Environmental Code of Practice on HALONS

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Section 1

Introduction

The objective of this Halon Code of Practice is the protection of the ozone layer, through measures to reduce, and eventually eliminate, halon emissions to the atmosphere.

1.1 Scope

This Halon Code of Practice is intended for halon owners and halon users. It has been designed to give direction on how to manage halon stocks in a manner that takes into consideration the environmental concerns regarding the depletion of the ozone layer.
This Halon code of Practice is not intended to supersede the vast array of existing regulations, codes, and standards. Nor is it intended to be a compendium of ready-to-use recipes. In fact, this Halon code of Practice is designed to complement these existing documents by providing a much needed focus on their respective requirements.
The user of this Halon Code of Practice is ultimately responsible for judging its suitability for the particular application.

1.2 Purpose

The purpose of this Halon Code of Practice is to establish a framework to reduce the risk to humans and the environment associated with the use of halons in Canada by:

(a) reducing the potential for unwanted[1] releases of halons;
(b) promoting the use of recycled halons as a measure to minimize unwanted emissions;
(c) promoting the search for, and use of, alternatives to halon fire protection;
(d) encouraging an orderly phase-out of halons in existing fire protection systems.

1 The term "unwanted" , with respect to releases of halons, emphasizes the distinction between WANTED releases of halons (to actually fight fires) and all the other "non-fire" situations or "unwanted" releases.

Section 2
Regulatory Framework

The requirements of the Montreal Protocol apply to Parties to the Montreal Protocol, i.e., countries that have pledged to implement these requirements within their national boundaries. The Government of Canada has delegated to Environment Canada the responsibility of ensuring that the requirements of the Protocol are met within the Canadian boundaries.

Several levels of jurisdictions and rules apply to ozone-depleting substances (ODS) and, more specifically, to halons. Some rules are enforceable under law and other are derived from voluntary consensus.

The federal regulations apply to every person in Canada; the ODS regulations set control measures on the supply end, namely , the production, the importation, the exportation of specific ODS. The provincial/territorial regulations apply to the respective province/territory; they set control measures on the use mainly through recovering, recycling, and reclaiming requirements. Similarly, municipal by-laws only apply to municipal boundaries.

Industry standards usually apply within national boundaries, but are not legally enforceable (unless they are specified in a regulation). They are usually designed by industry consensus to ensure a minimum quality of product or service.

2.1 The Montreal Protocol

The Montreal Protocol on substances that deplete the ozone layer is an international treaty that was ratified by 24 nations in 1987. In its original version, it restricted the production of halons to 1986 levels by January 1, 1992. The Copenhagen amendments, adopted in 1992, required a phase-out of halon production and consumption[1] by January 1, 1994.

As of 31 July 1995, 149 nations have ratified the 1987 Montreal Protocol and 47, the Copenhagen amendments to the Montreal Protocol.

The Montreal Protocol allows the continued trade of recycled halons, i.e. those produced before January 1, 1994. The Montreal Protocol does not prescribe restrictions on the use of any ozone-depleting substance (ODS); however, the Montreal Protocol does call upon Parties to make best efforts to control unnecessary emissions.

2.2 The Canadian Environmental Protection Act (CEPA)

The Canadian Environmental Protection Act (CEPA) provides the legal basis for Canadian compliance with the requirements of the Montreal Protocol. There are two regulations under the Act:

(a) the Ozone-Depleting Substances Regulations (ODS Regulations);
(b) the Ozone-Depleting Substances Products Regulations (ODS Products Regulations).

1The Montreal Protocol defines "consumption" as "production" + "importation" - "exportation", for each Party.

The former prohibit the manufacture of ODS (such as halons) in Canada, and prescribe restrictions on the importation of ODS (such as halons) into Canada. The latter prohibits the use of ODS in specific applications.

2.3 Provincial Legislation

Fire protection is of provincial jurisdiction. Each Province has a "Fire Protection Act" that appoints a Fire Commissioner (or a Fire Marshal) and that specifies the duties of that appointed official.

The Government of Canada has the Canadian Forces Fire Marshall for all military installations and undertakings, and the Fire Commissioner of Canada for all non-military federal installations and undertakings.

Several Provincial legislatures have established environmental requirements for ozone-depleting substances, including halons. Table 2.1 briefly summarizes various provincial /territorial requirements.

2.4 Codes and Standards

In addition to the legal requirements mentioned above, several groups of industry representatives and trade associations establish standards for various aspects of the business.

The Standards Council of Canada is a federal Crown corporation whose mandate is to foster and promote voluntary standardization for the benefit of the industry, consumers and the economy. In responding to the authority given by the Standards Council of Canada Act (1970), the Standards Council of Canada functions as the national coordinating body through which organizations concerned with voluntary standardization may operate and cooperate to recognize, establish and improve standardization in Canada.

The Standards Council of Canada administers the National Standards System and has accredited the following standards development organizations: the Bureau de normalisation du Québec (NBQ); the Canadian Gas Association (CGA); the Canadian General Standards Board (CGSB); the Canadian Standards Association (CSA); and Underwriters' Laboratories of Canada (ULC).

ULC is responsible for the following subject areas: fire protection equipment, fire resistant construction, fuel burning equipment, liquid and materials classified as fire hazards, etc.

Table 2.1 - Provincial/Territorial requirements relating to halons and fire protection equipment.

This table is intended solely as an indication of the wide array of measures taken by the Provinces/Territories.
The reader is expressly advised to confirm with the appropriate provincial/territorial authorities.

Provision	Alta	BC	Man	NB	Nfld	NWT	NS	Ont	PEI	Que	Sask	Yuk
No release of ODS	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓
mandatory reporting of ODS release			✓	✓	✓				✓			✓
No new FPE containing ODS					✓		✓	✓	✓			
mandatory ODS recovery		✓	✓		✓		✓		✓	✓	✓	✓
No sale of portable FE	✓	✓	✓	✓		✓				✓	✓	
certification to service FPE	✓	✓	✓	✓	✓			✓	✓		✓	✓
No leak testing with ODS		✓	✓	✓			✓		✓	✓	✓	✓
No ODS topping up of leaking FPE		✓	✓	✓								✓
No non-refillable containers		✓		✓			✓		✓			✓
mandatory labelling of FPE			✓	✓				✓	✓		✓	
mandatory plan to manage & eliminate halons		✓		✓	✓							✓

NOTE: A shaded area indicates a DRAFT provision.
FE: fire extinguisher; FPE: fire protection equipment; ODS: ozone-depleting substances.

Section 3
Applications of Halons

Halons are used in fire protection because they are effective fire extinguishing agents, are electrically non-conductive, leave no solid or liquid residue, are non-corrosive, and are considered not toxic at recommended concentrations for occupied areas. However, halons significantly contribute to the depletion of the stratospheric ozone layer.

No halons were ever produced in Canada and their importation started around 1965. In Canada, halon 1211 is used almost exclusively in portable equipment (hand-held fire extinguishers and, to a limited extent, in larger capacity wheeled units mainly used at civil and military airports). Halon 1301 is employed primarily in automatic fixed systems (also known as total-flooding systems); these fire protection systems are designed to provide a fire extinguishing concentration of the agent. Applications include: computer rooms, telecommunications facilities, control rooms, shipboard machinery spaces, aircraft engine nacelles and cargo bays, and other similar high value fire risks.

Up to recently, actual fire fighting and explosion suppression represented the smallest portion of all halon releases. Other sources of halon releases include unwanted discharge in response to non-fire situations, equipment leakage, testing, training, and losses during service procedures.

Modifications in work procedures have already resulted in significant reductions in halon emissions. In total-flooding installations, the testing for enclosure integrity is no longer done by discharge testing; it is now replaced by the door-fan test and other procedures that do not require the use of halons. With the hand-held halon fire extinguishers, new training procedures for aircraft personnel has significantly reduced the emissions of halons.

Due diligence by the facility owner is required to further reduce emissions caused by unwanted release due to non-fire events.

3.1 Responsibilities

Protecting a facility against fire damage is the responsibility of the owner of the facility. Similarly, whether to maintain an existing fire protection system that uses halons or to search for alternatives to a halon fire protection, the ultimate responsibility rests with the owner of the protected facility.

3.2 Alternatives to Halons

Alternatives are now available for many of the applications where halons would have been the extinguishant of choice in the past. However, for some applications, satisfactory alternatives have yet to be fine-tuned:

(a) applications with space and/or weight restrictions (onboard aircraft, onboard submarines, in military tactical personnel carriers, etc.);

(b) applications where inerting concentrations of agent must be achieved in occupied areas.

Throughout the world, concerned groups (for example, the aircraft industry, or the military) are financing tremendous research and development (R+D) efforts to find suitable alternatives to halons.

In the United States of America, the Environmental Protection Agency periodically updates a list of all acceptable alternatives to halons. Criteria to determine the acceptability of alternatives include the impacts on human health and the environment. The list addresses streaming applications (portables) and the total-flooding systems (in occupied and non-occupied applications). Environment Canada freely uses this list which is reproduced in Appendix D.
Alternatives can satisfactorily replace halon 1211 in most applications with very few exceptions (such as fire protection onboard aircraft or submarines). Alternatives to halon 1301 must be tailored to specific needs Consideration should be given to the particular class of fire hazard when determining alternatives to halons. NFPA standard 2001 lists minimum requirements for clean agents to replace halons in total-flooding systems. State-of-the-art detection systems or compartmentation of protected assets may alleviate the need to use halons.
Assistance in determining the most suitable choice of fire protection for a particular fire hazard can be obtained by consulting existing documentation (see Appendix B - Relevant codes and standards) or a fire protection professional.

3.3 Recycling of halons

Halons can be removed from applications where

- alternatives to halons provide an acceptable protection against fire risks,
- where there have been changes to the relevant asset being protected, or
- where the asset has reached the end of its useful life.

The recovered halons can then be reconditioned and recycled to meet the needs of more critical applications or provide recharge quantities to maintain existing systems.

The Underwriters' Laboratories of Canada (ULC) has published two standards that specifically address halon recycling:

(a) The servicing of halon Extinguishing Systems and
(b) Halon recovery and re-conditioning equipment (see Appendix B - Relevant codes and standards).

ATTENTION

Some provincial legislation now require that only certified service companies can service halon systems. Refer to the appropriate provincial authority for additional information.

This **Environmental Code of Practice** recommends that
the servicing of halons equipment be done only by companies certified to ULC standards.

3.4 Essential uses

The Parties have prohibited the world-wide production of halons since January 1994. Two exceptions to this world-wide production ban are (a) developing countries -- called "Article 5 countries" -- for their domestic needs, and (b) exemptions for essential uses -- the exemptions are granted by the Parties. Parties to the Montreal Protocol are asked each year to submit nominations for essential use exemption[1].

While the production is prohibited around the world, it should be emphasized that the USE of existing halons is NOT prohibited.

The essential use exemption grants a Party the permission to produce (or import) a specified quantity of newly-manufactured halons for the specified use during the specified year. To date, all the nominations that have been submitted to the Parties for an exemption from the production phase-out have been rejected. The rationale for the rejection was not the essential characteristics of the application, but the belief that existing stocks of halons are large enough to accommodate, through recycling, the more critical needs of fire protection.

The Russian Federation has been granted an essential use exemption. The exemption is with respect to halon 2402 for year 1996 and beyond.

3.5 The Halon Bank

Canada has no physical HALON BANK where users could deposit or withdraw halons. The HALON BANK is a clearinghouse service administered by the Underwriters' Laboratories of Canada (ULC).

The HALON BANK (1-800-463-8244 puts clients in touch with appropriate companies - halon owners with halon buyers and vice-versa. The HALON BANK also provides an up-to-date selection of information relating to the conservation and use of halons.

1 Every year, at the beginning of summer , Environment canada publishes a notice in the Canada Gazette, Part I, asking users to submit nominations for an essential use exemption.

Section 4

Emission reduction

Most of the recommendations given in this section apply equally to portable fire extinguishers and total-flooding systems. Recommendations specific to one group are introduced as such.

ATTENTION

Several provincial legislation now require to report any release of halons into the environment. Some have a threshold quantity, others do not. Refer to the appropriate provincial authority.

4.1 New Installations

A new installation, by definition, requires a reference point in time to differentiate the new from the old. This reference point is arbitrarily chosen as the date of publication of this code of practice. Thus, a new installation is defined as one that did not physically exist on the date of publication of this Code of Practice.

> This**Environmental Code of Practice**
> recommends that NO halons be used as fire extinguishant in NEW installations.

A shrinking source of supplies, coupled to an increasing price of the resource, should be convincing arguments to deter the use of halons in new installations.
The International Maritime organization (IMO) prohibits since October 1994[1] the use of halogenated hydrocarbons in NEW installations on all commercially registered ships.

ATTENTION

> Some provincial legislation prohibit the use of portable fire extinguishers containing halons. Refer to the appropriate provincial authority for additional information.

4.2 Existing Installations

Existing halon equipment (whether portable extinguishers or total-flooding systems) must be properly maintained for as long as it remains in service.
Maintenance is a thorough examination of the equipment and is intended to give maximum assurance that the equipment will perform as intended. This means an effective and safe operation

1 Resolution MSC 27 (61).

meanwhile (for example, a leaky extinguisher, or a faulty detection system that could trigger the release of a total-flooding system).

recharging are described in NFPA 10 (portable extinguishers) and NFPA 12A (extinguishing systems).

discharge. The protected asset must not be without fire protection, once a halon release happens. Will the equipment be recharged with halons or will the halons be replaced with an alternative ?

Environmental Code of Practice

A discharge of the equipment may be the trigger needed to replace the halons. For example, halons will be replaced in "specify date" or at the discharge of the equipment, whichever comes

4.2.1 Record-keeping

all times: description of the original installation, specifications, drawings, flow charts, electrical

kept current.

actions, and policies related to the fire protection installation. This documentation will facilitate

ATTENTION

legislations now specify the records to keep and the time

4.2.2 Training

documents are recommended to maintain awareness.

personel addresses two types of specific action sets: (a) safety procedures for all specialised installation/service

SAFETY PROCEDURES

employees. The National Fire Code of Canada 1995 describes various requirements in relation to

communications systems, and so on.

WORK PROCEDURES
Training should include the purpose of the fire protection system, a description of the various controls (manual and automatic) and of their operation, procedures during alarm activation, environmental awareness (halons and the destruction of the ozone layer).

PORTABLE EXTINGUISHERS
Training of personnel with the use of portable extinguishers no longer requires the release of halon 1211. Alternative procedures, such as video cassettes and the use of halon simulants, meet the same objective[1].

This **Environmental Code of Practice**
recommends that hand-held portables fire extinguishers no longer use halons.

4.2.3 Testing

Testing refers to several situations, the most common of which include: verification of the operational specifications of the various components in a fire protection installation; re-qualification of halon cylinders by the hydrostatic pressure test; testing of halon cylinders to detect leaks.
Operator's manuals and work procedures -- that describe the installed fire protection system, the operating characteristics of the equipment, and the maintenance requirementsof the various components -- should be available at all times.

TOTAL-FLOODING SYSTEMS
Testing of operational specifications of a total-flooding system no longer requires the discharge of the halon 1301. Alternative test methods to evaluate the enclosure integrity provide better information without the use of any ozone-depleting substances. NFPA standard 12A recommends the use of the "door fan test" to assess the enclosure integrity.

> This E**nvironmental Code of Practice**
> recommends that methods not requiring the use of halons be implemented for testing and training.

4.2.4 Inventory Control

Halons are contained in portable extinguishers (hand-held or wheeled units) or in larger cylinders used for total-flooding systems. An owner may not be aware of the quantities of

1 Several provinces already prohibit the use of hand-held portable fire extinguishers containing halons.

halons located at a particular site. Halons may have been installed during the initial construction

The information recorded in this inventory control serves several purposes: better management of the resource by the owner; better planing for alternatives to halons; better enforcement of

For each facility that has halon fire protection, determine and record the following information:

(a) protected area:

physical location;

•

area occupied or not, openings [doors, windows], adjacent facilities);

(b) installation:

date of original installation;

•

•system configuration (i.e., local application, all spaces, room only, back-up system);

• es) of supplier, installer, manufacturer and servicing company;

•

•maintenance history (e.g. discharges, recharges, tests, inspections, hydrostatic testing,

(c) for each halon container:

•

•type of halon (e.g. halon 1301 or 1211);

type of container (TC markings stamped on container);

•

•quantity of agent (in kilograms);

storage pressure;

•

•initials of person that performed the last service;

date of last hydrostatic test1

4.2.5 Labelling

1 [... any non-corrosive fire extinguishing agent be hydrostatically retested with volumetric expansion measurement every 12 years ...] retested 2 tim presuure]

In order to minimize unwanted emissions, all halon containers, and especially the portable extinguishers, should be labelled in accordace with the ULC standards. In addition, some provinces require that halon cylinders be labelled to indicate that the contents of this cylinder is an ozone-depleting subtance.

4.2.6 Maintenance of existing systems

1. Maintain on site a record that fully describes the equipment currently in operation. This should include drawings, specifications, design documents, system electrical and mechanical plans, sequence of operation of the system, and other relevant documents.

   If "as-built" documentation is not available, an "as-is" record should be compiled. Require that all maintenance and service work be recorded and that "as-built" documents be updated to reflect any changes.

   The maintenance company should be charged with logging and investigating any system operation, including system troubles and alarm conditions.

2. Existing systems should comply with relevant current codes and standards. Compliance ensures an acceptable reliability of the system to limit emissions. However, compliance may require some up-grading. System upgrades should be designed by qualified persons.

3. All system components should be listed by an accredited certification organization, such as Underwriters Laboratories of Canada (ULC) or Underwriters Laboratories, Inc (UL)[1].

4. Automatic release circuits should be designed to operate only after a verification of the alarm has confirmed the need to release the fire extinguishing agent. Systems in rooms which are staffed around the clock2 should be converted to manually activated discharge only.

5. Ensure that a comprehensive maintenance program is implemented as recommended in NFPA 10 (Portable Fire Extinguishers) or NFPA 12A (Halon 1301 Fire Extinguishing Systems).

6. Allow maintenance to be conducted only by service companies certified by ULC for the purpose (ULC/ORD-C1058.18)3. Ensure that the certified company is qualified to service both the halon system and the associated (fire detection alarm and electrical control) equipment. Their appropriate work procedures ensure a fully integrated maintenance of mechanical and electrical equipment and, thus, will prevent accidental releases when maintenance is done on any part of the installation.

7. Prior to conducting any maintenance or repair on a halon system, ensure that the firing mechanisms on the halon containers are disabled and properly tagged for

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1 A lot of fire protection equipment is designed and manufactured in the USA.

2 This is not meant to include the 24-hour-a-day "night watchperson" scenario.

3 The Province of Ontario has mandated this requirement (Ontario Regulation 413/94).

the duration of the job and not re-activated until maintenance or repair has been completed.

Assess the system performance, in terms of history of false alarms and discharges. Document the reasons that cause these incidents. Implement a method of reporting incidents. Elements to be

a) date and location of incident;
description of incident;
c)
d) likely cause(s) for alarm situation;
likely cause(s) for release;
f)

ATTENTION

Some provincial legislation now require that halon releases be reported.

4.2.8 Maintenance / servicing history

Document the terms of reference for maintenance / servicing (who does what, when, etc.).

records to determine if refilling or "topping up" has ever occurred.

ATTENTION

halon portable extinguishers. Refer to the appropriate provincial authority.

This **Environmental Code of Practice**
recommends that no topping-up of halon cylinders be done

Section 5

Decommissioning

Decommissioning (i.e., the removal of halons from active service) is a prime element of any management plan for halons. It can be divided in two phases: (a) planning the phase-out of halons, and (b) carrying on with the actual disposal of halons.

> This **Environmental Code of Practice** recommends that the owner prepare a decommissioning plan for each halon protection system.

During the decommissioning and subsequent disposal of halons, .care must be taken to avoid any release of halons in addition to ensure that the asset or facility is not left without fire protection. Decommissioning prompts recovery and recycling. Some provincial legislation have mandated that only ULC1 certified companies do the recovery and recycling of halons. A certified service company may help in that respect.

5.1 Phase-out plan

5.1.1 Mandate

Identify the person(s) responsible to initiate, develop and implement the halon phase-out plan. Clearly delineate the mandate, and provide adequate authority and financial resources to implement and monitor the tasks identified in the plan.

5.1.2 Hazard/Risk analysis

Perform a hazard/risk analysis of the fire protection system (refer to Appendix E). This analysis will also determine if the use of halon is still an appropriate strategy to protect the asset.

5.1.3 Schedule

A schedule should be developed to:

(a) periodically assess the need of halons as fire extinguishing agents; this periodic assessment should be done annually to take advantage of all the technical developments (alternatives to halons, improvements in detection systems, changes in regulatory requirements, etc.);

1 Underwriters' Laboratories of Canada (ULC) has published two standards, one on the servicing companies and one on the re-conditioning equipment.

from today, at the next halon discharge, year 2000, or any other date; the important point is to set a date and write it down in the decommissioning plan.

Disposal

Establish a policy to dispose of unnecessary or decommissioned halons.

(a) storing the halon cylinders in the facility and advise the Halon Bank (TEL: 1-800-463-8244) of the availability of halons; the Halon Bank offers clearinghouse

sellers;

(b) contracting out the disposal to a ULC certified service company which will recover

(c) exporting your halons to a developing country in order to alleviate the need to produce new halons; Environment Canada require a permit to export halons out of

(d) destroying the halons. A UNEP-sponsored workshop, held in May 1995 in Montreal, confirmed the availability (and commercial viability) of several

The disposal of halons should be decided in advance and be performed in a manner that does not endanger the environment (though unnecessary releases to the atmosphere).

practices, in determining whether to recycle or destroy the halons, etc.

5.2.1 Storage

1. This encompasses all halon containers (whether portable extinguishers or cylinders

2. The area used for the storage of the h
accident), dry (to avoid humidity and ensuing corrosion) and equipped with a halon detecting system/device to detect any release of halon from the containers(s). Ensure periodic inspection of the container.

The halon container should comply with the requirements of Transport Canada's

hydrostatic test1

The hydrostatic test (every 12 years) is a requirement of the transport authorities (TC in Canada and DOT in USA) and apply only to containers in

For halon containers continuously in service without discharging, NFPA recommends that each container shall be given a complete external visual

inspection every five years, in accordance with section 3 in pamphlet C-6 of the Compressed Gas Association (CGA).

In addition, no halon container shall be recharched without a hydrostatic test if more than 5 years have elapsed since the date of the last test.

If a halon container has lapsed its hydrostatic test date, Transport Canada now requires that a "permit of equivalent level of safety" be issued to transport the container under pressure

4. Leak testing of halon cylinderss should be performed periodically and acccording to ULC standards. Report any leaks to the appropriate authority.
5. PLAN AHEAD. What will happen to your halons at the date of hydrostatic test ? Do you wish to recycle your halons (to your own operations or to other's) ? Do you wish to have your halons destroyed ?

5.2.2 Recycling

Should you decide to recycle your halons, you should be aware that some provincial legislation have mandated that only certified service companies do the recycling. Refer to the appropriate authority.

The trend in recycling is to have a certified service company do the job. That certified service company is fully qualified and uses certified equipment that guarantees that emissions to the atmosphere are kept to a minimum.

This **Environmental Code of Practice**
recommends that recovery/recycling/reclaiming activities on halons be done only by service companies that are certified to ULC standards (Refer to APPENDIX C).

5.2.3 Destruction

Several technologies, successfully proven at the bench scale, are now available. Most of the technologies to destroy halons are also applicable to other ozone-depleting substances (eg., CFCs). State-of-the-art technologies include: plasma arcs, UV photolysis, UV laser photolysis, catalysts, incineration

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APPENDIX B

The Underwriters' Laboratories of Canada (ULC) has been accredited by the Standards Council of Canada to develop an implement national standards on fire protection. These standards are voluntary by nature; however, some legislations have adopted them by reference in their regulations

Codes and standards are updated on a continuous basis.
Please ensure that you have the latest edition.

ULC/ORD-C1058.5-1993
Halon Recovery and Reconditioning Equipment

ULC/ORD-C1058.18-1993
The Servicing of Halon Extinguishing Systems

CAN4-S508-M90 (Amended Mar 1993)
Standard for the Rating and Fire Testing of Fire Extinguishers and Class D Extinguishing Media

CAN/ULC-S512-M87 (Amended April 1993)
Standard for Halogenated Agent Hand and Wheeled Fire Extinguishers

CAN/ULC-S524-M91
Standard for the Installation of Fire Alarm Systems

CAN/ULC-S527-M87 (Amended Jun 1992)
Control Units for Alarm Systems

CAN/ULC-S532-M90 (Amended Mar 1993)
Standard for the Regulation of the Servicing of Portable Fire Extinguishers

CAN/ULC-S536-M86 (Amended Dec 1992)
Standard for the Inspection and Testing of Fire Alarm Systems

CAN/ULC-S537-M86
Standard for the Verification of Fire Alarm Systems

CAN/ULC-C539
Fire Alarm Devices, Single and Multiple Station, Mechanically-Operated Type

APPENDIX B

In the United States of America (USA), the development of industry standards is not as structured as it is in Canada. The National Fire Protection Association (NFPA) produces the most widely used fire protection standards in the world.

NFPA 10 (MM-10-94)	Portable Fire Extinguishers
NFPA 12A (MM-12A-92)	Halon 1301 Fire Extinguishing Systems
NFPA 12B (MM-12B-90)	Standard on Halon 1211 Fire Extinguishing Systems
NFPA 55 (MM-55-93)	Storage, Use and Handling of Compressed and Liquefied Gases in Portable Cylinders
NFPA 69 (MM-69-92)	Explosion Prevention Systems
NFPA 72 (MM-72-93)	National Fire Alarm Code
NFPA 75 (MM-75-92)	Protection of Electronic Computer/Data Processing Equipment
NFPA 408 (MM-408-94)	Aircraft Hand Portable Fire Extinguishers
NFPA 2001 (MM-2001-94)	Clean Agent Fire Extinguishing Systems

Fire Protection Handbook: 17th Edition (MM-FPH1791)

Fire Protection Systems: 2nd Edition (MM-FPS-93)

Underwriters Laboratories Inc. (UL) also develops industry standards in the USA.

UL 2083 (September 30, 1993)
Halon 1301 Recovery/Recycling Equipment

UL 2006 (February 20, 1991)
Halon 1211 Recovery/Recharge Equipment

PPENDIX C

Category			Service for which certification is obtained
I	II	III	
A	A	-	Charging, recharging and hydrotesting of halon system containers;
B	B	-	Repair and maintenance of all system components;
C	-	-	Determination of quality of halon 1301;
D	-	-	Reconditioning of recovered halon to accepatable quality requirements;
E	E	-	Dismantling of systems;
F	F	F	field inspections, including certification of the integrity of installed systems.

Call 1 (800) 463-8244 to get most recent list of service companies.

Certification category I FULL SERVICING of Halon 1301 systems

Control Fire Systems Ltd. / Toronto, Ontario (416-236-2371)
Superior Safety Inc. / Winnipeg, Manitoba (204-694-0140)

Certification category II LIMITED SERVICING of Halon 1301 systems

Classic Fire Protection Inc. / North York,Ontario (416-740-3000)
D&L Engineering Sales Ltd. / Halifax, Nova Scotia (902-429-3790)
Douglas Fire Safety Systems Inc. / Ottawa, Ontario (613-733-5348)
Levitt-safety Ltd. / Oakville, Ontario (905-829-3299)
Magna Fire Protection & Security Ltd. / Brampton, Ontario (905-791-9606)
Sentry Fire Equipment Ltd. / Sarnia, Ontario (519-383-6060)
Superior Safety Inc. / Thunder Bay, Ontario (807-623-2797)

Certification category III INSPECTION of Halon 1301 systems

Cronin Fire Equipment Ltd. / Nepean, Ontario (613-727-5330)
First Stage Fire Protection & Sec. Ltd. / Downsview, Ontario (905-475-8641)
Imperial Oil, Products & Chem. Div. / Sarnia, Ontario (N/A)
Lyons Fire Potection Services Inc. / Etobicoke, Ontario (416-674-5633)
Ontario Hydro - Central Warehouse / Etobicoke, Ontario (N/A)
Ontario Hydro - DNGS / Bowmanville, Ontario (N/A)
SSCAN Technologies / Richmond Hill, Ontario (905-731-8975)

APPENDIX D

ACCEPTABLE STREAMING AGENTS

Agent	Comment
C6F14 (PFC-614 or CEA-614)	Allowed where no other agent is technically feasible.
HCFC Blend B (Halotron 1)	Non-residential uses only.
HCFC Blend C (NAF P-III)	Non-residential uses only.
HCFC Blend D (Blitz III)	Non-residential uses only.
HCFC-123	Non-residential uses only.
HCFC-124 (FE-241)	Non-residential uses only.
Gelled Hydrocarbons/Dry Chemical Suspension (formerly Powdered Aerosol B)	Allowable in the residential use market.
Water Mist using Potable or Natural Sea Water	
Carbon dioxide (CO2)	
Dry Chemical	
Water	
Foam	

APPENDIX D

ACCEPTABLE TOTAL FLOODING AGENTS - **OCCUPIED AREAS** -

Agent	Comment
C4F10 (PFC-410 or CAE-410)	Allowed where no other agent is technically feasible. NOAEL 40%
C3F8 (PFC-218 or CAE-308)	Allowed where no other agent is technically feasible. NOAEL 30% (final listing forthcoming)
HCFC Blend A (NAF S-III)	NOAEL 10% LOAEL 10%
HCFC-23 (FE-13)	NOAEL 30%
HFC-227ea (FM-200)	NOAEL 9.0% LOAEL 10.5%
IG-01 (Argon)	Minimum oxygen 10%. Proposed Acceptable. (forthcoming)
IG-55 (Argonite)	Minimum oxygen 10%. Proposed Acceptable. (forthcoming)
IG-541 (Inergen)	Minimum oxygen 10%. Maximum CO2 5%
Water mist using Potable or Natural Sea Water	
Carbon Dioxide (CO2)	Must meet NFPA 12 and OSHA 1910.162(b)5 requirements
Water sprinklers	

ACCEPTABLE TOTAL FLOODING AGENTS - **UNOCCUPIED AREAS** -

Agent	Comment
CF3I	NOAEL 0.2%; LOAEL 0.4% (final listing forthcoming)
HCFC-22	NOAEL 2.5%; LOAEL 1.0%
HCFC-124	NOAEL 1.0%; LOAEL 2.5%
HCFC-125	NOAEL 7.5%; LOAEL 10%
HFC-134a	NOAEL 4%; LOAEL 8%
Gelled Hydrocarbons/Dry Chemical Suspension (PGA)	(final listing forthcoming)
Inert Gas/Powdered Aerosol Blend (FS 0140)	(final listing forthcoming)
[Water Mist Surfactant Blend] A	
Powdered Aerosol A (SFE)	
Sulfur Hexafluoride (SF6)	(final listing forthcoming) Discharge test agent for new halon systems, allowed for military uses and civilian aircraft uses only.

APPENDIX E

1. PURPOSE

The purpose of a hazard/risk analysis is to provide information on a fire protection installation with respect to :

(a) its identification;
(b) an assessment of its relevance (RE: consistency with the owner's loss prevention policies);
(c) an assessment of its efficiency (RE: fire prevention and fire protection).

It is the intent of this hazard/risk analysis to direct the attention on important aspects of fire prevention/protection; this analysis should not be interpreted as additional formats or forms to fill.

2. DESIGN CONSIDERATIONS

Employ «best available expertise» to guide this analysis, whether you rely on in-house technical experts or seek the advice of outside professionals, with experience in designing and installing fire protection systems.

The existing halon system has originally been installed to meet specific fire protection needs. Verify that these needs still exist. Determine if alternatives to halons could not provide the same fire protection.

Determine if an "automatic discharge" system is absolutely necessary. A manually activated system may be justifiable in a location which is physically staffed around the clock by fully trained operators and is equipped with early warning fire detection. Examples of such locations are process control rooms or military command-and-control facilities.

2.1 For each asset being protected against fire damage,
- (a) determine the fire hazard(s) threatening the asset;
- (b) identify all risks to human health that may be present, including the exposure to combustion products in a fire situation;
- (c) determine the value of the asset, in terms of costs of repair/replacement and down-time consequences.

2.2 Assess the effectiveness and reliability of the existing installation in terms of
- (a) history of false alarms and/or discharges;
- (b) any failure to detect fire or discharge when properly required.
- (c) changes to the protected asset and its physical environment from the time of initial installation.

2.3 Determine if the protected area is capable of containing the extinguishing agent at the recommended concentration and for the required period of time. Repair any penetrations to the protected enclosure. Establish procedures to ensure the continued enclosure integrity.

2.4 Identify conditions in the protected and adjacent areas that could activate fire detectors (false alarms) and trigger the discharge of the halon system under review. Relocation could appropriately alleviate the identified hazardous condition(s): critical equipment can be duplicated at a secondary location; adjacent rooms could be upgraded to eliminate the hazardous condition(s).

2.5 Compare the existing installation (fire detection, extinguishing system, control panels, etc.) to current design practices with respect to compliance with the current codes and standards. Equipment, in particular, the means of detecting fire and initiating agent discharge, may require an upgrade to achieve optimum protection from false alarm sources.

2.6 Evaluate alternatives to halons (see Appendix D). If it is determined that halons constitute the only acceptable extinguishing agent, ensure that the existing installation, including the hardware and the software, conform to current codes and standards in order to establish a minimum level of reliability.