Environmental Guideline for Ozone Depleting Substances (ODS's) and Halocarbon Alternatives

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1 Introduction

1.1 Background

The stratospheric ozone layer helps filter the sun's harmful ultraviolet (UV) radiation from the earth. Increased UV radiation harms human health and damages animal and plant life. Evidence shows that the main causes of ozone depletion are the releases of manufactured chlorine and bromine-based chemicals such as chlorofluorocarbons (CFC's), halons and hydrochlorofluorocarbons (HCFC's) into the atmosphere. Hence, these chemicals are known as ozone depleting substances (ODS's). The main uses of these chemicals are in air conditioning, refrigeration and fire extinguishing equipment. As one of more than 160 nations ratifying the Montreal Protocol, an international agreement to protect the ozone layer, Canada is committed to eliminating releases of ODS's.

HCFC's have less ozone depleting potential than CFC's and have been useful as an interim alternative to 'bridge' the transition to ODS elimination. However, they are still ODS's and under the Montreal Protocol, their production and consumption will be phased out over the next 5-15 years in developed countries. Other halocarbon alternatives such as hydrofluorocarbons (HFC's) and perfluorocarbons (PFC's) have no ozone-depleting potential but do contribute to global warming and, therefore, require management and control.

To better manage ODS's and halocarbon alternatives the Canadian Council of Ministers of the Environment (CCME) developed a National Action Plan for the Environmental Control of ODS and their Halocarbon Alternatives (NAP) as well as Canada's Strategy to Accelerate the Phase-Out of CFC and Halon Uses and to Dispose of the Surplus Stocks (Phase-out Strategy). The NAP outlines how to meet national targets for the control, reduction and elimination of emissions of ODS's and certain halocarbon alternatives. It addresses the ultimate management, control, phase-out and disposal of CFC's and halons in Canada and sets out agreed upon objectives and tasks for harmonized federal, provincial and territorial actions.

The Phase-out Strategy describes specific approaches for the phase-out of uses of CFC's and halocarbons in various sectors throughout Canada - including household appliances and mobile air conditioning - with the ultimate objective of avoiding the release of these substances to the environment. The NAP incorporates tasks needed to implement the Phase-out Strategy.

Taken together, these two documents provide a detailed plan to ensure that Canada will meet or exceed its national and international commitments to protect the earth's ozone layer and reduce its impacts on climate change. The Government of the Northwest Territories (GNWT) fully supports these initiatives. This revision to the NWT Environmental Guideline for Ozone Depleting Substances (ODSs) – now re-titled Environmental Guideline for Ozone Depleting Substances (ODS's) and Halocarbon Alternatives - incorporates relevant actions presented in the Phase-out Strategy and the NAP and expands the previous Guideline to include certain halocarbon alternatives.

1.2 Guideline Purpose

The intent of this Guideline is to heighten awareness and assist in the management of ozone depleting substances and their halocarbon alternatives in the NWT. This Guideline provides requirements and direction regarding the release, servicing, training, record keeping, labelling and disposal of equipment containing ODS's and specific halocarbon alternatives. For the purposes of this Guideline, ODS's and halocarbon alternatives include air conditioning and refrigerant agents as well as substances contained in certain fire extinguishing equipment. The Guideline targets commercial applications but also addresses individual responsibility for appropriate maintenance and disposal of equipment and appliances containing ODS's and halocarbon alternatives.

The Environmental Guideline for Ozone Depleting Substances (ODS's) and Halocarbon Alternatives does not cover the production, importing or exporting of new, unused ODS's and halocarbon alternatives. These activities are controlled under federal regulations by Environment Canada.

This publication is a general guideline affecting the use of ODS's and halocarbon alternatives in the NWT. Section 2.2 of the *Environmental Protection Act* (EPA) gives the Minister of Environment and Natural Resources the authority to develop, coordinate and administer guidelines. This Guideline complements existing acts and regulations that should be consulted for interpretation and application.

1.3 Definitions

Air conditioning or Refrigeration equipment	Heat pump, air conditioning, or refrigeration equipment including any motor vehicle air conditioners which contain an ODS or halocarbon alternative.
Certified service technician	A technician who is otherwise qualified to service refrigerant equipment and has successfully completed the environmental awareness training course for refrigerants offered by the Heating, Refrigeration and Air Conditioning Institute of Canada.
Chiller	An air conditioning system or refrigeration system that has a compressor, an evaporator and a secondary refrigerant.
Commissioner's Land	Lands in the Northwest Territories that have been transferred by Order-in-Council to the Government of the Northwest Territories. This includes highways, block land transfers and most lands within municipalities.
Fire extinguishing equipment	A portable or fixed unit or system used to extinguish fire that contains an ODS or halocarbon alternative.
Fixed fire extinguishing equipment	A total flooding fire extinguishing system, a local application fire extinguishing system, or hand hose line fire extinguishing system if that system contains an ODS or halocarbon alternative.

Halocarbon	Chemicals consisting of carbon, sometimes hydrogen, and either chlorine, fluorine, bromine or iodine.
Halocarbon alternatives	Any substance listed under the headings Hydrofluorocarbons (HFC's) and Perfluorocarbons (PFC's) in items 6 and 7 of Appendix A.
Halon	Any substance listed under the headings Bromofluorocarbons (halons) and Bromochloromethanes in items 3 and 5 of Appendix A.
Halon Code of Practice	The Environment Canada publication entitled Environmental Code of Practice on Halons (Code of Practice EPS 1/RA/3E, July, 1996 original date) and subsequent updates.
Motor vehicle air conditioner	An air conditioning system on a motor vehicle which is a mechanical vapour compression refrigerant system that provides cooling for the passenger compartment of the vehicle and contains an ODS or halocarbon alternative as a refrigerant.
Ozone depleting substance (ODS)	Any substance listed under the headings Chlorofluorocarbons (CFC's), Hydrochlorofluorocarbons (HCFC's), Bromofluorocarbons (halons), Chlorocarbons and Bromochloromethanes in items 1 to 5 of Appendix A.
Portable fire extinguisher	A hand-held or wheeled fire extinguisher containing an ODS or halocarbon alternative.
Recover	Collecting an ODS or halocarbon alternative in a container which is not regularly a component of the system from which the ODS or halocarbon alternative was removed.
Recycle	Restoring a recovered ODS or halocarbon alternative to acceptable purity levels by filtering, drying, distilling or chemical treatment.
Refrigerant Code of Practice	The Environment Canada publication entitled Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems (Code of Practice EPS 1/RA/2E, March, 1996 original date) and subsequent updates.
Servicing	The act of installing, repairing, maintaining, testing, converting, mothballing, decommissioning or adjusting a component of fire extinguishing, air conditioning, or refrigeration equipment, where the component contains an ODS or halocarbon alternative.

2 Roles & Responsibilities

2.1 Department of Environment and Natural Resources, Environmental Protection Division

The Department of Environment and Natural Resources, Environmental Protection Division (EPD) is responsible for initiatives which manage and control the discharge of contaminants and reduce the impact on the natural environment. EPD is responsible for ensuring that waste management procedures, emission levels and environmentally acceptable disposal methods are maintained. The EPD's programs are applied primarily to Commissioner's Land, lands administered by municipal governments or GNWT undertakings. Legislative authority is provided by the *Environmental Protection Act* (EPA). Contact EPD for a listing of relevant regulations and guidelines or visit the website at http://www.enr.gov.nt.ca/eps/leg.htm.

A waste manifest form must accompany ODS's or halocarbon alternatives recovered from commercial equipment if moved off site for storage, recycling or disposal (also see Section 3.8). For further information on hazardous waste manifesting please refer to the Environmental Guideline for the General Management of Hazardous Waste in the NWT or contact EPD. Registration numbers and waste manifest forms are available by contacting EPD.

2.2 Other Regulatory Agencies

Environment Canada, through the *Ozone-depleting Substances Regulations, 1998* (SOR/99-7) and subsequent amendments under the *Canadian Environmental Protection Act (1999)*, controls the import, manufacture, use, sale and export of bulk chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), bromofluorocarbons (BFCs), halons, tetrachloromethane (carbon tetrachloride) and methyl chloroform (1,1,1-trichloroethane). These regulations reflect Canada's international commitments under the Montreal Protocol to eliminate production and consumption of ODS's. Environment Canada, through the *Federal Halocarbon Regulations, 2003* under the *Canadian Environmental Protection Act (1999)* is also responsible for the management and control of the end use of ODS's and halocarbon alternatives at federally owned and operated facilities ('federal house'), federally authorized facilities and facilities located on aboriginal and federal lands.

The Northwest Territories' Department of Municipal and Community Affairs, through the Office of the Fire Marshal is involved with ODS's and halocarbon alternatives because fire extinguishing equipment may contain these chemicals, notably halons.

2.3 Owners

Building/facility owners may be affected by phase-outs of ODS's and management requirements for ODS's and halocarbon alternatives. ODS's and halocarbon alternatives are most often found in air conditioning or refrigeration equipment or as halons in fire extinguishing systems. Owners have the responsibility to prevent releases of ODS's and halocarbon alternatives from equipment and to ensure equipment is serviced in accordance with this Guideline. Leaks or damages to equipment containing ODS's and halocarbon alternatives must be repaired as quickly as possible.

Automobile owners must not ignore leaks in air conditioning equipment containing ODS's or halocarbon alternatives and must ensure leaks and damages are repaired as soon as possible.

Owners of fire extinguishing equipment containing halons should be aware of the presence of an ODS in the equipment. Replacement halons are no longer being manufactured or imported into Canada. As a result, these owners should consider plans to phase out the use of fire extinguishing equipment containing halons.

Additional information on phase-out and prohibition requirements is provided in Section 3.6 for CFC- and HCFC-containing fixed and mobile refrigeration and air conditioning equipment and in Section 3.7 for fire extinguishing equipment containing halons.

2.4 Service Technicians

Technicians servicing equipment containing ODS's and halocarbon alternatives must be appropriately trained and follow acceptable servicing procedures as required by this Guideline. Service technicians must not fill leaking equipment and must use proper recovery/recycling equipment and methods to prevent the release of ODS's and halocarbon alternatives into the environment. Technicians should inform the building/facility owner if leaking equipment is discovered.

Automobile service technicians have similar responsibilities to those described above. Leaks to automobile air conditioning equipment must be repaired by a certified service technician.

Sections 3.2, 3.3, 3.4, 3.5, 3.6 and 3.7 provide additional information on servicing and technician requirements.

2.5 Vendors of ODS's and Halocarbon Alternatives

Vendors who sell ODS's or halocarbon alternatives other than as part of equipment also have a role in the management of these chemicals. Vendors are responsible for selling ODS's and halocarbon alternatives for use as refrigerants to only certified service technicians. Vendors are encouraged to ensure industry stewardship of ODS's and halocarbon alternatives including take-back and storage of full or partially full refillable containers until the seller can deliver them to a person or company who manufactures, recycles, converts or destroys the ODS or halocarbon alternative.

Sections 3.3, 3.4 and 3.5 provide additional information on vendor requirements.

3 Standards

The following sections outline the requirements for the management and control of ODS's and halocarbon alternatives in the NWT.

3.1 Release of ODS's and Halocarbon Alternatives

Releases of ODS's and halocarbon alternatives are not allowed, except for the purpose of extinguishing fires or as a release from low pressure chiller purge systems that emit less than 0.1 kg of halocarbons per kilogram of air purged to the environment.

The following are the major sources of ODS's and halocarbon alternatives in the NWT:

- Refrigeration equipment, including some indoor ice making equipment;
- Air conditioning equipment;
- Motor vehicle air conditioners;
- Fire extinguishing equipment;
- Equipment used in the recovery, recycling or storage of an ODS or halocarbon alternative.

Careful attention should be paid when handling these pieces of equipment. Any leaks in equipment must be repaired as soon as possible and before adding an ODS or halocarbon alternative. When servicing, testing or discarding fire extinguishing, air conditioning or refrigeration equipment the technician must recover for reuse, recycling or disposal any ODS or halocarbon alternative that would otherwise be released during these procedures or that would remain in equipment being discarded.

3.1.1 Reported Release

The following reporting limits are based on the *Spill Contingency Planning and Reporting Regulations* (1990) established under the *Environmental Protection Act*.

> Any release of an ODS or halocarbon alternative listed in Appendix A of this guideline, which is classified as a class 2 (Gases), class 9 (Miscellaneous Products, Substances or Organisms) or is not classified, under *Transportation of Dangerous Goods Regulations* (TDGR) from containers with a capacity greater than 100 L, must be reported immediately to the 24 Hour Spill Report Line by calling (867) 920-8130.
>
> Similarly, a release of 5L or greater of an ODS or halocarbon alternative listed in Appendix A of this guideline, and classified as a class 6 (Toxic and Infectious Substances), under TDGR, must be reported immediately to the 24 Hour Spill Report Line by calling (867) 920-8130.

The responsibility for reporting could lie with either the owner or operator of the air conditioning, refrigeration or fire extinguishing equipment or the service technician depending on the circumstances surrounding the leak or spill. The *Spill Contingency Planning and Reporting Regulations,* Section 9. (1) state,

> "The owner or person in charge, management or control of contaminants at the time a spill occurs shall immediately report the spill…"

3.2 Servicing Certification

Only technicians with the appropriate trade qualifications should service air conditioning (including motor vehicles), refrigeration or fire extinguishing equipment.

For air conditioning and refrigeration equipment where the servicing may result in the release of an ODS or halocarbon alternative, a service technician must also be certified through successful completion of the environmental awareness training course for refrigerants offered by the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI). Information on the 1-day training course is available from the HRAI website at http://www.hrai.ca/site/skilltech/cfc_training.html

Only a certified service technician is allowed to purchase or possess an ODS or halocarbon alternative for the purpose of servicing air conditioning or refrigeration equipment containing an ODS or halocarbon alternative. Companies employing service technicians must maintain records indicating which employees are certified to service equipment containing ODS's or halocarbon alternatives.

Section 3.6 contains additional information on servicing requirements for refrigerants.

For fire extinguishing equipment, there is no environmental awareness training course available. Service technicians must follow the requirements in this Guideline when servicing may result in the release of an ODS or halocarbon alternative from fire extinguishing equipment.

Section 3.7 contains additional information on servicing requirement for fire extinguishing equipment, especially systems containing halon.

3.3 Sales Record

If a certified service technician purchases an ODS or halocarbon alternative for use as a refrigerant other than as a component in another product, the vendor must require the certified service technician to sign an acknowledgement of receipt of the ODS or halocarbon alternative. The vendor must keep a sales record indicating the type of ODS or halocarbon alternative, the date of sale, as well as the name and company of the certified service technician.

3.4 Containers

All containers for the sale, recovery, storage, recycling or disposal of ODS's and halocarbon alternatives must be refillable. Refillable containers are less prone to leakage and they also eliminate emissions caused by disposal of throwaway and recyclable containers. Refillable containers should be designed and manufactured to contain the specific type of ODS or halocarbon alternative being stored.

Prior to disposal of a container, any residual ODS or halocarbon alternative must be recovered. Technicians must place a notice on the container stating; the date of the recovery, the technician and company name as well as an indication that the container no longer contains an ODS or halocarbon alternative.

3.5 Record Keeping and Labelling

All new equipment imported into, installed or sold in the NWT that contains an ODS or halocarbon alternative must be clearly labelled with the quantity and type of ODS or halocarbon alternative contained in the equipment.

Vendors who sell ODS's or halocarbon alternatives must keep sales records (see Section 3.3).

All persons who service refrigeration, fire extinguishing or air conditioning equipment with an ODS or halocarbon alternative must keep an accurate log of the particulars of the service event including quantities, date, name of business and technician involved. The record should be tabled chronologically. Note also the requirements for disposal of equipment in Sections 3.6.3 and 3.7.3.

All information and records referred to in this Guideline must be maintained for a period of two years and be made available for inspection on request by an inspector appointed under the *Environmental Protection Act*.

All vendors and service companies who are required to maintain records should provide in writing to the EPD, the name and mailing address of the company, as well as a contact name.

3.6 Air Conditioning and Refrigeration Equipment

Owners, vendors and service providers of air conditioning and refrigeration equipment using HCFC's should be aware of the staged phase out of production and consumption of these refrigerants required under the Montreal Protocol. Over the next 5-15 years HCFC's will become progressively less available in Canada and owners of refrigeration and air conditioning equipment should be preparing for a transition to alternative refrigerants. Additional information on HCFC use and phase out can be found at the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) website at http://www.hrai.ca/hcfcphaseout/

3.6.1 Servicing

Any technician who services air conditioning or refrigeration equipment containing ODS's or halocarbon alternatives must be certified and hold appropriate trade qualifications. Servicing must be performed in accordance with the Refrigerant Code of Practice and this Guideline. Technicians servicing motor vehicle air conditioners must also follow the requirements of the Society of Automotive Engineers (SAE) Standards J-1627, J-1628 and J-1989.

Technicians servicing air conditioning or refrigeration equipment must use equipment that can recover and contain an ODS or halocarbon alternative.

Recovery and recycling equipment intended for use with commercial/industrial air conditioning and refrigeration equipment, as well as motor vehicle air conditioners, must be certified to or meet the requirements set out in the American Air Conditioning and Refrigeration Institute (AACRI), Standard ARI-740.

Recovery and recycling equipment intended for use with small appliances such as household air conditioners, refrigerators or freezers must recover a minimum of 90% of the refrigerant in the cooling system of the appliance. Devices for recovery and recycling intended for use with small appliances that do not have an operational compressor must recover a minimum of 80% of the refrigerant in the cooling system of the appliance.

A leak test must be completed before any air conditioning or refrigeration equipment is refilled. An ODS or halocarbon alternative must never be used for the purposes of leak testing.

3.6.2 Conversion and Refilling Requirements and Prohibitions

Commercial refrigeration and air conditioning equipment (including chillers) should not be converted to use CFC's and equipment using CFC's should not be installed.

Commercial refrigeration and air conditioning equipment must not be refilled with CFC's. If refrigerant is lost from these systems and the need for refrigeration or air conditioning remains, the equipment must be replaced or properly retrofitted to use an alternate refrigerant.

CFC-containing chillers must be converted to an alternate refrigerant or replaced at the next overhaul. Remaining CFC-containing chillers must be phased out of use by January 1, 2015.

Household appliances must not be converted to use CFC's. Individuals are encouraged to replace or properly retrofit household appliances using an alternate refrigerant if the CFC charge is lost.

Most automobile air conditioners now use an ozone-friendly refrigerant; however, in vehicles manufactured in 1993 or earlier, the air conditioning systems may use an ODS. If the air conditioning system in such a vehicle is faulty or leaking and requires repairs, technicians must not recharge that system with an ODS. Instead, a conversion kit that uses an alternative refrigerant (i.e., HFC-134a) should be used.

3.6.3 Disposal

Air conditioning or refrigeration equipment that contains an ODS or halocarbon alternative must not be discarded unless the refrigerant is removed by a certified service technician prior to disposal. Technicians must place a notice on the piece of equipment stating; the date of the service, the certified service technician and company name as well as an indication that the equipment no longer contains refrigerant. Unwanted ODS's or halocarbon alternatives must be managed in an environmentally acceptable manner. This will likely involve shipping to an appropriate facility for recycling, conversion or destruction (see Section 3.8).

Household air conditioning and refrigeration equipment or motor vehicles delivered to a municipal solid waste landfill are exempt from requiring removal of ODS's and halocarbon alternatives providing the landfill has a separate area identified and prepared for storage of this equipment. Municipalities are encouraged to bring in certified technicians to remove ODS's and halocarbon alternatives from stored equipment when quantities warrant. Remote, isolated, small communities where certified service technicians are not generally available may contact EPD for assistance on developing a plan to properly manage ODS- and halocarbon alternative-containing equipment, including discarded refrigerators and freezers.

3.7 Fire Extinguishing Equipment

The Montreal Protocol required a phase-out of halon production and consumption by January 1, 1994. However, the Montreal Protocol allows the continued trade of recycled halons, i.e., those produced before January 1, 1994. For information on the continued availability of halons, see Sections 3.8 and 4; also note the recharge restrictions and phase out requirements in Section 3.7.2.

3.7.1 Servicing

Any technician who services fire extinguishing equipment containing ODS's or halocarbon alternatives must hold appropriate trade qualifications and follow the requirements in this Guideline. If the equipment contains halon, servicing must be performed in accordance with the Halon Code of Practice and the ULC publications; Halon and Halocarbon Clean Agent Recovery and Reconditioning Equipment (ULC/0RD-C1058.5-2004) and Servicing of Halon and Clean Agent Extinguishing Systems (ULC/ORD-C1058.18-2004).

Technicians servicing fire extinguishing equipment must use equipment that can recover and contain an ODS or halocarbon alternative.

Recovery and recycling equipment intended for use with fire extinguishing equipment must comply with the UCL publication Halon and Halocarbon Clean Agent Recovery and Reconditioning Equipment (ULC/0RD-C1058.5-2004)

A leak test must be completed before any fire extinguishing equipment is refilled. An ODS or halocarbon alternative must never be used for the purposes of leak testing.

3.7.2 Conversion and Refilling Requirements and Prohibitions

The recharging of fixed fire extinguishing systems with halons will be prohibited effective January 1, 2010. Prior to this date, halon-based systems are allowed one recharge, but within one year of the recharge date, the equipment must be replaced with an alternate non-halon system. Owners of fixed fire extinguishing equipment that contains a halon should evaluate alternatives and prepare a management plan to address halon phase out requirements. The Halon Code of Practice can be used as a guide in developing a halon management plan. Critical uses may be exempted from the recharging limit and phase out requirements. Contact EPD for assistance in determining if an application represents a critical use.

Fire extinguishing equipment containing halons should not be installed and existing systems should not be modified to use halons.

Portable halon-containing extinguishers must not be refilled, except for critical uses.

3.7.3 Disposal

Fire extinguishing equipment must not be disposed of unless the halon or any other ODS or halocarbon alternative is removed by a service technician, as described in Section 3.7.1, prior to disposal. Technicians must place a notice on the piece of equipment stating; the date of the service, the technician and company name as well as an indication that the equipment no longer contains an ODS or halocarbon alternative.

Unwanted ODS's or halocarbon alternatives must be managed in an environmentally acceptable manner. This will likely involve shipping to an appropriate facility for recycling, conversion or destruction (see section 3.8). Recovered halons may be used to provide recharge quantities to existing fixed fire protection systems (see Halon Bank in Section 3.8).

Owners of portable fire extinguishers, including marine and household systems, containing halon are encouraged to take this equipment out of service and have the halon removed and recovered prior to disposal of the extinguisher.

3.8 Recycling or Disposal of ODS's and Halocarbon Alternatives

Facilities for the recycling or disposal of unwanted ODS's and halocarbon alternatives do not exist at this time in the NWT. ODS's and halocarbon alternatives that are not reusable in their current state must be sent to an appropriate facility outside of the NWT for recycling, conversion or destruction. The receiving facility must be registered in the receiving province or territory and be approved to manage the ODS or halocarbon alternative. For further information on shipping ODS's and halocarbon alternatives please refer to the Environmental Guideline for the General Management of Hazardous Waste in the NWT or contact EPD.

Refrigerant Management Canada (RMC) is a not-for-profit corporation established by the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) and the Canadian refrigeration and air conditioning industry. The program is an industry-led environmental care program committed to the responsible disposal of surplus ozone depleting refrigerants from the

stationary refrigeration and air conditioning industry. RMC should be contacted for information on disposal options for ozone depleting refrigerants (see contact information in Section 4).

The Halon Bank is a clearinghouse service for the reuse of halons administered by the Underwriters' Laboratories of Canada (ULC). The Halon Bank matches clients with appropriate companies - halon owners with halon buyers and vice-versa. It also provides an up-to-date selection of information relating to the conservation and use of halons. For more information on the Halon Bank contact ULC (see contact information in Section 4).

4 Additional Resources

This document is intended as a source of basic information about the issues involved in the management and control of ODS's and halocarbon alternatives. It does not replace the existing legislation which is referenced in the Guideline. If you have any questions or concerns please contact the appropriate agency using the resource listing below before proceeding.

1. Environmental Protection Division
   Department of Environment and Natural Resources
   600, 5102-50th Avenue
   Yellowknife, NT, X1A 3S8
   Phone (867) 873-7654; Fax (867) 873-0221

2. Office of the Fire Marshal
   Department of Municipal and Community Affairs
   600, 5201 – 50th Avenue
   Yellowknife, NT, X1A 3S9
   Phone (867) 873-7469; Fax (867) 873-0260

3. Environmental Protection Operations
   Environment Canada
   5204 – 50th Avenue, Suite 301
   Yellowknife, NT, X1A 1E2
   Phone (867) 669-4725; Fax (867) 873-8185

4. Commercial Chemicals Evaluation Branch
   Environment Canada
   351 St. Joseph Blvd.
   Hull, PQ, K1A 0H3
   Phone (819) 953-1675; Fax (819) 994-0007

5. The Heating, Refrigerating and Air Institute of Canada (HRAI)
   2800 Skymark Avenue, Building 1, Suite 201
   Mississauga, ON, L4W 5A6
   Phone: 1-800-267-2231; Fax (905) 602-1197
   Website: http://www.hrai.ca/

6. Refrigeration Management Canada
   2800 Skymark Avenue, Building 1, Suite 201
   Mississauga, ON, L4W 5A6
   Phone: 1-866-622-0209
   Website: http://www.hrai.ca/rmc/

7. Underwriters' Laboratories Canada
Head Office and Laboratory
7 Underwriters Road
Toronto ON M1R 3B4
Tel: 1-866-937-3852 or 416-757-3611
Fax: 416-757-8727
E-mail: ulcinfo@ulc.ca
Website: http://www.ulc.ca/index.asp

8. Manitoba Ozone Protection Industry Association Inc. (MOPIA)
2141 - B Henderson Highway
Winnipeg, MB, R2G 1P8
Phone (204) 338-0804; Fax (204) 338-0810
Website: www.mopia.mb.ca

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American Air Conditioning and Refrigeration Institute (AACRI), Standard ARI-740 (1998): Standard for Refrigerant Recovery/Recycling Equipment (1998).

Canadian Council of Ministers of the Environment (CCME), National Action Plan for the Environmental Control of Ozone-Depleting Substances (ODS) and their Halocarbon Alternatives, (1998, PN 1314, May 2001 update)

Canadian Council of Ministers of the Environment (CCME), Canada's Strategy to Accelerate the Phase-Out of CFC and Halon Uses and to Dispose of the Surplus Stocks, (PN 1316, May 2001).

Environment Canada, Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems, Ottawa, ON, (EPS 1/RA/2E, 1996).

Environment Canada, Environmental Code of Practice on Halons, Code of Practice 1/RA/E, Ottawa, ON, (1996).

Government of the Northwest Territories, Environmental Guideline for the General Management of Hazardous Wastes in the NWT, Yellowknife, NT, Environmental Protection Service, Department of Resources, Wildlife and Economic Development, (revised 1998).

Government of the Yukon, Motor Vehicle Air Conditioning Systems and Ozone Depletion, Whitehorse, YT, Environmental Protection & Assessment Branch, Department of Renewable Resources, (2005).

Society of Automotive Engineers (SAE), Performance Criteria for Electronic Refrigerant Leak Detectors (Standard J-1627, August 1995).

Society of Automotive Engineers (SAE), Technical Procedure for Using Electronic Refrigerant Leak Detectors for Service of Mobile Air Conditioning Systems (Standard J-1628, November 1998).

Society of Automotive Engineers (SAE), Recommended Service Procedure for the Containment of Cfc-12 (R-12) (Standard J-1989, November 1998).

Underwriters Laboratories of Canada (ULC), Halon and Halocarbon Clean Agent Recovery and Reconditioning Equipment, ULC/0RD-C1058.5-2004.

Underwriters Laboratories of Canada (ULC), The Servicing of Halon and Clean Agent Extinguishing Systems, ULC/ORD-C1058.18-2004.

Appendix A

Ozone Depleting Substances and Halocarbon Alternatives

1. Chlorofluorocarbons (CFC's)

a)	CFC-11	trichlorofluoromethane	Not classified under TDG
	CFC-12	dichlorofluoromethane	TDG class 2.2 Non-flammable gas
	CFC-13	chlorotrifluoromethane	TDG class 2.2 Non-flammable gas
	CFC-113	trichlorotrifluoroethane	TDG Class 9
	CFC-114	dichlorotetrafluoroethane	TDG class 2.2 Non-flammable gas
	CFC-115	chloropentafluoroethane	TDG class 2.2 Non-flammable gas
b)	All other CFCs		Consult TDGA for classification.

c) All isomers and mixtures containing any of the above.

2. Hydrochlorofluorocarbons (HCFC's)

a)	HCFC-21	dichlorofluoromethane	TDG class 2.2 Non-flammable gas
	HCFC-22	chlorodifluoromethane	TDG class 2.2 Non-flammable gas
	HCFC-123	dichlorotrifluoroethane	Not classified under TDG
	HCFC-124	chlorotetrafluoroethane	TDG class 2.2 Non-flammable gas
b)	All other HCFC's not specifically listed.		Consult TDGA for classification.

c) All isomers and mixtures containing any of the above.

3. Bromofluorocarbons (halons)

a)	Halon-1202	dibromofluoromethane	TDG Class 9
	Halon-1211	bromochlorodifluoromethane	TDG class 2.2 Non-flammable gas
	Halon-1301	bromotrifluoromethane	TDG class 2.2 Non-flammable gas
	Halon-2402	dibromotetrafluoroethane	TDG class 2.2 Non-flammable gas
b)	All other halons not specifically listed.		Consult TDGA for classification.

c) All isomers and mixtures containing any of the above.

4. Chlorocarbons

a)	Trichloroethane or methyl chloroform (R-140)	TDG class 6.1 Poison
	Tetrachloromethane or carbon tetrachloride (R-10)	TDG class 6.1 Poison

b) All isomers and mixtures containing any of the above.

5. Bromochloromethanes

a)	Halon-1011	bromochloromethane	TDG class 6.1 Poison
b)	All mixtures containing halon-1011.		

6. Hydrofluorocarbons (HFC's)

a)	HFC-23	trifluoromethane	TDG class 2.2 Non-flammable gas
	HFC-32	difluoromethane	TDG class 2.1 Flammable gas
	HFC 125	pentafluoroethane	TDG class 2.2 Non-flammable gas
	HFC-134a	tetrafluoroethane	TDG class 2.2 Non-flammable gas
	HFC-143a	trifluoroethane	TDG class 2.1 Flammable gas
	HFC 227	heptafluoropropane	TDG class 2.1 Flammable gas
b)	All other HFC's not specifically listed.		Consult TDGA for classification.
c)	All isomers and mixtures containing any of the above.		

7. Perfluorocarbons (PFC's)

a)	PFC-14	tetrafluoromethane	TDG class 2.2 Non-flammable gas
	PFC-116	hexafluoroethane	TDG class 2.2 Non-flammable gas
	PFC-1218	octafluoropropane	TDG class 2.2 Non-flammable gas
b)	All other PFC's not specifically listed.		Consult TDGA for classification.
c)	All mixtures containing any of the above.		