

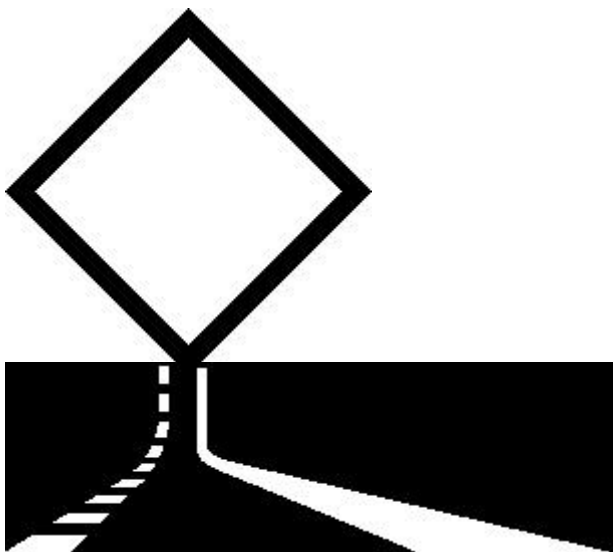
DG

**A Technical Publication
from the Co-ordination
and Information Centre**

Transportation of Explosives

November 2009

**Dangerous Goods
And Rail Safety**



**Government
of Alberta** ■
Transportation

This material is meant as a guide to certain parts of the Transportation of Dangerous Goods Regulations and is not meant to be a substitute for them. It is the responsibility of handlers, offerers and transporters of dangerous goods to consult the Regulations for the exact requirements. The Co-ordination and Information Centre of Alberta Transportation can provide accurate information regarding the Regulations 24 hours a day.

Co-ordination and Information Centre

**Alberta Transportation
Dangerous Goods and Rail Safety Branch
Main Floor, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta, T6B 2X3**

**Tel. Edmonton: (780) 422 – 9600
Tel. Province-wide: 1 (800) 272 – 9600
Fax: (780) 427 – 1044**

These telephone lines are recorded to assist in responding to the emergency (natural/manmade) and/or inquiry regarding dangerous goods and to ensure that the information is accurate. Direct any questions regarding the recording to the Compliance Officer responding to your call or contact the Manager of the CIC at 780-427-8660. *Legal Authority: Dangerous Goods Transportation and Handling Act, Section 13(1).*

INTRODUCTION

Dangerous goods are grouped into nine hazard classes. Some hazard classes have divisions associated with them. Explosives are known as Class 1 dangerous goods and are found in Schedule I of the Transportation of Dangerous Goods (TDG) Regulations. Explosives have a UN number starting with a zero (i.e., UN 0012).

DIVISIONS OF CLASS 1

There are six (6) divisions in Class I, each describing a level of explosive hazard associated with the product [Section 2.10]:

- Class 1.1** A substance or article with a mass explosion hazard
- Class 1.2** A substance or article with a projection hazard, but not a mass explosion hazard
- Class 1.3** A substance or article which has a fire hazard and either a minor blast hazard or a minor projection hazard or both but not a mass explosion hazard
- Class 1.4** A substance or article which presents no significant hazard beyond the package in the event of ignition or initiation during transport
- Class 1.5** A very insensitive substance with a mass explosion hazard, and
- Class 1.6** An extremely insensitive article with no mass explosion hazard

PACKING GROUP

All explosives are included in packing group II.

COMPATIBILITY GROUP and CLASSIFICATION CODE

Description of substance or article to be classified	Compatibility Group	Classification Code
Primary explosive substance	A	1.1A
Article containing a primary explosive substance and not containing two or more effective protective features. Some articles, such as detonators for blasting, detonator assemblies for blasting and primers, cap-type, are included in the compatibility group, even though they do not contain primary explosives.	B	1.1B,1.2B, 1.4B
Propellant explosive substance or other deflagrating explosive substance or article containing such an explosive substance	C	1.1C,1.2C, 1.3C, 1.4C
Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without the means of initiation and without a propelling charge, or article containing a primary explosive substance and containing two or more effective protective features	D	1.1D, 1.2D, 1.4D, 1.5D
Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids)	E	1.1E, 1.2E, 1.4E
Article containing a secondary detonating explosive substance, with its own means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids) or without a propelling charge	F	1.1F, 1.2F, 1.3F, 1.4F

Description of substance or article to be classified	Compatibility Group	Classification Code
<p>Pyrotechnic substance, an article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tear or smoke producing substance (other than a water activated article or one containing white phosphorus, phosphides, a pyrophoric substance, a flammable liquid or gel or hypergolic liquids).</p>	G	1.1G, 1.2G, 1.3G, 1.4G
<p>Article containing both an explosive substance and white phosphorous</p>	H	1.2H, 1.3H
<p>Article containing both an explosive substance and a flammable liquid or gel.</p>	J	1.1J, 1.2J, 1.3J
<p>Article containing both an explosive substance and a toxic substance</p>	K	1.2K, 1.3K
<p>Explosive substance or article containing an explosive substance and presenting a special risk (e.g. due to water-activation or presence of hypergolic liquids, phosphides or a pyrophoric substance) needing isolation of each type.</p>	L	1.1L, 1.2L, 1.3L
<p>Articles containing only extremely insensitive detonating substances</p>	N	1.6N
<p>Substance or article packed or designed that any hazardous effects arising from accidental functioning are confined within the means of containment package unless the means of containment has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prohibit fire fighting or other emergency response efforts in the immediate vicinity of the means of containment.</p>	S	1.4S

COMPATIBILITY GROUPS

A person must not load or transport with other explosives in the same means of transport, except for a ship, explosives that have a compatibility group letter listed in column 1 of a row in the following table unless the compatibility group letter of the other explosives is listed in column 2 of the same row [Section 5.7]:

Column 1	Column 2
A	A
B	B,S
C	C, D, E, N, S
D	C, D, E, N, S
E	C, D, E, N, S
F	F, S
G	G, S
H	H, S
J	J, S
K	K, S
L	L
N	C, D, E, N, S
S	B,C, D, E, F, G, H, J, K, N, S

For a mixed load of two or more explosives with compatibility groups C, D, E, N or S, the compatibility group of the mixed load is the first compatibility group of E, D, C, N or S present in the mixed load.

Despite the above clause, detonators in compatibility group B may be loaded or transported in the same road vehicle with explosives in compatibility group D or N [Section 5.7(2)]. The compatibility group of the mixed load is D.

Despite the above clause, explosive articles included in compatibility group G, except for fireworks with UN number UN0333, UN0334, UN0335 or UN0336, may be loaded or transported in the same road vehicle together with explosive articles included in compatibility group C, D or E. The compatibility group of the mixed load is E.

For a mixed load of two explosives with one of the compatibility groups being S, the compatibility group of the mixed load is that of the other compatibility group.

MEANS OF CONTAINMENT FOR CLASS 1, EXPLOSIVES

A person must use a means of containment that is in standard with CGSB-43.151 to contain dangerous goods in transport that are included in Class 1, Explosives [Section 5.8].

MAXIMUM NET EXPLOSIVES IN A ROAD VEHICLE

The total net explosives quantity of all explosives that are transported together in a road vehicle must be less than or equal to the following limits:

- (a) 25 kg if any of the explosives are UN0190, SAMPLES, EXPLOSIVE;
- (b) 2,000 kg if any of the explosives are included in Class 1.1A; and
- (c) 20,000 kg. [Section 9.5]

PREPARATION OF THE SHIPPING DOCUMENT

The information on a shipping document must be easy to identify, legible and printed in indelible ink. The shipping document may be prepared in English or in French [Section 3.4].

When the information related to dangerous goods is on the same shipping document with information related to non-dangerous goods, the dangerous goods information must be shown [Section 3.4]:

- before the information related to the non-dangerous goods and under the heading “Dangerous Goods”,
- printed or highlighted in a colour that contrasts with the print or highlight used for the information related to the non-dangerous goods, or
- following an “X” opposite the shipping name in a column under the heading “DG”.

The following is the minimum required information that must appear on a shipping document:

Shipping Document Information	When Required	Where in the Regulations
Date	Always	3.5(1)(b)
Name and address of consignor	Always	3.5(1)(a)
Description of goods in the following order		3.5(1)(c)
a. Shipping name	Always	3.5(1)(c)(i)
b. The technical name of the most dangerous substance related to the primary classification	If Provision 16 of Schedule 2 applies	3.5(1)(c)(i)(A)
c. The words “Not Odorized”	For liquefied petroleum gas that has not been odorized	3.5(1)(c)(i)(B)
d. Primary classification	Always	3.5(1)(c)(ii)
e. Compatibility group	For Class 1	3.5(1)(c)(iii)
f. Subsidiary classifications	If Any	3.5(1)(c)(iv)
g. UN number	Always	3.5(1)(c)(v)
h. Packing group	If Any	3.5(1)(c)(vi)
The quantity in the International System of Units (SI) ^{1, 2}	Always	3.5(1)(d)
The net explosive quantity	For Class 1	3.5(1)(d)
The number of containers ²	For dangerous goods in small containers requiring safety labels	3.5(1)(e)
The words “24-Hour Number” followed by a telephone number where the consignor can be easily reached ³	Always	3.5(1)(f)
Emergency Response Assistance Plan (ERAP) number and telephone number to activate it	If Required	3.6(1)
The control and emergency temperatures	For products in Classes 4.1 and 5.2	3.6(3)

Note:

1. If the quantity of dangerous goods is less than 10% of the container’s capacity, the words “Residue – Last Contained” followed by the shipping name of the dangerous goods last contained in the means of containment may be used to describe the quantity. This does not apply to Class 2 gases in small containers and Class 7 radioactive substances [Section 3.5(4)].

2. If the quantity of dangerous goods or the number of small means of containment changes during transport, the carrier must show on the shipping document or on a document attached to the shipping document the change in the quantity of dangerous goods or the number of small containers [Section 3.5(5)].
3. A consignor can also use the telephone number of an agency that is competent to give the technical information on the shipment. For example, it is possible to use CANUTEC as a source of technical information provided that the consignor has received permission in writing from CANUTEC [Section 3.5(2)].

PROHIBITION: EXPLOSIVES (Section 1.8)

A person must not handle, offer for transport or transport dangerous goods by any means of transport if the dangerous goods are explosives and

- a. are in direct contact with a large means of containment, except when the explosives are to be transported by road vehicle in quantities that are allowed for the explosives in Schedule 1 or in any special provision in Schedule 2; or
- b. are also radioactive materials.

150 KG GROSS MASS EXEMPTION (Section 1.15)

Part 3 (Documentation), Part 4 (Dangerous Goods Safety Marks), Part 5 (Means of Containment), Part 6 (Training) and Part 8 (Accidental Release and Imminent Accidental Release Report Requirements) of the Regulations do not apply to the handling, offering for transport or transporting of dangerous goods on a road vehicle, a railway vehicle or a ship on a domestic voyage if

- a. the dangerous goods (not included in Class 2, Gases), are contained in one or more means of containment each of which has a gross mass less than or equal to 30 kg and is designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no accidental release of dangerous goods that could endanger public safety;
- b. The gross mass of all dangerous goods
 - i) transported on the road vehicle or the railway vehicle is less than or equal to 150 kg, and
 - ii) transported on the ship on a domestic voyage is less than or equal to 150 kg, excluding dangerous goods in a road vehicle or railway vehicle being transported on the ship.

This exemption applies only to the explosives listed below:

- (i) UN numbers UN0044, UN0105, UN0131, UN0161, UN0173, UN186, UN0191, UN0197, UN0276, UN0312, UN0323, UN0335 if classified as a consumer firework, UN0336, UN0337, UN0351, UN0373, UN0404, UN0405, UN0431, UN0432, UN0454 and UN0499, and
- (ii) UN numbers UN0012, UN0014 and UN0055 if the cartridges are for shotguns or, in the case of cartridges for rifles or pistols, the caliber is less than 12.7 mm (50 calibre).

The above exemption does not apply to dangerous goods that

- (i) are in a quantity or concentration that requires an emergency response assistance plan,
- (ii) require a control or emergency temperature

500 KG GROSS MASS EXEMPTION (Section 1.16)

Part 3 (Documentation), Part 4 (Dangerous Goods Safety Marks) and Part 5 (Means of Containment) of the Regulations do not apply to explosives in a quantity less than or equal to 500 kg gross mass in transport solely on land on a road vehicle or railway vehicle if they are Class 1.4S or UN numbers UN0191, UN0197, UN0276, UN0312, UN0336, UN0403, UN0453 and UN0493 and

- a. the dangerous goods are contained in one or more means of containment, each of which has a gross mass less than or equal to 30 kg;
- b. the dangerous goods are accompanied by a shipping document that, is located in accordance with sections 3.7 to 3.9 of Part 3, Documentation. The shipping document includes the following information in the following order:
 - i. the primary class of the dangerous goods in each means of containment following the word "Class" or "Classe",
 - ii. the total number of means of containment on which a dangerous goods safety mark is required to be displayed, for each primary class, following the words "number of means of containment" or "nombre de contenants", and
For example, Class 1.4S, number of means of containment, 10

- c. each means of containment has displayed on one side, other than the side on which it is intended to rest or to be stacked during transport,
 - i. the dangerous goods safety marks required by Part 4, Dangerous Goods Safety Marks, or
- d. the person transporting the dangerous goods is trained in accordance with Part 6, Training.

This exemption does not apply to dangerous goods that:

- i) are in a quantity or concentration that requires an emergency response assistance plan
- ii) require a control or emergency temperature
- iii) are included in Class 1, Explosives, except for explosives included in Class 1.4S and the UN numbers listed above.

AGRICULTURE: 1500 KG FARM VEHICLE EXEMPTION (Section 1.21)

Part 3 (Documentation), Part 4 (Dangerous Goods Safety Marks), Part 5 (Means of Containment), and Part 6 (Training) of the Regulations do not apply to explosives in a quantity less than or equal to 1 500 kg gross mass in transport on a road vehicle licensed as a farm vehicle if the explosives are Class 1.4S and

- a. the dangerous goods are transported solely on land for a distance less than or equal to 100 km;
- b. the dangerous goods are to be or have been used by a farmer for farming purposes.

Despite the exemption from Part 3(Documentation), if an emergency response assistance plan is required, the dangerous goods for which the the plan is required must be accompanied by a shipping document.

AGRICULTURE: 3000 KG GROSS MASS FARM RETAIL EXEMPTION (Section 1.22)

Part 3 (Documentation), Part 4 (Dangerous Goods Safety Marks), and Part 5 (Means of Containment) of the Regulations do not apply to explosives in a quantity less than or equal to 3,000 kg gross mass in transport on a road vehicle if the explosives are Class 1.4S and

- a. the dangerous goods are transported solely on land between a retail place of purchase and place of destination, for a distance on public roads less than or equal to 100 km;
- b. the dangerous goods are to be or have been used by a farmer for farming purposes;
- c. the dangerous goods are in a means of containment that is designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no accidental release of the dangerous goods that could endanger public safety.

CLASS 1, EXPLOSIVES EXEMPTION (Section 1.31)

Part 3 (Documentation), Part 4 (Dangerous Goods Safety Marks), Part 6 (Training), Part 9 (Road) and Part 10 (Rail) of the Regulations do not apply to the handling, offering for transport or transporting on a road vehicle or a railway vehicle included in Class 1, Explosives, if

- a. the quantity of all the explosives in the road vehicle or railway vehicle that are not subject to special provision 85 or 86, expressed in net explosives quantity is less than or equal to the number shown in column 6 of Schedule 1 for each of the explosives;

For the purpose of this explanation, suppose the explosives have net explosive quantities NEQ1, NEQ2, NEQ3, etc. and have UN numbers NUM1, NUM2, NUM3, etc. This section is satisfied if the total net explosives quantity of all the explosives taken together (NEQ1 + NEQ2 + NEQ3 + etc.) is less than or equal to the number in column 6 of Schedule 1 for NUM1 and is also less than or equal to the number in column 6 of Schedule 1 for NUM2 and is also less than or equal to the number in column 6 of Schedule 1 for NUM3, etc.

- b. the quantity of all the explosives in the road vehicle or railway vehicle that are subject to special provision 85 or 86, expressed in number of articles, is less than or equal to the number shown in special provision 85 or 86 for each of the explosives;

For the purpose of this explanation, suppose the explosives have number of articles NB1, NB2, NB3, etc. This section is satisfied if the total number of articles of all the explosives taken together (NB1 + NB2 + NB3 + etc.) is less than or equal to the number shown in special provision 85 or 86 for NUM1, and is also less than or equal to the number shown in the special provision for NUM2, NUM3, etc.

- c. each means of containment has displayed on it the class, compatibility group and UN number of the explosives contained inside it; and
- d. a placard is displayed in accordance with paragraph 4.15(1)(e) of Part 4, Dangerous Goods Safety Marks, if the explosives are included in Class 1.1, 1.2, 1.3 or 1.51
 - (i) in any quantity exceeding 10 kg net explosives quantity, or
 - (ii) in any number of articles exceeding 1000 for explosives subject to special provision 85 or 86.

Special Provision 76 (Fireworks Display Exemption)

Despite section 5.7 of Part 5, Means of Containment, any combination of these dangerous goods included in Class 1, Explosives, may be handled, offered for transport or transported in a road vehicle if

- a) the total quantity of all the dangerous goods included in Class 1, expressed in net explosives quantity, is less than or equal to 5 kg;
- b) the total number of articles of dangerous goods subject to special provision 86 is less than or equal to 100 articles; and
- c) the operator of the road vehicle has a valid Pyrotechnic Card that has been issued to the operator by the Explosives Regulatory Division of natural Resources Canada.

UN0027, UN0066, UN0094, UN0101, UN0105, UN0161, UN0197,
UN0255, UN0305, UN0325, UN0335, UN0336, UN0337, UN0349,
UN0430, UN0431, UN0432, UN0454, UN0499

Special Provision 85

Despite the index number in Column 6 of Schedule 1, these dangerous goods may be handled, offered for transport or transported in accordance with section 1.31 of Part 1, Coming into Force, Repeal, Interpretation, General Provisions and Special Cases, when they are in a quantity that is less than or equal to 15 000 articles.

UN0044

Special Provision 86

Despite the index number in Column 6 of Schedule 1, these dangerous goods may be handled, offered for transport or transported in accordance with section 1.31 of Part 1, Coming into Force, Repeal, Interpretation, General Provisions and Special Cases, when they are in a quantity that is less than or equal to 100 articles.

UN0029, UN0030, UN0121, UN0131, UN0255, UN0267, UN0315, UN0325, UN0349,
UN0360, UN0361, UN0367, UN0368, UN0454, UN0455, UN0456, UN0500

Note: Explosives cannot be sent through the postal system.

REQUIREMENT FOR AN EMERGENCY RESPONSE ASSISTANCE PLAN (ERAP)

A person who offers for transport or imports, in a road vehicle or railway vehicle, a quantity of dangerous goods that have one or more UN numbers, are included in Class I, Explosives and are contained in one or more means of containment must have an approved ERAP if the total quantity of those dangerous goods exceeds the ERAP limit for at least one of the UN numbers [Section 7.1]

When the quantities of explosives are expressed in net explosives quantity and number of articles, one kilogram net explosives quantity must be counted as 100 articles and each 100 articles must be counted as one kilogram net explosives quantity [Section 7.1 (3)(a)].

A quantity of dangerous goods that have the same UN number exceeds the ERAP limit if the dangerous goods have an index number in column 7 of Schedule 1 and

If an explosive

- (i) not subject to special provision 86, have a net explosives quantity that is greater than the number when that number is expressed in kilograms, or
- (ii) subject to special provision 86, are in a quantity greater than the number of articles listed for the explosive [Section 7.1(4)(d)].

If there is no index number set out in Column 7 of Schedule 1, an ERAP is not required.

SAFETY MARKS

Generally, unless specifically required by the TDG Regulations for a particular dangerous good or class of dangerous goods, the consignor of the dangerous goods must display an appropriate label, shipping name and UN number on the small means of containment (Section 4.10).

Safety marks for Explosives are the same whether a label (100 mm x 100 mm) or placards (250 mm x 250 mm) are used.

A placard is required for explosives if:

- the amount meets the ERAP limit in Column 7 of Schedule 1 [Section 4.15(1)(a)];
- have a gross mass greater than 500 kg [Section 4.15(1)(d)]; or
- are included in Class 1.1, 1.2, 1.3 or 1.5 and are

(i) not subject to special provision 85 or 86 and exceed 10 kg net explosives quantity, or

(ii) subject to special provision 85 or 86 and the number of articles exceeds 1000.

A Danger placard cannot be used to replace an Explosive placard for a mixed load – the explosive placard must always be displayed [Table from Section 4.15].

Options for Class 1

A placard is not required to be displayed for explosives that are included in Class 1.4 except for UN0301, Ammunition, Tear Producing, and in a quantity less than or equal to 1000 kg net explosives quantity, or Class 1.4S and are in any quantity.

UN0301 requires an emergency response assistance plan (ERAP). The ERAP index in column 7 of Schedule 1 for UN0301 is 75 kg NEQ.

Only the placard for the explosives with the lowest division number is required to be displayed for explosives that are included in more than one division and are in a large means of containment, except in the following cases:

- a. when explosives included in Class 1.2 and Class 1.5 are transported together, the placard for Class 1.1 must be displayed; and
- b. when explosives included in Class 1.4 and Class 1.5 are transported together, the placard for Class 1.5 must be displayed.

Despite the requirement in Section 4.15 for the display of a UN number, a UN number is not required for Class 1, Explosives [Section 4.17]

ACCIDENTAL RELEASE REPORTING REQUIREMENTS

Part 8 of the TDG Regulations describe the requirements in the event of an accidental release or an imminent accidental release. In the case of explosives, an immediate report is required when any quantity is released that:

- a) could pose a danger to public safety or 50 kg; or
- b) is included in Class 1.1, 1.2, 1.3 or 1.5 and is
 - (i) not subject to special provision 85 or 86 but exceeds 10 kg net explosives quantity, or
 - (ii) subject to special provision 85 or 86 and the number of articles exceeds 1000

For more information on reporting requirements, request the CIC information bulletin entitled Reporting an Accidental Release of Dangerous Goods.

In Alberta, the report must be made to:

- the local police,
- Alberta Transportation, Dangerous Goods and Rail Safety Branch at 1-800-272-9600,
- the person's employer,
- the consignor of the dangerous goods,
- for a road vehicle, the owner, lessee or charterer of the road vehicle involved, and
- CANUTEC at (613)996-6666 for Class 1 Explosives, and Class 6.2, Infectious Substances, or there was an accidental release from a cylinder that suffered a catastrophic failure.





The information that must be included in the immediate report is:

- the shipping name or UN number of the dangerous goods,
- the quantity of dangerous goods initially loaded into the means of containment,
- the quantity of dangerous goods released,
- a description of the condition of the means of containment from which the dangerous goods were released, including details of the conditions of transport when the release occurred
- a description of the circumstances that led to a catastrophic failure of a cylinder, if involved in the release,
- the location of the accidental release,
- the number of injuries or deaths, if any occurred,
- an estimate of the number of people evacuated from private residences, public areas or public buildings as a result of the accidental release.

A report can also include other information not required by the regulations; for example, any cleanup arrangements, involvement of other emergency response agencies like the police, fire department, Alberta Environment, etc.

Appendix 1: IMAGES OF LABELS AND PLACARDS

CLASS 1, EXPLOSIVES

Classes 1.1, 1.2, 1.3		
		
Label and Placard		
Black: Symbol, numbers, letter and line 5 mm inside the edge for a label and 12.5 mm inside the edge for a placard		
Orange: Background		
The symbol is an exploding bomb.		
** Place for the division – to be left blank if explosive is a subsidiary class		
* Place for the Compatibility Group letter – to be left blank if explosive is a subsidiary class		
Class 1.4	Class 1.5	Class 1.6
		
Label and Placard		
Black: Numbers, letter and line 5 mm inside the edge for a label and 12.5 mm inside the edge for a placard		
Orange: Background		
* Place for the Compatibility Group letter		

Dangerous Goods Shipping Document for Road Transport

DESTINATION (City-Town)			CONSIGNOR			
Name:			Name:			
Address:			Address:			
Name of Carrier		Prepaid <input type="checkbox"/>	Collect <input type="checkbox"/>		Transport Unit Number	
Point of Origin			Shipping Date		Shipper's No.	
REGULATED DANGEROUS GOODS			24-Hour Number:			
			ERAP Reference _____ and Telephone Number _____			
Shipping Name	Primary Class	Subsidiary Class	UN Number	Packing Group	Quantity	Packages Requiring Labels
This is to certify that the above named articles are properly classified, described, packaged, marked and labelled and are in proper condition for transportation according to the <i>Transportation of Dangerous Goods Regulations</i> .						
Special Instructions						
NON-REGULATED GOODS						
Packages	Description of Articles				Weight	
Received in apparent good order			_____ Consignee Signature		_____ Shipper's Signature	
Received in Apparent Good Order	_____ Driver's Signature			_____ Driver's No.		

Please note that this sample shipping document contains some information that is not required in the TDG Regulations. The additional information reflects current industry practices.