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Canada

Manufacture of Highway Pressure Tanks

Under B620-98

Transport Canada
Safety and Security
Dangerous Goods

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Content

TDG

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- Sari Markel, Jennifer Sully and Dawn Phillips - University Summer Students
- Doug Weese - Ontario Regional Office

We welcome news, comments or highlights on transportation of dangerous goods activities, announcements of meetings, conferences or workshops. The **Newsletter** carries signed articles from various sources. Such articles do not necessarily represent the views of the Directorate, nor does publishing them imply any endorsement. Material from the **Newsletter** may be used freely with customary credit.

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The New Assistant Deputy Minister - Safety and Security

Mr. William J.S. Elliott

Effective September 18, 2000, Mr. William J.S. Elliott is the Assistant Deputy Minister, Safety and Security, at Transport Canada.

Mr. Elliott possesses a Bachelor of Arts and a Law Degree, both from the University of Ottawa. He was called to the Bar of Ontario in 1981.

In 1998, Mr. Elliott was appointed Deputy Commissioner, Canadian Coast Guard with the Department of Fisheries and Oceans. From 1992 to 1998, he was with the Department of Justice as Senior General Counsel and Head of Legal Services for the Department of Indian and Northern Affairs. He also held the position of Senior Counsel Manager, Comprehensive Claims and Northern Affairs in the Department of Justice.

Mr. Elliott joined the Office of the Deputy Prime Minister of Canada in 1988. In that Office, he played various roles, including Legal Advisor and Special Assistant, Executive Assistant

and Chief of Staff. He was responsible for providing advice and analysis on a broad range of economic, social and policy issues.

Prior to beginning his career in the public service, Mr. Elliott practised law for a number of years.

Mr. Elliott replaces Mr. Ron Jackson who has retired from the public service.

FEATURE

Manufacture of Highway Pressure Tanks Under B620-98

by Kevin Green

One Stop TCRN (Transport Canada Registration Number) Design Reviews for Highway Pressure Tanks in Accordance with CSA B620-98

National Standard of Canada CAN/CSA B620-98 *Highway Tanks and Portable Tanks for the Transportation of Dangerous Goods* will be brought into force near the end of next year with the Clear Language amendment to the Transportation of Dangerous Goods (TDG) Regulations.

For highway tanks that are pressure vessels, the CSA Standard B620-98 introduces the "One Stop TCRN Design Review". Pressure vessel highway tanks include tank specifications TC 331, TC 338, TC 341, TC 412 with design pressures greater than 15 psig, and TC 407 with design pressures greater than 35 psig, but exclude tanks manufactured of fibre reinforced plastics (frp). The TCRN is a unique number issued by Transport Canada to a highway tank manufacturer to indicate approval for a particular tank design. The new standard requires each manufacturer to obtain and display the appropriate TCRN on each pressure vessel highway tank.

The TCRN replaces the Canadian Registration Number (CRN) that was required under the previous edition of the CSA B620. Under the CRN program, a design review was required for each province or territory in which a pressure vessel of that design would operate. For a highway tank that frequently operates from coast to coast, this could mean as many as thirteen separate reviews of a single pressure vessel design. The TCRN design registration is intended to be a one stop approval recognized throughout Canada. It should greatly simplify and reduce the regulatory burden on both tank manufacturers and users, while continuing to promote public safety.

The new process will consist of five steps that a manufacturer must follow for the construction and certification of Highway Pressure Tanks to the requirements of CSA B620-98.

Five Steps for Manufacturers to Follow Before Constructing Highway Pressure Tanks

1 - B620-98 Facility Registration

A manufacturer must register with the TDG Directorate in accordance with B620-98. This could be a new registration, or an upgrade of a currently valid B620-87 registration. An upgrade from a B620-87 to a B620-98 registration often requires improvements to the facility's B620 quality control manual to include more complete procedures, documentation samples and revised inspection and test procedures and reports. Clause 9 and Appendix B of B620-98 describe the registration and quality control requirements.

2 - ASME Pressure Vessel Manufacturer Authorization

A condition of registration referred to in paragraph 1 above is that the manufacturer have a valid certificate of authorization from either ASME for the use of the U stamp, or from the applicable provincial pressure vessel authority for manufacture of ASME Section 8, Division 1 pressure vessels. Should provincial pressure vessel manufacturing authorization not be available to you as a highway

tank manufacturer in your province or territory, you should contact ASME directly for authorization as an ASME U stamp pressure vessel manufacturer.

3 - Highway Tank Design Package

A manufacturer must then prepare a complete design package for the highway tank design and its accessories. The design should include all drawings, calculations, and accessory specifications for the highway tank vehicle as prescribed in CSA B620, including vents, relief devices, bumpers, accident damage protection, piping, etc.

4 - Design Review by a Designated Agency

A manufacturer should then forward this design package to an agency designated by Transport Canada for the review of highway tank designs to the requirements of CSA B620 and the ASME Code. Contact the TDG Directorate at (613) 998-5270 for a list of designated agencies. You may select any agency you wish from the list. For a fee to be determined between the designated agency and the manufacturer, the designated agency will review the design and issue a report as to the compliance of the design with the requirements of CSA B620 and the ASME Code.

5 - Application for a TCRN

Finally, the manufacturer must apply to the TDG Directorate for a TCRN. The application for a TCRN must include the design review report from a designated agency. If the Director, Regulatory Affairs, is satisfied that the design complies with the applicable requirements, a TCRN will be issued to the manufacturer. The manufacturer must include this TCRN on the certificate of compliance and the name plate of every tank constructed to that design.

Please consult the B620-98 standard for all the details. A copy of the standard may be obtained by contacting the Canadian Standards Association at 1-800-463-6727. Other questions may be addressed to the Transport Dangerous Goods office in your region or by contacting the TDG Directorate in Ottawa at (613) 998-5270.

North American Inspectors' Championship

by Louis Trépanier

This event formerly known as "challenge" is held every year to recognize the contribution of roadside inspectors to the commercial safety program in North America. Inspectors representing provinces, states and territories across North America compete in three areas: 1) level I roadside inspections; 2) dangerous goods/highway tank inspections; and 3) motor coach inspections.

The theme for this year's championship, sponsored by the Commercial Vehicle Safety Alliance and the Louisiana State Police, was "Performance, Education and Uniformity". This year's event was held in New Orleans from August 7 to August 12. There were fifty-two inspectors participating in the competition, including representatives from four Canadian provinces; British Columbia, Alberta, Ontario and Québec.

Congratulations to all the participants. The grand champion for the event was Mr. David Abeita representing the state of New Mexico. Mr. Ed Marshall, representative from British Columbia, received the highest points for Canada.

More information on the championship can be found on the CVSA web site at:

http://www.cvsa.org/

Civil Aviation - Dangerous Goods Standards Division

by Roger Lessard

Who We Are

Each day, large quantities of dangerous goods are transported in Canada by air. To ensure the safe transport of these goods, government and industry work together to develop rules which encompass every element of their transport including their packaging, identification, and handling. These rules are called the *Transportation of Dangerous Goods Regulations* which adopt, by reference, the International Civil Aviation Organization *Technical Instructions for the Safe Transport of Dangerous Goods by Air*.

The government organization responsible for the administration and enforcement of these regulations is located within the Commercial and Business Aviation Branch of the Civil Aviation Directorate of Transport Canada. There are two components to the Civil Aviation Dangerous Goods organization.

The headquarters component, the Dangerous Goods Standards Division, is responsible for the provision of technical advice in the development and maintenance of regulations governing the transport of dangerous goods by air. The Division also develops and maintains the relevant standards, policies, guidelines, and public awareness programs.

The Regional component is responsible for:

- Auditing and inspecting air operators (domestic and foreign) at such sites as the ramp, passenger/baggage check-in, and acceptance locations.
- Auditing and inspecting shippers and freight forwarders who handle, offer for transport or transport dangerous goods by air.
- Conducting investigations of alleged air related violations of the *Transportation of Dangerous Goods Act, 1992* by domestic and foreign air operators, shippers, and freight forwarders. Implementing enforcement actions including, proceeding with prosecution action or detention of aircraft or dangerous goods in accordance with the provisions of the *Transportation of Dangerous Goods Act, 1992*.
- Reviewing and approving the Dangerous Goods Chapter of Air Operator's Operations Manuals and the Air Operator's Transportation of Dangerous Goods Training Programs.
- Conducting Public Awareness Activities.

As A Passenger, What Dangerous Goods Can I Carry on an Aircraft?

As a general rule, passengers are not authorized to transport dangerous goods on board an aircraft, however, there are exceptions. The following is a list of these exceptions:

- When in retail packagings, alcoholic beverages containing more than 24 per cent but not more than 70 per cent alcohol by volume, in receptacles not exceeding 5 L, with a total net quantity per person of 5 L for such beverages;

Note.—Alcoholic beverages containing not more than 24 per cent alcohol by volume are not subject to any restrictions.

- Non-radioactive medicinal or toilet articles (including aerosols). Also aerosols in Division 2.2, with no subsidiary risk, for sporting or home use in checked baggage only. The total net quantity of all such articles carried by each person must not exceed 2 kg or 2 L and the net quantity of each single article must not exceed 0.5 kg or 0.5 L. The term 'medicinal or toilet articles (including aerosols)'is intended to include such items as hair sprays, perfumes, colognes and medicines containing alcohols;
- Small carbon dioxide gas cylinders worn for the operation of mechanical limbs, also spare cylinders of a similar size if required to ensure an

adequate supply for the duration of the journey;

- As carry-on baggage, dry ice in quantities not exceeding 2 kg per person, when used to pack perishables that are not dangerous goods, provided the package allows the release of carbon dioxide gas;
- Safety matches or a lighter intended for use by an individual when carried on the person. However lighters containing unabsorbed liquid fuel (other than liquefied gas), lighter fuel and lighter refills are not permitted on one's person or in checked or carry-on baggage;

Note.—Strike anywhere matches are forbidden for air transport.

- Radioisotopic cardiac pacemakers or other devices, including those powered by lithium batteries, implanted into a person, or radio-pharmaceuticals contained within the body of a person as the result of medical treatment;
- Hair curlers containing hydrocarbon gas, no more than one per person, provided that the safety cover is securely fitted over the heating element. Gas refills for such curlers must not be carried;
- One small medical or clinical thermometer which contains mercury, for personal use, when in its protective case.

The following is also a list of exceptions to the general rule, but before you do carry the following dangerous goods on an aircraft, you need the approval of the air operator:

- Small gaseous oxygen or air cylinders required for medical use;
- As checked baggage only, securely boxed cartridges for sporting purposes, in Division 1.4S, in quantities not exceeding 5 kg gross mass per person for that person's own use, excluding ammunition with explosive or incendiary projectiles. Allowances for more than one person must not be combined into one or more packages;
- As checked baggage, dry ice in quantities not exceeding 2 kg per person, when used to pack perishables that are not dangerous goods, provided the package permits the release of carbon dioxide gas;
- As checked baggage only, wheelchairs or other battery-powered mobility aids with non-spillable batteries, provided that the battery is disconnected, the battery terminals are insulated to prevent accidental short circuits and the battery is securely attached to the wheelchair or mobility aid;
- As checked baggage only, wheelchairs or other battery-powered mobility aids with spillable batteries, provided that the wheelchair or mobility aid can be loaded, stowed, secured and unloaded always in an upright position and that the battery is disconnected, the battery terminals are insulated to prevent accidental short circuits and the battery is securely attached to the wheelchair or mobility aid. If the wheelchair or mobility aid cannot be loaded, stowed, secured and unloaded always in an upright position, the battery must be removed and the wheelchair or mobility aid may then be carried as checked baggage without restriction. The removed battery must be carried in strong, rigid packagings as follows:

  packagings must be leak tight, impervious to battery fluid and be protected against upset by securing to pallets or by securing them in cargo compartments using appropriate means of securement (other than by bracing with freight or baggage) such as by use of restraining straps, brackets or holders;

  batteries must be protected against short circuits, secured upright in these packagings and surrounded by compatible absorbent material sufficient to absorb their total liquid contents; and

  packagings must be marked 'Battery, wet, with wheelchair' or 'Battery, wet with mobility aid' and labelled with a 'Corrosive' label and with a package orientation label.

- As carry-on baggage only, a mercurial barometer or mercurial thermometer carried by a representative of a government weather bureau or similar official agency. The barometer or thermometer must be packed in a strong outer packaging, having a sealed inner liner or a bag of strong leak-proof and puncture-resistant material impervious to mercury, which will prevent the escape of mercury from the package irrespective of its position;
- No more than two small carbon dioxide cylinders per person fitted into a self-inflating life-jacket, plus no more than two spare cartridges;
- As carry-on baggage only, heat producing articles (i.e battery-operated equipment such as underwater torches and soldering equipment which, if accidentally activated, will generate extreme heat and can cause fire). The heat producing component, or the energy source, must be removed so as to prevent unintentional functioning during transport.

Is Camping Equipment Considered to be Dangerous Goods?

Equipment that contains a flammable substance, such as kerosene or propane, is classified as dangerous goods. The following table shows what camping equipment is authorized and what is prohibited on an aircraft.

Camping Equipment	Prohibited/Authorized Aboard an Aircraft
Propane, butane cylinders	Prohibited in checked or carry-on baggage
Flammable liquids (kerosene, white gas, naphthalene, diesel fuel, etc.)	Prohibited in checked or carry-on baggage
Lighting gel Solid fuel	Prohibited in checked or carry-on baggage
Equipment designed to contain a flammable liquid (stoves and canisters)	Prohibited in checked or carry-on baggage if containing dangerous goods Empty packagings that have contained a dangerous substance must be handled in the same manner as is required by the ICAO Technical Instructions for a package filled with that substance unless adequate measures have been taken to nullify any hazard. The equipment is authorized if the hazard has been nullified.
Equipment containing a flammable liquid (engines, internal combustion)	Prohibited in checked or carry-on baggage
Safety matches or a lighter	Authorized only when carried on the person. Strike anywhere matches are forbidden for air transport
Batteries, dry cells (Alkaline, Nickel Cadmium)	Authorized
Pepper spray (Aerosols (Oleoresin Capsicum)	Prohibited in checked or carry-on baggage

How to reach us:

Headquarters		613-991-3988
Atlantic Region	Paul Saulnier Superintendant	506-851-7247
Québec Region	Jocelyne Raymond Superintendant	514-633-2838
Ontario Region	Glen Varley Superintendant	416-952-0024
Prairie and Northern Region	Fred Cunningham Superintendant	780-495-5278
Pacific Region	Lynne Meinert Superintendant	604-666-5655
Web site address	http://www.tc.gc.ca/aviation/commerce/dgs/indexxe.htm	

ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air

The ICAO Dangerous Goods Council approved a delay in the implementation of the 2001 - 2002 Edition of the ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (TI's) from January 1, 2001 to July 1, 2001. Consequently, the existing 1999 - 2000 Edition of the TI's will remain in effect until June 30, 2001, and the 2001 - 2002 Edition will become effective on July 1st, 2001. In the interim, an Addendum for essential safety-related items to the 1999 - 2000 Edition may be published.

TDG

CANUTEC

June 1, 2000 to September 30, 2000

Number of Calls

Technical	3,593
Regulatory	1,287
Information	3,396
Other	2,416
Total	**10,692**
Emergency Calls	**362**

Source of Emergency Calls

Fire Dept.	100
Police Dept.	29
Hazmat Contractor	6
Carrier	132
End User	33
Manufacturer	3
Government	31
Private Citizen	8
ER Centre	4
Poison Control	5
Medical	6
Others	5

Emergency Calls by Class of Dangerous Goods

Class 1 - Explosives	6
Class 2 - Compressed Gas	83
Class 3 - Flammable Liquids	82
Class 4 - Flammable Solids	10
Class 5 - Oxidizers and Organic Peroxides	28
Class 6 - Poisonous and Infectious Substances	32
Class 7 - Radioactives	4
Class 8 - Corrosives	119
Class 9 - Miscellaneous	148
NR - Non-regulated	52
Mixed Load -	2
Unknown -	13

Emergency Calls by Province/Country

British Columbia	48
Alberta	31
Saskatchewan	13
Manitoba	22
Ontario	134
Québec	74
New-Brunswick	8
Nova Scotia	12
Prince Edward Island	0
Newfoundland	6
Northwest Territories	1
Yukon	0
United States	11
International	1

Emergency Calls by Transport Mode

Road	92
Rail	93
Air	7
Marine	5
Pipeline	0
Non transport	165
Multi modal	0

Refrigerants and Ozone-depleting Substances

by Denis Carrière

CANUTEC routinely receives telephone calls concerning gas leaks from refrigeration units. These units were initially manufactured with Freon® (chlorofluorocarbons or CFCs) as refrigerants. The more recent units however do not contain any Freon® even though most people believe that they still do. This article will outline general information on refrigerant gases and will highlight the dangers they can cause.

In the past, food could not be kept for long periods of time. With the arrival of refrigeration near the turn of the century, the possibility of keeping food for longer periods helped to fuel the industrial revolution. Initially, ice was used to store food but it melted and needed to be replaced periodically. As science progressed, better methods of refrigeration were developed based on the property that gases which expand will also, as a result, lower their temperature. Some gases have a higher heat capacity than others (can absorb more heat and so are more efficient) but the gases used initially had some disadvantages. Ammonia and sulfur dioxide enjoyed early use but both gases are highly toxic and corrosive. Extremely flammable hydrocarbon gases such as propane were also used but proved dangerous because of the poor quality of the sealing gaskets which allowed occasional gas leaks. What was needed was a non-flammable, non-toxic and non-corrosive gas.

In 1929, chlorofluorocarbons [trichlorofluoromethane (CCl_3F) and dichlorodifluoromethane (CCl_2F_2)] were discovered (R-11 and R-12 respectively). These gases are non-toxic, non-flammable and non-corrosive. They have very high chemical and thermal stability. An added advantage was that they had very good heat transfer capabilities which meant they were excellent refrigerants or cooling agents. (For the purpose of this article, "refrigerant gas" refers only to halogenated [*fluorine, chlorine, bromine and iodine*] hydrocarbons). It was now possible to manufacture refrigeration units small enough for household use. From that moment, the refrigeration industry boomed. More chlorofluorocarbons were discovered. They proved to be good for many uses where toxicity, flammability or corrosivity was an issue. They were used as degreasing agents, foaming agents for plastics and in metered dose inhalers (small inhaler pumps) for asthma sufferers. The propellant gas inside the inhalers is still a CFC namely because of its high efficiency and low toxicity. (This is one of the few uses where CFCs are still allowed). Derivatives called "Halons" (bromofluorocarbons) were also developed as good fire extinguishing agents.

In the late 1970's, scientists discovered excessive radiation readings in the upper atmosphere of the Antarctic. It seemed that the ozone layer was thinning. As we now know, CFCs were found to be contributing to the depletion of the ozone layer. In the 1980's, control measures were established. The *1987 Montreal Protocol on Substances that Deplete the Ozone Layer* was signed and established international agreements on the elimination of certain ozone-depleting substances including CFCs and their replacements with alternatives. Everyone remembers the foam containers previously used in the fast food industry. They were eliminated in the early 1980's because the foaming agents used were CFCs.

When CFCs are released, they drift up into the stratosphere where they are broken down by ultraviolet (UV) radiation. It is the chlorine atom that is cleaved off the molecule by ultraviolet light that destroys the ozone. A single atom of chlorine can destroy more than 100,000 molecules of ozone. Ozone depletion stops only when the chlorine atom randomly reacts with another molecule (other than ozone) to produce a stable substance. At that point, the chlorine atom is no longer free to react with ozone.

The normal process of ozone formation occurs when oxygen is irradiated by UV light.

$$O_2 + \text{UV light} \rightarrow 2O$$

oxygen molecule — 2 oxygen atoms

$$O_2 + O \rightarrow O_3 \text{ (ozone)}$$

However, when CFCs are irradiated with UV light, they produce chlorine radicals which act as a catalyst for ozone destruction.

$$CCl_3F + UV\ light \rightarrow CCl_2F + Cl\ radical$$

$$Cl\ radical + O_3 \rightarrow ClO + O_2$$

$$ClO + O \rightarrow Cl\ radical + O_2$$

After reacting with ozone, the chlorine radical is still present and unchanged and can destroy many ozone molecules before reacting with something to produce a stable product.

Interim products, such as hydrochlorofluorocarbons (HCFCs), were developed to replace CFCs. Their ozone depleting potential is much lower (compare CFC-12 = 1.0 vs. HCFC-22 = 0.055). They were developed as an interim solution until non ozone-depleting substances could be found. The regulations now prescribe their gradual elimination. The new alternatives are hydrofluorocarbons (HFCs). Since they do not contain chlorine, they do not affect the ozone layer. The HFCs are not as efficient as HCFCs but they are still good cooling agents or refrigerants (neither one is as efficient as CFCs). Unfortunately, the HFCs have one disadvantage. These gases have a substantial global warming effect (greenhouse effect) which cannot be overlooked. Another problem with HFCs is that during the manufacturing process, highly toxic dioxins are produced. Because of this, HFCs may have to be regulated by environmental guidelines. Currently, most home air conditioning units operate on R-22 (HCFC-22) (UN1018) or mixtures that contain R-22. It is still widely available and is more efficient than HFCs, therefore capable of producing smaller units. The air conditioning in cars is mostly R-134a (HFC-134a) (UN3159).

Ozone-depleting substances are regulated under the *Canadian Environmental Protection Act, 1999* and the *Ozone-depleting Substances Regulations, 1998* (amended and revised periodically).

For your information, the following table provides some refrigerants currently used (pure or in mixtures) relating to the *Transportation of Dangerous Goods Regulations*. Many of the mixtures are shipped under UN3163, Liquefied Gas, n.o.s.

Refrigerants	Substances	Name	Formula	UN/NA #	CAS #	Flammable
R-11	CFC-11	trichlorofluoromethane	CCl_3F	NR*	75-69-4	no
R-12	CFC-12	dichlorodifluoromethane	CCl_2F_2	1028	75-71-8	no
R-22	HCFC-22	chlorodifluoromethane	$CHClF_2$	1018	75-45-6	no
R-123	HCFC-123	2,2-dichloro-1,1,1-trifluoroethane	$C_2HCl_2F_3$	NR*	306-83-2	no
R-124	HCFC-124	chlorotetrafluoroethane	C_2HClF_4	1021	63938-10-3	no
R-125	HFC-125	1,1,1,2,2-pentafluoroethane	CHF_2-CF_3	3220	354-33-6	no
R-134a	HFC-134a	1,1,1,2-tetrafluoroethane	CF_3-CH_2F	3159	811-97-2	no
R-141b	HCFC-141b	1,1-dichloro-1-fluoroethane	CCl_2F-CH_3	9274	1717-00-6	no
R-142b	HCFC-142b	1-chloro-1,1-difluoroethane	$CClF_2$-CH_3	2517	75-68-3	yes
R-143a	HFC-143a	1,1,1-trifluoroethane	CF_3-CH_3	2035	420-46-2	yes
R-152a	HFC-152a	1,1-difluoroethane	CHF_2-CH_3	1030	75-37-6	yes

* NR = Not regulated

In the past, one of the big manufacturers of CFCs was DuPont. Their products were licensed under the trademark Freon®. Many people grew up with the word "Freon®" and it is still used often when referring to "refrigerant gases". Freon® was used almost exclusively for CFCs but people still refer to refrigerant gases as Freon®. Most of the refrigerants now in use are registered under different trade names, depending which company sells them. For example, DuPont labels their products under the trade name "Suva®"; Allied Signal labels their products "Genetron®". The refrigerant gases that are now sold for air conditioning and refrigeration are mostly HCFCs or HFCs or mixtures of the two, but not CFCs.

Today, there is a misconception on refrigerant gases and it can be a dangerous one. In the past, a CFC gas leak meant a non-toxic and non-flammable gas but with the new products on the market, that is a dangerous assumption. Most of the new gases are still non-toxic (or relatively non-toxic) and non-flammable, but some gases are actually flammable. Two examples are the R-143a (UN2035) and the R-152a (UN1030). They are now mainly used in aerosols as propellants, but are also found in some refrigerant mixtures. Hydrocarbons are used more frequently as refrigerants because of the improved sealing on modern devices. There are also other options to halons which are non-flammable and are being sold as fire suppression agents. Two of these products are HFC-227ea (FM-200) and the latest one, HFC-236fa.

Another dangerous assumption is using R-12a as a replacement for R-12. The substance R-12a is a mixture of hydrocarbons, which includes propane. This replacement is highly flammable. Its use is prohibited in the U.S. by the *Environmental Protection Agency* (EPA). This product is not regulated in Canada because these gases (hydrocarbons) are not regulated by Environment Canada (not toxic to human health or to the environment), and no other Canadian regulation covers its use as a refrigerant in motor vehicles. New alternatives are being developed which will focus on minimal environmental impact.

Refrigerant gases, whether they be CFCs, HCFCs or HFCs, are all heavier than air, therefore will settle in low lying areas (basements). These gases are non-toxic but the main danger is that they displace oxygen, hence they act as asphyxiants. However, it is somewhat more difficult to determine the flammability hazard of a refrigerant if we do not know what the leaking substance is. Refrigeration equipment today contains mixtures of various refrigerant gases. These mixtures are often referred to by their trade names or the R-400 series (e.g. R-401, R-402, etc.) or R-500 series. Some of the mixtures are more efficient that any one pure gas. Others are just cheaper than using one pure gas. Therefore, when in doubt, the room where the leak is occurring should be well ventilated.

The dangers of a refrigerant gas leak and the appropriate response should follow certain guidelines. Refrigerant gases have a very weak smell (which is described as slightly sweet) or they have no smell at all. These gases are non toxic but they can be dangerous because they will displace the surrounding air and may create an oxygen deficient atmosphere. The symptoms of exposure include dizziness, lack of coordination similar to being drunk and even unconsciousness. Any victim should be removed to fresh air and administered oxygen by a qualified person. Any responders to these types of incidents should be aware of the dangers of oxygen deficient atmospheres and respiratory equipment or SCBA should be worn at all times with standard clothing. Another danger is the leak itself. The escaping gas will be very cold. Persons in contact with the gas could get severe frostbite. Contact of the skin with the liquid can also cause defatting (removal of the natural oils from the body) and cause dryness and cracking of the skin. Any clothing or equipment that comes in contact can be easily decontaminated by airing to outside air. Any enclosed space in which there is a leak should be well ventilated to the outside air using positive pressure ventilation.

This article will provide suggestions and should not be applied as absolute guidelines. If you have questions, please refer to the appropriate authorities.

For more information on the ozone layer and the ozone-depleting substances, you may visit the following web site:

http://www.ec.gc.ca/ozone/

Truck Study on Transportation of Dangerous Goods – Summer 2000

by Sari Markel, Jennifer Sully and Dawn Phillips

Many trucks are able to carry, or have carried, a dangerous goods product but do not necessarily do so with every shipment. How often do transport trucks transport dangerous goods and of these dangerous goods, which ones are most often shipped?

A tank truck, when carrying a dangerous goods product, must clearly display on the ends and sides of its tank a four-digit identification number indicating the materials being shipped on either a diamond-shaped placard or on an adjacent orange panel.

A non-tank truck must also display a placard and an identification number when its load exceeds a specific quantity of dangerous goods. However, at times, a placard without an identification number is sufficient.

To answer the question of what percentage of trucks carry dangerous goods, fieldwork was necessary. As Highway 401 runs through Kingston, and there is an exit in Kingston at which there is an overpass as well as a small valley, Kingston seemed like an ideal location at which to view passing trucks.

A tally was made, noting every transport truck that passed, whether it displayed a placard holder, and if a placard was contained in the placard holder (please refer to Table 1). The numbers reached from each of the three trials (on June 27, on July 27, and on August 29, 2000), taken at approximately the same time of day, during the early afternoon, were very similar. Over two hundred trucks were seen driving on Highway 401 per hour. Approximately 5% of the trucks displayed placards, and hence carried a dangerous goods product. Furthermore, approximately 42% of the trucks displayed a placard holder with no placard.

As the placard and identification numbers of applicable trucks were recorded, it became obvious that among the thousands of dangerous goods products certain ones were more commonly transported at this site. Gasoline or Motor Spirit (UN 1203), Liquefied Petroleum Gases (UN 1075), and Hypochlorite Solutions (UN 1791) are among the most common products being shipped past our observation point during the

three trial periods (refer to Table 2).

In addition to recording each truck as it drove by, and registering its placard identification number, if applicable, pictures were taken to keep a record of the various types of transport trucks. A compilation of these pictures and their classification (according to a report prepared by Transport Canada Motor Carrier Policy, "Operating Costs of Trucks in Canada - 1998") can be obtained by writing to the Editor of the Newsletter.

As mentioned above, many trucks displayed placard holders but no placard. Do certain manufacturers, when producing new trucks, standardize the procedure of placing placard holders on the truck? Or, can one conclude that trucks that have placard holders have shipped dangerous goods at one time? Although the latter seems like a logical assumption, it is inconclusive.

Considering the low percentages of dangerous goods that were shipped during each of the three trial periods (we expected 10% but obtained from 3% to 7%) one may wonder if these numbers are representative of all times throughout the day or if these numbers simply reflect the standard daytime transport at this site. Although the data achieved during each trial was comparable, it would be necessary to carry out further investigations, perhaps at different times throughout the day, in order to draw precise conclusions from the fieldwork performed for this site.

TABLE 1

Date	Total Trucks	Trucks with a Placard	Trucks with Placard Holder	Direction	Time
6/27/00	344	24 (7%)	135 (39%)	West to East	1:00-3:00 pm
7/27/00	496	21 (4%)	216 (44%)	West to East	2:20 - 4:20 pm
7/27/00	400	20 (5%)	163 (41%)	East to West	2:20 - 4:20 pm
8/29/00	510	36 (7%)	233 (46%)	West to East	2:30 - 4:30 pm
8/29/00	565	17 (3%)	220 (39%)	East to West	2:30 - 4:30 pm

TABLE 2

Dangerous Goods Shipments Recorded

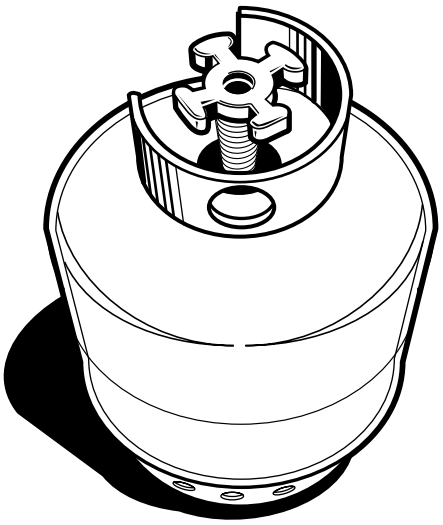
June 27, 2000		**West to East**
UN 1075 x 2	Class 2.1	Liquefied Petroleum Gases
UN 1203 x 3	Class 3	Gasoline or Motor Spirit or Petrol
UN 1593	Class 6.1	Dichloromethane
UN 1789	Class 8	Hydrochloric acid
UN 1791 x 2	Class 8	Bleach, household or Hypochlorite Solutions
UN 1966	Class 2.1	Hydrogen, refrigerated liquid
UN 2922	Class 8	Corrosive liquid, Toxic, n.o.s.
UN 3077	Class 9	Environmentally Hazardous Substances, Toxic, n.o.s.
UN 3267	Class 8	Corrosive liquid, basic, organic, n.o.s.
x 2		DANGER
1/2 black, 1/2 white	Class 8	Corrosive
Orange	Class 1	Explosives
Green	Class 2	Non-flammable gas
Yellow	Class 2	Oxygen

July 27, 2000		**West to East**
UN 1203 x 4	Class 3	Gasoline or Motor Spirit or Petrol
UN 1983	Class 2.2	Refrigerant Gas R 133a
UN 1824	Class 8	Sodium Hydroxide, Solution
UN 1987	Class 3	Alcohols, n.o.s.
UN 2014	Class 5.1	Hydrogen Peroxide, Aqueous Solution
x 1		DANGER
Red x 7	Class 2 or 3	Flammable
White x 4	Class 2 or 6	
1/2 black, 1/2 white	Class 8	Corrosive
July 27, 2000		**East to West**
UN 1203 x 5	Class 3	Gasoline or Motor Spirit or Petrol
UN 1075 x 2	Class 2.1	Liquefied Petroleum Gases
UN 1789	Class 8	Hydrochloric Acid
UN 2055	Class 3	Styrene Monomer, Inhibited
UN 2014	Class 5.1	Hydrogen Peroxide, Aqueous Solution
UN 3082	Class 9.2	Environmentally Hazardous Substances, Liquid, n.o.s.
UN 1202	Class 3	Heating Oil, Light
UN 2784	Class 3	Organophosphorous Pesticides, Liquid, Flammable, Toxic, n.o.s.
x 2		DANGER
	Class 8	Corrosive
Red x 4	Class 2 or 3	Flammable
August 29, 2000		**West to East**
UN 1203 x 5	Class 3	Gasoline or Motor Spirit or Petrol
UN 1075 x 4	Class 2.1	Liquefied Petroleum Gases
UN 1202	Class 3	Heating Oil, Light
UN 1866	Class 3	Resin Solution, flammable
UN 2055	Class 3	Styrene Monomer, Inhibited
UN 1760 x 2	Class 8	Corrosive liquids, n.o.s.
x 7		DANGER
Black / white x 4	Class 8	Corrosive
Yellow	Class 5	Oxidizer
Red / White x 2	Class 4	Combustible
August 29, 2000		**East to West**
UN 1203 x 4	Class 3	Gasoline or Motor Spirit or Petrol
UN 1075 x 2	Class 2.1	Liquefied Petroleum Gases
UN 2205	Class 6	Adiponitrile
UN 1791	Class 8	Hypochlorite Solutions
UN 1255	Class 3	Naphtha, petroleum
UN 3032	Class 4.1	Self-reactive substances, samples, n.o.s.
x 2		DANGER
Black / White x 2	Class 8	Corrosive
Green	Class 2	Non-flammable gas
Yellow	Class 5	Oxidizer
White	Class 2 or 6	

Requalification of Propane or LPG Cylinders By External Visual Inspection

by Doug Weese

Transport Canada safety standard CAN/CSA-B339 allows refillable propane or LPG cylinder to be requalified by the external visual inspection method. Any facility wishing to visually requalify cylinders must be registered with Transport Canada. Registration is only required for facilities that visually requalify cylinders and is not required for facilities that are filling propane or LPG cylinders.



To register, one must complete an application form entitled "*Application For Registration as a Requalifier of Cylinders for LPG and Propane Services by External Visual Inspection Pursuant to CAN/CSA-B339*" and send it to the address given on the application form. On the application form, you must supply the actual physical site address where the cylinders will be requalified.

If acceptable, Transport Canada will issue a certificate of registration to the applicant with a unique registration mark and an expiry date that is five years from the date of issue. It is recommended that you reapply to Transport Canada six months in advance of your expiration date, if you wish to continue requalifying cylinders after the expiration date.

The application forms are available on the TDG web site (www.tc.gc.ca/tdg/info/moc/cylinder/pappl_e.htm) or from Transport Canada regional offices.

Anyone who will be requalifying cylinders or taking any part in the requalification process must have followed a PGAC (Propane Gas Association of Canada) 100-4 "Propane Cylinder Inspection Course" within the last 3 years. At the requalification site, you must have your "Propane Cylinder Inspection Course" certificate, training workbook and copies of the relevant standards (section 24 of CAN/CSA-B339 and Compressed Gas Association (CGA) pamphlets C-6 and C-6.3). You must follow the inspection procedure that you indicated in your application such as the procedure described in your "Propane Cylinder Inspection Course" workbook, including having on hand all required inspection tools and equipment. Test records of the requalification must be filled out completely. These test records must be kept for ten years. Successfully requalified cylinders will be marked as follows:

XX YYY ZZ E

where **XX** is the month of requalification
(*you must show both digits)

YYY is the requalifier's registration mark

ZZ is the year of requalification

and **E** is used to denote visual inspection.

The stamping must be legible and permanent. The date marked on the cylinder must be the actual date of requalification and not some future date.