guide, but have not reviewed this final version. These reviewers are not responsible for any errors that may be present in this document or for any effects that may result from such errors.

UNITED NATIONS PUBLICATION
ISBN: 978-92-807-3295-5

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Training Manual for Customs and Enforcement Officers

Third Edition

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

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Acknowledgements

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

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With special thanks for the invaluable contribution to this manual:

UNEP DTIE specifically acknowledges the contribution of the following:

Visible Earth -
National Aeronautics and Space Administration (NASA)
catalogue of NASA images and animation
http://visibleearth.nasa.gov/

Environmental Investigation Agency (EIA)
http://www.eia-international.org/
Cover photos kindly provided by EIA

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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 national border controls. This illicit trafficking undermines the substantial hard work, financial resources and time invested by the governments, companies and individuals to implement this treaty. As part of their compliance with the Montreal Protocol, each nation that is a Party to the treaty has to set the necessary policies to regulate trade in these chemicals and establish a monitoring and control system at the borders to enforce them. The Customs and enforcement officers, which are the focus of this publication, are the people who make this import-export control system work. They are the front line of defence.

The United Nations Environment Programme recognizes this critical role Customs and enforcement 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 and enforcement 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 (MLF), has developed this training manual and the course methodology. Under the MLF, more than 16,000 Customs and enforcement officers worldwide have been trained by various agencies. This vast majority have been trained by OzonAction's Compliance Assistance Programme (CAP) using this manual. However, refresher training courses will have to be conducted in order to keep Customs and enforcement officers up to date with the latest issues and developments.

This third edition of the manual is updated to reflect the evolving role of Customs and enforcement officers in implementing their commitments under the Montreal Protocol. It includes additional information on all the substances now controlled under the Montreal Protocol, with a focus on hydrochlorofluorocarbons (HCFCs) which are primarily used as refrigerants and foam blowing agents. HCFCs replaced chlorofluorocarbons (CFCs) which were phased out by 1st January 2010. As most ozone depleting substances are also potent greenhouse gases, the section dealing with linkages between ozone layer depletion and global warming has been extended to include new scientific findings.

We hope that this manual helps Customs and enforcement officials and staff in their daily work and encourages them to see that their traditional role as guardians 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

AHRI	AHRI - Air-Conditioning, Heating 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
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
CUE	critical use exemption
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
HFO	hydrofluoroolefin (unsaturated HFC)
HPMP	HCFC Phase-out Management Plan
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
MDI	metered dose inhalers
MEA	multilateral environmental agreement
MLF	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
PU	Polyurethane
QPS	quarantine and pre-shipment
RILO	Regional Intelligence Liaison Office
RMP	Refrigerant Management Plan
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
XPS	Extruded polystyrene foam

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 (as amended and adjusted at a later stage) 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. In developed countries production and consumption of all ODS other than HCFCs has already been phased out except for few exempted uses. Developing countries may produce and consume CFCs, halons, HBFCs, and CTC only for exempted uses while production and consumption of MB, TCA and HCFCs is still allowed.

In 2011 global production and consumption of all ODS amounted to about 40 000 ODP tonnes which implies that significant quantities were traded worldwide. Monitoring trade in ODS is thus crucial to ensure compliance with the Montreal Protocol provisions.

Most developing countries do not produce or manufacture ODS; they generally only import them. Therefore, in order to guarantee that the Protocol's phase-out targets for ODS are met, all Parties are obliged to establish a licensing system covering both import and export (including re-export) of ODS to help control and monitor the amount of these substances 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 and Enforcement Officers in developing countries. The country's HCFC Phase-out Management Plan (HPMP) will contain components on Customs and enforcement training and these can be referenced.

How should the training programme be conducted?

The training methodology adopted may need to be adapted to suit the particular needs of the country; the following is a recommended approach:

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

- Phase I: Train-the-Customs and Enforcement Officers - trainers
- Phase II: Train-the-Customs Enforcement Officers - 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 potential for high turnover of Officers within the Customs service, the ultimate goal of the training programme is for this to be integrated within the national Customs training curricula to ensure that this type of training is maintained for new Customs Officers. The focus of the customs training curricula should be on building capacities of the trainers in order to sustain training. It would also be preferable, whenever possible, that the training involve all enforcement stakeholders and that the training is institutionalised to include junior officers and middle-rank or senior managers.

Other approaches to training customs officers on ODS may also be considered instead of following a three phase approach described above. An example of such alternative approach ("Model Training Strategy for Enforcement Officers under the HPMP" developed by ROAP) can be seen in Annex D-6.

What is the scope of the manual?

The training manual is intended to be used for any Montreal Protocol–related Customs training in developing countries in which Customs training is approved as part of their HCFC Phase-out Management Plan (HPMP) 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 combating illegal trade in ODS. Information on ODS substitutes is also included, because ODS are often fraudulently traded under the names of substitutes and alternative chemicals.

Special emphasis is placed on HCFC refrigerants and foam blowing agents, which presently 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 is expected to increase in coming years.

Who should use the manual?

Implementing and bilateral agencies under the Multilateral Fund for the Implementation of the Montreal Protocol (MLF) 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 presentations.

International Customs trainers may use the manual as training material for Phase I of the Customs training programme in conjunction with the country's HPMP.

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 and substitutes, as well as the link between depletion of the ozone layer and climate change.

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 organizers 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 presentation slides to be used during the Phase II training. They also include ODS safety cards.

Additional learning tools

Video resources

Seven 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, “The Antarctic Ozone Hole -- From Discovery to Recovery, a Scientific Journey”
- 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, “Protecting Our Atmosphere for Generations to Come: 25 Years of the Montreal Protocol
- Video 7: The Arctic and the Ozone Layer: Stabilizing our Environment and Climate.

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, as it contains the Customs checklist for examining ODS shipments, describes the different smuggling schemes and includes the Customs Officer’s Quick Tool for Screening ODS – see below.

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 originally developed by UNEP’s Compliance Assistance Programme in West Asia and was revised in 2013 to complement this third version of the Customs training manual.

Enforcement Strategies for Combating the Illegal Trade in HCFCs and Methyl Bromide

UNEP DTIE publication available at
http://www.unep.fr/ozonaction/information/mmcfiles/
7622-e-Enforcement_Strategies_Illegal_Trade_HCFCs.pdf

Risk Assessment on Illegal Trade in HCFCs

UNEP DTIE publication available at
http://www.unep.fr/ozonaction/information/mmcfiles/7507-e-risk_assessment.pdf

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.org/ozonaction/tradenames).

Case studies for Customs officials

The case studies that appear in Annex D.11 can be adapted to each country to include relevant names, places and organisations.

Presentation Slides

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, should be made available during the training for display and for the practical exercises.

Document display

During the training, a display table should be set up for 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. Documents in high-quality desktop publishing formats are available upon request. UNEP encourages national Customs and enforcement agencies to translate, adapt or otherwise use the original material. Information about this process is available at http://www.unep.org/ozonaction/Topics/Customs/tabid/6402/Default.aspx

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:

$$3O_2 \rightleftarrows 2O_2 + 2O \rightleftarrows 2O_3$$

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.

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 irritant gas, it may cause human respiratory problems, especially in older people and young children. It also can damage plants.

Video 1: NASA video, "Ozone Creation"

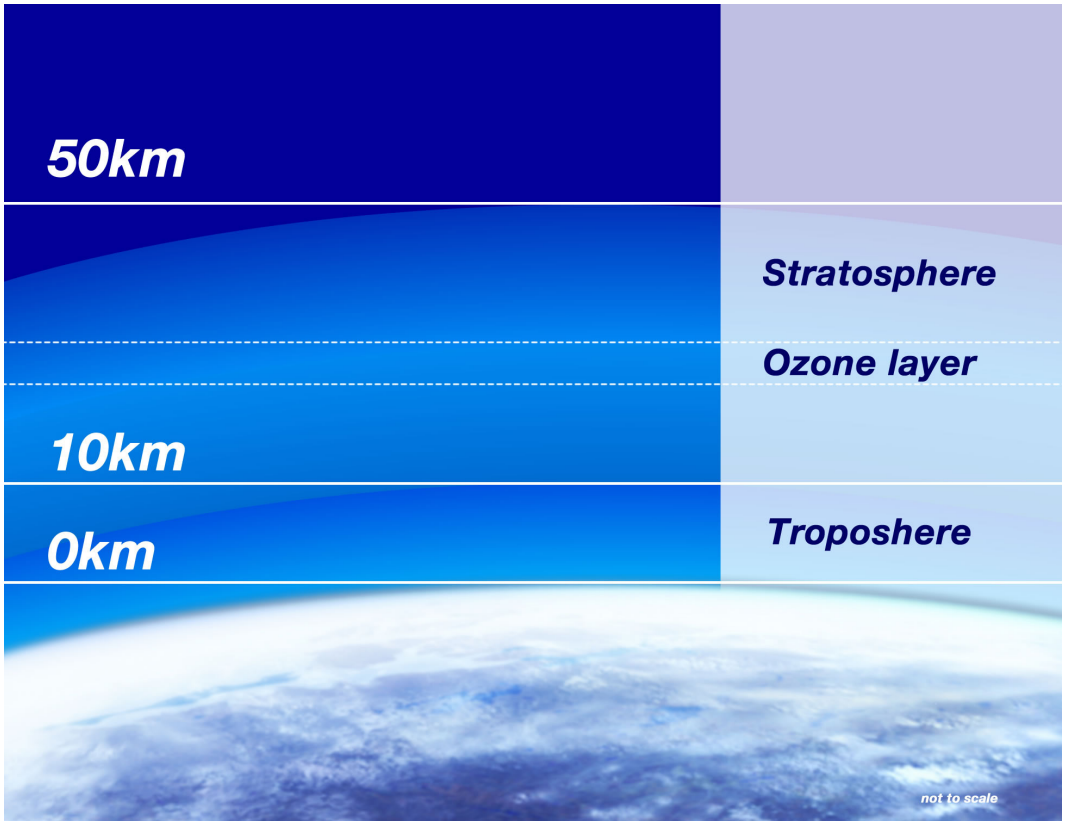


Figure 1-1 The layers of the earth's atmosphere

Why is the ozone layer very important?

The ozone layer is vital to life on earth because it acts as a filter for UV 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

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.

Flora

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 organisms 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.

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 the release of 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 km^2. 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.

UNEP video 3, “The Antarctic Ozone Hole: From Discovery to Recovery, a Scientific Journey”

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.

UNEP video 7, “The Arctic and the Ozone Layer: Stabilizing our Environment and Climate”

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. More information on ozone holes can be found at http://ozone.unep.org/new_site/en/faqs.php

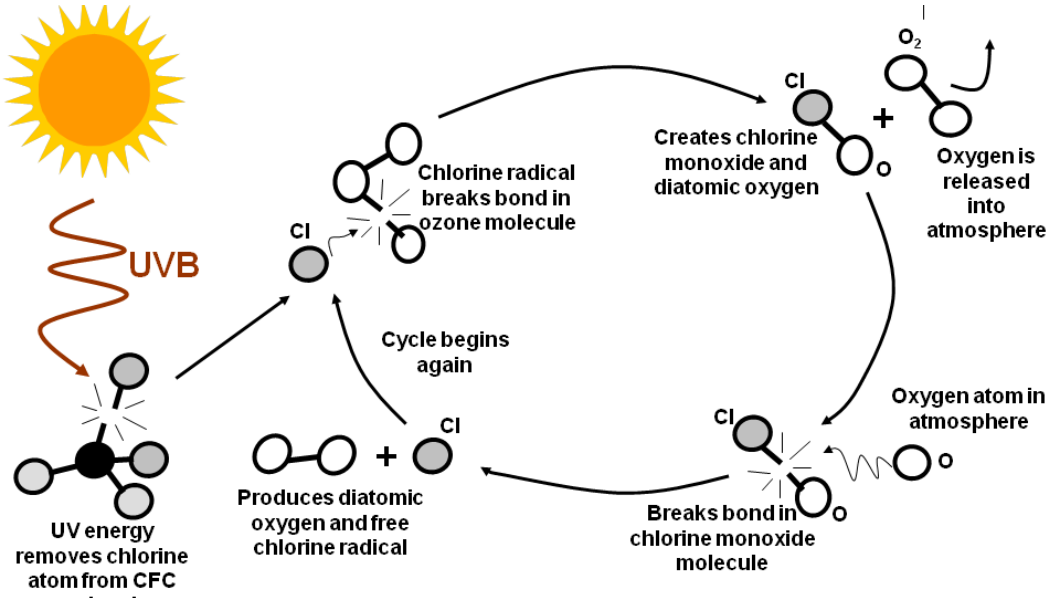
How is ozone destroyed?

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.

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 1-2 illustrates the process through which chlorofluorocarbons (CFCs), a type of ODS, deplete ozone.

Figure 1-2 How CFCs deplete the ozone



Video 2: NASA video, "Ozone Destruction"

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

Most ODS are also potent greenhouse gases having high global warming potentials (GWPs). Thus, phasing out ODS not only protects the ozone layer, but also contributes to climate protection.

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 and linkages with ozone layer depletion 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. The production and consumption of CFCs has been phased out since 2010. HCFCs, transitional substances, are in the process of 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 rapidly being replaced by the less ozone-damaging HCFC refrigerants (ODP and GWP > 0), HFC refrigerants (ODP = 0, but GWP > 0) and hydrocarbon (HC) and CO_2 (ODP = 0 and GWP very low).

Many old domestic refrigerators in developing countries still use CFC-12 as a refrigerant while newly produced units mainly contain either HFC or HC (non-ODS substances) in their cooling circuits. 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, but many new systems contain non-ODS refrigerants such as HFCs (manly HFC-134a) or HCs (mainly propane or cyclobutane), often used in the form of mixtures/blends (R-404A, R-410A). Newly designed CO_2-based refrigeration systems have also become more common. 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 the CFC-containing mixtures R-500 (a mixture of CFC-12 and HFC-152a) and R-502).

Air-conditioning and heat pump systems for buildings may contain large amounts of HCFC-22, CFC-11, CFC-12 or CFC-114 as refrigerants, but HFCs (mainly HFC-134a) and HCs (mainly propane) and mixtures containing HFCs, for example, R-407C, R-404A or R-410A, which have also become very common in these applications. CFC refrigerants are often found in the air-conditioning systems of vehicles manufactured before 1994. Since that time most air-conditioned vehicles have been produced with HFC-134a refrigerant. Presently, new types of refrigerants including unsaturated HFCs with very low GWPs (so called "HFOs") are now being used instead of HFC-134a in air-conditioning systems in passenger cars.

Many drop-in substitutes for CFC-12 refrigerants are based on mixtures containing HCFCs, such as R-401A or R-409A.

It is worth noting that 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 agents

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. Recently, CFC-11 had been replaced by HCFC-141b, HFC-142b or non-ODS alternatives (HFCs – mainly HFC-245fa, HCs – mainly cyclopentane or n-pentane, CO_2 or other non-ODS blowing agents e.g. methylal).

As cleaning solvents

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. 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 was used for cleaning purposes in aerosol production.

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 essential use) are produced without CFCs. The most common replacements for CFCs in this application are HCs or HFCs (mainly HFC-134a or HFC-152a), though HCFCs may also be used in certain formulations.

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 were used for medical sterilisation purposes in hospitals and health care facilities. The CFC compound reduced the flammability and explosive risk from the ethylene oxide. The most common mixture, 12/88, contained 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 based on HCFCs or HFCs 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. While methyl bromide use in developing countries for general fumigation purposes will cease in 2015, except for critical uses, the Montreal Protocol will, however, still permit the use of methyl bromide for quarantine and pre-shipment applications (see Chapter 2). It must be noted that methyl bromide is a very toxic chemical and cylinders containing methyl bromide should only be handled by qualified and properly trained personnel.

As feedstock and process agents

Quantities of ODS traded for use as feedstock and process agent are exempted from the Montreal Protocol phase-out schedules. CFCs, HCFCs and carbon tetrachloride are still commonly used as feedstock in chemical synthesis. ODS used for feedstock applications are usually not released to the atmosphere and therefore do not contribute to ozone layer depletion. Carbon tetrachloride, when used as a process agent, facilitates chemical reaction processes. If a monitoring system has not yet been established, ODS declared for feedstock or process agent applications could be diverted to other uses that have already been banned.

For laboratory and analytical purposes

Small quantities of carbon tetrachloride and other ODS are used in laboratories for chemical reactions and as analytical reagents. This use is considered by the Montreal Protocol provisions as global essential use, and is thus exempted from the control measures.

What are ODS substitutes?

As shown in the sections above, ODS are gradually being phased out from all applications except for a few specific areas comprising essential, feedstock and process agent uses. The following are the main substitutes for CFCs and HCFCs which are presently used in large quantities in almost all applications:

- Hydrofluorocarbons (HFCs): R-134a, R-152a and R-32 are the most popular ODS substitutes. Most HFCs are also potent greenhouse gases.
- Hydrocarbons (HCs): R-290 (propane), n-pentane and R-600a (cyclobutane) are the most popular ODS substitutes. However HCs are flammable substances.
- Mixtures containing the above substances.

Other popular substitutes for CFCs and HCFCs are CO_2 (used in refrigeration and foam blowing only) and ammonia (used in refrigeration).

New emerging substitutes for CFCs and HCFCs are unsaturated HFCs, also known as hydrofluoroolefins (HFOs), which have much lower GWPs than HFCs. The most popular HFOs are : HFC-1234yf (used in refrigeration and air conditioning) and HFC-1234ze (used in foam blowing).

The most frequently used substitutes for halons in fire fighting are HFCs, fluorinated ketones and not-in-kind alternatives such as water mist or nitrogen.

The most frequently used substitutes for methyl bromide are specialty pesticides (e.g. 1,3-D, metam sodium or chloropicrin) and phosphine or sulphuryl fluoride. Not-in-kind alternatives such as heat treatment may also be applied.

How are ODS released into the stratosphere?

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

- 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 without prior recovery of the ODS
- 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.

When will the ozone layer recover?

According to the 2010 report of the Scientific Assessment Panel, if all parties to the Montreal Protocol and its Amendments comply with their phase-out obligations, the average concentration of ozone molecules in the stratosphere will reach “normal” (1980) levels over the globe by 2025-2040, but ozone layer recovery over the Antarctic will take 20-30 years longer. This long recovery time takes into account the amounts of ODS contained in refrigerators and other equipment that will eventually be released and the current and projected levels of production of HCFCs. The length of the recovery period stems in part from the long lifetime of ODS and the nature of the ‘chain reaction’ that destroys ozone molecules. The Antarctic ozone hole is expected to recur regularly for around 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, 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, 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 created 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 attempting 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 many ODS are also powerful greenhouse gases.
- The Montreal Protocol controls the trade in ozone-depleting chemicals. The Kyoto Protocol does not have any trade provisions with regard to greenhouse gases.

What is being done to save the ozone layer?

Before the 1970s, the world community was not generally 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, 197 countries and the European Union are Party to the Montreal Protocol, which makes the Montreal Protocol the only international environmental treaty ratified by all countries in the world. . 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 layer 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. The Green Customs Initiative, also described below, 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. The concept of the informal Prior Informed Consent (iPIC) procedure on information exchange on ODS trade is also explained. Other important 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 the Protocol has achieved universal ratification with 197 countries and the European Union having committed themselves to phase out the consumption and production of ODS.
The original 1987 Protocol listed eight controlled ODS - five CFCs (Annex A, Group I), three halons (Annex A, Group II) - and specified 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”. Currently there are around 100 specific ODS controlled by the Protocol,

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/new_site/en/Treaties/treaties_decisions-hb.php?sec_id=25). Decisions appear in the “Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer” (http://ozone.unep.org/Publications/MP_Handbook/MP-Handbook-2012.pdf).

It is important to know that while the Montreal Protocol contains phase-out schedules related to controlled substances, it does not control products (including equipment) containing those substances. Therefore, 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 a 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. This concerns, for example ODS solvents which are often traded under commercial names only and their composition is not revealed in customs documentation.

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.

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/new_site/en/Treaties/treaties_decisions-hb.php?sec_id=25) 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.

2007 Montreal Adjustment

The 2007 Nineteenth Meeting of the Parties in Montreal revised the control measures for HCFCs in developed and developing countries. Specifically, developing countries agreed to phase out HCFCs by 2030 with possibility of using certain quantities of HCFCs for servicing refrigeration and air conditioning equipment until 2040.

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 usually binding after a 10-year grace period following that of the 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 large quantities of ODS, in particular, HCFCs and methyl bromide.

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, 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, or

consumption = (production + imports) – exports.

Most Article 5 countries historically imported all ODS used in the country. More recently ODS production is well established in a small number of Article 5 countries.

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 freeze level for HCFCs was set at the base level, which was defined as a country's average consumption (/production) between 2009 and 2010. After the freeze date (1 January 2013), the country's annual consumption (and production) could not exceed its freeze level. Then from 31 December 2014 the gradual phase-out begins.

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* 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

** 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/or 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. There is also a "critical use" provision under the Montreal Protocol that applies only to methyl bromide. A country may be granted a "critical use exemption" (CUE) for methyl bromide which allows it to import or produce a given quantity of that substance in a given calendar year and use it for the specified applications approved by the Parties in a decision. 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 production of CFCs for Metered Dose Inhalers (MDIs), for example, is currently allowed under the Montreal Protocol in the framework of essential use exemption process.

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. Decisions VII/5 and XI/12 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, as defined under the Montreal Protocol (decision XI/12), are those non-quarantine treatments applied within 21 days prior to export to meet the official requirements of the importing country or existing official requirements of exporting country. Exempted imports of methyl bromide for QPS use may be illicitly 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, provided the Party does not exceed the make-up quantity[1] or consumption and emission limits set up for it (Decisions X/14 and XXII/8).

1 Make-up quantity - the quantity of controlled substance per year, needed to continue the manufacture of products in a plant, due to transformation, destruction and inadvertent losses (i.e. emissions and residual amounts in the final product)". Source: Report of the Process Agent Task Force, October 2004

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.

Critical use of methyl bromide

Non-Article 5 countries have already phased out production and consumption of methyl bromide in 2004, yet some of them are still applying for critical use exemption allowances, which is possible based on consent from the Meeting of the Parties. Article 5 countries may still produce and consume methyl bromide until the end of 2014, and until then cannot request critical use exemptions. However, they will be eligible from 1 January 2015.

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 September 2012, all countries in the world had ratified the Montreal Protocol, making it the first and only universally ratified Multilateral Environmental Agreement.

The actual status of ratification for each Party of each Amendment is available on the Ozone Secretariat website, http://ozone.unep.org/new_site/en/treaty_ratification_status.php. Tables 2-3a and 2-3b show the restrictions in trade with non-Parties with regard to particular groups of controlled substances.

Table 2-3a : Trade restrictions by amendment for Article 5 countries

Status of ratification by A 5 country	Trade permitted with Article 5 countries? Y = Yes N = No								
	CFCs	Other CFCs	Halons	CTC	MCF	MB	HBFC	HCFC	BCM
Montreal Protocol only	Y	N	Y	N	N	N	N	Y	N
London Amendment	Y	Y	Y	Y	Y	N	N	Y	N
Copenhagen Amendment	Y	Y	Y	Y	Y	Y	Y	Y	N
Montreal Amendment	Y	Y	Y	Y	Y	Y	Y	Y	N
Beijing Amendment*	Y	Y	Y	Y	Y	Y	Y	Y	Y

*Note: Ratification of the Beijing Amendment is not mandatory for Article 5 Parties with regard to trade in Annex CI substances (HCFCs) only until 31.12.2012 (Decision XX/7 of the Parties).

Table 2-3b : Trade restrictions by amendment for non-Article 5 (Article 2) countries									
Status of ratification by A 2 country	Trade permitted with non-Article 5 countries? Y = Yes N = No								
	CFCs	Other CFCs	Halons	CTC	MCF	MB	HBFC	HCFC	BCM
Montreal Protocol only	Y	N	Y	N	N	N	N	N	N
London Amendment	Y	Y	Y	Y	Y	N	N	N	N
Copenhagen Amendment	Y	Y	Y	Y	Y	Y	Y	N	N
Montreal Amendment	Y	Y	Y	Y	Y	Y	Y	Y	N
Beijing Amendment*	Y	Y	Y	Y	Y	Y	Y	Y	Y

Actual list of ratification of individual amendments by countries and actual list of countries qualified as Non-Article 5 Parties can be found on the Ozone Secretariat's website: http://ozone.unep.org/new_site/en/treaty_ratification_status.php
Trade in ODS-containing products (including equipment)

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 to the original Protocol. Presently, since all countries have ratified the Protocol, this table is for information purposes only. However since the same products listed below may also contain HCFCs, you may use this table for a quick check if trade in products containing HCFCs is restricted in your country. A more detailed table based on HS classification of goods with respect to their customs codes showing the products (including equipment) which may contain ODS or rely on ODS is contained in Annex B.4.

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 all countries are now parties to the original Montreal Protocol and many of them have ratified all or most of the Amendments, 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 as of 1 January 2000, each Party should have established and implemented 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). Since the Montreal Protocol definition of controlled substance also covers substances contained in mixtures, the obligation to establish a licensing system also includes import and export of mixtures containing ODS.

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.

The great majority of the 194 Parties to the Montreal Amendment to the Protocol have now established import and export licensing systems for ozone-depleting substances, as required by the amendment, and have provided disaggregated information on their licensing systems detailing which annexes and groups of substances under the Montreal Protocol were subject to those 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. Some other countries decided to license only ODS imports despite the obligation that the licensing system cover both imports and exports, which could enable smugglers to use these countries as transit 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. Parties are being encouraged and given the assistance they need to establish and maintain their own licensing systems.

Dumping equipment containing ODS or whose functioning relies on ODS

As the phase-out of ODS progresses and countries introduce use bans and other restrictions concerning ODS, the issue of dumping obsolete equipment containing or relying on ODS can increasingly become a problem. This occurred in the context of the CFC phase-out with equipment containing or relying on CFCs and now this is again taking place with equipment containing or relying on HCFCs. The equipment concerned is mostly equipment designed for HCFC-22 used in the refrigeration or air conditioning sector, but foaming equipment (old PU foam machines, spray foaming machines and XPS foaming equipment) which all operate using R-141b can also be subject to dumping because it generally cannot be retrofitted to non-ODS blowing agents.

The issue of dumping obsolete ODS equipment has been addressed by the Parties to the Montreal Protocol which 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 climate change, the generation, transboundary movement and management of hazardous waste, the international trade of hazardous chemicals and pesticides, persistent organic pollutants, 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), the United Nations Office on Drugs and Crime (UNODC), UNEP and the secretariats of six multilateral environmental agreements (MEAs): Basel Convention, the Rotterdam Convention the Stockholm Convention, Convention on Biological Diversity (CBD), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Ozone Secretariat. The Initiative has organized integrated Customs training and developed the Green Customs Guide and e-learning modules.

The objective of the Green Customs Initiative is to enhance the capacity of Customs and other 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 at 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.

Recently, following recommendations by the Partners to the Green Customs Initiative and participants in the training workshops, e-learning modules for customs officers have been developed jointly by the Partners in cooperation with WCO. These include an introduction to the Green Customs Initiative and a training module for Customs officers on the Montreal Protocol which is based on this Customs Training Manual, as well as modules on other multilateral environmental agreements.

Access to the modules can be arranged through the national WCO contact point and is free, and access to this is limited to customs and enforcement officers. Access to the modules on the Basel, Rotterdam and Stockholm Conventions will also be made available through the website of these MEAs: http://www.basel.int; http://www.pic.int; and http://www.pops.int

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. As of 15 February 2013, it has 179 Parties. The Convention responds to the international community’s challenges stemming from the worldwide generation of hundreds of millions of tonnes of waste, some of which are managed and moved across international borders in ways that may have negative effects on human health and the environment. This global environmental treaty aims at minimizing the generation of hazardous and other wastes, requires Parties to manage such wastes in an environmentally sound manner and strictly regulates the transboundary movements of such wastes.

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, 177 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

The dramatic growth in chemical production and trade during the past three decades has raised concerns about the potential risks posed by hazardous chemicals and pesticides. Countries lacking adequate infrastructure to monitor the import and use of these chemicals are particularly vulnerable. 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. The Convention was adopted in 1998 and 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. The Convention introduces the Prior Informed Consent (PIC) procedure, a mechanism for formally obtaining and disseminating the decisions of importing Parties as to whether they wish to receive future shipments of those chemicals listed in Annex III of the Convention and for ensuring compliance with these decisions by exporting Parties. The Convention also facilitates information exchange among Parties for a very broad range of potentially hazardous chemicals. The Convention requires each Party to notify the Secretariat when taking a domestic regulatory action to ban or severely restrict a chemical. A developing country Party or a Party with an economy in transition that is experiencing problems caused by a severely hazardous pesticide formulation may report such problems to the Secretariat. All Parties receive summaries of these notifications and proposals on a regular basis via the PIC Circular. When a chemical that is banned or severely restricted by a Party is exported from its territory, that Party must notify each individual importing Party before the first shipment and annually thereafter. Exports of banned or severely restricted chemicals, as well as chemicals subject to the PIC procedure, are to be appropriately labeled and accompanied by basic health and safety information in the form of a safety data sheet.

Information and guidance on the Rotterdam Convention specific to Customs is available at: http://www.pic.int/Implementation/Customs/RolesProvisions/tabid/1611/language/en-US/Default.aspx

Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants (POPs) was adopted in 2001 and entered into force on 17 May 2004. As at 15 February 2013, the Stockholm Convention has 178 Parties. 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. Specific effects of POPs can include cancer, allergies and hypersensitivity, damage to the central and peripheral nervous systems, reproductive disorders, and disruption of the immune system. Some POPs are also considered to be endocrine disrupters, which, by altering the hormonal system, can damage the reproductive and immune systems of exposed individuals as well as their offspring; they can also have developmental and carcinogenic effects The Stockholm Convention requires Parties to introduce measures to reduce or eliminate releases of the covered POPs. Obligations relevant to the import/export of POPs cover only intentionally produced POPs. The export of POPs covered by the Convention, for which there is a production- or use-specific exemption or acceptable purpose, is allowed only for the purpose of environmentally sound disposal, to a Party which is permitted to use the chemical or to a State not Party provided that that State has provided an annual certification whereby the State commits to the objectives of the Convention. The export of POPs covered by the

Convention for which there is no longer a production- or use- specific exemption in effect for a Party, is only allowed for the purpose of environmentally sound disposal. 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.

United Nations Office on Drugs and Crime (UNODC)

UNODC is a global leader in the fight against illicit drugs and international crime. Established in 1997 through a merger between the United Nations Drug Control Programme and the Centre for International Crime Prevention, UNODC operates in all regions of the world through an extensive network of field offices.

UNODC is involved in issues of environmental crime through several initiatives, including the International Consortium on Combating Wildlife Crime (ICCWC) – a Partnership between UNODC, CITES Secretariat, INTERPOL, World Customs Organization and the World Bank. This is a multi-agency initiative that brings comprehensive support to the Member State's national law enforcement agencies working for the protection of natural resources and wildlife. Through the UNODC-WCO Container Control Programme, UNODC is also involved in assisting countries to combat environmental crime, particularly in the detection and prevention of illegal trade in hazardous waste and chemicals, protected timber and endangered species.

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 may also 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)
- Asia-Pacific Trade Agreement (APTA)
- Pacific Island Countries Trade Agreement (PICTA)

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. A country's HCFC Phase-Out Management Plan or 'HPMP', available from its National Ozone Unit, provides more specific information on the specific ODS regulations and ODS phase-out plans in 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 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 or exports 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 and exporters to verify possession of appropriate licences for imported or exported quantities of the ozone-depleting substances in question and to confirm that the specific shipment has been authorized through an import or export licence and/or permit, as required by the country's licensing system. In some countries in addition to an import licence (usually valid for a few months and covering the total quantity of ODS intended to be imported during that period), an import permit for each shipment is required.

- **Consult the Register of Allowances and Permits.** If the Customs Officer has no direct online access to the register of import and export licences and permits granted as well as the actual imports/exports of each importer/exporter, the Officer must contact the NOU or the licensing agency to check the data. Importers and exporters must have appropriate licences and, if required by the country's legislation, 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 or reclaimed 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 Institutional Strengthening Programme
- Implementation of the HCFC Phase-out Management Plan (HPMP), which often includes recovery, recycling and reclamation (3R) programmes and training programmes for refrigeration technicians and Customs Officers. HPMPs were designed as the next step after completion of the Refrigerant Management Plans (RMPs), which dealt mostly with CFC phase-out.
- 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 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 or HCFCs, 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.

Environmental Inspection

In many countries protection of the environment is under a specialized governmental agency. Qualified officers from the agency may be authorised to go to any entity operating in the country and check whether the country’s legislation dealing with environmental protection is being followed. The inspection should also cover compliance with the country’s ODS legislation. For countries with an environmental inspection system in place, it is important that there is good cooperation between the inspection agency and the Customs authorities. The organisation of mutual controls by customs officers and environmental inspectors of entities involved in ODS trade has proved to be a useful way to spot illegal activities.

Pesticides board

The pesticides board may issue licences for the import and export of methyl bromide. The licence should specify whether methyl bromide is imported for standard fumigation or for quarantine or pre-shipment (QPS) purposes only. Depending on national regulations, the pesticides board also may issue a “negative list” to ban the import and export of specified goods, to ban the use of certain pesticides or prescribe safety precautions or specific modes of use, or to prescribe storage requirements. Routine controls of entities using methyl bromide can be conducted by the officers of the pesticides board in order to ensure that the substance is used in accordance with the conditions specified in the import licence documentation, i.e. for standard fumigation or QPS applications.

Bureau of standards

The bureau of standards (or equivalent) 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. It may also define the quality standards for other imported refrigerants and non-ODS alternatives based on existing ISO and other international standards. Close coordination with the bureau of standards is therefore essential when monitoring imports to ensure that the relevant national standards are used during screening.

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 laboratories, which may include Customs laboratories, provide 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 and environmental inspectors. 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, exporters, 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 non-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's HPMP provides more country-specific information.

Import/export licensing systems

Most developing countries do not produce ODS and so depend fully on ODS imports. However, Article 4B of the Montreal Protocol requires that each country establish both import and export licensing system for all ODS in order to ensure that smugglers do not take advantage of the lack of monitoring of exports and use such countries as transit points

for illegal ODS shipments going to other countries. Licensing systems shall cover not only virgin ODS, but also used, recycled and reclaimed ODS as well as mixtures containing ODS. Monitoring and controlling the legal trade in ODS in full and preventing their illegal trade are therefore crucial to 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. However, receiving financial assistance from the Multilateral Fund is not possible if the country has not established an ODS import/export licensing system, even if it has not yet 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).

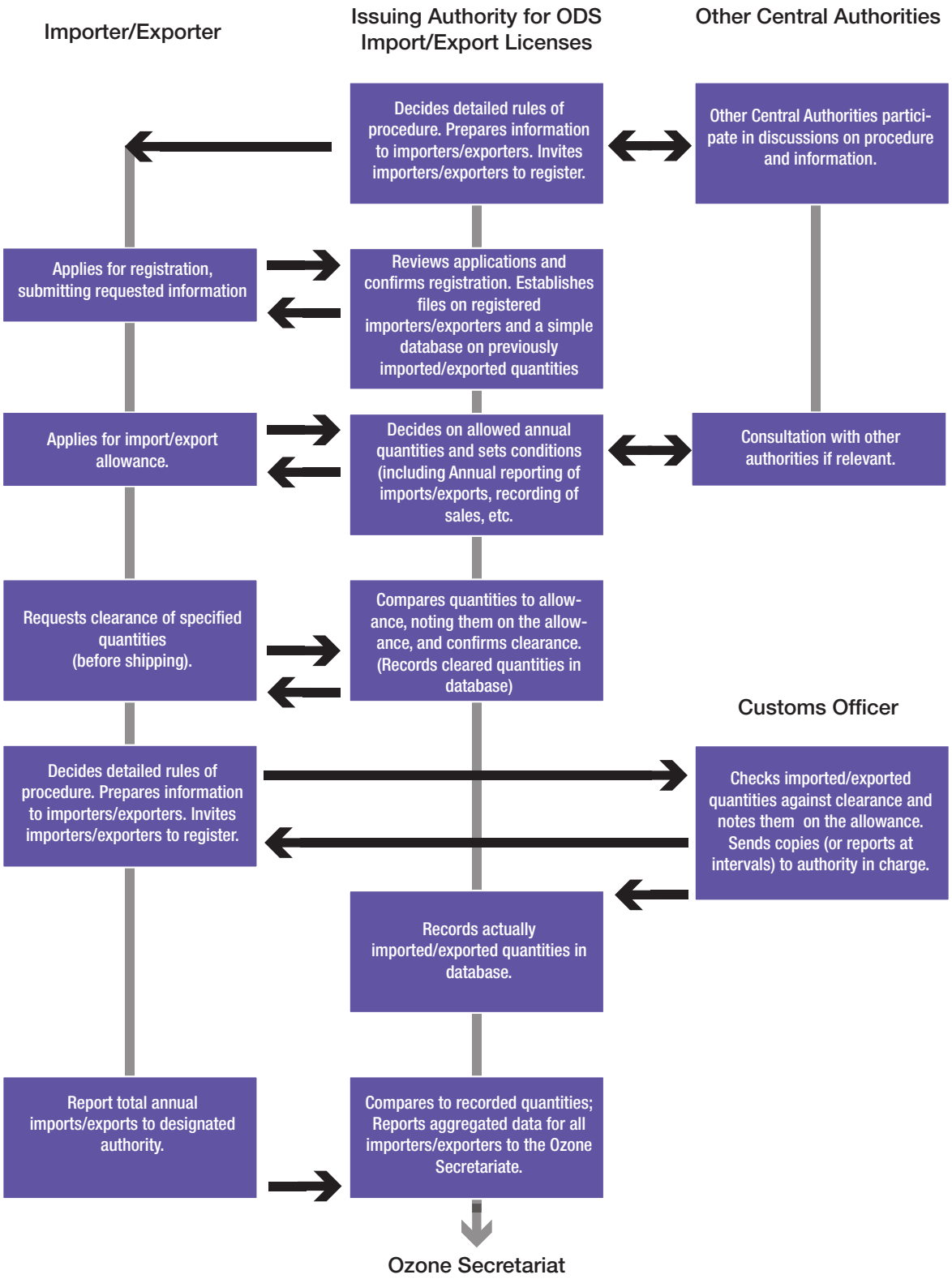
Legal basis, structure and functioning of a licensing system

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 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 below. 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 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 entirely prohibits 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 an annual quota for each type of ODS 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 in a single shipment. The sum of import permits shall not exceed the quantity specified in a general import licence. The importer must not exceed the granted allowance for a specific ODS.

After the phase-out date, any Party to the Montreal Protocol may apply for exemptions to import or produce ODS for essential uses. Any Party may also use ODS freely for laboratory and analytical, 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 licences and permits.

Export licensing

The licensing system also requires monitoring and controlling of ODS exports, including re-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 of the incoming quantity of ODS. Such a system of informal prior informed consent or 'iPIC') has become very popular and is presently applied in many countries – see section on iPIC in Chapter 9.

Re-export of ODS takes place when the substance is imported to the country and then exported instead of being used domestically. Re-export is considered as export by the Montreal Protocol (see para 4 of Decision XVII/16 of the Parties) and thus an export licence is required.

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 request the NOU to provide 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 below 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 exhaust gases (see Table 3-2).

Table 3-1: Decision matrix: Seized ODS and ODS-based products and equipment *(The shaded fields indicate the environmentally preferable options)*

Option	Ozone-depleting substances (e.g., CFC refrigerants, HCFC 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

Table 3-2 Approved destruction processes for ODS

Technology	Applicability							
	Concentrated Sources							Dilute Sources
	Annex A		Annex B			Annex C	Annex E	
	Group 1	Group 2	Group 1	Group 2	Group 3	Group 1	Group 1	
	Primary CFCs	Halons	Other CFCs	Carbon Tetrachloride	Methyl Chloroform	HCFCs	Methyl Bromide	
Destruction & Removal Efficiency (DRE)	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	95%
Argon Plasma Arc	Approved	Approved	Approved	Approved	Approved	Approved	Not Determined	
Cement Kilns	Approved	Not Approved	Approved	Approved	Approved	Approved	Not Determined	
Chemical Reaction with H_2 and CO_2	Approved	Approved	Approved	Approved	Approved	Approved	Not Determined	
Gas Phase Catalytic De-halogenation	Approved	Not Determined	Approved	Approved	Approved	Approved	Not Determined	
Gaseous/Fume Oxidation	Approved	Not Determined	Approved	Approved	Approved	Approved	Not Determined	
Inductively coupled radio frequency plasma	Approved	Approved	Approved	Approved	Approved	Approved	Not Determined	
Liquid Injection Incineration	Approved	Approved	Approved	Approved	Approved	Approved	Not Determined	
Microwave Plasma	Approved	Not Determined	Approved	Approved	Approved	Approved	Not Determined	
Municipal Solid Waste Incineration								Approved
Nitrogen Plasma Arc	Approved	Not Determined	Approved	Approved	Approved	Approved	Not Determined	
Porous Thermal Reactor	Approved	Not Determined	Approved	Approved	Approved	Approved	Not Determined	
Portable Plasma Arc	Approved	Not Determined	Approved	Approved	Approved	Approved	Not Determined	
Reactor Cracking	Approved	Not Approved	Approved	Approved	Approved	Approved	Not Determined	
Rotary Kiln Incineration	Approved	Approved	Approved	Approved	Approved	Approved	Not Determined	Approved
Superheated steam reactor	Approved	Not Determined	Approved	Approved	Approved	Approved	Not Determined	
Thermal Reaction with Methane	Approved	Approved	Approved	Approved	Approved	Approved	Not Determined	

Source: Annex to decision XXIII/12, Report of the combined ninth meeting of the Conference of the Parties to the Vienna Convention on the Protection of the Ozone Layer and the Twenty-Third Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

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's HPMP for specific procedures). UNEP's "Handbook on Data Reporting Under the Montreal Protocol" (http://www.unep.fr/ozonaction/information/mmcfiles/7660-e-Data_Reporting_Handbook.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.

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.

Cases of non-reported trade

In certain specific situations of trade in ODS, or in ODS-containing products, may proceed without customs controls in the importing country. This may concern the supply of HCFC refrigerants for servicing of ships in foreign ports or providing humanitarian aid by UN or other similar international organizations, or structures to countries in emergency situations. The question of treatment of ODS supplied to ships for servicing as exports/imports is currently being discussed by the Parties of the Montreal Protocol and, as yet, there has been no solution found. Therefore these situations should be treated according to the national legislation of importing and exporting countries. It should be noted that most countries may require import and export licenses in such cases.

Cases of providing humanitarian aid in emergency situations in the form of supplies of ODS or ODS-containing products without export and import license should be reported to the relevant authorities in the exporting and importing country in order to enable the authorities to include this specific type of shipment in their import and export statistics.

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 (CFCs, HCFCs and mixtures containing them) and non-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 high flammability. See Annex C to this volume for the safety cards on ODS and their alternatives.

Recent incidents have been reported where refrigeration units (especially those installed in refrigerated containers) or equipment charged from refrigerant cylinders labelled as HFC 134a (or R-134a) have unexpectedly exploded, with significant consequences including some deaths. Investigations conducted to determine the cause of the explosions confirmed suspicions of the refrigerant gas was contaminated with R-40, also known as chloromethane or methyl chloride.

Although chloromethane was once widely used as a refrigerant, its use was discontinued principally due to its toxicity and flammability. Today chloromethane is used as a feedstock; for example, in the production of silicone polymers.

One characteristic of chloromethane is it reacts with aluminium, creating a chemical compound called Trimethylaluminium. This colourless, liquid substance is also pyrophoric; i.e., its vapour produces white smoke or ignites spontaneously in contact with air.

Chloromethane, used as a refrigerant, has similar properties to R-134a which makes it difficult to detect when mixed in refrigeration systems. Considering that not all refrigerant gas identifiers currently available on the market are able to detect R-40, various industry stakeholders suggest using the "flame halide detector test" to ensure that the R-134a being added into the system is not contaminated with chloromethane. R-134a is a fluorinated gas and will emit a blue flame. A green flame will generally indicate the presence of chlorine, e.g. R-22 is chlorinated and will produce a green flame when subjected to the halide flame detector test.

National Ozone Officers and Customs authorities should therefore pay attention when inspecting or handling shipments of this type, as R-40 is known to have been filled in 13.6 kg (30lb) cylinders and mislabelled R-134a. Technicians have also inadvertently charged refrigeration systems with R-40 or R-40 mixed with other refrigerants believing the substance to be R-134a.

More information on cases of counterfeiting, mislabelling and illegal trade involving R-40 and on identification of R-40 can be found here: http://www.unep.org/ozonaction/InformationResources/OzonActionWebinar/OzonActionWebinarSeries/tabid/104363/Default.aspx

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.

Foam blowing agents

The most frequently used ODS for foam blowing include CFC-11 and HCFC-141b. CFC-11 has already been phased out, but may still be smuggled (or even legally traded if recycled or reclaimed). Both are liquids at room temperature, so they are usually stored and transported in drums or truck/rail cisterns, but due to its very low boiling point (24oC) CFC-11 is often stored and transported in pressurised cylinders. Similarly, as in the case of refrigerants, hydrocarbons are also used as foam blowing agents, but different safety measures should be followed for handling them because of their high flammability. Neither CFC-11 nor HCFC-141b can be detected by many refrigerant identifiers, so if a substance needs identification, a sample must be taken by a qualified laboratory technician for laboratory analysis. Unless they are properly trained, customs officers should not open containers containing the above substances or containers with polyol premixes for polyurethane foam production which also contain these chemicals.

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 and Methyl Chloroform

Carbon tetrachloride (CTC) and methyl chloroform (MCF, TCA) are colourless liquids 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 and MCF are harmful to the liver, kidneys, and central nervous system. Inhalation of these chemicals can produce dizziness, headache, fatigue, nausea, vomiting, stupor and diarrhoea. CTC and MCF also irritate the skin and prolonged contact may cause dryness and cracking. Customs Officers should use protective gloves and clothing to avoid exposure. CTC has already been phased out from solvent uses, but can still be applied as laboratory and analytical reagent and as process agent in chemical processes.

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 countries, 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 must also 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, reclaimed or contaminated ODS
- Do use protective clothing, including safety goggles and cold-insulating gloves, when handling refrigerants, foam blowing agents and halons. Refrigerants, foam blowing agents 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 pressurised 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.
- 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.

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 or drums containing low-boiling ODS blowing agents or solvents 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, including 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/dyn/icsc/showcard.home

Annex C.4 : CHLORODIFLUOROMETHANE			**ICSC:** 0049 Peer-Review Status: 03.07.2002 Validated
CAS No: 75-45-6 RTECS No: PA6390000 UN #: 1018 EINECS #: 200-871-9	Monochlorodifluoromethane Methane, chlorodifluoro-	HCFC 22 R 22	Formula: $CHClF_2$ 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	Irregular heartbeat. Confusion. Drowsiness. Unconciousness.	Use 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.	Wear safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
INGESTION		Do not eat, drink, or smoke during work.	
SPILLAGE DISPOSAL : Ventilation.			
PACKAGING & LABELLING : Special insulated cylinder. UN Hazard Class: 2.2			
EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G2A.			
SAFE STORAGE : Fireproof. Cool. Ventilation along the floor.			
PHYSICAL STATE; APPEARANCE : COLOURLESS COMPRESSED LIQUEFIED GAS.			
PHYSICAL DANGERS : The gas is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.			
CHEMICAL DANGERS : Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive gases including hydrogen chloride (see ICSC 0163), phosgene (see ICSC 0007), hydrogen fluoride (See ICSC 0283) and carbonyl fluoride (See 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 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. This may result in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.			
EFFECTS OF LONGTERM EXPOSURE:			
OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000ppm as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2001). MAK: 500 ppm, 1800 mg/m³; Peak limitation category: II(8); Pregnancy risk group: C; (DFG 2006).			
PHYSICAL PROPERTIES : Boiling point: -41°C Melting point: -146°C Relative density (water = 1): 1.21 Solubility in water, g/100ml at 25°C: 0.3		Vapour pressure, kPa at 20°C: 908 Relative vapour density (air = 1): 3.0 Auto-ignition temperature: 632°C 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. Card has been partially updated in July 2007: see Occupational Exposure Limits.			
IPCS International Programme on Chemical Safety		Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission © IPCS 2004-2012	
LEGAL NOTICE	Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information.		

Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0049

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/safework/info/publications/WCMS_113134/lang--en/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?

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 some countries, the demand for CFCs in the service sector remains high though the import of virgin CFCs has been banned since 1 January 2010. 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 (13.6 kg) cylinder of CFCs, which contains enough refrigerant to service many such systems, was 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 non-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: 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”

Table 5-1 AVERAGE PRICE OF CFCs AND HCFCs AND THEIR ALTERNATIVES

ODS	Average price/ kilogram (US$/kg) (2005 per Report to 50th meeting)	Average Price/ kilogram (US$/kg) (2006 per Report to 54th meeting)	Average Price/ kilogram (US$/kg) (2007 per Report to 57th meeting)	Average Price/ kilogram (US$/kg) (2008 per Report to 60th meeting)	Average Price/ kilogram (US$/kg) (2009 Report)	Average Price/ kilogram (US$/kg) (2010 Report)	Number of countries where prices increased	Number of countries where prices decreased	Range (US$/kg) (2010 Report)	Number of countries reporting non-zero data for 2010	Data excluded* from the calculation of the average (US$/kg.) (2010 Report)
CFC-11	$7.09	$9.67	$10.65	$11.42	$12.30	$20.85	3	1	$7.40 (Syrian Arab Republic) to $40.00 (Argentina)	5	$56.75 (Brazil)
CFC-12	$8.98	$10.95	$12.81	$11.52	$10.84	$13.65	7	4	$5.00 (Syrian Arab Republic) to $30.75 (Argentina)	13	$4.50 (Cambodia), $50.44 (Brazil)
CFC-113	$9.02	$19.41	$19.00	$16.52	$9.91	$7.30	N/A	N/A	$7.30 (Cameroon)	1	None
CFC-114	$9.98	$17.37	$18.92	$16.31	$6.35	N/A	N/A	N/A	None	0	None
CFC-115	$10.94	$12.41	$11.97	$8.82	$11.62	$11.00	N/A	1	$11.00 (Chad)	1	None
Cyclopentane	N/A	N/A	$4.03	$1.91	$3.74	$4.58	2	1	$3.00 (Morocco) to $6.00 (Cameroon)	5	None
HCFC-123	N/A	N/A	N/A	N/A	$9.09	$14.15	3	1	$8.00 (Panama) to $29.72 (Paraguay)	6	$30.00 (Serbia)
HCFC-124	N/A	N/A	N/A	N/A	$12.73	$22.85	1	N/A	$22.85 (Argentina)	1	None
HCFC-133	N/A	N/A	N/A	N/A	$19.25	N/A	N/A	N/A	None	0	None
HCFC-141b	N/A	N/A	$3.87	$6.66	$5.00	$6.58	9	3	$2.70 (Morocco) to $11.60 (Uruguay)	17	$1.40 (Iran (Islamic Republic of)), $12.55 (Guatemala)
HCFC-141b in Imported Pre-blended Polyol	N/A	N/A	N/A	N/A	$3.99	$3.78	1	1	$3.00 (Morocco) to $4.87 (Philippines (the))	6	$0.50 (Swaziland) $8.20 (Kyrgyzstan)
HCFC-142b	N/A	N/A	$5.46	$6.59	$7.75	$7.30	3	N/A	$6.00 (Cuba) to $9.30 (Kyrgyzstan)	4	$30.00 (Georgia)
HCFC-22	$5.41	$6.52	$7.21	$7.75	$7.35	$8.64	30	9	$2.27 (El Salvador) to $23.09 (Tonga)	51	$81.00 (Jamaica), $87.00 (Turkey)
HCFC-225	N/A	N/A	N/A	N/A	$9.00	N/A	N/A	N/A	None	1	None
HCFC-225ca	N/A	N/A	N/A	N/A	$32.22	$37.10	1	N/A	$37.10 (Philippines (the))	1	None
HCFC-225cb	N/A	N/A	N/A	N/A	$19.11	$37.10	1	N/A	$37.10 (Philippines (the))	1	None
HFC-134a	$12.21	$13.16	$12.44	$11.37	$12.52	$17.23	33	6	$4.80 (Syrian Arab Republic) to $39.00 (Cape Verde)	49	$0.93 (Zambia), $220.00 (Turkey)

Table 5-1 AVERAGE PRICE OF CFCs AND HCFCs AND THEIR ALTERNATIVES											
HCFC-227ea	N/A	N/A	$9.32	$12.97	$18.03	$36.37	2	1	$17.74 (Croatia) to $55.00 (Serbia)	3	$127.52 (Philippines (the))
HCFC-245fa	N/A	N/A	$7.44	$10.38	$10.11	N/A	N/A	N/A	None	0	None
HFC-356mfc	N/A	N/A	$15.52	$10.38	$9.63	N/A	N/A	N/A	None	0	None
Isobutane (HC-600a)	N/A	N/A	$14.24	$22.53	$24.36	$24.01	7	3	$2.26 (Zambia) to $61.00 (Morocco)	21	$106.00 (Croatia), $119.05 (Lesotho)
MDI (foam production)	N/A	N/A	$3.83	$3.34	$2.91	$3.28	1	1	$3.00 (Morocco) to $4.00 (Cameroon)	4	None
Methyl formate	N/A	N/A	N/A	N/A	$5.02	$3.62	N/A	1	$3.62 (Brazil)	1	None
Pentane	N/A	N/A	$1.40	$6.00	$2.20	$3.30	1	N/A	$2.60 (Morocco) to $4.00 (Armenia)	2	None
Propane (HC-290)	N/A	N/A	$6.49	$7.88	$20.53	$23.58	1	3	$10.70 (Republic of Moldova (the)) to $40.00 (Chad)	10	$85.21 (Brazil)
R-404A	N/A	N/A	$12.44	$16.46	$16.13	$20.03	23	6	$5.32 (Syrian Arab Republic) to $52.00 (Cape Verde)	44	$1.42 (Zambia), $61.00 (Comoros (the))
R-407C	N/A	N/A	$14.21	$17.42	$16.95	$20.75	17	4	$5.00 (El Salvador) to $46.00 (Cape Verde)	32	$1.42 (Zambia), $57.00 (Comoros (the))
R-410A	N/A	N/A	$14.21	$15.43	$16.44	$20.86	17	6	$9.27 (Honduras) to $46.00 (Cape Verde)	34	$5.00 (El Salvador), $58.63 (Bahamas (the))
R-502	$14.20	$16.74	$21.44	$16.97	$16.20	$13.23	3	1	$8.00 (Syrian Arab Republic) to $15.83 (Vanuatu)	9	$6.00 (Iran (Islamic Republic of)), $15.90 (Kyrgyzstan)
R-507A	N/A	N/A	$12.47	$17.69	$17.48	$18.20	7	6	$9.00 (Chad) to $30.00 (Georgia)	20	$8.00 (Panama), $39.00 (Cape Verde)

Source: "Status of implementation of delayed projects and prospects of Article 5 countries in achieving compliance with the next control measures of the Montreal Protocol", Document 64/6, 64th Executive Committee Meeting of the Multilateral Fund for the Implementation of the Montreal Protocol, 25–29 July 2011.

Note: Table 5-1 indicates that in 2010 HCFC-22, HCFC-141b and HCFC-142b still remain much less expensive than the comparable CFCs, based on this sample of data. It should be noted that only five countries provided CFC-11 price data and 13 countries provided CFC-12 price data and it is not clear whether there is any CFC for sale in most countries since such CFCs would come from stockpiled quantities. With respect to HFC-143a and propane (HC-290) for example, the prices indicated in Table 5-1 are higher than the prices of the respective CFCs, but this table does not reflect the lack of availability of CFCs.
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 frequently smuggled into developing countries, further increasing the demand for ODS.
Other important factors that maintain the demand for smuggled ODS include:

- The easy availability of CFCs because it is home to the main producers of these chemicals. Although production of CFCs for non-exempted uses such as refrigeration and air conditioning or foam blowing has been already phased out, CFCs may still be produced for exempted uses, or illicitly produced.
- 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
- 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 and the low price of HCFCs 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 in the past, ODS (mainly CFCs) became the second most profitable illegally traded goods after drugs. Illegal trade may have accounted 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. This scenario may be repeated in the next couple of years with regard to trade in HCFCs once the restrictions on consumption of those substances become more severe following the Montreal Protocol phase-out schedule.

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 grew rapidly, 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. When CFC consumption and production in developing countries was phased out on 1 January 2010, (except for exempted uses), the quantities of virgin CFCs still available on the market rapidly diminished; however the demand for these chemicals remained relatively high.

In general terms, the phase-out of ODS may increase the incidence of illegal trade, depending on the market conditions for ODS in particular countries and the demand for those ODS. For instance this may be an issue with methyl bromide, which has already been phased out in developed countries and is gradually being phased out in developing countries.

As countries begin to restrict or ban HCFCs, the black market in these substances may flourish until the prices of alternatives 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 rely on ODS for functioning. Nevertheless, millions of appliances and pieces of equipment owned by businesses and consumers remain which 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 in the past, 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-oansupplement6IllegalTrade.pdf
For more recent data on illegal trade in ODS with a focus on HCFCs, see "Risk Assessment of Illegal Trade in HCFCs" available at http://www.unep.fr/ozonaction/information/mmcfiles/7507-e-risk_assessment.pdf

HCFCs: History repeating itself?

The phase-out of HCFCs under the Montreal Protocol could be history repeating itself, mirroring the phase-out and development of the black market for CFCs.

The global production levels of HCFCs are exceeding those of CFCs and increasing rapidly. Presently, the global trade in HCFCs in bulk amounts to over 100,000 tonnes per year (including HCFCs contained in blends). HCFCs are used mostly as refrigerants in refrigeration, air conditioning and heat pump equipment and as foam blowing agents, but other uses such as aerosol propellants, fire fighting agents, solvents or sterilants are also popular. Large quantities of HCFCs are also used in chemical processes such as feedstock and process agents; however HCFCs traded for those uses are not included in a country's consumption. Moreover, used or non-virgin HCFCs (recovered, recycled or reclaimed) are not counted in the consumption calculations, but according to Article 4B of the Montreal Protocol imports and exports of all traded HCFCs, including those contained in blends as well as those intended for exempted uses, need to be licensed.

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.

Previously customs officers in developing countries and countries with economies in transition have been advised by local environmental authorities to pay special attention to controlling shipments of CFCs while trade in HCFCs was not considered a priority. Currently however, National Ozone Units (NOUs) have to closely monitor quantities of HCFCs actually imported and exported in order to avoid exceeding the consumption limits set up in their HCFC Phase-out Management Plans (HPMPs) which take into account the Montreal Protocol provisions and specific national obligations. From now on, local Customs authorities are therefore requested to focus on targeting HCFCs when setting up their priorities in checking shipments of substances which are considered dangerous for the environment.

Reports of smuggled HCFCs have surfaced in many countries. Smuggling small quantities of HCFCs across the border, where the Customs presence is limited, 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.

Since HCFCs are presently controlled globally and import restrictions including import quotas have been set up by a number of countries, some traders may wish to circumvent the legislation and smuggle HCFCs. The methods used for smuggling HCFCs do not vary much from methods previously used for smuggling CFCs. These are described in detail in the "ODS smuggling" section below.

CFCs and HCFCs falsely labelled as HFCs

Customs Officers should carefully scrutinise shipments labelled HFC-134a (R-134a), a non-ODS alternative, as well as those labelled R-404A or R-410A or HFC-containing mixtures. 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 shipments of HFC-134a, other HFCs or mixtures containing HFCs 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, R-404A or R-410A, altering packaging and smuggling large quantities of HCFCs in heat pumps.
Contaminated ODS and mixtures containing ODS are also being falsely labelled as virgin refrigerants such as HFC-134a, HFC-containing mixtures (R-404A, R-41OA, R-407C) or

HCFC-22. The profits gained from this particular type of smuggling may be high because of the low value of the poor-quality ODS used. The use of contaminated mixtures of ODS in equipment will result in its malfunction and damage.

There have been cases where refrigeration systems or equipment charged from cylinders labelled as containing HFC-134a have been contaminated with chloromethane or R-40 which led to some of the systems exploding, causing serious harm to the equipment and personnel (including some deaths). Handling or inspecting such shipments entails serious safety risks and potential damage to equipment. National Ozone Officers in cooperation with Customs officers should take the necessary measures to address these risks by:

- Coordinating with RAC equipment manufacturers to provide the necessary information to their dealers.
- Coordinating with refrigerant importers/distributors to conduct regular checks of refrigerants in the market and to inform customers of issue of concern.
- Being more vigilant when inspecting R-134a cylinders and using refrigerant identifiers (and other methods of checking – see Chapter 4) to verify their purity level.
- Coordinating with refrigeration technician associations to inform their members.
- Disseminating information to the media, particularly those involved in the refrigeration and air conditioning sector to outreach the information to relevant stakeholders.

For more details on fake refrigerants containing R-40 and for links to websites on the topic - see Chapter 4 above, section “CFCs and HCFCs falsely labelled as HFCs.”

CTC/TCA phase-out

Although carbon tetrachloride and methyl chloroform or 1,1,1-trichloroethane (MCF, 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 (CTC) is presently used in large quantities as feedstock to create other chemicals where it is completely transformed in the process or as a process agent where it facilitates the chemical processes. It was also used in large quantities as a solvent and still is a very popular laboratory and analytical reagent. Because the consumption and production of CTC for non-exempted uses has already been phased out, its use in process agent and feedstock applications, which are exempted by the Protocol, may create an opportunity for illicit trade where it can be diverted to banned uses.

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 diverting imports for lab/analytical uses feedstock or process agents to banned uses (solvents) and imports under the general Customs code of ‘composite solvents’ instead of Customs code for the pure substance.

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 or HCFC refrigerants might be falsely declared and labelled as non-controlled substances such as hydrocarbons (propane, butane), hydrofluorocarbons (e.g. HFC-134a) or mixtures containing HFCs.

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 5-1. The access points to the main CFC-12 container become visible only after the double-layered container is cut open.

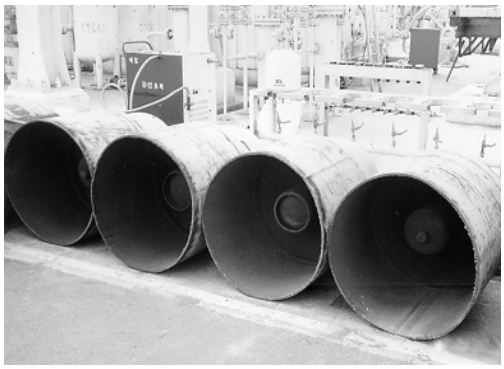


Photo 5-2 . View of the smallHFC-134a cylinders after removing the CFC-12 refrigerant and cutting open the main containers.

Photo 5-3. View of the seized CFC-12 containers declared and labelled as HFC-134a.

Photo 5-4. View of the seized CFC-12 containers declared and labelled as HFC-134a.

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

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 and therefore are still allowed even after the phase-out date. Thus an importer may falsely claim 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's legislation 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.

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

Concealment and double layering of ODS

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 or HCFC refrigerant might be concealed in outer cartons of HFC refrigerants (see box for an example of concealed ODS).

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).

An example of concealed ODS

Ninety 30 lb (13.6 kg) 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 5-6. Ninety 30 lb cylinders of CFC-12 were hidden on this boat.

Photo 5-7. Cylinders hidden in storage compartments within boat.

Photo 5-8. Back of boat filled with CFC-12 cylinders.

Photo 5-9. Seized CFC-12 cylinders.

Credits: George White, senior special agent, US Customs Service

Photo 5-10a

Photo 5-10b

Photo 5-10c

Photo 5-10d

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.

Contact the WCO CEN Team by email cis@wcoomd.org for a CEN access form or to discuss CEN training possibilities.

Photo 5-11a An oil drum with no unusual markings

Photo 5-11b Cut and opened top part of the oil drum

Photo 5-11c The top shelf was taken off and the cylinders were uncovered

Photo 5-11d Aspect of concealment re-created after cutting the oil drum vertically.

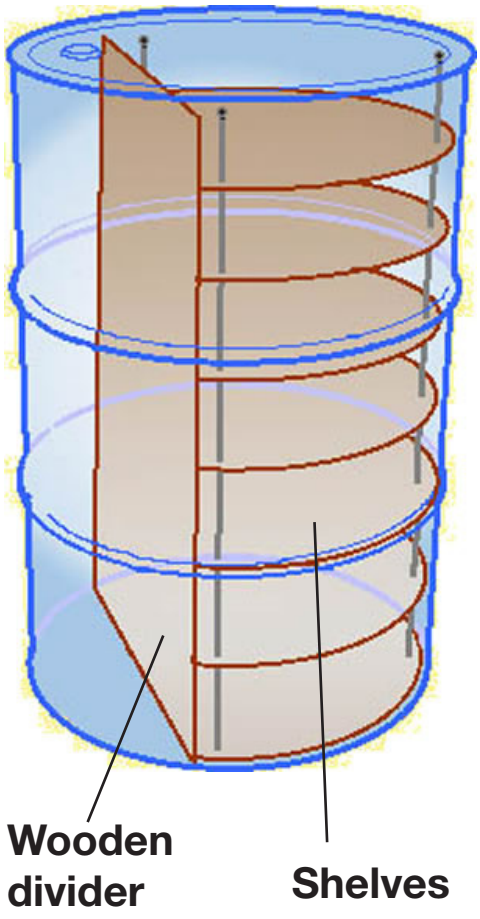


Photo credits : Japanese Customs

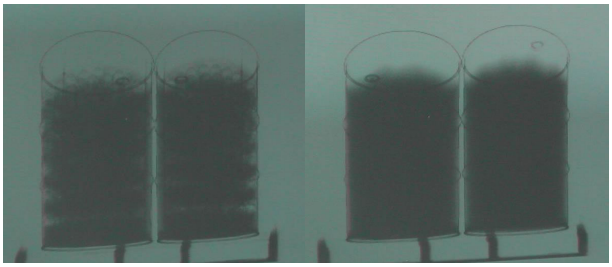


Photo 5-11e Oil drums containing cylinders.

Photo 5-11f Oil drums containing antifreeze only.

Another example of double layering is shown on Photos 5-12a and 5-12b. Fig. 5-12a depicts x-ray scan of a truck showing cylinders with HCFC-22 hidden behind the layer of other goods. Fig. 5-12b shows the photograph of the opened truck where actual contents of the cargo (HCFC-22 cylinders in cardboard boxes) are well visible.

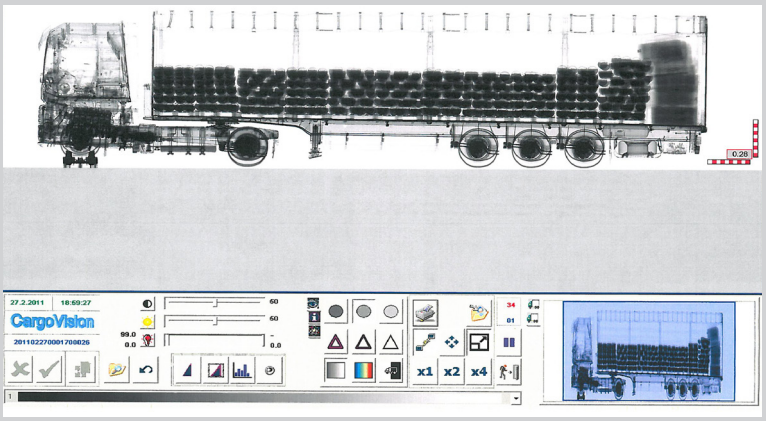


Photo 5-12a. X-ray scan of the truck showing double layering.

Photo 5-12b. Photograph of the opened truck revealed that the actual cargo were cylinders with HCFC-22 packed in cardboard boxes.

Photo credits: Finnish Customs

The Finnish Customs Services in Vaalimaa in cooperation with the Finnish Environment Institute recently reported a seizure of more than 15 tonnes of HCFC-22 (R22) – a hydroclorofluorocarbon (HCFC) used as refrigerant and foam blowing agent. HCFC-22 is an ozone-depleting and global warming gas whose production, consumption and trade are strictly controlled under the Montreal Protocol and by European Union regulations. On the 27th of February 2011 a truck coming from Latvia tried to cross – allegedly by accident - the Vaalimaa Customs checkpoint in Eastern Finland which is the primary customs and border crossing between the European Union and the Russian Federation. Sensing something suspicious about the cargo, Customs officers scanned the truck (see photos) and detected 1150 refrigerant cylinders of 13.6kg each – totalling 15.64 tonnes. The cylinders and their packaging were labeled R22 and hidden behind a cover cargo of glass and ceramic ornaments and other decorative products. The analysis at the Customs Laboratory confirmed that the cylinders actually contained R22 and that these were misdeclared and did not show any serial numbers. The goods were seized and will eventually be destroyed. Investigations concerning the origin of the chemicals and the people involved in this smuggling case are ongoing.

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 can then be 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).

ODS 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 ODS and export and import it for repairs. The equipment is then filled with ODS at each export and unloaded at each import.

Contaminated mixtures shipped under the name of ODS or ODS substitutes

ODS (or non-ODS) refrigerants which are recovered from equipment are often so highly contaminated that recycling or reclamation is impossible. Specifically, it is the case when the recovered refrigerants are mixtures of unknown composition which were created when so called "drop-in" blends were added to the equipment during servicing. In developing countries such highly contaminated mixtures are stockpiled in large quantities because shipping of such wastes for destruction requires a lot of administrative work and destruction is very costly. Holders of such contaminated refrigerants may therefore wish to get rid of them through improper means. This situation can create incentives for smugglers who take the contaminated substance and fill it into cylinders labelled as ODS (HCFC or mixtures containing HCFC) or as non-ODS (HFC-134a or mixture containing HFC-134a). Such mislabelled cylinders are then shipped to developed or developing countries. This activity is of great concern since it is not only illegal, but it also can be dangerous and damage the RAC equipment when filled unknowingly with such contaminated mixtures.

Examples of cases of illegal trade in HCFCs reported by developing countries

In Table 5-2 below, some selected cases of illegal trade in HCFCs that were reported by developing countries are presented in order to better illustrate the smuggling methods described above, specifically with regard to illegal trade in HCFCs in developing countries. For more detailed information on illegal trade in HCFCs and related risk assessment see "Risk Assessment of Illegal Trade in HCFCs" available at http://www.unep.fr/ozonaction/information/mmcfiles/7507-e-risk_assessment.pdf

Table 5-2. Examples of cases of illegal trade in HCFCs reported by developing countries

Country	Date	Substance traded	Volume	Exporting country	Smuggling method	Details of the case
India	2010	HCFC-22	1150 13.6 kg cylinders	China	Mislabelling	Detected at Tutincorin port, cylinders were mislabelled as R-404a
India	2010	HCFC-22	1139 13,6 kg cylinders	Middle East	Mislabelling	Seized in Delhi, misdeclared as R-134a
India	2010	HCFC-22	65 large cylinders totalling 55.7 MT	Suppliers registered in Singapore and Malaysia	Mislabelling	Seized in Chennai, mislabelled as R-401a
Uzbekistan	2010	R-406, HCFC-22	5 cylinders totalling 68 litres	India	Ordinary front door smuggling	Found in a car at land border
Philippines	2003	Mixture containing HCFC-22	2982 kg in 454 cylinders	China	Contaminated mixture mislabelled as HFC-134a	When tested with identifier, substance appeared to be a mixture of HFC-134a, CFC-12 and HCFC-22
St Kitts and Nevis	2006	Mixture containing HCFC-22	768 kg	St Maarten free trade zone	Contaminated mixture mislabelled as HCFC-22	When tested with identifier, substance appeared to be a mixture of HFC-134a, CFC-12 and HCFC-22

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.

Recently, a detailed study on risk assessment with respect to trade in HCFCs entitled "Risk Assessment of Illegal Trade in HCFCs" was published by UNEP DTIE. It is available at http://www.unep.fr/ozonaction/information/mmcfiles/7507-e-risk_assessment.pdf

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 these 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 may also need to survey local markets, importers' storage rooms and servicing workshops in co-ordination with the National Ozone Unit, the environmental inspection agency (if present) and the local trade or industry association to detect any illegal trade in ODS.

Informal Prior informed consent (iPIC), 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 may thus become a licensed importer. Any import declared as non-ODS refrigerant 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 illicit trade in ODS was detected when the value of goods was not realistic (alternatives to CFCs or HCFCs may be more expensive than CFCs or HCFCs 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, UN or ASHRAE numbers, chemical names and formulas or mixture compositions, 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.

NOTE: It is possible that the importer would not agree to reveal the chemical nature of the shipped commodity, especially with regard to composition of the mixture, claiming that it is proprietary information and Intellectual Property Rights law supports it not providing this. In such case the Customs Officer – when suspecting illegal trade in ODS - should request a written statement signed by the importer that the shipped commodity does not contain ODS. If the importer refuses to provide such a statement, the Customs Officer should consult the NOU who may directly contact the producer of the commodity in question in order to obtain such statement.

Screening by quantity of import

Because trade in refrigerants is generally only profitable in large quantities, Customs Officers should pay particular attention to large shipments. Unusually large imports of non-ODS refrigerants like HFC-134a or mixtures containing HFC substances should be closely examined. The same applies to unusually large imports of HCFC refrigerants whose first

control measure came into force in 2013, and for which many countries have introduced HCFC import quotas. 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 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 of non-ODS refrigerant 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.

The main countries producing ODS are summarised in Table 5-3. The list of countries producing ODS should be updated periodically, because several countries are in the process of closing their production plants. The list of countries producing non-ODS alternatives has also been provided in this section.

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.org/ozonaction/tradenames). This resource provides the most current information.

Table 5-3 Countries producing ODS

Annex, Montreal Protocol	ODS type	Countries
A-I	CFCs	China, Russian Federation - (only in small quantities)
A-II	Halons	NONE
B-I	CFCs	NONE
B-II	Carbon Tetrachloride	China, France
B-III	Methyl Chloroform	NONE
C-I	HCFCs	Argentina, Canada, China, Democratic People's Republic of Korea, France, India, Japan, Mexico, Netherlands, Republic of Korea, Russian Federation, United States of America, Venezuela
C-II	HBFCs	NONE
C-III	Bromochloromethane	NONE
E-I	Methyl Bromide	China, Japan, United States of America

Source: Article 7 data for 2012 reporting year, only countries with positive production figures, http://ozone.unep.org/new_site/en/ozone_data_tools_access.php
Note: More detailed information is available from the UNEP Database. a HFCs are also used as halon alternatives

A number of countries produce HFCs (non-ODS alternatives); these include: Argentina, Brazil, China, France, Germany, India, Japan, Mexico, Netherlands, Republic of Korea, Spain, United Kingdom, United States of America.

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 declared 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 exporting 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/new_site/en/ozone_data_tools_reclaimation_facilities.php

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/transfer, it may be mislabelled. Most gas cylinders have silk-screened or spray-painted labels. If a cylinder has been repainted, 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, UN 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. ODS containers may be packaged in cardboard boxes labelled as a non-ODS. Chapter 6 and Annex B.2 contain lists of ASHRAE numbers, CAS numbers, UN numbers, trade names and HS Customs codes.

Consistency check of ISO container 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. If a container designed for pressurised gases is labelled as containing liquid refrigerants, its contents should be analysed.

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 leak. 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. 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 refrigerant

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 appear to indicate retrofitting, but may not.	ODS refrigerant, non-ODS refrigerant	Check labelling and analyse if necessary

MAC = mobile air-conditioning.

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

Direct identification and analysis

Any suspicious refrigerant import should initially be identified by means of an electronic refrigerant identifier/analyser. Although the identifiers currently in use at many Customs borders or checkpoints are limited in the type of gases they can identify correctly, new models are now available in the market that can identify a wider range of ODS and non-ODS chemicals and mixtures. In cases where it is deemed necessary to more accurately and reliably identify an imported substance, it is preferable to have a sample analysed by an authorised laboratory. This could be a government, Customs or an accredited private laboratory where available. Further advice on laboratory analysis can be obtained from the NOU or the WCO.

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.org/ozonaction/tradenames.

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 WCO member-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 Harmonized Commodity Description and Coding System (also known as the Harmonized System or the HS) provides uniform codes that are used around the world to facilitate trade. HS 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 HS 2007 update contained HS codes for ODS-containing mixtures (see Annex B.3) and the HS 2012 update contains specific 6-digit HS codes for the five most commonly used HCFCs, and at the same time regrouped CFCs and certain other ODS.

Overview of HS codes

HS codes are represented with six digits at the international level. The first four digits correspond to the relevant heading number, while the fifth and sixth digits identify the one- and two-dash subheadings respectively (the absence of such subheadings being indicated by a zero) (see box).

HS 2012 codes for select ODS	
CFC-12	2903.77
Carbon tetrachloride	2903.14
Methyl chloroform	2903.19
HCFC-22	2903.71
Methyl bromide	2903.39

The HS codes for ODS listed in Annexes B.2 and B.3 and in the Customs Officer's Quick Tool in Annex B.1 are international codes that are directly applicable to all the Contracting Parties to the HS Convention. Countries that are not a Contracting Party to the HS Convention are also welcome to use the HS codes.

The national authorities of the Contracting Parties to the HS Convention may create their own codes beyond the HS-level by adding one or more digits for each of the chemicals or groups of chemicals listed in the table.

Changes to HS codes of HCFCs and other ODS since 1 Jan 2012

In the HS Nomenclature 2007 Edition of the HCFCs were classified as follows:

Chapter 29. **Organic chemicals.**

29.03 Halogenated derivatives of hydrocarbons.

[…]

2903.4 - Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens:

[…]

2903.49 - - Other

In this 2007 classification, subheading 2903.49 included, among other groups of substances, derivatives of methane, ethane or propane halogenated only with fluorine and chlorine (= HCFCs).

This classification did not allow the collection of trade data regarding the individual HCFCs on which the Parties to the Montreal Protocol have to report data, since a number of other substances were also classified under the same HS code of 2903.49, including the ozone depleting substances: HBFCs and bromochloromethane (BCM). Even if trade in HCFCs were identified, the trade statistics might not contain information as to which particular HCFC substances were traded.

In view of the quickly growing quantities of HCFCs being traded globally and of the diminishing trade in CFCs since their phase-out by 1 January 2010, the Parties to the Montreal Protocol requested a revision of the HS codes for chlorofluorocarbons (CFCs) and hydrochloroflurocarbons (HCFCs).

On 26 June 2009, the Council of the World Customs Organization recommended to the Contracting Parties to the HS Convention to amend heading 29.03 of Chapter 29 with the objective of assigning specific 6-digit HS codes to the five most commonly used HCFCs, and

to delete the individual HS codes previously assigned to CFCs.

Based on this WCO Council Recommendation the relevant amendment of the HS has been agreed upon by the HS Contracting Parties and entered into force on 1 January 2012. HCFCs are now classified in the HS as follows:

Chapter 29. **Organic chemicals.**

29.03 Halogenated derivatives of hydrocarbons.

[…]

2903. - Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens:

2903.71 - - Chlorodifluoromethane (= HCFC-22)

2903.72 - - Dichlorotrifluoroethanes (= HCFC-123, covers two isomers)

2903.73 - - Dichlorofluoroethanes (= HCFC-141, covers 3 isomers including the most popular HCFC-141b)

2903.74 - - Chlorodifluoroethanes (= HCFC-142, covers 3 isomers, including the most popular HCFC-142b)

2903.75 - - Dichloropentafluoropropanes (= HCFC-225, covers 9 isomers, including the most popular HCFC-225ca and HCFC-225cb)

2903.76 - - Bromochlorodifluoromethane, bromotrifluoromethane and dibromotetrafluoroethanes

[…]

2903.79 - - Other (= all remaining HCFCs and a number of other halogenated derivatives of acyclic hydrocarbons containing two or more different halogens, including inter alia the following ozone depleting substances controlled by the Montreal Protocol: hydrobromofluorocarbons (HBFCs) and bromochloromethane (BCM))

[…]

Based on the HS 2012 Amendment cited above, the single new code for all CFCs is 2903.77 and it also covers all other halogenated derivatives of acyclic hydrocarbons, perhalogenated only with fluorine and chlorine. Based on the same HS 2012 Amendment, the old HS code **2903.46** for halons 1301, 1211 and 2402 has also changed to **2903.76.**

It is also worth noting that the HS code for methyl bromide (bromomethane) was changed in the past. Since 1 January 2007 the HS code for methyl bromide (bromomethane) is 2903.39. However, many other substances are classified under the same HS code (i.e. 2903.39), including hydrofluorocarbons (HFCs), which are commonly used as substitutes for CFCs and HCFCs. It is therefore recommended that the countries insert additional subdivisions in their nomenclatures and assign specific codes for these substances by adding one or more digits to the standard 6-digit HS code 2903.39. This has already been done, for example, in the HS-based online customs tariff database, also called the TARIC, at 10-digit level of the European Union and in the Harmonized Tariff Schedule of the United States (2012). For more information on the insertion of additional subdivisions, see the 'WCO recommendation on the insertion in national statistical nomenclatures of subheadings to facilitate the collection and comparison of data on the international movement of substances controlled by virtue of amendments to the Montreal Protocol on Substances that Deplete the Ozone layer' (1 July 2006) (amended 24 June 2011) (http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs_recommendations.aspx).

It should be noted that all HS-based Customs Tariffs which follow HS 2012 now have the new structure for HS heading 29.03 as of 1 January 2012.

HS codes for ODS-containing mixtures

ODS that are traded within mixtures, which is common for solvents and refrigerants, are not easily identified by the HS codes. For mixtures used in specific applications such as refrigerants, there is no HS code related to this use. The HS codes allow for monitoring trade in certain mixtures containing ODS, such as mixtures containing HCFCs. HS classification of these mixtures is contained in Annex B.3 and in the Customs Officer's Quick Tool in Annex B.1. Annex B.5 lists mixtures and their compositions. Each mixture may have several trade names.

HS codes for products that may contain or rely on ODS

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 ODS in the importing country.

Annex B.4 identifies the various chapters and HS codes relevant to products that may contain or rely on 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 Union as a Combined Nomenclature (CN) system. Annex IV of Regulation (EC)1005/2009 contains CN codes for ODS.

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. These however 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 HCFC-22 is chlorodifluoromethane and its chemical formula is CHF_2Cl; the chemical name for halon 1301 is bromotrifluoromethane and its chemical formula is CF_3Br.

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 HCFC-22 is 75-45-6.

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 HCFC-22 is 1018. 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). The number always starts with the letter R (for "refrigerant")

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 give to their products. Examples of trade names for ODS are Genetron-11, Solkane -141b and Asahiklin-225. The ASHRAE number of a certain chemical, such as 11 or 22, often appears in the trade name, indicating that it is, for example,

CFC-11 or HCFC-22. The most popular trade names of ODS are shown in the Customs Officer's Quick Tool document contained in Annex B.1. It is important to note that some companies give the same trade names to ODS and non-ODS substances, so knowing only the trade name is not sufficient for ODS identification.

More trade names of the commercially relevant ozone-depleting substances and their alternatives can be found on the OzonAction website (http://www.unep.org/ozonaction/tradenames) 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 may be packaged in disposable containers. Disposables are manufactured in capacities ranging from 500g to about 23kg (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. It is also easier to spot illegal trade cases if ODS are shipped in refillable containers only since these are usually registered with are returned to the seller after the contents have been used.

Pressurised containers

Most 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 liquid at room temperature and can be stored and transported in drums, cans, barrels, bottles and similar containers. Often, cylinders (in particular non-refillable ones), 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 : George White, Senior Special Agent, United States Customs Service, USA; except photos 6-1, 6-2, 6-4, 6-18 to 20, 6-23a and 6-23b: Prof. Janusz Kozakiewicz. Photo 6-3 : Ozonaction

Photo 6-1 - Disposable cylinder with HCFC-22 – the most popular HCFC refrigerant.

Photo 6-2 - Disposable cylinder with SUVA MP39 - an R-401 refrigerant blend containing HCFCs.

Photo 6-3 - 1 lb canisters and cardboard packaging.

Photo 6-4 - Disposable cylinder with Forane 408 – an R-408 refrigerant blend containing HCFCs.

Photo 6-5 - Cardboard packaging for 13.6kg (30 lb) disposable cylinder, top view.

Photo 6-6 - Pallet of CFC-12.

Photo 6-7 - Pallet of CFC-12.

Photo 6-8 - Traditional reusable cylinders.

Photo 6-9 - Example of CFC-12 cylinder, dichlorodifluoromethane.

Photo 6-10 - "Recovered" R-502 (mixture of 49 per cent HCFC-22 and 51 per cent CFC-115) cylinder.

Photo 6-11 - Various low-pressure containers.

Photo 6-12 – 50 (22.7kg) and 30 lb (13.6kg) reusable cylinders; 30 lb (13.6kg) disposable cylinder.

Photo 6-13 - Modern reusable cylinders.

Photo 6-14 - Various sizes of recoverable containers.

Photo 6-15 - Stacked ISO containers.

Photo 6-16 - ISO tanks allow for multimodal transport of large quantities of refrigerants.

Photo 6-17 - Front end of an ISO tank (see box for example of ISO tank labelling).

Photo 6-18 - Drums holding 240 kg of HCFC-141b intended for use as foam blowing agent

Photo 6-19 - Truck cistern used for transportation of large bulk quantities of HCFC-141b

Photo 6-20 - One tonne (1000 kg) capacity pressurised cylinders

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 6-21 - Barrel of halon 1301 (bromotrifluoromethane).

Photo 6-22 - Cylinder of halon 1211(bromochloro difluoromethane).

Photo 6-23a - Cylinder containing methyl bromide

Photo 6-23b - Cylinder containing methyl bromide

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 globally accepted labelling requirement exists for ODS-based technology. Nevertheless, some countries require that ODS containers placed on their markets have special labels indicating that they contain ODS. For example, in the European Union it is mandatory to label ODS containers as “Danger. Hazardous to the ozone layer” (Regulation (EC)1272/2008)

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/bonnet, 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.

AHRI colour codes

The Air-Conditioning, Heating and Refrigeration Institute (AHRI) colour assignments for refrigerant containers are described in more detail in AHRI Guideline N (http://www.ahrinet.org/App_Content/ahri/files/Guidelines/AHRI%20Guideline%20N-2008.pdf). 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.ahrinet.org/.

AHRI Guideline N is a voluntary US industry guideline for the uniform assignment of colours for containers used for new or reclaimed refrigerants that meet AHRI Standard 700-2011 purity specifications. Guideline N is also used in some other countries—in particular in Latin America. However, AHRI 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 AHRI 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 labelling 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 as 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, specifically including polyol pre-mixes for polyurethane foam production
- 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 7-1a and 7-1b. Two different refrigerant identifiers

Refrigerant identifiers/analysers are small portable units used to identify certain ODS and non-ODS. The more sophisticated models detect CFCs, HCFCs, HFCs and hydrocarbons. They are also able to analyse the composition of certain refrigerant blends, their water content, and purity and to indicate the presence of highly flammable substances.

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 thicker tube of the two metal tubes leading to the compressor. Safety precautions should be observed when testing. The thicker 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.

Large containers (1 tonne or more) will usually have two valves which will not be marked with colours. When such a container is in a horizontal position, always use the upper valve since this will allow access to the portion of the cylinder containing the vapour.

Capabilities and limitations of refrigerant identifiers

Refrigerant identifiers typically utilise 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 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.

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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).

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 Autofrost 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 once it has been proved that it does not contain banned components.

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.

Photo 7-2. Conducting a temperature-pressure test.

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.

Photo 7-3. Example of a leak detector.

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.

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, which is an extremely toxic substance, as well as CTC and other ODS which are liquids at room temperature (e.g. HCFC-141b) 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, liquid HCFCs 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 liquid ODS unless they are specially trained technicians and authorised to do so. The government laboratory may be able to provide Customs Officers with specialized 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 sandwich panels used, for example, in the construction of walls of cold stores. Analysis to determine whether PU foam contains CFCs or HCFCs 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 for Phase II Customs Training

Phase I of the Customs training on dealing with ozone depleting substances—the train-the-Customs-trainers phase (usually conducted by an international consultant in collaboration with the NOU) in combination with the UNEP Customs training manual and the country's HPMP —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 may include 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 in the same region that has already implemented a 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.

Also in Annex D a model approach to enforcement officers training in the framework of country's HPMP is included. It has been developed by ROAP and shows using one country's example how the three phases of training described above can be implemented by the country as part of its HPMP. The implementation is foreseen in three steps:

Step I: Institutional set-up (2-3 months) - during which all stakeholders of the training process are identified and the substantial assumptions concerning arrangements for training are agreed upon.

Step II: Preparation for national-level training (4-6 months) –which includes Phase I of training (national train-the-trainers workshop) and during which draft national training curriculum is formulated It has also been proposed that before national train-the-trainers workshops start a regional train-the-trainers workshop is conducted.

Step III: National and local trainers workshops (up to 24 months) – which corresponds to Phase II of training and during which the relevant workshops are conducted.

Step IV: Review of the training programme – which corresponds to Phase III of training (monitoring of the results of training)

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.

Video resources

Trainers could select relevant segments of videos to support their presentations and to help Customs Officers visualise the specific subject areas. 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.

E-learning module

As part of UNEP OzonAction's Compliance Assistance Programme, an interactive online version of UNEP's customs training manual was developed, as an e-learning module, in collaboration with the World Customs Organization. This online training tool will facilitate knowledge acquisition by new Customs and enforcement officers as well as provide experienced officers with an easy way to refresh their skills. The e-learning modules are also hosted within WCO's online training platform which will help ensure the long-term sustainability of training. Three new e-learning modules have also been developed which cover issues addressed by the Basel, Rotterdam and Stockholm Conventions, the Chemical Weapons Convention and the Convention on Biological Diversity, and are available on the same platform.

Presentation Slides

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

Demonstration materials

Demonstration materials such as ODS, refrigerant cylinders and packaging, as well as ODS products and equipment borrowed 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.

Practical exercise in identification of ODS

Conducting practical exercises in the identification of ODS is one of the most important elements of the training course, both in Phase I and in Phase II. It would be preferable to conduct this exercise in two parts, following the suggestions below:

1. Participants are divided into small groups and are given different samples of documentation that normally accompany a shipment, including information on the chemical name and formula of the substance, HS code, UN number or CAS number – some of the data may be false (may not match) or all information may be correct. The participants can also be given the corresponding cylinders (previously prepared by the trainer) which may be labelled properly or may contain incorrect/false information. Each group is asked to examine the shipment documentation and the cylinders and determine whether, in their opinion, the shipment is suspicious or not; and what substance they believe is contained in the cylinder.

2. Each group is then given a refrigerant identifier to verify the contents of their cylinder to find out if their inspection and analysis of the elements were correct.

The exercise would be more effective if each group is made to examine two different sets of documentation and cylinders. Both sets can have incorrect data (documentation does not match the labelling) or one set is correct and the other false.

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.

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.org/ozonaction/Topics/Customs/tabid/6402/Default.aspx

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

- 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 prepared and used in the Phase II training?
- Was country-specific information 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

- Are data collected routinely on legal imports of ODS and, if applicable, on ODS-based products and equipment?
- How many illegal imports were detected and seized in the previous year?
- How many suspect shipments were specifically checked for ODS in the previous year?
- 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 weekend 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)
- 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 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.
- Prepare in advance any tools necessary to conduct practical demonstrations and exercises (documentation, identifiers, cylinders)

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.

e-learning module

Workshop participants can be required to complete the online e-learning course prior to attending the actual live training session (they can be registered beforehand and given a password to access the WCO online training platform). This will enable the participants to familiarise themselves with the basic concepts to be presented in the training and allow more time for hands-on exercises during the workshop. If this option is not possible, a session could be carried out where the UNEP-WCO customs e-learning module is demonstrated and some sessions are carried out in a group setting.

To register, NOUs may contact their respective UNEP OzonAction Regional Office, while Customs and enforcement officers may contact their country's national coordinator for the World Customs Organization -
http://e-learning.wcoomd.org/hosting/Learning/Coordinators.pdf ;
or contact the WCO e-learning team- elearning@wcoomd.org

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.

Practical exercises

Practical exercises are a very important part of each training course. They should be carefully designed to ensure active participation – dividing participants into small groups of 4-6 persons would be preferable when conducting such exercises. A good mix of presentations, group discussions and group practical exercises will help to produce a successful course.

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.
- Ensure adequate time for practical demonstrations and exercises.

... continued

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 has already taken place or will soon approach 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 179 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), a WCO initiative, 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.wcoomd.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, a number of 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.

ENVIRONET

ENVIRONET is a real-time communication tool for information exchange and cooperation in the area of environmental border protection among Customs administrations, competent national agencies, international organizations and their regional networks, as well as other enforcement authorities bearing similar responsibilities.

As one of the CENcomm (Customs Enforcement Network Communication) applications, ENVIRONET is internet-based and accessible only to a Closed User Group (CUG).
For detailed information on ENVIRONET, please contact environet@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.

Customs Risk Management Compendium

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. Considering the fact that development and implementation of an intelligence-enabled risk management framework along with embedding a risk management culture within a Customs organization enables more effective decision-making at all levels of the organization and in relation to all areas of risk, the WCO developed the "WCO Customs Risk Management Compendium". The Compendium is comprised of two separate but interlinked volumes. Volume 1 sets out the organizational framework for risk management and outlines the risk management process. Volume 2 deals mainly with risk assessment, profiling and targeting tools that inform selection criteria for identifying high-risk consignments, passengers and conveyances for Customs intervention.

- To provide Members with a set of standard guidelines and to explain the framework and methodology in general; Risk Assessment, Profiling and Targeting,
- To assist its Members in constructing national information and intelligence systems; the Global Information and Intelligence Strategy;
- To specify and list several risk indicators including illicit trafficking related to multilateral environmental agreement; the Standardized Risk Assessment, Model Risk Indicators/ Profiles;
- To provide a set of standard analytical concepts and guidelines and an overview of the types, processes and products of analysis; the Analysis Guidelines,
- To identify most common risk indicators considering international trade logistical phases (pre-arrival, arrival and post-arrival); several documents on Risk Indicators and Manuals, were developed and incorporated into Volume 2 of Risk Management Compendium.

Risk indicators and profiles that Customs Officers can use in their daily work to target people, goods and conveyances for either physical inspection or post-clearance audit, thereby allowing them to operate more efficiently and effectively. These tools have proven to be effective in the collection and analysis of data as well as the enhancement of international co-operation.

Harmonized System (HS)

The Harmonized System, developed by the WCO, is a multipurpose goods nomenclature used, as of March 2012, by more than 200 countries and Customs or Economic Unions, 141 of which are Contracting Parties to the HS Convention, as the basis for Customs tariffs and for the compilation of international trade statistics. Over 98 per cent of the merchandise in international trade is classified in terms of the HS (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 HS 2007 amendments included subheadings for the separate identification of mixtures containing ODS and a separate code for mixtures containing methyl bromide.
The recent HS 2012 amendments include specific 6-digit HS codes for the five most commonly used HCFCs, and at the same time CFCs were regrouped under a single code and certain other ODS and were specifically introduced to facilitate the monitoring and control of the international trade in HCFCs which are presently traded in huge quantities [see Annex B.3 for details].

World Trade Organization (WTO)

The WTO, which has 158 member countries (2013), 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.

Project Sky Hole Patching II

A joint global Customs enforcement operation initiated by the World Customs Organization and the United Nations Environment Programme (UNEP) and code-named "Sky-Hole Patching II" led to the confiscation of more than 7,500 cylinders of CFCs (chlorofluorocarbons), HCFCs (hydrochlorofluorocarbons) and other ozone depleting substances.

Totalling over 108 tonnes of ozone depleting substances (ODS) and 668 items of equipment containing ODS, each of these man-made chemicals is linked to the rapid depletion of the ozone layer and all have been either banned or subject to strict controls under the terms of the Montreal Protocol on Substances That Deplete the Ozone Layer.

Built on the success of Project Sky-Hole Patching I, Project Sky-Hole Patching II saw over 80 countries pledge their commitment to participating in the project, making it a truly global event.

The ODS seized during Sky-Hole Patching II, comprised over 64 tonnes of ODS + 730 items of ODS-containing equipment which, had they not been confiscated, would have presented the equivalent of 400 thousand tonnes of CO_2–equivalent emissions, if released into the atmosphere.

Informal Prior Informed Consent mechanism

Prior Informed Consent (PIC), a tool used by many environmental conventions to better manage the import and export of controlled commodities or items between countries and combat their illicit trade. In 2006 National Ozone Units of countries from the South Asia/South East Asia and the Pacific Regional Networks piloted a similar mechanism on a voluntary basis called informal PIC or iPIC. The countries agreed to informally consult the list of the registered importers/exporters provided by the network countries before issuing import/export licences; and inform the relevant NOU once the licences had been issued. The mechanism was useful for member countries in implementing effective licensing systems and avoiding exceeding their annual consumption quota as part of their phase-out strategies or as proscribed by the Montreal Protocol. Since then, the iPIC mechanism has been quite successful and has evolved and grown to become a global voluntary initiative for likeminded states who wish to strengthen the implementation of their national ODS licensing system and effectively support ODS trade control and actively support prevention of illegal trade. Countries which are not already members of iPIC are strongly encouraged to join and to begin to reap the benefits of this initiative. More detailed information on iPIC and its role in combating illegal trade in ODS can be found in a separate section in this Chapter.

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 trade issues. 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 following 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.

Asian Regional Partners Forum on Combating Environmental Crime (ARPEC)

UNEP continually seeks opportunities to build co-operation with like-minded organisations interested in curbing the illegal trade in environmentally sensate commodities. After a meeting of such partners in August 2005 convened by UNEP's Regional Office for Asia and the Pacific (ROAP), UNEP spearheaded the establishment of 'The Asian Regional Partners Forum on Combating Environmental Crime' (ARPEC) with like-minded organisations that are committed to fight environmental crimes. ARPEC enables partners to design joint initiatives and brainstorm on emerging issues in relation to illegal international trade in environmentally sensitive commodities such as endangered wild fauna and flora and toxic chemicals and hazardous waste, including ODS. This forum has created numerous opportunities for partners to cooperate in capacity building, training and workshops and to share information in their

respective fields. It has also crystallised regional enforcement operations such as Project Sky Hole Patching (an enforcement operation on combating the illegal trade in ozone depleting substances and hazardous waste in Asia and the Pacific - http://www.greencustoms.org/docs/Sky_Hole_Patching_BKK.pdf) and PATROL - Partnership against Transnational Crime through Regional Organized Law Enforcement. ARPEC members gather twice a year in Bangkok, Thailand.

UNODC Border Liaison Office (BLO) Project and Project PATROL

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. Since 1999, UNODC has signed memoranda of understanding with six countries in the Greater Mekong Sub-region (GMS) to establish over 70 Border Liaison Offices (BLOs).

In 2011, UNODC, UNEP and two leading non-governmental organisations specialising in conservation and enforcement teamed up to coordinate efforts through Project PATROL ("Partnership on Combating Transnational Crime through Regional Organized Law Enforcement"). In Cambodia, Thailand and Viet Nam, officials in border areas including immigration officers, police, customs and trade control, military and policymakers have started a needs assessment-based training to combat all types of transboundary crimes, bringing environmental issues closer to the core of national and regional enforcement efforts.

Asia Pacific Region

Border Dialogue and Bilateral Discussion on Data Discrepancy

Since 2004, UNEP has facilitated a number of dialogues among neighbouring countries to improve their ODS control at the border as well as bilateral discussions between importing and exporting countries which often address discrepancies identified in trade data.

Private and Public Partnerships to combat illegal trade in ODS

Noting that all ODS controlled under the Montreal Protocol are man-made substances, the private sector involvement plays a crucial role both in phase-out and enforcement efforts. Since 2004, UNEP ROAP have been working with private enterprises and governments so that they can join hands to support enforcement operations, to promote effective monitoring of trade in ODS, and to encourage sound disposal and Recovery / Purification / Re-use of ODS. The Public Private Partnership on Trade in ODS was formed originally during the workshop on "Preventing Illegal Trade: Public-Private Partnership" on 26-27 February 2004 in Thailand, as an interface of the private sector and the public sector.

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.cec.org/ods/main/cec_ods_intro_e.asp).

Latin America and Caribbean (LAC) Region

A key element of regional meetings and training workshops on the monitoring and control of ODS and related technologies is working with the regional agencies such as the Caribbean Community (CARICOM), Caribbean Forum (CARIFORUM), La Comisión Centroamerica

de Ambiente y Desarrollo (CCAD), El Mercado Común del Sur (Mercosur), the Caribbean Customs Law Enforcement Council, etc. The Network of Ozone Officers in the LAC Region continue discussions and cooperation with these agencies, the member states, international agencies and other entities for the establishment of a regional mechanism on sustainable compliance with CFC management post-2010 as well as other ODS.

In January 2012 the 18th Meeting of the Forum of Ministers of the Environment of Latin America and the Caribbean approved "Decision 7 on Chemicals, Hazardous Waste and Other Wastes." The decision highlights the relevance of the decisions adopted by different chemical conventions including those by the Montreal Protocol and reaffirms the need to increase efforts and establish regional mechanisms to prevent and control illegal traffic of hazardous wastes, ODS and chemicals. This decision can now be used as a policy tool in the LAC region.

With regard to trade in ODS in the region, country-to-country verification is now done by the National Ozone Officers. They cross reference and verify the validity of a particular shipment to an exporting country.

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.

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 very effective way of exchanging information on ODS trade at the international level is through the informal Prior Informed Consent (iPIC) mechanism described below.

Informal Prior Informed Consent (iPIC) mechanism of exchanging information on trade in ODS

The iPIC procedure is a system of informal exchange of information on intended imports and exports between authorities in trading countries responsible for issuing import or export licences. The iPIC is an informal and voluntary system. Nevertheless, in Decision XIX/13 of the Parties to the Montreal Protocol, iPIC was described as one of the measures that could assist in combating illegal trade in ODS effectively. The advantage of the informal approach over the formal one is that communication between importing and exporting countries can be organised on the level of National Ozone Units (NOUs), which facilitates information exchange and assists in forging informal links between staff responsible for issuing licences or permits in those countries. That, in turn, can facilitate efficient monitoring of trade in ODS and prevention of illegal activities.

The simplest way to implement the iPIC procedure is for the responsible authorities in each participating country, along with the NOUs or bodies responsible for issuing import/export licences in a country, to agree to informally and confidentially exchange via e-mail specific types of information relating to ODS imports and exports. The information being shared between these authorities contains details of any application for an import or export licence made to that authority that involves the other country. Confirmation on the eligibility of the shipment is also exchanged by e-mail. The responsible authorities participating in the iPIC procedure agree on the list of substances concerned (which should include both pure substances and mixtures, specifically those containing HCFCs) and on the maximum time allowed for issuing the confirmation of shipment eligibility (e.g. if the confirmation is not received by a specific deadline, then the shipment can be sent out without confirmation). The key action under an iPIC system is when the exporting country checks the copy of import licences before issuing an export licence. Similarly, the importing country informs the exporting country of its registered importers and the quantities allocated to them for a given calendar year.

Under the iPIC system, each year the exporting and importing countries exchange background information in the form of an iPIC "Information Sheet." This sheet provides data on the most important elements of a country's licensing system and includes a list of eligible importers/exporters of the substances covered by the iPIC. If all countries in a particular region agree to participate in an iPIC procedure, all the Information sheets are shared with the authorities of all participating countries in the region to inform them of the other countries' licensing systems and their list of eligible importers and exporters. Such an approach makes the whole region much more resistant to illegal trade from outside and at the same time prevents the development of illegal trade within the region.

In an effort to further facilitate the iPIC mechanism, UNEP OzonAction designed and developed iPIC Online (http://www.unep.org/ozonaction/InformationResources/iPIConline/tabid/79051/Default.aspx). This online version of the iPIC mechanism is password-protected

and provides a 24-hour/7-day, quick, easy, global and personalised access for its users. It is a centralised, one-stop, standardised and secured repository of iPIC Information Sheet data and allows users to search specific items in the Information Sheets. iPIC Online also features an interactive query facility to allow an iPIC focal point to correspond and consult iPIC focal points of other countries on doubtful transactions and allows an easy and quick generation of various reports and statistics.

The list of countries participating in iPIC system worldwide (as of April 2013) is shown below. More information on iPIC procedures can be found in the following UNEP publications: "Compliance through Informal Prior Informed Consent on Trade of Ozone Depleting Substances - iPIC" and "IPIC – A Tool to Strengthen Enforcement of Licensing Systems for Ozone Depleting Substances" available at http://www.unep.org/ozonaction/InformationResources/iPIC-online/tabid/79051/Default.aspx

List of countries which have applied iPIC procedure in international trade in ODS

status as of April 2013 NB: to see current list of countries, visit the iPIC online website

1. Afghanistan
2. Albania
3. Angola
4. Antigua and Barbuda
5. Armenia
6. Australia
7. Austria1
8. Azerbaijan
9. Bahamas
10. Barbados
11. Belarus
12. Belgium*
13. Belize
14. Bhutan
15. Brazil
16. Bulgaria1
17. Burkina Faso
18. Cambodia
19. China (excluding Hong Kong and Macao)
20. Colombia
21. Costa Rica
22. Croatia
23. Cyprus*
24. Czech Republic*
25. Denmark*
26. Estonia1
27. Fiji
28. Finland*
29. France*
30. Gambia
31. Germany*
32. Greece*
33. Guyana
34. Hungary*
35. Indonesia
36. Iran (Islamic Republic of)
37. Ireland*
38. Italy*
39. Jamaica
40. Kazakhstan
41. Korea, Republic of
42. Kyrgyzstan
43. Lao, People's Democratic Republic of
44. Latvia*
45. Lithuania*
46. Luxemburg*
47. Malaysia
48. Malta*
49. Mauritius
50. Mexico
51. Moldova, Republic of
52. Mongolia
53. Montenegro
54. Myanmar
55. Namibia
56. Nepal
57. Netherlands*
58. New Zealand
59. Oman
60. Palau
61. Panama
62. Papua New Guinea
63. Paraguay
64. Peru
65. Philippines
66. Poland*
67. Portugal*
68. Romania*
69. Russian Federation
70. Saint Lucia
71. Saint Vincent and the Grenadines
72. Serbia
73. Singapore
74. Slovakia*
75. Slovenia*
76. Spain*
77. Sri Lanka
78. Sweden*
79. Tajikistan
80. Tonga
81. Trinidad and Tobago
82. Turkmenistan
83. United Kingdom*
84. Uzbekistan
85. Vanuatu
86. Venezuela, Bolivarian Republic of
87. Viet Nam

* Trade in ODS with these countries – European Union Member States - is based on import and export licenses issued by European Commission

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.
AHRI colour assignments	Voluntary industry guideline (AHRI Guideline N) for the uniform assignment of colours for containers used for currently in use, newly developed or reclaimed refrigerants that meet AHRI Standard 700 purity specifications. AHRI is the Air-Conditioning, Heating and Refrigeration Institute (formerly ARI). NB: Guideline N does not cover colors for recovered and recycled refrigerants which are covered in AHRI Guideline K.
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.
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 (CCl4) 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.
chlorofluoro-carbons (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. They are also potent greenhouse gases.
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.
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. They are also potent greenhouse gases.

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. They are also potent greenhouse gases.
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.
hydrofluoro-carbons (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 and are therefore potent greenhouse gases. Newly developed unsaturated HFCs (HFOs) have a very low global warming potential and are considered as future replacements for ODS.
isomer	molecules with the same molecular formula but with different molecular structures
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 (NOU)	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.
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 hole	Area in the stratosphere over certain part of Earth where the concentration of ozone is exceptionally low. Largest ozone hole is situated over Antarctica.
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://ozone.unep.org/new_site/en/index.php
PU or PUR	Polyurethane, a synthetic resin in which the polymer units are linked by urethane groups, used chiefly as constituents of paints, varnishes, adhesives, and foams.
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.
XPS	Extruded polystyrene, a high performance rigid foam board with high compressive strength commonly used in residential, commercial and industrial insulation.

Annex B
ODS Information

Annex B.1: Customs Officer's Quick Tool for Screening ODS (including HS codes valid until 31 Dec 2011)

Ozone Depleting Substances ODS

Name/Group	Chemical name	Formula	ASHRAE # for refrigerants only	ASHRAE1 safety group	CAS[2] #	UN[3] #	HS code Since 1 Jan 2012	HS code Until 31 Dec 2011
Annex A, Group I (CFCs)								
CFC-11	Trichlorofluoromethane	$CFCl_3$	R-11	A1	75-69-4	1017	2903.77	2903.41
CFC-12	Dichlorodifluoromethane	CF_2Cl_2	R-12	A1	75-71-8	1028	2903.77	2903.42
CFC-113	Trichlorotrifluoroethanes	$C_2F_3Cl_3$	R-113	A1	76-13-1		2903.77	2903.43
CFC-114	Dichlorotetrafluoroethanes	$C_2F_4Cl_2$	R-114	A1	76-14-2	1958	2903.77	2903.44
CFC-115	Chloropentafluoroethane	$CClF_2CF_3$	R-115	A1	76-15-3	1020	2903.77	2903.44
Annex A, Group II (Halons)								
Halon-1211	Bromochlorodifluromethane	CF_2BrCl	R-12B1		353-59-3	1974	2903.76	2903.46
Halon-1301	Bromotrifluromethane	CF_3Br	R-13B1		75-63-8	1009	2903.76	2903.46
Halon-2402	Dibromotetrafluroethane	$C_2F_4Br_2$	R-114B2		124-73-2		2903.76	2903.46
Annex B, Group I (Other CFCs)								
CFC-13	Chlorotrifluoromethane	CF_3Cl	R-13	A1	75-72-9		2903.77	2903.45
Annex B, Group II								
Tetrachlormethane or carbon tetrachloride		CCl_4		B1	56-23-5	1864	2903.14	2903.14
Annex B, Group III								
1,1,1-trichloroethane or methyl chloroform		$C_2H_3Cl_3$	R-140a		71-55-6	2831	2903.19	2903.19
Annex C, Group I (HCFCs)								
HCFC-22	Chlorodifluoromethane	CHF_2Cl	R-22		75-45-6	1018	2903.71	2903.49
HCFC-123	Dichlorotrifluoroethanes	$C_2HF_3Cl_2$	R-123		306-83-2		2903.72	2903.49
HCFC-124	Chlorotetrafluoroethanes	C_2HF_4Cl	R-124		2837-89-0		2903.79	2903.49
HCFC-141	Dichlorofluoroethanes	$C_2H_3FCl_2$			1717-00-6		2903.73	2903.49
HCFC-141b	1,1-dichloro-1-fluoroethane	CH_3CFCl_2	R-141b		1717-00-6		2903.73	2903.49
HCFC-142	Chlorodifluoroethanes	$C_2H_3F_2Cl$			75-68-3		2903.74	2903.49
HCFC-142b	1-chloro-1,1-difluoroethane	CH_3CF_2Cl	R-142b		75-68-3		2903.74	2903.49
HCFC-225	Dichloropentafluoropropanes	$C_3HF_5Cl_2$					2903.75	2903.49
Annex C, Group II (HBFCs)								
HBFC-22B1	Bromodifluoromethane	CHF_2Br					2903.79	2903.49
Annex C, Group III								
Bromochloromethane		CH2BrCl					2903.79	2903.49
Annex E, Group I								
Methyl bromide (or Bromomethane)		CH3Br			74-83-9	1062	2903.39	2903.39
The most popular ODS containing blends (Refrigerants)								
R-500[5]	CFC-12 / HFC-152a		R-500		**		3824.71	3824.71
R-502[5]	HCFC-22 / CFC-115		R-502		**	1973	3824.71	3824.71
R-401A (MP-39)	HCFC-22/HFC-152a/HCFC-124		R-401A		**		3824.74	3824.74
R-406A	R-22/R-600a/R-142b (55/04/41)						3824.74	3824.74
R-408A (FX 10)	HCFC-22/HFC-143a/HFC-125		R-408A		**		3824.74	3824.74
R-409A (FX 56)	HCFC-22 / HCFC-124/HCFC-142b		R-409A		**		3824.74	3824.74
R-415B	R-22/R-152a (25/75)						3824.74	3824.74
R-418A	HC-290/HCFC-22/HFC-152a		R-418A		**		3824.74	3824.74

Selected Non-Ozone Depleting Substances[4]							
Name/Group	**Chemical name**	**Formula**	**ASHRAE # for refrigerants only**	**ASHRAE1 safety group**	**CAS2 #**	**UN3 #**	**HS code**
Hydroflourocarbons (HFCs)							
HFC-134a	1,1,1,2-Tetrafluoroethane	CF_3CH_2F	R-134a	A1	811-97-2	3159	2903.39
HFC-152a	1,1-Difluoroethane	CHF_2CH_3	R-152a	A2	75-37-6		2903.39
HFC-125	Pentafluoroethane	CF_3CHF_2	R-125	A1	354-33-6		2903.39
HFC-143a	1.1.1-trifluoroethane	CF_3CH_3	R-143a	A2	420-46-2		2903.39
HFC-32	Difluoromethane	CH_2F_2	R-32	A2	75-10-5		2903.39
HFC-23	Trifluoromethane	CHF_3	R-23	A1	75-46-7		2903.39
HFC-245fa	1,1,1,3,3-Pentafluoropropane	$CF_3CH_2CHF_2$	R-245fa	A1	460-73-1		2903.39
HFC-1,2,3,4yf	2,3,3,3-Tetrafluoropropene	CH_2=CF-CF_3	R-1,2,3,4yf				
Hydrofluorocarbons blends (HFCs)							
R-404A	R143a/125/134a		R-404A	A1/A1	**		3824.78
R-507A	R143a/125		R-507A	A1	**		3824.78
R-407A	R32/125/134a		R-407A	A1/A1	**		3824.78
R-407B	R32/125/134a		R-407B	A1/A1	**		3824.78
R-407C	R32/125/134a		R-407C	A1/A1	**		3824.78
R-410A	R32/125		R-410A	A1/A1	**		3824.78
R-508A	R23/116		R-508A	A1/A1	**		3824.78
R-508B	R23/116		R-508B	A1/A1	**		3824.78
Halogen-free Refrigerants							
R-717	Ammonia	NH_3	R-717	B2	7664-41-7	1005	2814.10
R-744	Carbon dioxide	CO_2			124-38-9		2811.21
R-600	Butane	$CH_3CH_2CH_2CH_3$			106-97-8		2901.10*
R-600a	Iso-Butane	C_4H_{10}	R-600a	A3	75-28-5	1969	2901.10*
R-290	Propane	C_3H_8	R-290	A3	74-98-6	1978	2711.12

*The HS Code applies only if the concentration of butane or Iso-butane is higher than 95%. Otherwise, the substance should be classified in the specific provision of subheading 2711.13 for "Butanes".

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

4 - Their HS codes may be used to disguise ODS

5 - International trade not allowed (contains CFCs)

** 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

Source: Article 7 data for 2012 reporting year, only countries with positive production figures.

Group	Producing Countries
Chlorofluorocarbons (CFCs)	China, Russian Federation
Halons	(only in small quantities)
Carbon tetrachloride (CCl_4)	China, France
Methylchloroform (CH_3CCL_3)	None
Hydrochlorofluorocarbon (HCFCs)	Argentina, Canada, China, Democratic People's Republic of Korea, France, India, Japan, Mexico, Netherlands, Republic of Korea, Russian Federation, United States of America, Venezuela
Methyl Bromide	China, Japan, United States of America

HS codes for selected products that may contain ODS (list is not exhaustive)

Product	HS code/codes
AC systems (including components and parts)	All codes under 84.15
Refrigerators & Freezers	84.18, 84.19, 85.10
Compressors of a kind used in refrigeration equipment	8414.30
Vehicles	CHAPTER 87
Fire Extinguishers	8424.10
Insulating boards & pipe covers	39.17, 39.20, 39.21, 39.25, 39.26
Polyurethanes	3909.50
Composite solvents	3814.00
Dehumidifiers*	8509, 8479
Pre-blended polyols	3907

"*Air dehumidifiers can be classified in heading 84.79 (under the residual subheading 8479.89), while certain types could also fall under 85.09 (subheading 8509.80), as electro-mechanical domestic appliances, with self-contained electric motor, provided their weight is 20kg or less. Heading 85.09 has priority over heading 84.79."

United Nations Environment Programme

Prepared by: Compliance Assistance Programme (CAP)

Regional Office for West Asia

Quality Reviewed and revised by: Dr. Janusz Kozakiewicz

Annex B.2: Controlled ODS and their identifiers, including 2012 HS codes

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 changes of HS codes for ODS since 1 January 2012, the "AHRI 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 AHRI 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 since 1 Jan 2012	AHRI colour assignments for refrigerant containers	ASHRAE safety group	ODP
Annex A Group I (CFC)	**Chlorofluorocarbons (CFCs)**								
CFC-11	Trichlorofluoromethane	$CFCl_3$	R-11	75-69-4	1017	2903.77	Orange	A1	1.0
CFC-12	Dichlorodifluoromethane	CF_2Cl_2	R-12	75-71-8	1028	2903.77	White	A1	1.0
CFC-113	Trichlorotrifluoroethanes	$C_2F_3Cl_3$	R-113	76-13-1		2903.77	Dark purple (violet)	A1	0.8
CFC-114	Dichlorotetrafluoroethanes	$C_2F_4Cl_2$	R-114	76-14-2	1958	2903.77	Dark blue (navy)	A1	1.0
CFC-115	Chloropentafluoroethane	$CClF_2CF_3$	R-115	76-15-3	1020	2903.77		A1	0.6
Annex A Group II (Halon)	**Halons**								
Halon-1211	Bromochlorodifluoromethane	CF_2BrCl	R-12B1	353-59-3	1974	2903.76			3.0
Halon-1301	Bromotrifluoromethane	CF_3Br	R-13B1	75-63-8	1009	2903.76			10.0
Halon-2402	Dibromotetrafluoroethane	$C_2F_4Br_2$	R-114B2	124-73-2		2903.76			6.0
Annex B Group I (CFC)	**Other chlorofluorocarbons (other CFCs)**								
CFC-13	Chlorotrifluoromethane	CF_3Cl	R-13	75-72-9		2903.77	Light blue (sky)	A1	1.0
CFC-111	Pentachlorofluoroethane	C_2FCl_5	R-111	354-56-3		2903.77			1.0
CFC-112	Tetrachlorodifluoroethane	$C_2F_2Cl_4$	R-112	76-12-0		2903.77			1.0
CFC-211	Heptachlorofluoropropane	C_3FCl_7		422-78-6		2903.77			1.0
CFC-212	Hexachlorodifluoropropane	$C_3F_2Cl_6$		3182-26-1		2903.77			1.0
CFC-213	Pentachlorotrifluoropropane	$C_3F_3Cl_5$		2354-06-5		2903.77			1.0

Name /Group	Chemical name	Formula	ASHRAE #	CAS #	UN #	HS code since 1 Jan 2012	AHRI colour assignments for refrigerant containers	ASHRAE safety group	ODP
CFC-214	Tetrachlorotetrafluoropropane	$C_3F_4Cl_4$		29255-31-0		2903.77			1.0
CFC-215	Trichloropentafluoropropane	$C_3F_5Cl_3$		1599-41-3		2903.77			1.0
CFC-216	Dichlorohexafluoropropane	$C_3F_6Cl_2$		661-97-2		2903.77			1.0
CFC-217	Chloroheptafluoropropane	C_3F_7Cl		422-86-6		2903.77			1.0
Annex B Group II	**Saturated chlorinated derivatives of acyclic hydrocarbons**								
	Tetrachlormethane or carbon tetrachloride	CCl_4		56-23-5	1864	2903.14		B1	1.1
Annex B Group III									
	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)	**Hydrochlorofluorocarbons (HCFCs)**								
HCFC-21	CHFCl2		R-21			2903.79			0.04
HCFC-22	CHF2Cl		R-22	75-45-6	1018	2903.71	Light green		0.055
HCFC-31	CH2FCl		R-31			2903.79			0.02
HCFC-121 (3)	Tetrachlorofluoroethanes	C_2HFCl_4				2903.79			0.01-0.04
HCFC-122 (3)	Trichlorodifluoroethanes	$C_2HF_2Cl_3$				2903.79			0.02-0.08
HCFC-123	Dichlorotrifluoroethanes	$C_2HF_3Cl_2$	R-123	306-83-2		2903.72	Light blue-grey		0.02-0.06
HCFC-123	2,2-dichloro-1,1,1-trifluoroethane	$CHCl_2CF_3$				2903.72			0.02
HCFC-124	Chlorotetrafluoroethanes	C_2HF_4Cl				2903.79			0.02-0.04
HCFC-124 (3)	2-chloro-1,1,1,2-tetrafluoroethane	$CHFClCF_3$	R-124	2837-89-0		2903.79	Deep green (DOT green)		0.022
HCFC-131	Trichlorofluoroethanes	$C_2H_2FCl_3$				2903.79			0.007-0.05
HCFC-132	Dichlorodifluoroethanes	$C_2H_2F_2Cl_2$				2903.79			0.008-0.05
HCFC-133	Chlorotrifluoroethanes	$C_2H_2F_3Cl$				2903.79			0.02-0.06

Name /Group	Chemical name	Formula	ASHRAE #	CAS #	UN #	HS code since 1 Jan 2012	AHRI colour assignments for refrigerant containers	ASHRAE safety group	ODP
HCFC-141	Dichlorofluoroethanes	$C_2H_3FCl_2$				2903.73			0.005-0.07
HCFC-141b (3)	1,1-dichloro-1-fluoroethane	CH_3CFCl_2	R-141b	1717-00-6		2903.73			0.011
HCFC-142	Chlorodifluoroethanes	$C_2H_3F_2Cl$				2903.74			0.008-0.07
HCFC-142b	1-chloro-1,1-difluoroethane	CH_3CF_2Cl	R-142b			2903.74		A2	0.065
HCFC-151	Chlorofluoroethanes	C_2H_4FCl				2903.79			0.003-0.005
HCFC-221	Hexachlorofluoropropanes	C_3HFCl_6				2903.79			0.015-0.07
HCFC-222	Pentachlorodifluoropropanes	$C_3HF_2Cl_5$				2903.79			0.01-0.09
HCFC-223	Tetrachlorotrifluoropropanes	$C_3HF_3Cl_4$				2903.79			0.01-0.08
HCFC-224	Trichlorotetrafluoropropanes	$C_3HF_4Cl_3$				2903.79			0.01-0.09
HCFC-225	Dichloropentafluoropropanes	$C_3HF_5Cl_2$				2903.75			0.02-0.07
HCFC-225ca (3)	1,1-dichloro-2,2,3,3,3-pentafluoropropane	$CF_3CF_2CHCl_2$	R-225ca			2903.75			0.025
HCFC-225cb (3)	1,3-dichloro-1,2,2,3,3-pentafluoropropane	CF_2ClCF_2CHClF	R-225cb			2903.75			0.033
HCFC-226	Chlorohexafluoropropanes	C_3HF_6Cl				2903.79			0.02-0.10
HCFC-231	Pentachlorofluoropropanes	$C_3H_2FCl_5$				2903.79			0.05-0.09
HCFC-232	Tetrachlorodifluoropropanes	$C_3H_2F_2Cl_4$				2903.79			0.008-0.10

Name / Group	Chemical name	Formula	ASHRAE #	CAS #	UN #	HS code since 1 Jan 2012	AHRI colour assignments for refrigerant containers	ASHRAE safety group	ODP
HCFC-233	Trichlorotrifluoropropanes	$C_3H_2F_3Cl_3$				2903.79			0.007-0.23
HCFC-234	Dichlorotetrafluoropropanes	$C_3H_2F_4Cl_2$				2903.79			0.01-0.28
HCFC-235	Chloropentafluoropropanes	$C_3H_2F_5Cl$				2903.79			0.03-0.52
HCFC-241	Tetrachlorofluoropropanes	$C_3H_3FCl_4$				2903.79			0.004 -0.09
HCFC-242	Trichlorodifluoropropanes	$C_3H_3F_2Cl_3$				2903.79			0.005-0.13
HCFC-243	Dichlorotrifluoropropanes	$C_3H_3F_3Cl_2$				2903.79			0.007-0.12
HCFC-244	Chlorotetrafluoropropanes	$C_3H_3F_4Cl$				2903.79			0.009-0.14
HCFC-251	Trichlorotetrafluoropropanes	$C_3H_4FCl_3$				2903.79			0.001-0.01
HCFC-252	Dichlorodifluoropropanes	$C_3H_4F_2Cl_2$				2903.79			0.005-0.04
HCFC-253	Chlorotrifluoropropanes	$C_3H_4F_3Cl$				2903.79			0.003-0.03
HCFC-261	Dichlorofluoropropanes	$C_3H_5FCl_2$				2903.79			0.002-0.02
HCFC-262	Chlorodifluoropropanes	$C_3H_5F_2Cl$				2903.79			0.002-0.02
HCFC-271	Chlorofluoropropanes	C_3H_6FCl				2903.79			0.001-0.03
Annex C Group II (HBFC)	**Hydrobromofluorocarbons (HBFCs)**								
		$CHFBr_2$				2903.79			1.0
HBFC-22B1	Bromodifluoromethane	CHF_2Br	R-22B1			2903.79			0.74
		CH_2FBr				2903.79			0.73
		C_2HFBr_4				2903.79			0.3 - 0.8
		$C_2HF_2Br_3$				2903.79			0.5 - 1.8
		$C_2HF_3Br_2$				2903.79			0.4 - 1.6
		C_2HF_4Br				2903.79			0.7 - 1.2
		$C_2H_2FBr_3$				2903.79			0.1 - 1.1
		$C_2H_2F_2Br_2$				2903.79			0.2 - 1.5
		$C_2H_2F_3Br$				2903.79			0.7 - 1.6
		$C_2H_3FBr_2$				2903.79			0.1 - 1.7
		$C_2H_3F_2Br$				2903.79			0.2 - 1.1
		C_2H4Br				2903.79			0.07 - 0.1
		C_3HFBr_6				2903.79			0.3 - 1.5

Name / Group	Chemical name	Formula	ASHRAE #	CAS #	UN #	HS code since 1 Jan 2012	AHRI colour assignments for refrigerant containers	ASHRAE safety group	ODP
		$C_3HF_2Br_5$				2903.79			0.2 - 1.9
		$C_3HF_3Br_4$				2903.79			0.3 - 1.8
		$C_3HF_4Br_3$				2903.79			0.5 - 2.2
		$C_3HF_5Br_2$				2903.79			0.9 - 2.0
		C_3HF_6Br				2903.79			0.7 - 3.3
		$C_3H_2FBr_5$				2903.79			0.1 - 1.9
		C3H2F3Br				2903.79			30.2 - 5.6
		C3H2F4Br2				2903.79			0.3 - 7.5
		C3H2F5Br				2903.79			0.9 - 1.4
		C3H3FBr4				2903.79			0.08 - 1.9
		C3H3F2Br3				2903.79			0.1 - 3.1
		C3H3F3Br2				2903.79			0.1 - 2.5
		C3H3F4Br				2903.79			0.3 - 4.4
		C3H4FBr3				2903.79			0.03 - 0.3
		C3H4F2Br2				2903.79			0.1 - 1.0
		C3H4F3Br				2903.79			0.07 - 0.8
		C3H5FBr2				2903.79			0.04 - 0.4
		$C_3H_5F_2Br$				2903.79			
		C_3H_6FBr				2903.79			
Annex C Group III									
	Bromochloromethane3	CH_2BrCl				2903.79			0.12
Annex E Group I									
MB	Methyl bromide	CH_3Br		74-83-9	1062	2903.39			

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.
4. This HS code for methyl bromide was introduced in HS 2007 Amendment

Annex B.3

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

From an HCFCs perspective, the classification structure presented above means that if the mixture is a blend of HCFCs only or a blend of HCFCs and any substances other than CFCs – it should be classified under subheading 3824.74. If the mixture contains both HCFCs and CFCs (and possibly also other substances), it should be classified under subheading 3824.71.

It is also very important to note that the codes presented above apply only if the mixture is not covered by a more specific heading of the HS. For example, 'organic composite solvents' consisting of mixtures containing HCFCs are classified under heading 38.14 (HS code 3814.00 - "Organic composite solvents or thinners, not elsewhere specified or included; prepared paint or varnish removers").

* Except for the code 3824.78 which relates to non-ODS mixtures (mixtures containing HFCs, but not containing CFCs or HCFCs) used as replacements for ODS and ODS-containing mixtures

Annex B.4

HS codes for selected products that rely on, or may contain ODS

HS classification of air-conditioners – may contain or rely on CFCs or HCFCs

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 – may contain or rely on CFCs and HCFCs.

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 - may contain or rely on CFCs or HCFCs

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-extractors; snow-ploughs and snow-blowers.

See also Chapter 87.

HS Classification of Cars and Car Parts – may contain air conditioning or refrigerating equipment containing or relying on CFCs or HCFCs

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 – may contain halons, HCFCs and bromochloromethane

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 – may contain or rely on carbon tetrachloride or methyl chloroform

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 – may contain CFCs and HCFCs

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

Most frequently used ODS-containing refrigerant blends & other mixtures*

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%		
R-414A	HCFC-22	51%	HCFC-124	28.5%	HCFC-142b	4%	HC-600a**	16.5%
R414b (Hotshot)	HCFC-22	50%	HCFC-124	39%	HCFC-142b	9.5%	HC-600a**	1.5%
R-415A	HCFC-22	82	HFC-152a**	18.0				
R-416A	HFC-134a**	59%	HCFC-124	39.5%	HC-600*	1.5%		
R-418A	HC-290**	1.5%	HCFC-22	96%	HFC-152a**	2.5%		

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				
Trade Name	**Component 1**		**Component 2**	
Terr-O-Gas; Dowfume MC-33;	Methyl bromide	67%	Chloropicrin**	33%
50-50 Preplant Soil Fumigant; Agrobromo 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%

* This list is not exhaustive
** 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:

Annex C.1 Safety card for CFC-11
Annex C.2 Safety card for CFC-12 (cylinder)
Annex C.3 Safety card for CFC-13
Annex C.4 Safety card for HCFC-22 (cylinder)
Annex C.5 Safety card for HCFC-141b
Annex C.6 Safety card for HCFC-123
Annex C.7 Safety card for CFC-113
Annex C.8 Safety card for CFC-115 (cylinder)
Annex C.9 Safety card for Halon 1211 (cylinder)
Annex C.10 Safety card for Halon 1301 (cylinder)
Annex C.11 Safety card for carbon tetrachloride
Annex C.12 Safety card for methyl chloroform
Annex C.13 Safety card for methyl bromide
Annex C.14 Safety card for HFC 134a (non-ODS)
Annex C.15 Safety card for HC isobutane (non-ODS)
Annex C.16 Safety card for HC cyclopentane (non-ODS)
Annex C.17 Safety card for HC n-pentane (non-ODS)
Annex C.18 Safety card for HC propane (R-290) (non-ODS)

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

FRENCH: Programme International sur la Sécurité des Substances Chimiques
http://www.cdc.gov/niosh/ipcs/french.html

SPANISH: Instituto Nacional de Seguridad e Higiene en el Trabajo
http://www.insht.es/portal/site/Insht/
(haz clic sobre: Documentación, después Fichas Técnicas y Métodos,
después Fichas internacionales de seguridad química)

OTHER LANGUAGES: http://www.ilo.org/safework/info/WCMS_145760/lang--en/index.htm

Annex C.1 : TRICHLOROFLUOROMETHANE : CFC-11

ICSC: 0047
Peer-Review Status: 03.07.2002 Validated

CAS No: 75-69-4 RTECS No: PB6125000 EINECS #: 200-892-3	Trichloromonofluoromethane Fluorotrichloromethane	CFC 11 R 11	Formula: 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	Irregular heartbeat. Confusion.Drowsiness. Unconsciousness.	Use 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.	Wear 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.

PACKAGING & LABELLING : EC Classification, UN Classification, GHS Classification

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

PHYSICAL STATE; APPEARANCE : COLOURLESS GAS OR HIGHLY 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 : Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive gases of hydrogen chloride (see ICSC 0163), phosgene (see ICSC 0007), hydrogen fluoride (see ICSC 0283) and carbonyl fluoride (see ICSC 0633). Reacts with powdered aluminium, powdered zinc, magnesium shavings, lithium shavings and granular barium.

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

INHALATION RISK : On loss of containment this substance can cause suffocation by lowering the oxygen content of the air 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
Melting point: -111°C
Relative density (water = 1): 1.49
Solubility in water, g/100 ml at 20°C: 0.1
Vapour pressure, kPa at 20°C: 89.0
Relative vapour density (air = 1): 4.7
Relative density of the vapour/air-mixture at 20/C (air = 1): 4.4
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.

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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0047

Annex C.2 : DICHLORODIFLUOROMETHANE : CFC-12

ICSC: 0048
Peer-Review Status: 03.07.2002 Validated

CAS No: 75-71-8 RTECS No: PA8200000 UN #: 1028 EINECS #: 200-893-9	Difluorodichloromethane	CFC 12 R 12	Formula: 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	Irregular heartbeat. Confusion.Drowsiness. Unconsciousness.	Use 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.	Wear 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.

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

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

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

PHYSICAL STATE; APPEARANCE : COLOURLESS COMPRESSED LIQUEFIED GAS 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 : Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive gases of hydrogen chloride (see ICSC 0163), phosgene (see ICSC 0007), hydrogen fluoride (see ICSC 0283) and carbonyl fluoride (see 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 substance 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. This may result in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.

EFFECTS OF LONGTERM EXPOSURE:

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000ppm as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2004).
MAK: 1000 ppm, 5000 mg/m³; Carcinogen category: 4; Pregnancy risk group: C; (DFG 2001).

PHYSICAL PROPERTIES :

Boiling point: -30°C
Melting point: -158°C
Relative density (water = 1): 1.5
Solubility in water, g/100ml at 20°C: 0.03
Vapour pressure, kPa at 20°C: 568
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.

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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0048

Annex C.3 : CHLOROTRIFLUOROMETHANE (cylinder)

ICSC: 0420
Peer-Review Status: 23.10.1995 Validated

CAS No: 75-72-9 RTECS No: PA6410000 UN #: 1022 EINECS #: 200-894-4	Monochlorotrifluoromethane Trifluoromethyl chloride	CFC 13	Formula: $CClF_3$ 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 drums, etc., cool by spraying with water.
INHALATION	Confusion. Dizziness. Headache.	Use 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.	Wear 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 refer for medical attention.
INGESTION			

SPILLAGE DISPOSAL : Personal protection: self-contained breathing apparatus. Ventilation. NEVER direct water jet on liquid. .

PACKAGING & LABELLING : UN Hazard Class: 2.2

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

SAFE STORAGE : Fireproof if in building.

PHYSICAL STATE; APPEARANCE : COLOURLESS COMPRESSED LIQUEFIED GAS WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS : The gas is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS : Decomposes on burning. Decomposes on contact with hot surfaces. This produces 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 substance 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. This may result in impaired functions. Exposure could cause lowering of consciousness. See Notes.

EFFECTS OF LONGTERM EXPOSURE:

OCCUPATIONAL EXPOSURE LIMITS : TLV (NOT-ESTABLISHED):.
MAK: 1000 ppm, 4300 mg/m³; Peak limitation category: II(8); Pregnancy risk group: D; (DFG 2006).

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

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.
Card has been partially updated in July 2007: see Occupational Exposure Limits.

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Annex C.4 : CHLORODIFLUOROMETHANE

ICSC: 0049
Peer-Review Status: 03.07.2002 Validated

CAS No: 75-45-6 RTECS No: PA6390000 UN #: 1018 EINECS #: 200-871-9	Monochlorodifluoromethane Methane, chlorodifluoro-	HCFC 22 R 22	Formula: $CHClF_2$ 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	Irregular heartbeat. Confusion. Drowsiness. Unconciousness.	Use 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.	Wear safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL : Ventilation.

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

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

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

PHYSICAL STATE; APPEARANCE : COLOURLESS COMPRESSED LIQUEFIED GAS.

PHYSICAL DANGERS : The gas is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS : Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive gases including hydrogen chloride (see ICSC 0163), phosgene (see ICSC 0007), hydrogen fluoride (See ICSC 0283) and carbonyl fluoride (See 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 substance 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. This may result in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.

EFFECTS OF LONGTERM EXPOSURE:

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000ppm as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2001).
MAK: 500 ppm, 1800 mg/m³; Peak limitation category: II(8); Pregnancy risk group: C; (DFG 2006).

PHYSICAL PROPERTIES :

Boiling point: -41°C
Melting point: -146°C
Relative density (water = 1): 1.21
Solubility in water, g/100ml at 25°C: 0.3
Vapour pressure, kPa at 20°C: 908
Relative vapour density (air = 1): 3.0
Auto-ignition temperature: 632°C
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.
Card has been partially updated in July 2007: see Occupational Exposure Limits.

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Annex C.5 : 1,1-DICHLORO-1-FLUOROETHANE

ICSC: 1712
Peer-Review Status: 10.04.2008 Validated

CAS No: 1717-00-6 RTECS No: KI0997000 EC #: 602-084-00-X EINECS #: 404-080-1	Ethane, 1,1-dichloro-1-fluoro Dichlorofluoroethane	HCFC-141b	Formula: $C_2H_3Cl_2F/CH_3CCl_2F$ Molecular mass: 117
TYPES OF HAZARD/ EXPOSURE	**ACUTE HAZARDS/ SYMPTOMS**	**PREVENTION**	**FIRST AID/FIRE FIGHTING**
FIRE	Gives off irritating or toxic fumes (or gases) in a fire.	NO contact with hot surfaces.	Use water spray, foam, powder, carbon dioxide.
EXPLOSION			In case of fire: keep drums, etc., cool by spraying with water.
INHALATION	Drowsiness. Confusion. Unconciousness.	Use closed system or ventilation.	Fresh air, rest. Refer for medical attention.
SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	Rinse and then wash skin with water and soap.
EYES	Redness. Pain.	Wear safety goggles.	Rinse with plenty of water (remove contact lenses if easily possible).
INGESTION			Do NOT induce vomiting.

SPILLAGE DISPOSAL : Personal protection: self-contained breathing apparatus. Do NOT let this chemical enter the environment. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent. Carefully collect remainder. Then store and dispose of according to local regulations. .

PACKAGING & LABELLING : EC Classification - Symbol: N; R: 52/53-59; S: 59-61
GHS Classification - Signal: Warning
Causes eye irritation
May cause drowsiness and dizziness
Harmful to aquatic life

SAFE STORAGE : Separated from strong acids. Cool. Keep in a well-ventilated room. Store in an area without drain or sewer access.

PHYSICAL STATE; APPEARANCE : COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS : The vapour is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS : Decomposes on contact with hot surfaces or flames. This produces hydrogen chloride, hydrogen fluoride and phosgene. Reacts with strong acids.

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

INHALATION RISK : On loss of containment this substance can cause serious risk of suffocation when in confined areas.

EFFECTS OF SHORT TERM EXPOSURE : The substance is mildly irritating to the eyes. The substance may cause effects on the central nervous system and cardiovascular system. This may result in lowering of consciousness and cardiac disorders. Suffocation.

EFFECTS OF LONGTERM EXPOSURE:

OCCUPATIONAL EXPOSURE LIMITS : TLV not established. MAK (not established):.

PHYSICAL PROPERTIES :
Boiling point: 32°C
Melting point: -103.5°C
Density: 1.24 g/cm³
Solubility in water, g/100ml at 20°C: 0.4
Vapour pressure, kPa at 25°C: 76.3
Relative vapour density (air = 1): 4.0
Relative density of the vapour/air-mixture at 20°C (air = 1): 3.3 (calculated)
Auto-ignition temperature: 530-550°C
Explosive limits, vol% in air: 5.6-17.7
Octanol/water partition coefficient as log Pow: 2.3
Viscosity: 0.33 mm²/s at 25°C

ENVIRONMENTAL DATA : The substance is harmful 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 the area.

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Annex C.6 : 2,2-DICHLORO-1,1,1-TRIFLUOROETHANE

ICSC: 1343
Peer-Review Status: 24.11.1998 Validated

CAS No: 306-83-2 RTECS No: KI1108000 EINECS #: 206-190-3	HCFC 123		Formula: $C_2HCl_2F_3$ / $CHCl_2CF_3$ 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, use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Confusion. Dizziness. Drowsiness. Unconciousness.	Use 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.	Wear safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
INGESTION	See Inhalation.		Rest.

SPILLAGE DISPOSAL : Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Do NOT let this chemical enter the environment. Personal protection: chemical protection suit including self-contained breathing apparatus. .

PACKAGING & LABELLING :

EMERGENCY RESPONSE :

SAFE STORAGE : Keep in a well-ventilated room.

PHYSICAL STATE; APPEARANCE : COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS : The vapour is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS : Decomposes on heating. This produces 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 at which a harmful concentration of this substance in the air is reached on evaporation at 20°C.

EFFECTS OF SHORT TERM EXPOSURE : The substance is irritating to the eyes. The substance may cause effects on the central nervous system and cardiovascular system. This may result in narcosis and cardiac disorders.

EFFECTS OF LONGTERM EXPOSURE: The substance may have effects on the liver.

OCCUPATIONAL EXPOSURE LIMITS : TLV (NOT-ESTABLISHED): MAK: Carcinogen category: 3B; (DFG 2008).

PHYSICAL PROPERTIES :
Boiling point: 28°C
Melting point: -107°C
Relative density (water = 1): 1.5
Solubility in water, g/100ml at 25°C: 0.21
Vapour pressure, Pa at 25°C: 14
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 is persistent. 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. Card has been partially updated in February 2009: see Occupational Exposure Limits.

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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=1343

Annex C.7 : 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE

ICSC: 0050
Peer-Review Status: 03.07.2002 Validated

CAS No: 76-13-1 RTECS No: KJ4000000 EINECS #: 200-936-1	Trichlorotrifluoroethane	CFC 113 R 113	Formula: $C_2Cl_3F_3$ / $Cl_2FCCClF_2$ 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	Irregular heartbeat. Confusion. Drowsiness. Unconciousness.	Use 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.	Wear safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL : Personal protection: self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

PACKAGING & LABELLING :

EMERGENCY RESPONSE :

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 vapour is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS : Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive gases of hydrogen chloride (see ICSC 0163), phosgene (see ICSC 0007), hydrogen fluoride (see ICSC 0283) and carbonyl fluoride (see ICSC 0633). Reacts violently with powdered metals. This generates 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 substance can cause suffocation by lowering the oxygen content of the air 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. This may result in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.

EFFECTS OF LONGTERM 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: D; (DFG 2006).

PHYSICAL PROPERTIES :

Boiling point: 48°C
Melting point: -36°C
Relative density (water = 1): 1.56
Solubility in water, g/100ml at 20°C: 0.02
Vapour pressure, kPa at 20°C: 36
Relative vapour density (air = 1): 6.5
Relative density of the vapour/air-mixture at 20°C (air = 1): 3.0
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 partially updated in July 2007: see Occupational Exposure Limits.

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Annex C.8 : CHLOROPENTAFLUOROETHANE (cylinder)

ICSC: 0848
Peer-Review Status: 26.03.1998 Validated

CAS No: 76-15-3 RTECS No: KH7877500 UN #: 1020 EINECS #: 200-938-2	1-Chloro-1,1,2,2,2-pentafluoroethane Fluorocarbon 115	CFC 115	Formula: 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, use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Suffocation. See Notes.	Use 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.	Wear 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 refer for medical attention.
INGESTION			

SPILLAGE DISPOSAL : Ventilation. NEVER direct water jet on liquid. Personal protection: chemical protection suit including self-contained breathing apparatus.

PACKAGING & LABELLING : UN Hazard Class: 2.2

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G39.

SAFE STORAGE : Fireproof if in building. Cool.

PHYSICAL STATE; APPEARANCE : ODOURLESS COLOURLESS COMPRESSED LIQUEFIED GAS.

PHYSICAL DANGERS : The vapour is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS : Decomposes on contact with hot surfaces or flames. This produces 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.

EFFECTS OF LONGTERM EXPOSURE:

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000ppm, 6320mg/m³ as TWA; (ACGIH 1997).

PHYSICAL PROPERTIES :

Boiling point: -39°C
Melting point: -106°C
Relative density (water = 1): 1.3
Solubility in water: none
Vapour pressure, kPa at 20°C: 797
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.

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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0848

Annex C.9 : BROMOCHLORODIFLUOROMETHANE (cylinder)			ICSC: 0635 Peer-Review Status: 10.06.1997 Validated
CAS No: 353-59-3 RTECS No: PA5270000 UN #: 1974 EINECS #: 206-537-9	Freon 12 B 1 R 12 B 1	Halon 1211	Formula: $CBrClF_2$ 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, use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
INHALATION	Drowsiness. Unconciousness.	Use 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.	Wear face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
INGESTION			
SPILLAGE DISPOSAL : Ventilation. Do NOT let this chemical enter the environment.			
PACKAGING & LABELLING : UN Hazard Class: 2.2			
EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-20G39.			
SAFE STORAGE : Fireproof if in building.			
PHYSICAL STATE; APPEARANCE : LIQUEFIED COMPRESSED GAS WITH CHARACTERISTIC ODOUR.			
PHYSICAL DANGERS : The gas is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.			
CHEMICAL DANGERS : Decomposes on contact with open flames or very hot surfaces. This produces toxic gases including phosgene, hydrogen fluoride, hydrogen chloride and hydrogen bromide.			
ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation.			
INHALATION RISK : On loss of containment this substance can cause 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. This may result in cardiac disorders.			
EFFECTS OF LONGTERM EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis.			
OCCUPATIONAL EXPOSURE LIMITS : TLV (NOT-ESTABLISHED):.			
PHYSICAL PROPERTIES : Boiling point: -4°C Melting point: -160.5°C		Solubility in water: none Relative vapour density (air = 1): 5.7 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.			
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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0635

Annex C.10 : BROMOTRIFLUOROMETHANE (cylinder)			ICSC: 0837 Peer-Review Status: 26.03.1998 Validated
CAS No: 75-63-8 RTECS No: PA5425000 UN #: 1009 EINECS #: 200-887-6	Trifluorobromomethane Fluorocarbon-1301 Bromofluoroform		Formula: $CBrF_3$ 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, use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
INHALATION	Dizziness. Headache. Unconciousness.	Use 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.	Wear 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 refer for medical attention.
INGESTION			
SPILLAGE DISPOSAL : Ventilation. NEVER direct water jet on liquid. Personal protection: chemical protection suit including self-contained breathing apparatus.			
PACKAGING & LABELLING : 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 LIQUEFIED GAS.			
PHYSICAL DANGERS : The vapour is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.			
CHEMICAL DANGERS : Decomposes on contact with hot surfaces or flames. This produces toxic fumes including hydrogen bromide and hydrogen fluoride. Attacks plastics, 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 is irritating to the eyes. Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system.			
EFFECTS OF LONGTERM EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis.			
OCCUPATIONAL EXPOSURE LIMITS : TLV: 1000ppm, 6090mg/m³ as TWA; (ACGIH 1997). MAK: 1000 ppm, 6200 mg/m³; Peak limitation category: II(8); Pregnancy risk group: C; (DFG 2007).			
PHYSICAL PROPERTIES : Boiling point: -58°C Melting point: -168°C Relative density (water = 1): 1.5		Solubility in water: none Vapour pressure, kPa at 20°C: 1434 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. Card has been partially updated in March 2008: see Occupational Exposure Limits.			
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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0837

Annex C.11 : CARBON TETRACHLORIDE

ICSC: 0024
Peer-Review Status: 26.03.1998 Validated

CAS No: 56-23-5 RTECS No: FG4900000 UN #: 1846 EC #: 602-008-00-5 EINECS #: 200-262-8	Tetrachloromethane Tetrachlorocarbon Tetra	Formula: 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.	Use 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.	Wear 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 refer for medical attention.
INGESTION	Abdominal pain. Diarrhoea. Further see Inhalation.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give one or two glasses of water to drink. Refer for medical attention .

SPILLAGE DISPOSAL : Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in covered containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

PACKAGING & LABELLING : Unbreakable packaging. Put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Marine pollutant. EC Classification Symbol: T, N; R: 23/24/25-40-48/23-52/53-59; S: (1/2)-23-36/37-45-59-61
UN Classification: UN Hazard Class: 6.1; UN Pack Group: II

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-61S1846. NFPA Code: H3; F0; R0.

SAFE STORAGE : Separated from food and feedstuffs and metals. See Chemical Dangers. Ventilation along the floor. Cool.

PHYSICAL STATE; APPEARANCE : COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS : The vapour is heavier than air.

CHEMICAL DANGERS : Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive fumes of hydrogen chloride (see ICSC 0163), chlorine (see ICSC 0126) and phosgene (see ICSC 0007). Reacts with some metals such as aluminium, magnesium and zinc. This generates 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. This may result in unconsciousness. Medical observation is indicated.

EFFECTS OF LONGTERM 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; Carcinogen category: 4; Peak limitation category: II(2); Pregnancy risk group: C; Skin absorption (H); (DFG 2006).

PHYSICAL PROPERTIES :
Boiling point: 76.5°C
Melting point: -23°C
Relative density (water = 1): 1.59
Solubility in water, g/100ml at 20°C: 0.1 (poor)
Vapour pressure, kPa at 20°C: 12.2
Relative vapour density (air = 1): 5.3
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.5
Octanol/water partition coefficient as log Pow: 2.64

ENVIRONMENTAL DATA : The substance is harmful to aquatic organisms. This substance may be hazardous to 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.

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Annex C.12 : 1,1,1-TRICHLOROETHANE

ICSC: 0079
Peer-Review Status: 19.04.2007 Validated

CAS No: 71-55-6 RTECS No: KJ2975000 UN #: 2831 EC #: 602-013-00-2 EINECS #: 200-756-3	Methyl chloroform Methyltrichloromethane alpha-Trichloroethane	Formula: $C_2H_3Cl_3$ / 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. See Notes.		In case of fire in the surroundings, use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
INHALATION	Cough. Sore throat. Headache. Dizziness. Drowsiness. Nausea. Incoordination. Unconciousness.	Use ventilation, local exhaust or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
EYES	Redness. Pain.	Wear 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 refer for medical attention.
INGESTION	Nausea. Vomiting. Abdominal pain. Diarrhoea. Further see Inhalation.	Do not eat, drink, or smoke during work.	Do NOT induce vomiting. Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention .

SPILLAGE DISPOSAL : Personal protection: self-contained breathing apparatus. Ventilation. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

PACKAGING & LABELLING : Do not transport with food and feedstuffs. EC Classification Symbol: Xn, N; Note: F; R: 20-59; S: (2)-24/25-59-61 UN Classification UN Hazard Class: 6.1; UN Pack Group: III GHS Classification Signal: Warning, Causes mild skin irritation, Causes eye irritation, May cause drowsiness and dizziness, May cause damage to cardiovascular system if inhaled, Harmful to aquatic life. See warning icon below

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-61S2831 or 61GTI-III. NFPA Code: H2; F1; R0.

SAFE STORAGE : Separated from food and feedstuffs, strong oxidants, aluminium, magnesium and zinc. Cool. Dry. Store in an area without drain or sewer access.

PHYSICAL STATE; APPEARANCE : COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS : The vapour is heavier than air.

CHEMICAL DANGERS : Decomposes on burning. This produces toxic and corrosive fumes. Reacts violently with aluminium, aluminium alloys, magnesium, bases, strong oxidants, acetone and zinc.

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 : The substance is mildly irritating to the eyes, respiratory tract and skin. The substance may cause effects on the central nervous system. This may result in lowering of consciousness. Exposure at high levels could cause cardiac dysrhythmia.

EFFECTS OF LONGTERM EXPOSURE: The substance defats the skin, which may cause dryness or cracking

OCCUPATIONAL EXPOSURE LIMITS : TLV: 350 ppm as TWA; 450 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued; (ACGIH 2006). MAK: 200 ppm, 1100 mg/m³; Peak limitation category: II(1); Pregnancy risk group: C; Skin absorption (H); (DFG 2006).

PHYSICAL PROPERTIES :
Boiling point: 74°C
Melting point: -30°C
Relative density (water = 1): 1.34
Solubility in water: poor
Vapour pressure, kPa at 20°C: 13.3
Relative vapour density (air = 1): 4.6
Flash point: see Notes
Auto-ignition temperature: 537°C
Explosive limits, vol% in air: 8-16
Octanol/water partition coefficient as log Pow: 2.49

ENVIRONMENTAL DATA : The substance is harmful to aquatic organisms.

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. Do NOT use in the vicinity of a fire or a hot surface, or during welding. 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. Card has been partially updated in February 2009: see Chemical Dangers.

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Annex C.13 : METHYL BROMIDE (cylinder)

ICSC: 0109
Peer-Review Status: 25.11.2009 Validated

CAS No: 74-83-9 RTECS No: PA4900000 UN #: 1062 EC #: 602-002-00-2 EINECS #: 200-813-2	Bromomethane Monobromomethane	Formula: 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 appropriate extinguishing agent.
EXPLOSION	Risk of fire and explosion on contact with aluminium, zinc, magnesium or oxygen.		In case of fire: keep cylinder cool by spraying with water.
EXPOSURE		Strict Hygiene	In all cases consult a doctor ! First Aid : Use personal Protection
INHALATION	Cough. Sore throat. Dizziness. Headache. Abdominal pain. Vomiting. Weakness. Shortness of breath. Confusion. Hallucinations. Loss of speech. Incoordination. Convulsions. Symptoms may be delayed. See Notes.	Use ventilation, local exhaust or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.
SKIN	MAY BE ABSORBED! Tingling sensation. Itching. Burning sensation. Redness. Blisters. Pain. ON CONTACT WITH LIQUID: FROSTBITE. Further see Inhalation.	Cold-insulating gloves. Protective clothing.	Rinse skin with plenty of water or shower. ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer immediately for medical attention.
EYES	Redness. Pain. Blurred vision. Temporary loss of vision.	Wear safety goggles, face shield or eye protection in combination with breathing protection.	Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.

SPILLAGE DISPOSAL : Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. NEVER direct water jet on liquid.

PACKAGING & LABELLING :
EC Classification Symbol: T, N; R: 23/25-36/37/38-48/20-68-50-59; S: (1/2)-15-27-36/39-38-45-59-61
UN Classification UN Hazard Class: 2.3

GHS Classification Signal: Danger
Contains gas under pressure; may explode if heated
Toxic if inhaled (gas) Causes skin irritation Causes eye irritation
Causes damage to lungs, kidneys and central nervous system if inhaled
Causes damage to the liver, the kidneys and the central nervous system through prolonged or repeated exposure if inhaled Harms public health and the environment by destroying ozone in the upper atmosphere

EMERGENCY RESPONSE : NFPA Code: H3; F1; R0.

SAFE STORAGE : Fireproof if in building. Separated from strong oxidants, aluminium and cylinders containing oxygen. Ventilation along the floor.

PHYSICAL STATE; APPEARANCE : ODOURLESS COLOURLESS COMPRESSED LIQUEFIED GAS.

PHYSICAL DANGERS : The gas is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS : Decomposes on heating. This produces toxic and corrosive fumes including hydrogen bromide, bromine and carbon oxybromide. Reacts with strong oxidants. Attacks many metals in the presence of water. Attacks aluminium, zinc and magnesium. This produces pyrophoric compounds. This generates fire and explosion hazard.

ROUTES OF EXPOSURE : The substance can be absorbed into the body by inhalation and through the skin also as a vapour.

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, as a liquid, is severely irritating to the skin. The substance, as a liquid, is irritating to the eyes and respiratory tract. Inhalation may cause lung oedema. See Notes. Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed up to 48 hours. Exposure at high levels could cause death. Medical observation is indicated.

EFFECTS OF LONGTERM EXPOSURE: The substance may have effects on the nervous system, kidneys and liver. This may result in impaired functions. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 1ppm as TWA; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2009).
MAK: Carcinogen category: 3B; Skin absorption (H); BLW issued; (DFG 2009).

PHYSICAL PROPERTIES :
Boiling point: 4°C
Melting point: -94°C
Relative density (water = 1): 1.7 (liquid, 0°C)
Solubility in water, g/100ml at 20°C: 1.5
Vapour pressure, kPa at 20°C: 1893
Relative vapour density (air = 1): 3.3
Flash point: 194°C
Auto-ignition temperature: 537°C
Explosive limits, vol% in air: 10-16
Octanol/water partition coefficient as log Pow: 1.19

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. This substance does enter the environment under normal use. Great care, however, should be taken to avoid any additional release, for example through inappropriate disposal.

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.
Toxic effects on the nervous system may be delayed for several hours. Immediate administration of an appropriate inhalation therapy by a doctor, or by an authorized person, should be considered. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.

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Annex C.14 : 1,1,1,2-TETRAFLUOROETHANE (cylinder)

ICSC: 1281
Peer-Review Status: 19.04.2007 Validated

CAS No: 811-97-2 RTECS No: KI8842500 UN #: 3159 EINECS #: 212-377-0	HFC 134a		Formula: $C_2H_2F_4$ 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. Lethargy.	Use 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		Wear safety goggles.	
INGESTION			

SPILLAGE DISPOSAL : NEVER direct water jet on liquid. Do NOT let this chemical enter the environment. Personal protection: 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 LIQUEFIED GAS WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS :

CHEMICAL DANGERS : Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive fumes.

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 central nervous system and cardiovascular system. This may result in cardiac disorders.

EFFECTS OF LONGTERM EXPOSURE :

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
Melting point: -101°C
Solubility in water: none
Vapour pressure, kPa at 25°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 taken to avoid any additional release, for example 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.

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Annex C.15 : ISOBUTANE (cylinder)

ICSC: 0901
Peer-Review Status: 25.11.1998 Validated

CAS No: 75-28-5 RTECS No: TZ4300000 UN #: 1969 EC #: 601-004-00-0 EINECS #: 200-857-2	2-Methylpropane 1,1-Dimethylethane Trimethylmethane	Formula: 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.	Use 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		Wear safety goggles or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
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. Personal protection: filter respirator for organic vapours of low boiling point adapted to the airborne concentration of the substance.

PACKAGING & LABELLING : EC Classification: Symbol: F+; R: 12; S: (2)-9-16; Note: C

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-501. NFPA Code: H1; F4; R0.

SAFE STORAGE : Fireproof. Cool.

PHYSICAL STATE; APPEARANCE : COLOURLESS COMPRESSED LIQUEFIED 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. This generates 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. This may result in impaired functions and respiratory failure. Exposure at high levels could cause death.

EFFECTS OF LONGTERM EXPOSURE :

OCCUPATIONAL EXPOSURE LIMITS : TLV (NOT-ESTABLISHED):.
MAK: 1000 ppm, 2400 mg/m³; Peak limitation category: II(4); Pregnancy risk group: D; (DFG 2008).

PHYSICAL PROPERTIES :

Boiling point: -12°C
Melting point: -160°C
Relative density (water = 1): 0.6 (liquid)
Solubility in water at 20°C: none

Vapour pressure, kPa at 20°C: 304
Relative vapour density (air = 1): 2
Flash point: Flammable gas
Auto-ignition temperature: 460°C
Explosive limits, vol% in air: 1.8-8.4
Octanol/water partition coefficient as log Pow: 2.8

ENVIRONMENTAL DATA :

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.
Card has been partially updated in November 2008: see Occupational Exposure Limits.

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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0901

Annex C.16 : CYCLOPENTANE

ICSC: 0353
eer-Review Status: 09.06.2011 Validated

CAS No: 287-92-3 RTECS No: GY2390000 UN #: 1146	EC #: 601-030-00-2 EINECS #: 206-016-6	Pentamethylene	Formula: C_5H_{10} Molecular mass: 70.1

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Highly flammable. Heating will cause rise in pressure with risk of bursting.	NO open flames, NO sparks and NO smoking.	Use foam, carbon dioxide, powder. Water may be ineffective.
EXPLOSION	Vapour/air mixtures are explosive. Heating will cause rise in pressure with risk of bursting.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Use non-sparking handtools. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS !	
INHALATION	Cough. Nausea. Headache. Dizziness. Incoordination. Drowsiness. Unconciousness.	Use 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. Refer for medical attention .
EYES	Redness.	Wear 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 refer for medical attention.
INGESTION	Sore throat. Abdominal pain. Diarrhoea. Nausea. Vomiting. Further see Inhalation.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention.

SPILLAGE DISPOSAL : Evacuate danger area! Consult an expert! Personal protection: filter respirator for organic vapours of low boiling point adapted to the airborne concentration of the substance. Remove all ignition sources. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Do NOT absorb in saw-dust or other combustible absorbents. Then store and dispose of according to local regulations.

PACKAGING & LABELLING : EC Classification
Symbol: F; R: 11-52/53; S: (2)-9-16-29-33-61
UN Classification
UN Hazard Class: 3; UN Pack Group: II

GHS Classification
Signal: Danger
Highly flammable liquid and vapour
Causes eye irritation
May cause respiratory irritation

May cause drowsiness or dizziness
May be harmful if swallowed and enters airways
Toxic to aquatic life

EMERGENCY RESPONSE : NFPA Code: H1; F3; R0.

SAFE STORAGE : Fireproof. Well closed. Separated from strong oxidants and food and feedstuffs. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

PHYSICAL STATE; APPEARANCE : COLOURLESS LIQUID WITH MILD ODOUR.

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 : Reacts with strong oxidants.

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 rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT TERM EXPOSURE : The substance and the vapour in high concentrations are irritating to the eyes and respiratory tract. The substance is irritating to the gastrointestinal tract. If swallowed the substance easily enters the airways and could result in aspiration pneumonitis. The substance may cause effects on the central nervous system. This may result in lowering of consciousness.

EFFECTS OF LONGTERM EXPOSURE : Repeated or prolonged contact with skin may cause dryness and cracking and dermatitis.

OCCUPATIONAL EXPOSURE LIMITS : TLV: 600ppm as TWA; (ACGIH 2010).

PHYSICAL PROPERTIES :
Boiling point: 49°C
Melting point: -94°C
Relative density (water = 1): 0.8 at 20°C
Solubility in water: none
Vapour pressure, kPa at 20°C: 45
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: 320°C
Explosive limits, vol% in air: 1.1-8.7
Octanol/water partition coefficient as log Pow: 3.0
Viscosity: 0.44 mPa/s at 20°C

ENVIRONMENTAL DATA : This substance does enter the environment under normal use. Great care, however, should be taken to avoid any additional release, for example through inappropriate disposal.

NOTES : Refer for medical attention if breathing difficulties and/or fever develop.

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Annex C.17 : n-PENTANE

ICSC: 0534
Peer-Review Status: 19.10.1999 Validated

CAS No: 109-66-0 RTECS No: RZ9450000 UN #: 1265 EC #: 601-006-00-1 EINECS #: 203-692-4	Amyl hydride	Formula: 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 oxidizing agents.	Use 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. Unconciousness. Vomiting.	Use 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		Wear 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 refer for medical attention.
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! Personal protection: self-contained breathing apparatus. Ventilation. Remove all ignition sources. Do NOT wash away into sewer. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in dry sand or inert absorbent. Then store and dispose of according to local regulations.

PACKAGING & LABELLING : EC Classification : Symbol: F+, Xn, N; R: 12-65-66-67-51/53; S: (2)-9-16-29-33-61-62; Note: C
UN Classification : UN Hazard Class: 3; UN Pack Group: I

EMERGENCY RESPONSE : Transport Emergency Card: TEC (R)-592 or 30G30. NFPA Code: H1; F4; R0.

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. The vapour is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS : Reacts with strong oxidants such as peroxides; nitrates and perchlorates. This generates fire and explosion hazard. Attacks some forms of plastic, 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 : If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system.

EFFECTS OF LONGTERM EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis.

OCCUPATIONAL EXPOSURE LIMITS : MAK: 1000 ppm, 2950 mg/m³; (DFG 1995).

PHYSICAL PROPERTIES :
Boiling point: 36°C
Melting point: -129°C
Relative density (water = 1): 0.63
Solubility in water: none
Vapour pressure, kPa at 18.5°C: 53.3
Relative vapour density (air = 1): 2.5
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.8
Flash point: -49°C c.c.
Auto-ignition temperature: 309°C
Explosive limits, vol% in air: 1.5-7.8
Octanol/water partition coefficient as log Pow: 3.39

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.

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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0534

Annex C.18 : PROPANE (liquefied) (cylinder)			ICSC: 0319 Peer-Review Status: 27.11.2003 Validated
CAS No: 74-98-6 RTECS No: TX2275000 UN #: 1978 EC #: 601-003-00-5 EINECS #: 200-827-9	n-Propane		Formula: 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. Unconciousness.	Use closed system or 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.	Wear face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
INGESTION			

SPILLAGE DISPOSAL : Evacuate danger area! Consult an expert! Personal protection: self-contained breathing apparatus. Remove all ignition sources. Ventilation. NEVER direct water jet on liquid.

PACKAGING & LABELLING : EC Classification: Symbol: F+; 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 LIQUEFIED GAS.

PHYSICAL DANGERS : The gas is heavier than air and may travel along the ground; distant ignition possible. The gas is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS :

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

INHALATION RISK : On loss of containment this substance 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 central nervous system.

EFFECTS OF LONGTERM EXPOSURE:

OCCUPATIONAL EXPOSURE LIMITS : MAK: 1000 ppm, 1800 mg/m³; Peak limitation category: II(4); Pregnancy risk group: D; (DFG 2006).

PHYSICAL PROPERTIES :
Boiling point: -42°C
Melting point: -189.7°C
Relative density (water = 1): 0.5
Solubility in water, g/100ml at 20°C: 0.007
Vapour pressure, kPa at 20°C: 840
Relative vapour density (air = 1): 1.6
Flash point: -104°C
Auto-ignition temperature: 450°C
Explosive limits, vol% in air: 2.1-9.5
Octanol/water partition coefficient as log Pow: 2.36

ENVIRONMENTAL DATA :

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. Card has been partially updated in July 2007: see Occupational Exposure Limits.

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Source: http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0319

Annex D Elements of Customs Training Programme

Annex D1: Generic concept note for Customs Training

Annex D2: Generic agenda (3 days) for Phase I training

Annex D3: Generic agenda for Phase II (1 day)

Annex D4: Generic Agenda for combined Phase I & II training (5-day mixed approach)

Annex D5: Generic Customs Executive Briefing

Annex D.6: Model Training Strategy for Enforcement Officers under the HPMP

Annex D7: Generic break-out session at Train-the-Trainers Workshop

Annex D8: Generic break-out session report form

Annex D9: Generic participation certificate

Annex D10: Generic evaluation questionnaire

Annex D11: Generic case studies for Customs inspectors

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 1987 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 (mainly CFCs and HCFCs) have been used is the refrigeration and air-conditioning (RAC) servicing sector. Since 1 January 2010 imports of CFCs have been banned due to the requirement of the Montreal Protocol phase out schedule while HCFCs are still imported and will be gradually phased out following [Name of Country] commitments. In [Year], [Name of Country] consumed approximately [XX] metric tonnes of HCFCs which corresponds to [XX] ozone-depleting potential (ODP) tonnes. The RAC sector consumed [XX] metric tonnes of HCFCs, 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, RAC equipment containing HCFCs is imported into the country either already assembled (e.g. refrigerating or 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 HCFCs, 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 HCFC Phase out Management Plan (HPMP) 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 HPMP is a comprehensive approach to phase out the use of HCFCs in [Name of Country], in particular in RAC sector. [Name of Implementing Agency]'s role is to coordinate the implementation of the following training elements of the HPMP 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 and effectively manage 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.

* See also Annex D.6 where the model approach for enforcement officers training in the Framework of country's HPMP is included.

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 HCFCs 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 different sectors 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 HRMP.
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 and other means 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 and providing information on how illegal trade may be recognised and prevented.
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 was involved in preparation of country's HPMP
- 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] workshop 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 the Montreal Amendment to the Montreal Protocol.

The preparation of the workshop requires the development of the country's "HCFC Phase-out Management Plan (HPMP)" or any other relevant document 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.

Before the train-the-trainers workshop starts, participants are strongly encouraged to take the Montreal Protocol / ODS e-learning course that is available to customs officers through the WCO e-learning platform – http://www.wcoomd.org or http://clikc.wcoomd.org/). Customs officers should contact the WCO's national focal point in their country to register for the course and access the e-learning module.

This will familiarise them with certain concepts related to the Montreal Protocol and ODS phase out and enable them to better understand and absorb information that will be provided at the workshop. The common understanding of regional and national problems in enforcement of ODS regulations can be achieved by organising a regional train-the-trainers workshop before national train-the-trainers workshops are conducted. This may help in future collaboration between customs and other enforcement officers in the countries of particular region.

The national train-the-trainers workshop is usually conducted by an experienced trainer with assistance from the local NOU and local legal and technical experts.

The workshop 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 on 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 recommended that the training and certification be made 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.org/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 both 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: *Antarctic Ozone Hole - From Discovery to Recovery, a Scientific Journey*
* Ozone layer science
* Discussion

11:15 Break

11:30 Session 2: International response

* International response
* the Montreal Protocol and its Amendments, list of controlled ODS
* Phase-out schedule and strategies for Article 2 and Article 5 countries
* ODS substitutes
* ODS as potent greenhouse gases
* Discussion

12:00 Session 3: National obligations and response (NOU)

* Overview of national ODS consumption pattern
* National phase-out obligations
* National response
* HCFC Phase out Management Plan (HPMP)
* 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
* iPIC agreements (if any)
* 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 (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 the revised HS codes 2012 in the region
* 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
* Chemical names and formulas of ODS and ODS substituteshow these can be used as identification tools
* Common trade names for ODSs, including CFCs, HCFCs, methyl bromide, halons, and ODS-containing products (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

14:00 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

14:30 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

15:00 Break

15:15 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: Antarctic Ozone Hole -- From Discovery to Recovery, a Scientific Journey
* 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
* HCFC Phase out Management Plan (HPMP)
* 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
* iPIC agreements (if any)
* 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
*Chemical names and formulas of ODS and ODS substitutes – how these can be used as identification tools
* 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 - HCFC Phase out Management Plan (HPMP)
* 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
* iPIC agreements (if any)
* 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
  * United Nations Office for Drugs and Crime (UNODC)
  * UNEP (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 2012 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, mporters/ 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 ODS, including CFCs, HCFCs, methyl bromide, halons, and ODS-containing products (solvents, foams, aerosols etc.)
* Chemical names and formulas of ODS and ODS substitutes
- how these can be used as identification tools
* 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.

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: Antarctic Ozone Hole -- From Discovery to Recovery, a Scientific Journey
* 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
* HCFC Phase out Management Plan (HPMP)
* 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)
* iPIC agreements (if any)
* Discussion

12:30 Lunch

13:30 Session 4: Global and regional context

* Global production and trade in 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 in 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
*Chemical names and formulas of ODS and ODS substitutes
– how these can be used as identification tools
* 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 ODS 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.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

Model Training Strategy for Enforcement Officers under the HPMP

Strategy for the National Training for Enforcement Officers
under the HCFC Phaseout Management Plan (HPMP)
prepared by [Government of Country]

with assistance from

United Nations Environment Programme

in cooperation with

[national enforcement agencies]

1. Background

In **[year], [Country]** consumed approximately **[number]** ODP tonnes of ozone depleting substances (ODS). The country imports all its ODS, of which HCFCs accounted for **[number]** ODP tonnes.

The HCFC Phase-out Management Plan (HPMP) of **[Country]** was approved at the **[Nth]** Executive Committee meeting (**[Decision XX/xx]**). **[Country's]** HPMP is a comprehensive approach to phase out the consumption and production of HCFCs. The **[National Ozone Unit (NOU)]** is responsible for coordination of the national activities related to the HPMP implementation in cooperation with **[Agency1 as Lead Agency and Agency2 as a cooperating Agency]**.

The HPMP implementation plan was agreed at **[name of meeting/event]. The HPMP aims to phaseout HCFCs by [year], according to the accelerated phase-out schedule agreed in the 19th Meeting of the Parties (Decision XIX/6);** and keeping an allowance of 2.5% for meeting servicing needs till **[year].**

National HCFC phase-out targets are given below:
Baseline: Average 2009-2010 consumption
[Freeze at baseline level: YYYY]
[10 % reduction: YYYY]
[20% reduction: YYYY]
[35% reduction: YYYY]
[67.5 % reduction: YYYY]
[100 % reduction: YYYY except 2.5% for servicing use until YYYY]

The main HCFCs consuming sectors are **[enumerate sectors].** Since the country does not produce nor export HCFCs, its consumption depends solely on imports. In addition, appliances containing HCFCs are imported into the country [either already assembled or in parts for local assembly]. Any abrupt non-availability of HCFCs will adversely impact on important sectors of the local economy. It is therefore essential for users of HCFCs to be able to reduce and subsequently phase-out their consumption in a coordinated, planned and cost-effective manner in compliance with the national obligations under the Montreal Protocol on Substances that Deplete the Ozone Layer.

The early phase of the HPMP **[Country]** will focus on regulatory interventions and their enforcement, **[enumerate activities,** e.g. promotion of ozone-climate co-benefit activities as well as enhanced awareness activities and initiation of investment projects while the later phase will focus on a combination of non-investment and investment activities].

The country introduced its ODS import/export licensing system in **[Month Year]** and started implementation of its HCFC import/export licensing and quota system **[since YYYY]. [Government Agency(ies), along with the NOU]** are the agencies responsible for the management of the licensing and quota systems. The ability of front-line officers in key enforcement agencies including the customs to enforce the above mentioned regulations concerning ODS, ODS-dependent equipment and products containing ODSs is a vital element in national effort for HCFC phase-out (see Section 4 for a complete list of beneficiaries).

2. Goal and Objectives

The overall goal of the enforcement training is for the country to acquire strengthened and sustained capacity to monitor and control trade in HCFCs effectively and efficiently during the HPMP implementation and beyond. The objectives of the enforcement training during the period
[YYYY-YYYY] are primarily to:

[Modify as appropriate]

a. Inform enforcement officers about national regulations concerning HCFCs and the roles of enforcement officers in their application.

b. Make enforcement officers aware about customs regulations and monitoring and control systems for ODS control in neighboring countries and in major trade partner countries.

c. Familiarize enforcement officers with: international and domestic flows of HCFCs production and consumption; types of HCFCs and HCFC blends, HCFC-containing products and HCFC-dependent equipment used in the country; domestic sectors with demands for those products and equipment, and alternatives to HCFCs.

d. Equip enforcement officers with information and skills needed to identify, register, and handle HCFCs, HCFC blends, HCFC-containing products and HCFC-dependent equipment in accurate and safe manner in line with national laws and regulations.

e. Identify ways to detect and prevent, whenever possible, illegal entry of prohibited ODSs in coordination with the **[NOU].**

f. Develop a national scheme for long-term and self-sustaining training to maintain a high proportion of trained personnel among the enforcement workforce during the entire period of the HCFC phase-out.

g. Establish a network of ODS focal points in the country among enforcement agencies that are well linked with the **[NOU].**

As secondary objectives, the training could also be designed to familiarize enforcement officers with other Multilateral Environmental Agreements (MEA) with trade obligations and to create awareness about the HPMP and its linkages with the carbon neutrality plan of the country.

3. Methodology and Tools

The training will be implemented in the following four steps:

Step I: Institutional Set-up (2-3 months)

[NOU] is to update the senior management of [Ministry or Gov't Agency] about the overall legal frame for the Montreal Protocol implementation in the country and new regulations

aimed to start the control and phase-out of HCFCs. The licensing system **[with quota]** for HCFC control is **[put in place or updated]** during this period.

[Ministry or Gov't Agency] in return is to update the **[NOU]** about the plan on the national adaptation of **[HS2012]** codes relating to HCFCs **[(NB: if country uses ASYCUDA)in their ASYCUDA system, which is the automated system for customs data currently being used in the major customs stations of the country, to set up automated alerts on import of HCFCs].**

Bilateral meetings are then to be carried out between **[the NOU and Ministry or Gov't Agency]** to develop a detailed plan for the training and the responsibility to be assigned to each agency. Also during this step, baseline information on the existing knowledge and capacity related to ODS monitoring and control should be collected using some of the indicators proposed in Step IV.

Step II: Preparation for National-level Training (4-6 months, including formulation of a draft national curriculum)

A technical team comprising officers representing the **[NOU, Ministry or Gov't Agency, and the Customs training centre/institute]** will be established to prepare a draft national curriculum for the training. The activities planned as part of the HPMP implementation will be used as an opportunity to pilot test the curriculum as well as to establish an institutional mechanism to maintain it.

Tasks in this step include:

a) Gathering and reviewing the existing training materials in the **[NOU and Ministry or Gov't Agency]** and the additional material to be provided by UNEP as well as the joint WCO-UNEP e-learning course, "The Montreal Protocol: Phasing Out Ozone Depleting Substances" (http://www.wcoomd.org; http://clikc.wcoomd.org[1]).

a) Preparation of a "National Handbook on ODS Legislation and Import / Export Licensing
System" and/or a "Desk book for Customs Officers[2]."

b) Identification of geographic locations (e.g. border areas) / offices that are critical for the enforcement of ODS laws and regulations.

c) Selecting and making necessary institutional / contractual arrangements for individuals who will take part in the regional Train-the-Trainers workshop(s) to be organized by UNEP (if any) and who will lead the implementation of the national-level training.

d) [Appointment of a pool of resource persons to facilitate the national level and local level trainings].

e) Drafting of a curriculum to be implemented by [the Custom training centre/ institute].

f) Designing and delivery of a national-level Train-the-Trainers workshop. **[Ministry or Gov't Agency]** will provide all necessary training facilities and other logistical support as well as invite officers to the workshop.

During the national Train-the-Trainers workshop, the trainees are to revise collectively and finalise the draft national training schedule and the material for training that have been generated at the regional workshop. Also, this national workshop will provide the opportunity to select a few outstanding officers who will join the nationwide training as a trainer.

1 Access to the online course by NOUs and non-WCO member customs officers has been facilitated by WCO and UNEP since 2011. For more information, please contact OzonAction CAP team in your region.

2 The model outline for "Desk book for Customs Officers" is available in Chapter 8 of the UNEP training manual "Training Manual for Customs Officers - Saving the Ozone Layer: Phasing out ODS in developing countries." (Third Edition)

Step III: National and Local training workshops (up to 24 months)

As per the institutional arrangements made during Step I and based on the preparation done during Step II, training will be delivered to enforcement officers. To reach a maximum number of officers in a cost-effective and sustainable manner in order to produce the most impact on control of HCFCs, the training shall make use of the following training methods in particular:

- Completion of online course(s) as a requirement prior to a face-to-face training[3].
- Linking of HCFCs training with training organised by enforcement agencies such as **[national training on HS2012]**[4].
- Case studies on actual schemes for unauthorised trade, smuggling, and use of HCFCs, HCFC mixtures, HCFC-dependent equipment and HCFC-containing products.
- An evaluation to test trainees' level of knowledge at the beginning and at the end of the workshop.
- Group/break-out session(s) to discuss specific topic(s) and a reporting-back of key findings and recommendations from the group work.
- A practical, hands-on session on identifying HCFCs by examining packaging and labels as well as with the use of a digital refrigerant identifier.

The face-to-face workshops will be made as interactive as possible, using case studies, quizzes, and group sessions to draw out conclusions and recommendations. Arrangements should be made to issue a "Certificate of Participation" for both the online course and the face-to-face workshop.

Step IV: Review of the training programme (3-6 months)

The **[NOU]** is responsible for the overall coordination and monitoring of the training as part of their mandate for the HPMP implementation. After completion of Step 3 above, the [NOU] will evaluate the results of the training and report it to national partners and to the Implementing Agencies of the HPMP. In the evaluation, it is recommendable to consider using indicators of success such as the following:

- **Number/percentage** of workforce overall and in front-line trained in HCFC monitoring and control.
- **Number** of advanced or specialised workshops held with help from the **[NoU]**.
- **Number** of trainers who are capable of offering basic training on HCFC control.
- **Number** of workshops held independently of the **[NoU]**.

Upon completing all training workshops in Step 3, **[Ministry or Gov't Agency and the Custom training centre/institute]** will re-visit the draft curriculum prepared during Step I to produce a definitive version of the training to be implemented by national partners on self-financing basis.

In addition, the **[NOU, Ministry or Gov't Agency and the Custom training centre/ institute]** will agree on a way to enable continued, government-funded capacity-building for the trainers.

One-day or a half-day basic training on the Montreal Protocol should be made as part of the official curriculum of the national entity for enforcement training (e.g. Customs centre, college or academy) or as part of mandatory on-the-job training if the country does not have such institution so that it will be mandatory for all frontline and management-level officers to have basic knowledge about ODS control.

3 It is recommended to make the completion of one e-course as a mandatory requirement in order to participate in a face-to-face training.

4 Model material to add a half-day or a full-day session on HCFCs to a national HS2012 training is available from The regional OzonAction CAP Team upon request.

The following materials are available for national training[5]:

- UNEP (2012; in press). Training Manual for Customs Officers (3rd edition) - Saving the
- Ozone Layer: Phasing Out Ozone Depleting Substances in Developing Countries; and associated presentation material
- WCO-UNEP e-Learning Course on the MP
- Customs Quick Tool
- Green Customs Quiz
- UNEP CAP Factsheet Nos. 2, 11, 15, 16, 25, and 31 (prepared by ROAP)
- HPMP implementation plans in your Region (including list of NOOs)
- ODS Concealment Guide by Interpol
- EIA video and factsheets
- Material from projects and partners

NB: Do not hesitate to coordinate with your Regional CAP team for the latest and additional training tools and materials.

4. Expected Results (Outcomes)

When it is completed successfully, the training should enable enforcement officers to internalize the knowledge and to exercise the capacity gained to enforce laws and regulations concerning HCFCs. More specifically, the training should produce the following outcomes:

[Modify as appropriate]

- The officers – both new and experienced – should be given periodic opportunities to refresh skills and obtain additional information concerning HCFCs and the Montreal Protocol in general as part of their institutional training programmes. By Year **[YYYY]**, the training would become an integrated part of the national training curriculum that is mandatory for all customs officers, funded by the Customs.
- National licensing and quota systems for HCFCs are enforced and effective, thus supporting the country's compliance with national ozone protection regulations and the Montreal Protocol.
- Trade in HCFCs, HCFC blends, HCFC-containing products, and HCFC-based equipment are registered accurately using the latest customs codes **[HS2012 and national sub-coding]**.
- Customs trade registry on ODSs and ODS-based equipment is cross-checked with data of the ODS licensing system at least every [number] months until Year **[YYYY]**, and subsequently would be checked every year during **[specify]**.
- Refined and optimized operational details of HCFCs monitoring and control are well and widely understood by enforcement officers.
- Tools for ODS identification, for monitoring and controlling of trade in ODS, and for continued learning are accessible to and widely used by enforcement officers.
- Registration and initial use by the participating officers of the WCO-UNEP online customs training module on the Montreal Protocol.
- The country uses the informal Prior Informed Consent (iPIC) mechanism actively as an additional channel for screening unwanted trade in ODS.
- The country is engaged actively in international/ border areas cooperation to combat illegal trade in HCFCs, HCFC blends, HCFC-containing products, and HCFC-dependent equipment.

In addition, using its experience in enforcement of trade obligations under the Montreal Protocol, the enforcement agencies in the country should be capable of becoming an active player in national efforts to fulfill trade related obligations under other Multilateral Environmental Agreements (MEAs).

With newly gained or reinforced knowledge on MEA enforcement, enforcement agencies and their officers should be able to promote mainstreaming of environmental issues into ongoing bilateral trade cooperation mechanisms, border dialogues, and/or national effort to combat Transnational Organized Crime (TOC).

5 See also Chapter 8 of the "Training Manual for Customs Officers - Saving the Ozone Layer: Phasing out ODS in developing countries." (Third Edition)

5. Beneficiaries

Beneficiaries of the enforcement training under the HPMP are to be drawn from the following groups and organizations:

[Modify as appropriate]

- **Trainers from the Customs training unit**
- **Customs officers from various ports of entry, check points, and customs sections (computer and data processing, classification, administration, enforcement, investigation, risk management)**
- **Enforcement officers from police, coast guard, Defense Force**
- **Central/ National Laboratory**
- **Ozone officer of the NOU**
- **Attorney General's Office**
- **Local refrigeration expert to support practical session**
- **Private sector representatives including importers, customs brokers, wholesalers**
- **Ministry of trade and economic development**
- **Ministry of Fisheries and Agriculture**
- **Ministry of Tourism and Culture**
- **Ministry of Environment/ Environmental Protection Agency**
- **Prosecutor General's Office**
- **Media and general public (during opening, closing and awareness sessions)]**

It has been proven beneficial to involve the Customs administration of the country with which much of the ODS is traded. If resources permit and national stakeholders agree, they can be invited to take part in selected activities; e.g. training, during the implementation of the enforcement strategy.

6. Activities and Expected Outputs

The enforcement training is comprised of both virtual[6] and presential (face-to-face) activities. As part of the HPMP of [country], the following activities are to be carried out:

[Modify as appropriate]

Activity	Timetable	Budget (US$)
One-day Stakeholder consultation workshop to discuss the draft regulations (after formulation of the draft (30-40 participants) x 2	2010-2015	----
Law enforcement officers training workshop on new regulations, 8 workshops	2010-2020	----
Procurement of ODS Identifiers (10 sets)	2010-2013	----

6 Use of the WCO-UNEP online customs training module on the Montreal Protocol is recommended.

Annex D.7

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 come, first 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) who 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 licences?
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) Is participation in iPIC system useful for improving monitoring of ODS trade?
7) 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) Where and to whom to submit the report on the effects/impacts?

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 document checking and goods inspection
- How to deal with ODS-containing 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.8

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 HCFC Phase out Management Plan of [Country] and funded by the Multilateral Fund for the Implementation of the Montreal Protocol.

_____	_____	_____
Government of [Country]	UNEP DTIE	[Training Institute]

Annex D.10

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 presentations 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.11

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 HCFCs 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 HCFCs 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?

12. A shipment of pesticide was assigned to you for examination.

Trade name: MeBrom 98
HS code: 3808 91
Chemical composition: Bromomethane -98%, Chloropicrin – 2%
Country of origin: Israel

What courses of action should be taken?

13. A shipment of 600 cylinders of 13,6 kg capacity packaged in cardboard boxes was assigned to you for examination.

Supplier: Red Dragon Enterprises , Hong-Kong
Exporter: Trading and Shipping Co, Inc., Dubai
Name in documentation, on cardboard packaging and on cylinders: “Refrigerant HFC-134a”
UN number on cardboard packaging and on cylinders : UN3159
HS code in customs documentation: 2903 39
Chemical name on cardboard packaging, on cylinders and in customs documentation: 1,1,1,2-tetrafluoromethane

What courses of action should be taken?

Annex E
Presentation Slides

1. Customs and Enforcement Training and ODS
2. Workshop Objectives
3. Workshop Objectives 2
4. Who should use the Manual?
5. Ozone Science
6. Ozone in the Atmosphere
7. Formation of Ozone
8. UV radiation releases chlorine from CFCs
9. Destruction of ozone by CFCs
10. Effects of ozone layer 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 Adjustments 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 tariff classification
33. Trade & chemical names
34. ASHRAE & UN number
35. CAS Numbers
36. ASHRAE designations for single components
37. ODS Testing Methods
38. Portable refrigerant identifiers/analysers
39. Temperature/pressure method
40. Laboratory analysis
41. ODS Smuggling
42. Motives for ODS smuggling
43. ODS producing countries
44. Smuggling Schemes
45. Screening methods
46. Screening Documentation
47. Inspection of Goods
48. List of ODS products
49. Examples of trade in ODS equipment
50. Examples of smuggling schemes
51. Examples of smuggling schemes 2
52. Taiwan : Double layered cylinder with small HFC cylinder
53. Taiwan : Large CFC compartment only accessible after cutting the cylinder
54. ISO tanks – may be declared partially filled to avoid duties
55. Smuggling CFCs in Compressors or Other Equipment
56. India/Nepal border : CFCs filled in local size cylinders of 105kg
57. HFC cardboard packaging may Contain CFC or HCFC cylinders
58. Small CFC canisters – Easy to smuggle in private cars or baggage
59. Miami : CFC cylinders were smuggled in private boat
60.Japan: CFC cylinders smuggled in an oil drum
61. Finland: HCFC cylinders smuggled in a truck
62. Examples of Seizures and Fines
63. Means to Curb Illegal Trade in ODS
64. Regional Cooperation
65. Examples of Regional Cooperation
66. Models of Regional Cooperation
67. Customs and Enforcement Training
68. Training Tools
69. Jamaica ODS Licensing system : lessons learned
70. Jamaica ODS Licensing System : Results

Customs and Enforcement 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 HPMP
- Providing an overview on the established ODS licencing system & its implications for Customs officers and other stakeholder agencies

Workshop objectives 2

- Present revised customs codes for ODS & ODS containing products and 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

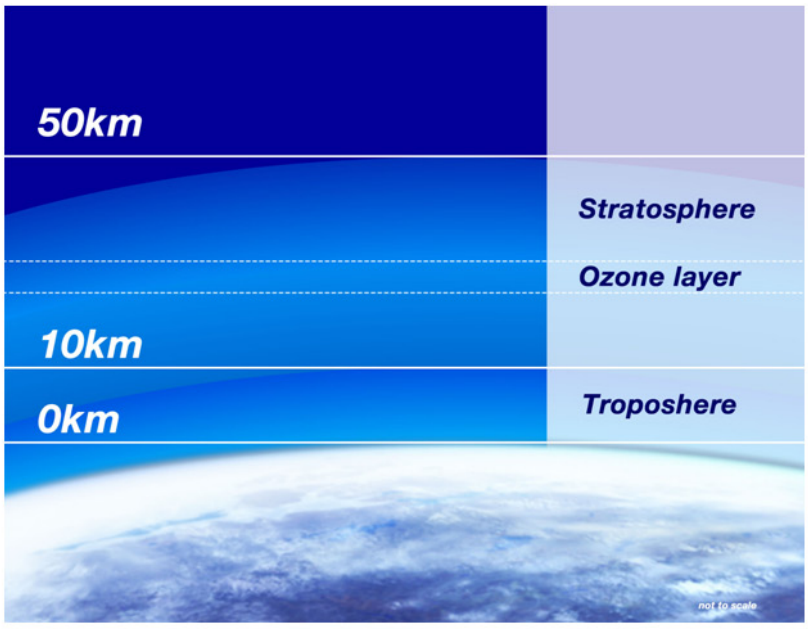
Who should use the manual?

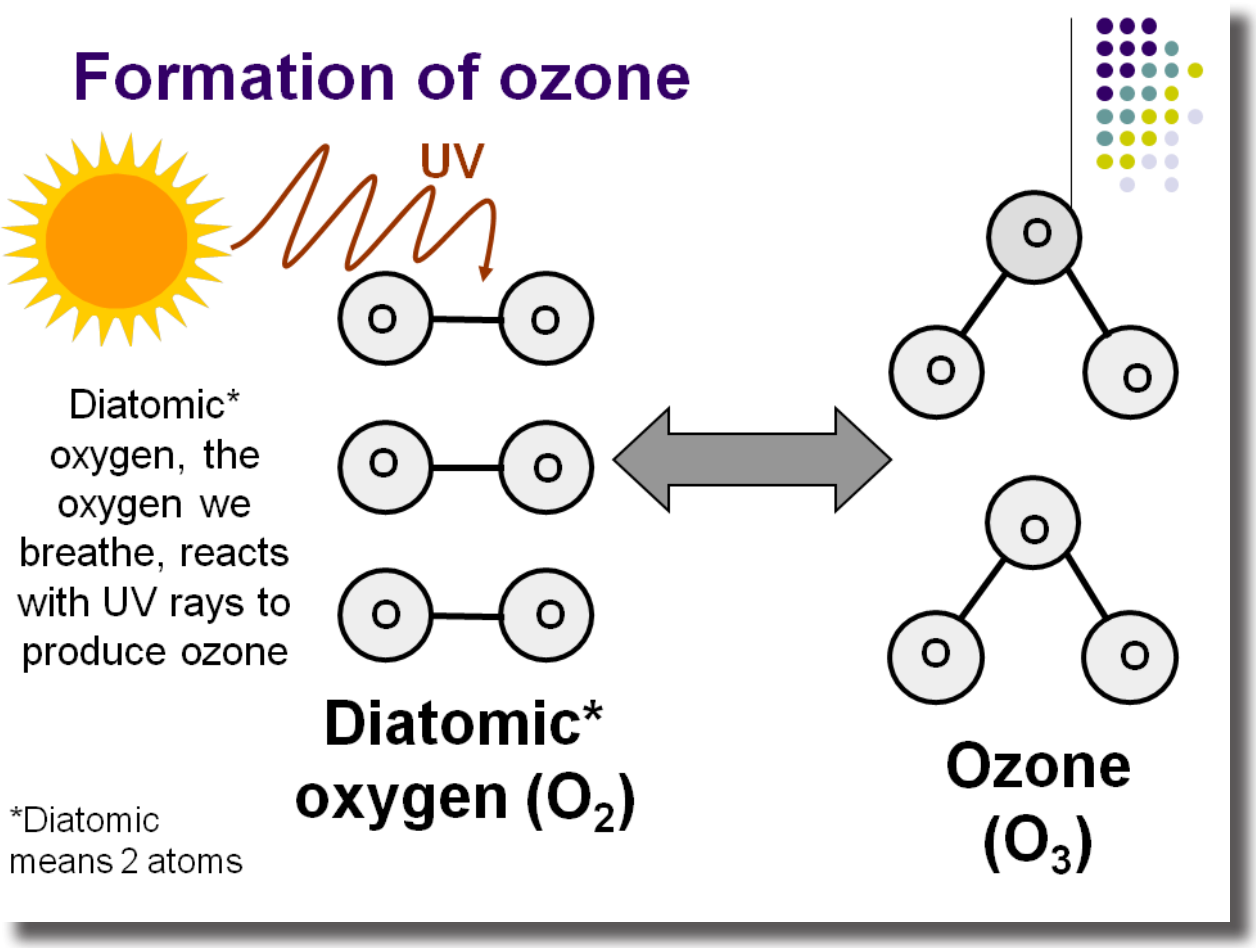
- Implementing & bilateral agencies under the Multilateral Fund
- International customs trainers
- Trained customs trainers; As a resource to prepare Phase II training
- Customs trainers, customs & enforcement officers & other relevant stakeholders involved in the operation & enforcement of the import/export licensing system for ODS

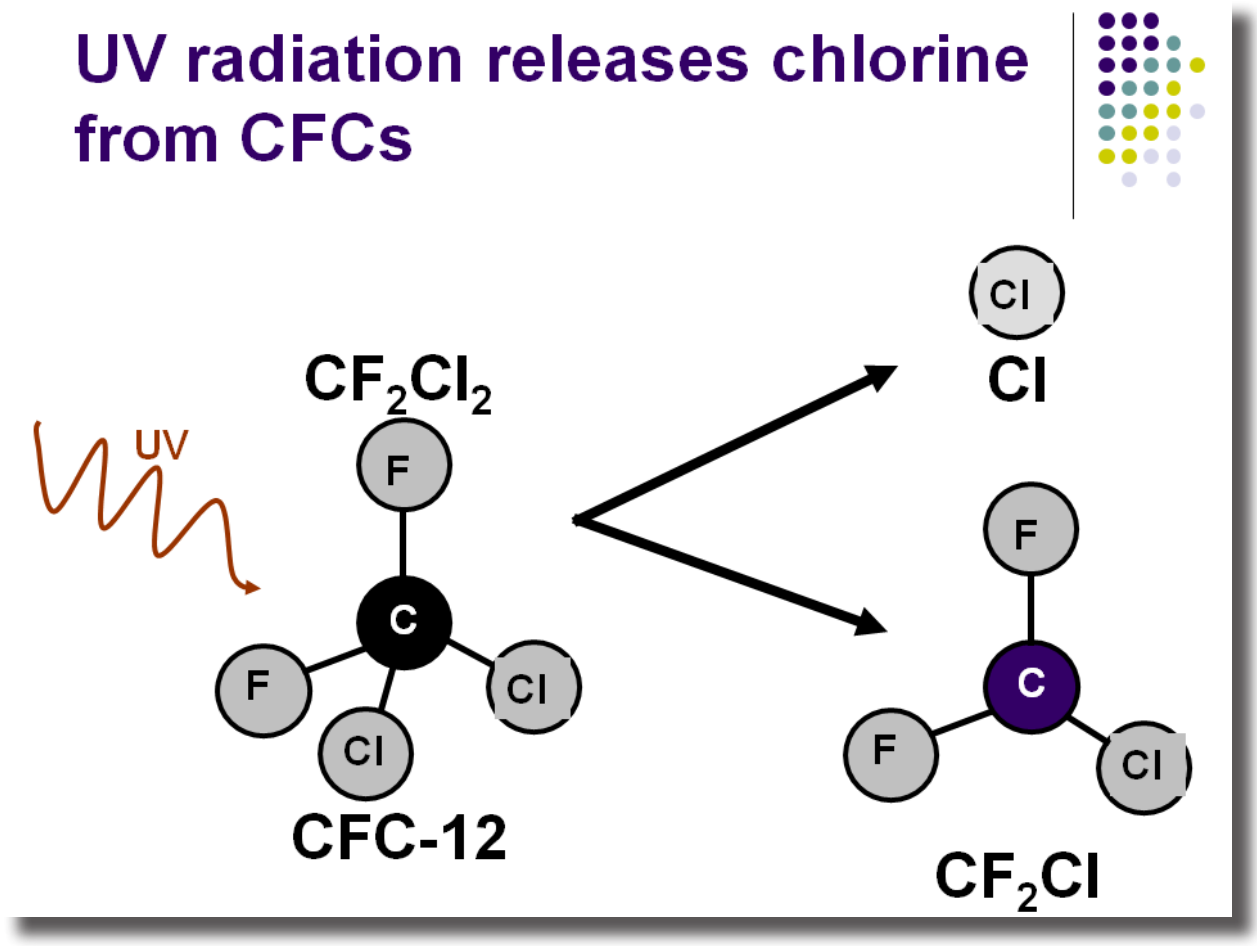
Ozone Science

Ozone creation & ozone destruction

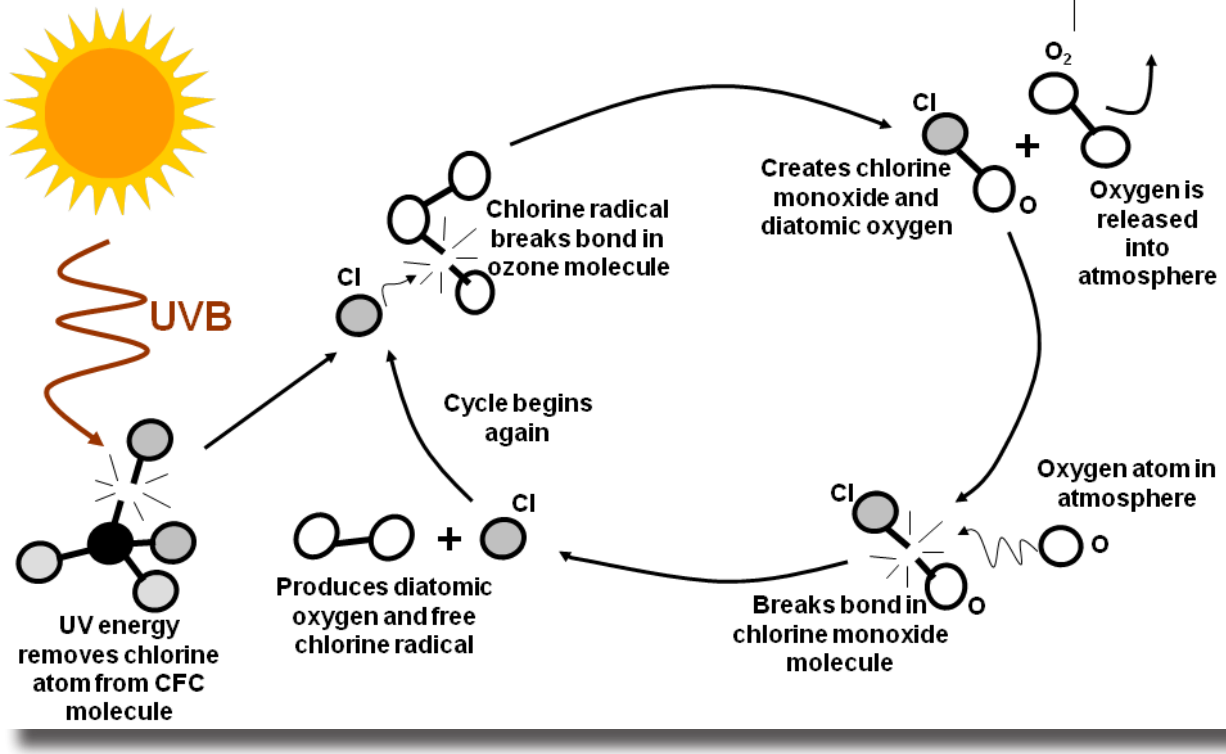
Ozone in the atmosphere




Formation of ozone
UV
O
O
O
O
O
O
O
O
O
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
UV
F
C
F
Cl
Cl
CFC-12
Cl
Cl
F
C
F
Cl
CF_2Cl

Destruction of Ozone by CFCs



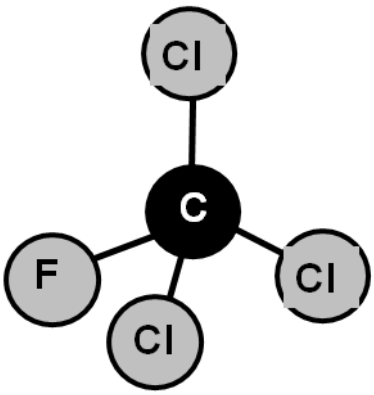
Effects of ozone layer depletion

- 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

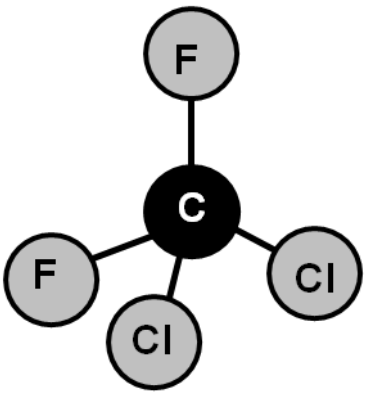
List of ODS with ODP

• 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

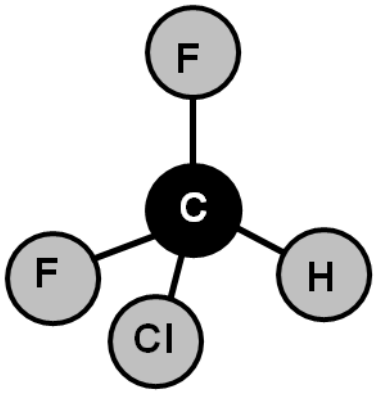


CFC-11

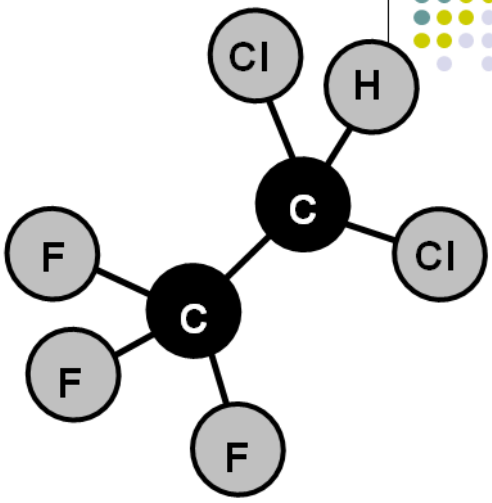


CFC-12

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

NOTE: Presently, CFCs are being replaced with HCFCs in all applications

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	2013 freeze	2030 phase-out – with an average annual consumption of 2.5% for "servicing" up to 2040
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 without being consumed. Only those uses of controlled substances as process agents 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*
- Following the Montreal Amendment of 1997 **each Party has to establish a licensing system for imports and exports of all new, used, recycled or relaimed ODS;** *Art. 4B of the MP*
- **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
- Kyoto Protocol

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, e-learning modules
- Supported by WCO, INTERPOL, CITES, Basel, Rotterdam, and Stockholm Conventions, Convention on Biological Diversity, Organization for the Prohibition of Chemical Weapons, UNEP (DELC,DTIE) and UNODC

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: none ➔ universal ratification!!

National Response

ODS Import/Export
Licensing System

Key enforcement players in the ODS licencing 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 & analyzers
- 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. Fictitious container numbers are a sign of illegal trade.
- ✓ Review all the necessary documents, if something 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 licence.
- ✓ 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

Do's

- 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. 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 (2012) for ODS
- 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

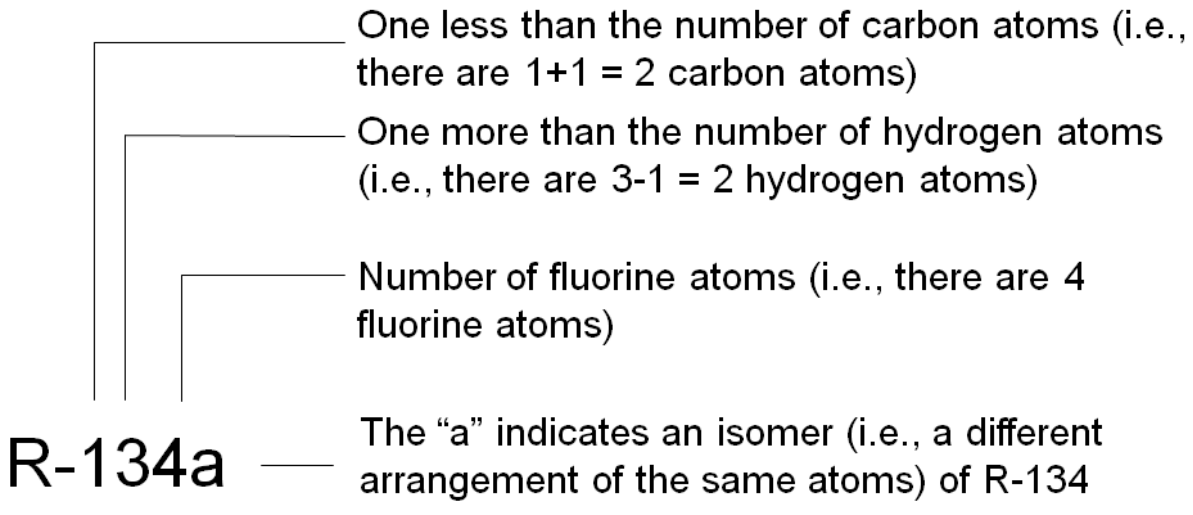
See Customs Quick Reference Tool for details

CAS numbers

- CAS number
  - Chemical Abstract Service number to identify a chemical. The CAS number contains from 5 to 9 digits separated into three groups by hyphens.
  - The first group, staring from the left, has up to 6 digits;
  - The second group always has 2 digits; the third group always has 1 digit.
  - The CAS number is specific for single chemicals and for some mixtures, e.g. CFC-12 is 75-71-8

See Customs Quick Reference Tool for more details

ASHRAE designations for single components



*R-134a is an ODS alternative

ODS Testing Methods

Portable refrigerant identifiers/analyzers

- 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 certainty 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)

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 or before 2010 in developing 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

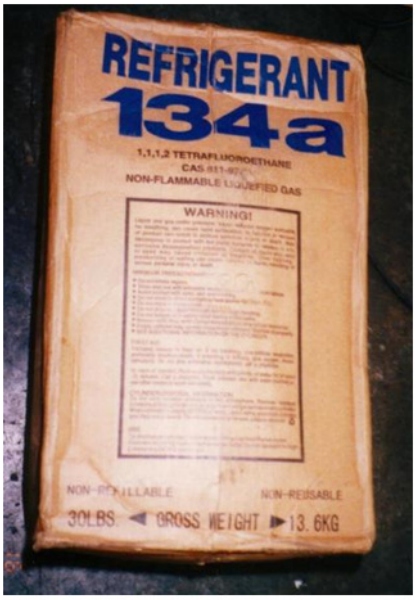
Smuggling CFCs in Compressors or Other Equipment

- 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 or HCFC cylinders

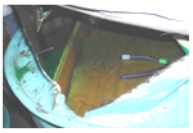


Small CFC canisters --Easy to smuggle in private cars or baggage

Miami: CFC cylinders were smuggled in private boat

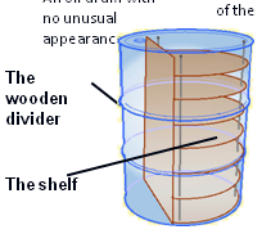
Japan: CFC cylinders were smuggled in an oil drum

An oil drum with no unusual appearanc

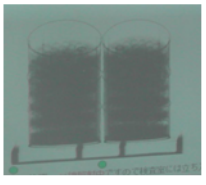


Cut and opened top part of the oil drum

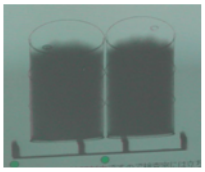
The top shelf was taken off, and then cylinders were



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

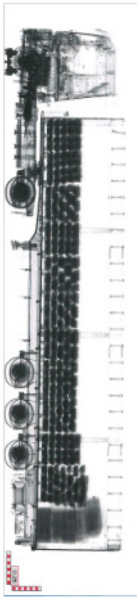


Oil drums containing cylinders



Oil drums containing antifreeze only

Finland: HCFC cylinders were smuggled in a truck



X-ray scan of the truck

HCFC-22 cylinders in card boxes were hidden behind other goods

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

Regional Cooperation

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 / SHP-II
  - 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 and Enforcement Training

Training Tools

- Deskbook for customs officers
- UNEP customs training manual
- UNEP-WCO e-learning module
- Videos
- Case studies
- Slides
- Examples of ODS, ODS-containing products & ODS alternatives
- Customs poster
- Customs Quick Tool
- Trade Names database

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

1. 20 Questions on Ozone Layer Depletion: 2010 update, UNEP Ozone Secretariat, 2010
2. An Unwelcome Encore: The Illegal Trade in HCFCs, Environmental Investigation Agency, 2006
3. AHRI Guideline N
4. AHRI Guideline K
5. ASHRAE Standard 34-1997 on "Number Designation and Safety Classification of Refrigerants"
6. Fact sheet No. 11 Necessary steps and issues to address during conviction trials of illegal ODS trade
7. Fact Sheet no. 15 Refrigerant Identifier, "Toward Full Compliance with the Montreal Protocol: A Tool-Kit of Policy Instruments for National Ozone Units", UNEP Compliance Assistance Programme
8. Handbook for the Vienna Convention for the Protection of the Ozone Layer, UNEP Ozone Secretariat, 2009
9. Handbook on Data Reporting under the Montreal Protocol, UNEP, 1999
10. Information Paper on Trade Names for Refrigerants, UNEP, 2000
11. 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
12. Illegal trade in ozone depleting substances: is there a hole in Montreal Protocol?, UNEP DTIE OzonAction, 2001
13. Networking Counts. Combating illegal trade in ozone depleting substances, UNEP DTIE OzonAction 2007
14. Preventing illegal trade in ODS: Strengthening the Montreal Protocol licensing system, EIA leaflet 2007
15. HCFC Policy & Legislative Options. A guide for developing countries, UNEP OzonAction Programme, 2010
16. Risk assessment of illegal trade in HCFCs, UNEP OzonAction Programme, 2011
17. Compliance through informal Prior Informed Consent on Trade of Ozone depleting Substances – iPIC, UNEP 2011
18. UNEP OzonAction Webinar Series - "Fake Refrigerants: Should we worry?" and related presentations by Mr. Mark Bennett and Mr. Michael Bennett http://www.unep.org/ozonaction/InformationResources/OzonActionWebinar/OzonActionWebinarSeries/tabid/104363/Default.aspx

Websites

AHRI - Air-conditioning, Heating & Refrigeration Institute
http://www.ahrinet.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
https://www.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.

Green Customs Initiative
http://www.greencustoms.org/

International Chemical Safety Cards
http://www.ilo.org/dyn/icsc/showcard.home

International Occupational Safety and Health Information Centre (CIS)
http://www.ilo.org/safework/cis/lang--en/index.htm

Interpol
http://www.interpol.int/

IPIC Online
http://www.unep.org/ozonaction/ipic

NASA's Ozone Hole Watch
http://ozonewatch.gsfc.nasa.gov/index.html

NASA's Visible Earth catalogue
http://visibleearth.nasa.gov/

Ozone Secretariat
http://ozone.unep.org/index.asp

Trade names of chemical products containing ozone depleting substances and their alternatives
http://www.unep.org/ozonaction/tradenames

United Nations Office on Drugs and Crime
http://www.unodc.org

UNEP DTIE OzonAction Branch
http://www.unep.org/ozonaction/

United States Environmental Protection Agency's Ozone Depletion Home Page
http://www.epa.gov/ozone/index.html

European Commission's ODS website
http://ec.europa.eu/clima/policies/ozone

World Bank Montreal Protocol Home Page
http://go.worldbank.org/KXM814CLA0

World Customs Organisation
http://www.wcoomd.org/

World Trade Organisation
http://www.wto.org/

Annex G

UNEP DTIE and Its OzonAction Branch

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 five 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 1,500 projects and services that benefit more than 130 developing countries and 19 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).

- Assisting 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 contribute to the realisation of the Millennium Development Goals and implementation of the Bali Strategic Plan.

For more information about these services please contact:

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Annex H

Useful Contact Addresses

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United Nations Industrial Development Organization,
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United Nations Development Programme (UNDP)
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Web: http://www.undp.org/content/undp/en/home/ourwork/environmentandenergy/focus_areas/ozone_and_climate/

World Bank
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Fax: (1-514) 282 0068
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Web: http://www.multilateralfund.org/

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Fax: (254-20) 762 46 91/92/93
Email: ozoneinfo@unep.org
Web: http://ozone.unep.org/new_site/en/index.php

World Customs Organization (WCO)
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Fax: (32-2) 209-9493
Web: http://www.wcoomd.org

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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.

Mrs Shamila Nair-Bedouelle (PhD, HDR)
Head of OzonAction Branch
UNEP Division of Technology, Industry and Economics

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** 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.org**

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 third 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 and its second edition in 2008.

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