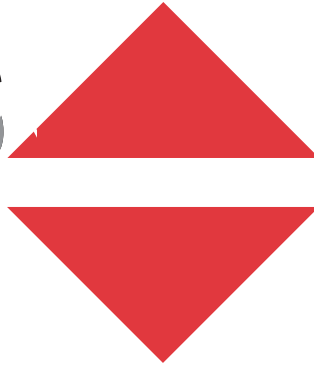




# Dangerous Goods



# Newsletter

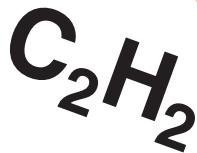
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Canada 



# SEGREGATION



Transport  
Canada  
**Safety and Security**  
Dangerous  
Goods

Transports  
Canada  
**Sécurité et sûreté**  
Marchandises  
dangereuses



Agreement Number 1529021

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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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## Editorial

Welcome to the Spring-Summer 2000 Edition of this newsletter.

I hope you will enjoy reading the articles we have included in this issue. The feature article on page 4 covers the segregation of chemical substances and explains why it is important to separate different classes of dangerous goods. Table 1 on page 5 gives examples of dangerous goods reactions.

As you probably know, the Director General, Dr. John A. Read and senior officials in TDG are working diligently to finalize the document on clear language regulations. We have received over 100 written submissions following the publication in Part 1 of the *Canada Gazette* and we hope to submit the final version of the document to the Department of Justice by the end of June 2000. We will keep you informed of our progress.

As always, your comments and suggestions are welcome. Enjoy your reading and the summer months!

*Renée Major*

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## Registration With CANUTEC for the Use of their 24-Hour Emergency Telephone Number

by Michel Cloutier

### Why Register?

In Part IV of the *Transportation of Dangerous Goods Regulations* (TDGR), Paragraph 4.8 (1)(L) requires consignors or manufacturers of dangerous goods to display a 24-hour emergency telephone number on their shipping documents. The TDGR provides consignors or manufacturers the option of displaying their own 24-hour telephone number or, should they wish, CANUTEC's emergency telephone number. However, to use CANUTEC's number they must register and receive written agreement from CANUTEC.

The purpose of registering is to ensure CANUTEC has information on the products likely to be involved so that, if asked, CANUTEC would be able to provide the correct information. It would help no-one if CANUTEC's phone number appeared for a product which was unknown to CANUTEC.

CANUTEC is the Canadian Transport Emergency Centre operated by Transport Canada to assist emergency response personnel in handling dangerous goods emergencies. This national bilingual advisory centre was established in 1979 and is part of the Transport Dangerous Goods Directorate within Transport Canada. The Directorate's overall mandate is to regulate the safe handling, offering for transport and transporting of dangerous goods by all modes. CANUTEC is one of the major safety programs that Transport Canada delivers to promote the safe movement of dangerous goods throughout Canada.

CANUTEC has established a scientific data bank on chemicals manufactured, stored and transported in Canada and is staffed by professional scientists specialized in emergency response and experienced in interpreting technical information and providing advice.

The use of CANUTEC's emergency telephone number is a service provided by Transport Canada at no cost.

### How to Register?

In order to register, the required form "Request to Use CANUTEC's Emergency Telephone Number" (MS Word 6.0 document available at the following web address: <http://www.tc.gc.ca/canutec/en/regist/registre.htm>) can be downloaded from the web site. It must then be printed, completed and returned by mail along with the additional information specified in the registration form. Upon receipt of the required information, CANUTEC will forward a written confirmation granting permission to use its emergency telephone number. We suggest this document be retained in your files as it is could be requested during routine inspections by Transport Canada Inspectors.

For additional details please contact Kristen Steel at [steelk@tc.gc.ca](mailto:steelk@tc.gc.ca).

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# FEATURE

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## Segregation of Chemical Substances

by Michel Cloutier

As of May 12, 2000, the number of distinct substances registered with the Chemical Abstract Service of the United States reached 23,689,719. It is important to note that many of these chemicals are produced for research and development purposes and only exist in small quantities, mostly developed and stored in laboratories. There are only a few thousand chemicals commonly used industrially and transported daily throughout the world. These chemicals are the core or foundation of the chemical world we know today. The more commonly known chemicals include substances such as sulphuric acid, hydrochloric acid, toluene, sodium hydroxide, xylenes and phosphoric acid.

The United Nations "*Recommendations on the Transport of Dangerous Goods*" has established a classification system to group, into nine individual classes, those chemicals that exhibit similar hazards. This system of classification significantly simplifies the identification of chemicals by their class number; for example class 3 represents all flammable liquids. Particular hazards can be effectively transmitted to emergency responders by the use of a placarding and labelling system which reflects the nine hazard classes. International Regulations (e.g. International Civil Aviation Organization *Technical Instructions, International Maritime Dangerous Goods Code*) as well as National Regulations (e.g. *Code of Federal Regulations* Title 49 for the United States, *Transportation of Dangerous Goods Regulations* for Canada) are then developed based on the United Nations Model Regulations. It is important to note that every set of regulations uses segregation principles and that these differ slightly from one transportation mode to another. Therefore, it is important that they be consulted prior to offering dangerous goods for transport.

The purpose of this article is not to describe the segregation requirements in the individual national or international regulations, but rather to raise awareness

about the need and importance of segregating different classes of dangerous goods.

Segregating incompatible chemicals is essential for the simple reason that some combinations result in the creation of uncontrollable reactions that may lead to catastrophic situations. The definition of the term "segregate" found in the 9<sup>th</sup> edition of the *Concise Oxford Dictionary* states: "segregate: put apart from the rest; isolate". Please remember that segregation can be applied to both the means of containment (MOC) and the means of transport (MOT). Generally speaking, segregation applies to packages as well as to transport vehicles. The intention is that: 1) incompatible substances must not be combined in the same packaging, 2) packages containing substances that are incompatible must sometimes be isolated from each other within the same means of transport, and 3) at other times, packages containing substances that are incompatible must not be shipped within the same means of transport.

Note that in its normal usage, segregation does not refer to keeping A away from B because an accident with A may cause a release of B; for example, when A is an explosive. The normal usage of segregation is to keep incompatible substances separate from each other should they be released.

There are many possible chemical reactions and they generally include one or more of the following: (see Table 1 for typical types of reactions)

- Combustion and/or evolution of considerable heat;
- Evolution of flammable, toxic or asphyxiant gases;
- Formation of corrosive substances;
- Formation of unstable substances;
- Neutralization with evolution of corrosive mists and considerable heat; and
- Polymerization with evolution of heat, increase in volume and potential rupture of container.

## Table 1: Examples of Dangerous Goods Reactions

Type of Reaction	General Reaction	Typical Example	Anticipated Effects
Neutralization Class 8 (acid) + 8 (base)	Acid + base = salts + water + release of considerable heat	HCl (hydrochloric acid) + NaOH (sodium hydroxide) = NaCl (sodium chloride/table salt) + H <sub>2</sub> O (water) + heat	Generation of corrosive vapours due to the release of considerable heat. The mixture of two Class 8 corrosive substances can produce a very violent reaction. Acids should never be mixed with bases.
Release of flammable gases Class 4.3 + water	Water reactive substances + H <sub>2</sub> O = flammable gas + residue + heat	CaC <sub>2</sub> (calcium carbide, solid) + 2 H <sub>2</sub> O (water) = C <sub>2</sub> H <sub>2</sub> (acetylene, gas) + Ca(OH) <sub>2</sub> (calcium hydroxide, solid) + heat	On contact with water, forms acetylene, a flammable gas, with generation of a corrosive substance. Possibility of fire and explosion.
Release of toxic and flammable gases Class 6.1 + 8 (acid)	Cyanides + acid = toxic and flammable gases	NaCN (sodium cyanide, solid) + HCl (hydrochloric acid) = NaCl (sodium chloride, solid) + HCN (hydrogen cyanide, gas)	Cyanides should never be mixed with acids because the reaction produces hydrogen cyanide, a highly toxic, flammable gas. Possibility of fire and explosion.
Release of toxic and corrosive gases Class 8 + water	Water-sensitive substances + H <sub>2</sub> O = toxic gas + residue + heat	4 POBr <sub>3</sub> (phosphorus oxybromide, solid) + 12 H <sub>2</sub> O = 12 HBr (hydrogen bromide (gaseous)) + 4 H <sub>3</sub> PO <sub>4</sub> + heat	This reaction releases hydrogen bromide, a toxic, corrosive gas. The mixture of hydrogen bromide with water produces a corrosive substance, hydrobromic acid in solution. A phosphoric acid residue is also formed and a large amount of heat is released.
Oxidation and combustion Class 3 + Class 5.1	Flammable liquid + oxidizing substance = explosion/fire and dense, toxic smoke	Hexanol (C <sub>6</sub> H <sub>13</sub> OH, liquid) + H <sub>2</sub> O <sub>2</sub> (concentrated hydrogen peroxide, liquid) = explosion/fire, release of CO <sub>2</sub> , + CO and soot.	This reaction causes fire and can even cause an explosion due to the formation of explosive vapours. Combustion will produce carbon dioxide and carbon monoxide (toxic) as well as a large quantity of soot.
Oxidation and combustion Organic substance + class 5.1	Organic substance + oxidizing substance = fire and dense, toxic smoke	Grease, oil, sawdust, solid flammable (class 4.1) + Ca(OCl) <sub>2</sub> (calcium hypochlorite) = fire + release of CO <sub>2</sub> + CO + Cl <sub>2</sub>	This reaction causes fire. Combustion will produce carbon dioxide, carbon monoxide (toxic), chlorine gas and a large quantity of soot.
Polymerizable substance + contaminant	Monomer + contaminant = polymer + heat + increased pressure and volume if confined	Ethylene (CH <sub>2</sub> =CH <sub>2</sub> ) + (free radical) = Polyethylene (...-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -...)	An uncontrolled or confined reaction can cause a violent explosion due to the increase in pressure in the container.

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# REGIONS

## Ontario Region's Rail Safety Congress

by Jean-Stéfane Bergeron

On Wednesday, February 23, 2000 another groundbreaking initiative for Transport Canada's Ontario Region and the railway industry was witnessed. The Railway Association of Canada and Transport Canada's Ontario Region jointly hosted in Toronto the first Rail Safety Congress.

The Rail Safety Congress was organized as part of Transport Canada's continuing efforts to foster partnerships with the railways operating in Ontario. Driven by the belief that through honest and open dialogue, quality relationships and collaborative efforts with each railway, Transport Canada is able to enhance safer rail transportation systems in a more effective, efficient, and timely manner.

The Congress was not just another way for Transport Canada to meet with the various railway representatives to discuss and share information about rail safety, as they have already been working closely on an individual basis. Nearly one hundred representatives from well over thirty companies from Ontario, other Canadian provinces and the United States along with representatives from three levels of government were in attendance. The Rail Safety Congress offered everyone in attendance a full day of current information regarding what's new, what's hot, and what are the challenges and possible solutions for the future. It also provided an exceptional opportunity to meet colleagues from industry and government alike and get reacquainted with old friends. No one appeared to be disappointed!

Presentations were given on a variety of topics by a distinguished group of speakers. Opening remarks were made by Mr. Terry Gibson, Director General of the Ontario Region and by Ms. Linda Hoffman, Surface

Regional Director. Mr. Terry Burtch, Director General, Railway Safety Directorate gave an overview of the changes to the *Railway Safety Act* and Mr. Edgar Ladouceur, Director, Compliance and Response Branch, Transportation of Dangerous Goods Directorate reviewed the proposed changes to the *Transportation of Dangerous Goods Regulations*. Mr. Mike Lowenger, Vice-President of the Railway Association of Canada followed with a discussion on the association's initiatives and services, including the new "Dangerous Goods" program.

Mr. Lowenger was also the moderator of a panel of representatives from five major railways in Ontario. The panel members included representatives from the St. Lawrence and Hudson Railway, CN Rail, VIA Rail along with representatives from the short-line railways Toronto Terminal Railway, Cando and Rail America. The panel discussion focused on the safety trends and best practices in each of their organizations.



From left to right: Terry Gibson, Linda Hoffman, Terry Burtch, Mike Lowenger and Edgar Ladouceur.

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The afternoon sessions were also informative. The management team of Transport Canada's Ontario Region Surface Group discussed recent safety trends and future challenges. The presentation focused on "Direction 2006", a collaborative community initiative between Transport Canada and the Railway Association of Canada whose objective is to reduce rail grade crossing accidents. A discussion followed on the new Safety Management System introduced in the revised Railway Safety Act. The day concluded with a question and answer period which led to more informative discussions.

Each participant received an information kit as well as a list of all the delegates, the participants' feedback and the speakers' notes. Judging from the comments received, the first joint Ontario Rail Safety Congress was a resounding success. We would like to take this opportunity to thank everyone who attended and for their contribution in making it a positive and productive experience.

See you again next year!

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## Back on Track

*by Dale Hicks*

The Eastern Compliance Working Group (ECWG) for the transportation of dangerous goods successfully reactivated their mandate by holding their first meeting in approximately 10 years on March 14, 2000 in Moncton, New Brunswick. The primary focus for this meeting was to have all the participants meet face-to-face and exchange information and preliminary views on outstanding issues.

Membership of the ECWG includes representation from the provincial governments of all four Atlantic provinces, Transport Canada regional inspectors as well as Transport Canada officials at Headquarters.

Mr. Dale Hicks, acting Regional Director of Surface for the Atlantic Region, believes the resurgence of the Eastern Compliance Group is a critical factor in Transport Canada's partnering initiative in the region. In today's regulatory environment, success depends on fostering partnerships with other government groups and agencies. The rebirth of this federal – provincial compliance group is definitely a step towards achieving success in the overall transportation of dangerous goods program here in Atlantic Canada.

The Transport Canada Dangerous Goods Manager will sit as a permanent co-chair, while the other co-chair will rotate between the four Atlantic Provinces representatives. Mr. Wilfred MacDonald,

Highway Safety Coordinator, Prince Edward Island Transportation and Public Works will co-chair the ECWG for a term of two years. One of the ECWG's objectives is to identify common problematic areas in jurisdictional compliance programs, and where conflict exists relative to legislation, make recommendations for change through the Federal/Provincial Task Force to the Canadian Council of Motor Transport Administrators (CCMTA) standing committee on the transportation of dangerous goods.

On the importance of the work of this committee, Mr. Edgar Ladouceur, Director, Compliance and Response Branch, TDG Directorate in Ottawa stated: "Proactive communication with the enforcement community at the provincial level is important to the overall success of the National TDG Program. The ECWG fills a void in this area and we should continue to support and encourage its activities." Mr. Ladouceur added: "I look forward to the Group's next meeting this coming Fall to pick up on the very positive thrust coming out of the last meeting."

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# UN Packaging by 2003!

by Dave Westman

The proposed Clear Language Regulations, published for comment last year, include a number of new initiatives. The most significant, from a packaging perspective, is a proposal to introduce the mandatory use of United Nations (UN) packaging for domestic transportation of dangerous goods, beginning in 2003 (section 5.6 of the proposed amendment). The current regulations do not require the use of specified packaging for small containers (< 454L) for the transportation of most classes of dangerous goods unless they are shipped by air.

Needless to say, this change will raise a few questions among shippers of dangerous goods: What is UN packaging? Will UN packaging be required for every shipment? Where can I obtain UN packaging? What should I do to prepare?

## What is UN Packaging?

A UN packaging is any bag, box, barrel, drum or jerrican that is marked to indicate that it has met specific performance tests, developed by the United Nations Committee of Experts on the Transport of Dangerous Goods. The tests relate to the container's ability to withstand transportation conditions: impact, stacking and internal pressure. The Committee has assigned all dangerous goods to one of three Packing Groups: PG I (high danger), PG II (medium danger) and PG III (low danger). The severity of the tests varies according to the Packing Group. Each packaging is marked with a code that indicates the type of packaging and the Packing Group, form (liquid or solid), gross weight or relative density, etc. for which the packaging was tested by the manufacturer and can, therefore, be used.

The requirements for the testing, marking and use of UN packaging are found in standard CAN/CGSB 43.150-97 "Performance Packagings for Transportation of Dangerous Goods". The "Users' Guide to UN Packaging", available on the TDG web site, is a handy guide to this standard.

## Will UN Packaging be Required for Every Shipment?

Some shipments of dangerous goods by road, rail and domestic marine transport will not require UN packaging. The 'Special Cases' in the Clear Language Amendment (Section 1.5) remove some dangerous goods from the packaging requirements of Part 5. For example, small (now < 450 L) containers of flammable liquids with a flash point above 37.8°C and no sub-risk are not subject to Part 5.

In addition, some dangerous goods are excepted from the UN packaging test requirements if certain packing conditions are met. These exceptions will appear in a future revision to standard CAN/CGSB 43.150. Here are some examples:

- The following materials, Packing Groups II or III only, are not required to be in UN packaging when
  - (a) packaged in a combination packaging (e.g., bottles in a box) having a maximum net mass of 40 kg, with metal or plastic inner packaging, each having a maximum capacity of 5 L; or
  - (b) packaged in metal or plastic packaging, each having a maximum capacity of 5 L, in palletized loads, a pallet box or unit load device, e.g. individual packaging placed or stacked and secured by strapping, shrink or stretch-wrapping or other suitable means, to a pallet:

**UN 1133** Adhesives, containing flammable liquid,

**UN 1210** Printing Ink, flammable;

**UN 1263** Paint (including lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base);

**UN 1263** Paint Related Material (including paint thinning or reducing compound)

**UN 1866** Resin Solution, flammable:



- Other materials that do not require UN packaging:

**UN 1950** Aerosols

**UN 2000** Celluloid

**UN 2211** Polymeric Beads, Expandable, evolving flammable vapours

**UN 2990, 3072** Life-saving Appliances

**UN 3314** Plastics Moulding Compound

## Where Can I Obtain UN Packaging?

The document 'Suppliers of UN Packaging', appearing on the TDG web site, is a list of Canadian suppliers of various types of UN tested packaging. Alternatively, companies may test their current packaging. The 'Manufacturer's Guide to UN Packaging', also on the web site, describes the steps in testing and marking a packaging in accordance with CAN/CGSB 43.150.

## What Should I Do To Prepare?

The new requirement, if adopted, will appear in the *Canada Gazette* Part II, expected to be published this year and posted on the TDG web site. Carefully review the "Special Cases" in the new TDG Regulations paying particular attention to the exemptions.

If your material is subject to the Part 5 requirements for

means of containment, obtain a copy of the standard CGSB 43.150 "Performance Packagings for Transportation of Dangerous Goods" from the Canadian General Standards Board, 1-800-665-2472. The requirements for the use of UN packaging are found in Part II of the standard. The most recent UN exceptions to package testing, which are not in the current edition (1997), are expected to be added to the standard before April 2001.

If the standard requires UN packaging for your material, test your current packaging (Part I of the standard contains the testing and marking requirements) or order UN packaging from a supplier.

A paper copy of 'Users' Guide to UN Packaging', 'Suppliers of UN Packaging' or 'Manufacturer's Guide to UN Packaging' can be obtained by sending a request to Dave Westman by facsimile at (613) 993-5925 or by E-mail to westmad@tc.gc.ca.

Finally, as with any new initiative, problems in adapting some packaging may arise during implementation of the requirement to use UN packaging. It is important, therefore, for shippers to conduct a review of their current packaging practice as early as possible to determine the effect on their operation. Any adjustments to the standard to accommodate unforeseen problems should be made before its April 2001 revision.



## CLEAR LANGUAGE REGULATIONS:

The proposed clear language Transportation of Dangerous Goods Regulations will be finalized and submitted to the Department of Justice by the end of June 2000.

For more information, please check our web site at:  
<http://www.tc.gc.ca/tdg/en/menu.htm>

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# “PREPARE and DECLARE” A Successful Conference

by Edgar Ladouceur

The second European dangerous goods conference organized by the US-based Hazardous Materials Advisory Council (HMAC) and the UK-based Pira International was held in Amsterdam on March 2 and 3, 2000. The conference attracted 115 delegates from 10 different countries, including Canada and the United States.

As an added benefit to participants, the International Regulations Committee of the Advisory Council held an open meeting prior to the conference which allowed participants to be briefed on a wide range of ongoing international regulatory initiatives.

The first International dangerous goods conference was held in Brussels in 1999 and dealt with the need to rationalize international regulations.

This year’s theme was “Prepare and Declare”. It was designed to provide insight and advice to participants on how to properly prepare and declare dangerous goods in order to avoid difficult situations that arise when undeclared dangerous goods are put in the transportation system.

The Chairman of the Advisory Council, Mr. David Hiromura, gave introductory comments to the conference. Mr. Eduardo Molinero, Administrator - Land Transport of Dangerous Goods, European Commission, described recent developments in dangerous goods regulations within the European Community; placing special emphasis on the “European Agreement Concerning the International Carriage of Dangerous Goods by Road” (ADR) and the “Regulation Concerning the International Carriage of Dangerous Goods by Rail” (RID).

Dr. Sergio Benassai, Chairman of the United Nations Committee of Experts on the Transportation of Dangerous Goods reported on the 17<sup>th</sup> Session of the Committee held in Geneva, Switzerland, last December.

Mr. Vaughn Arthur, Director of Education and Training,

gave a primer on the regulations that apply to consignments of dangerous goods moving within the United States (Title 49 of the Code of Federal Regulations) by highlighting variations with the International Civil Aviation Organization (ICAO) *Technical Instructions for the Safe Transportation of Dangerous Goods by Air*; the International Maritime Organization (IMO) *International Maritime Dangerous Goods Code (IMDG)*; and the United Nations Model Regulations.

Mr. Edgar Ladouceur, Director of Compliance and Response Branch, TDG Directorate, briefly reviewed the regulatory requirements for transporting dangerous goods within Canada and emphasized that although Canada-United States reciprocity agreements allowed for most shipments of dangerous goods to move between the two countries without difficulty, some variations did exist. He provided participants with examples in the areas of classification, documentation, safety marks, emergency response, packaging, training, and waste. The speaker noted that for consignments of dangerous goods originating in Europe and destined for Canada, it was important for shippers to be aware of the Canadian Transportation of Dangerous Goods legislation to avoid undue delays. Mr. Ladouceur concluded his remarks by giving participants a status report on the proposed revisions to the Canadian *Transportation of Dangerous Goods Regulations*, commonly referred to as the “Clear Language” initiative.

A comprehensive case study based on the 1996 European Directive requiring companies to have a Dangerous Goods Safety Advisor (DGSA) was presented by Mr. Hans van der Maat, Technical Director, Schiphol Airport, The Netherlands.

Other speakers provided information on efforts presently underway to further promote global harmonization; the selection, testing and use of

packages; and emergency response initiatives to dangerous goods incidents by air.

One of the highlights of the conference was an information session followed by a panel discussion with representatives from five different countries where experiences with undeclared dangerous goods were shared, possible causes discussed, and potential solutions offered.

The conference ended with a number of participants expressing their appreciation for the two days of intensive discussions and the hope that a third conference would be held next year to build on the momentum of the first two successful conferences.



## Correction on Previous Edition:

“Emergency Response Guide 2000” article on page 9.

E-mail address for Dave Allen (Province of Ontario) should read:

[dave.allen@mto.gov.on.ca](mailto:dave.allen@mto.gov.on.ca)

### Number of Calls

Technical	4,342
Regulatory	1,767
Information	4,639
Other	4,182

**Total** 14,930

**Emergency Calls** 339

### Source of Emergency Calls

Fire Dept.	92
Police Dept.	39
Hazmat Contractor	8
Carrier	123
End User	15
Manufacturer	6
Government	25
Private Citizen	8
ER Centre	3
Poison Control	5
Medical	8
Others	7



January 1, 2000 to May 31, 2000

### Emergency Calls by Class of Dangerous Goods

Class 1 - Explosives	2
Class 2 - Compressed Gas	78
Class 3 - Flammable Liquids	99
Class 4 - Flammable Solids	11
Class 5 - Oxidizers and Organic Peroxides	19
Class 6 - Poisonous and Infectious Substances	25
Class 7 - Radioactives	0
Class 8 - Corrosives	78
Class 9 - Miscellaneous	112
NR - Non-regulated	45
Mixed Load -	5
Unknown -	14

### Emergency Calls by Province/Country

British Columbia	44
Alberta	51
Saskatchewan	9
Manitoba	4
Ontario	121
Quebec	73
New-Brunswick	7
Nova Scotia	13
Prince Edward Island	0
Newfoundland	4
Northwest Territories	0
Yukon	0
United States	11
International	2

### Emergency Calls by Transport Mode

Road	96
Rail	94
Air	1
Marine	8
Pipeline	0
Non transport	140
Multi modal	0