

TRANSPORTATION OF BIOLOGICAL SUBSTANCES BY GROUND BIO-109 COURSE NOTES



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Compliant with the Transportation of Dangerous Goods Regulations and IATA at the time of publication.

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ACTS AND REGULATIONS

The Transportation of Dangerous Goods Regulation (TDGR) require that the various people involved in the all aspects of transport comply with the prescriptions of the law. These people are:

Handlers, including receivers or consignees,

Carriers and transport companies

Shippers (distributors, brokers, importers);

And any other person involved in the logistics of transporting dangerous goods.

Repercussion to non-compliance

Federal inspectors and provincial peace officers and highway controllers are mandated to enforce these regulations. Possible repercussions include but not limited to:

- To the shipper and transport company
- Penalties and sanctions: Up to \$50,000 and or 2 years
- To the driver
- 3-9 demerit points on the driver's license
- \$250 to\$ 900 in fines

These sanctions apply unless a person can prove **due diligence** under the Act.

EMERGENCY RESPONSE ASSISTANCE PLAN (ERAP)

Some shipments of dangerous goods present a higher level of danger. These shipments are required to have an **Emergency Assistance Response Plan**. This plan must be approved by Transport Canada.

REGISTRATION: The TDGR now requires that dangerous goods shipping, transportation and handling sites register in the Transport Canada database. This registration is renewable every 12 months.

A site means a permanent place where the importation, presentation for transport, handling or transport of dangerous goods takes place which are in the direct possession of a person carrying out these activities.

This applies to any person who imports, presents for transport, handles or transports dangerous goods at a site located in Canada of which they are the owner or operator.

<https://canadagazette.gc.ca/rp-pr/p2/2023/2023-10-25/html/sor-dors206-eng.html>

IN THE CASE OF INFECTIOUS SUBSTANCES, ONLY CAT A SHIPMENTS REQUIRE REGISTRATION.

STEP 1 - TRAINING

Under TDGR requires all persons (Shippers, carriers, handlers and importers) must:

- Be adequately trained and hold a training certificate, OR work in the presence and under the direct supervision of a trained person; AND
- Present his training certificate to any inspector or peace officer requesting it.
- Keep training certificates for two years after the expiry date.

Training certificate:

- is valid for 2 years (air) and 3 years (ground) or when changing employers.
- must be signed by the employee and employer.

STEP 2 - CLASSIFICATION

The classification (or shipping description) includes four elements which are:

Category:

- Category A = high risk
- Category B = minor risk
- *Exempt specimens¹: no foreseeable risks*

Shipping name:

- BIOLOGICAL SUBSTANCES, CATEGORY B
- INFECTIOUS SUBSTANCE, AFFECTING HUMANS
- INFECTIOUS SUBSTANCE, AFFECTING ANIMALS, only
- DRY ICE
- *Exempt human specimen, OR exempt animal specimen²*

Hazard class: TDGR has assigned all the dangerous goods to one of 9 hazard classes. For the purposes of this book we will only discuss the classes involved in shipping biological samples.

- Class 6.2 - Infectious substances
- Class 9 - Miscellaneous dangerous goods

IDENTIFICATION NUMBER (UN NUMBER)

- UN3373 - BIOLOGICAL SUBSTANCES, CATEGORY B
- UN1845 - DRY ICE
- UN2814 - INFECTIOUS SUBSTANCE, AFFECTING HUMANS
- UN2900 - INFECTIOUS SUBSTANCE, AFFECTING ANIMALS, only

CLASS 6.2 - INFECTIOUS SUBSTANCES

An infectious substance is defined as *“a substance known or reasonably believed to contain viable micro-organisms that are known or reasonably believed to cause disease in humans or animals.*

- Viruses (HIV, H1N1), bacteria, rickettsias, parasites etc.

CATEGORIES (class 6.2)

CATEGORY A (high risk): Infectious substances transported in a form that, in case of exposure, can provoke a permanent invalidity, constitutes a menace or cause death.

- UN2814 - INFECTIOUS SUBSTANCE, AFFECTING HUMANS
- UN2900 - INFECTIOUS SUBSTANCE, AFFECTING ANIMALS, only



¹ Exempt specimen is not an official category under TDGR but included here for clarity and training purposes.

² Exempt human (animal) specimen are not proper shipping name per se but are terms used to describe certain samples and included here for clarity and training purposes.

CATEGORY B (lower risk) : Infectious substances that do not meet the requirements for inclusion in Category A, but still represents a risk for public safety.



- HIV tainted blood sample (not a culture)
- Biological specimen infected with Hepatitis B

Category B substances are automatically assigned to **UN 3373 - BIOLOGICAL SAMPLE, CATEGORY B.**

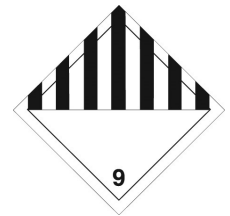
EXEMPTED SPECIMENS (minimal risk): A substance reasonably believe that it **does not contain** an infectious

- E.g. Blood sample on non-contaminated blood (routine testing), Urine sample (drug testing)

CLASS 9 - MISCELLANEOUS DANGEROUS GOODS

Dry ice UN1845 has three basic dangers associated to it:

Risk of suffocation by oxygen displacement, cold burns (dry ice is approximately -70 deg. C; or explosion form over-pressurisation of the packaging cause by the sublimation process.



STEP 3 - PACKAGING SURFACE (GROUND) TRANSPORT

Exempted specimens must use packaging that under normal conditions of transport will have no release of the specimen including:

- A primary leak proof receptacle
- A secondary receptacle (absorbent recommended - mandatory for Shared Health Manitoba)
- A sturdy, rigid outer package



Category B substances must be packed in accordance with **Packing Instruction 650** which requires:

- A primary leak proof receptacle
- A secondary leak proof receptacle (with absorbent for liquids)
- A sturdy, rigid outer package minimum size of 100 mm x 100 mm with a description of the contents.
- Testing is required



Category A substances must be packed in accordance with **Packing Instruction 620** which requires standardized packaging with:

- A primary leak proof receptacle
- A secondary leak proof receptacle (absorbent required for all liquid content)
- Rigid outer package with a minimum size of 100 mm x 100 mm bearing a certification (standardization) mark.



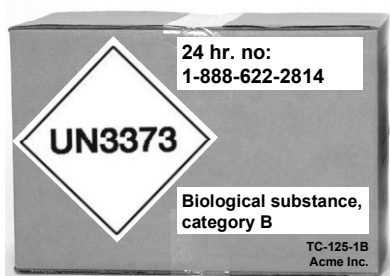
Dry ice does not require standardized packaging but must be packaged in such a manner as to **avoid over-pressurisation.**

STEP 4 - MARKING AND LABELLING

All packages must show appropriate safety marks as per TDGR. These safety marks must be visible, legible and resistant; be in French or in English (English only for the USA);

For exempt specimens:

- « Exempt Human Specimen » or « Exempt Animal Specimen », as required, or the equivalent in French

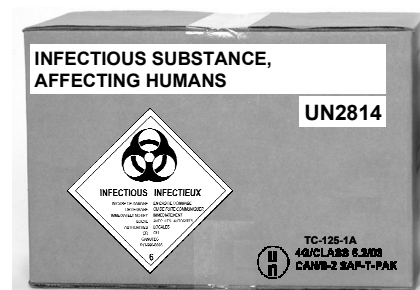


For Category B, the following are required:

- Shipping name: « Biological substances, category B »
- UN3373 label
- An emergency telephone number (24 hrs, 7 without any break in the communication with the mention: 24-hrs, or the equivalent in French).³

For Category A, the following are required:

- Shipping name
- Hazard class 6.2 label
- Identification number (UN)
- Package certification (TC125-1A)



Dry ice does not require any form of identification for surface transport.

STEP 5 - DOCUMENTATION

The term “ transport document ” , “ dangerous goods declaration ” , “ shipper’s declaration ”, are all synonymous and refer to the sheet of paper that must be used to indicate the presence of dangerous goods in a shipment.

Only dangerous goods shipment of Cat. A require a transport document. No shipper’s declaration of dangerous goods is required for Category B or Dry Ice.

- In English or French (English only for shipments to the USA);
- Legible and in indelible ink
- Kept for two years (shipper, carrier and importer)
- Within easy reach of the driver;
- Visible to anyone entering from the driver’s door, driver is away

The shipping document must have the following:

- Name and address of shipper
- A date
- A emergency number with the words *24-Hour Number* or *24-hr No.* or the equivalent in French
- number of packages, and total quantity (net or gross) in **metric units** (L or Kg)
- the complete shipping description (S.H.I.P.) in the following order: UN number, Shipping name, Hazard class.
- For certain highly infectious substances (see ERAP section), the shipper must have an Emergency Response Assistance Plan number and a telephone number to activate it.

³ The shipper may use CANUTEC if his/her firm is registered with that organization. Registration must be renewed every 3 years.

If the shipment consists of dangerous and non-dangerous goods on a single document, the dangerous goods information must be given in one of the following methods:

- The dangerous goods must be listed first under a heading "Dangerous Goods";
- The dangerous goods can be listed in any order but must be identified with an "X" in a column identified "DG" or "MD"; or
- The dangerous goods can be printed or highlighted in color.

STEP 6 - PLACARDING TRANSPORT UNITS

All large means of containment (trucks), in transport or storage in view of transporting, must have the appropriate safety marks (placards) as required by the TDGR. These safety marks must:

- Be visible, legible and resistant on all four sides;
- Removed when the container is cleaned and purged
- Showing the UN number when an ERAP is required
- For any quantity requiring an ERAP or 500 kg of Cat. A substances.

Any vehicle requiring placards becomes a "heavy truck" under Quebec Road Act and must therefore meet all requirements of this category.

STEP7 - LOADING

In Canada, it is forbidden to transport goods unless they are braced and secured using instruments of sufficient capacity. Please consult standard no. 10 of the Canadian Bracing and Securing Code.

STEP 8 - REPORTING

Any accidental release or imminent accidental release of class 6.2 materials must immediately be reported to 911, and CANUTEC (613-996-6666 or *666 on any cell phone). A written follow up report must be filed within 30 days.

If dangerous good, are discovered to have been lost or stolen or otherwise unlawfully interfered with, you must immediately make a report to the local police; CANUTEC at 613-996-6666 (*666 on any cell phone).

You must make all attempts to limit the damages following any spill of dangerous goods without putting your safety at risk. In general terms, you should:

- Advised persons concerned;
- Ensure adequate safety perimeter;
- Limit contamination to the environment;
- Collaborate with emergency personnel;
- Call Canutec *666



Tunnels: It is prohibited to travel in marked tunnels with a dangerous goods load requiring placards.



Level Crossings: The driver of a road vehicle that contains dangerous goods requiring placards must:

Stop at 5 meters from the crossing and look;

Use the by-pass lane if there is one. If not stay on the main road and use hazard lights while crossing.

Some exemptions exist - look for this road sign.



CHECKLIST

GROUND TRANSPORT	
PACKAGING AND LABELLING	YES
Exempt Specimens	
Good quality packaging	<input type="checkbox"/>
Label « Exempt Specimen »	<input type="checkbox"/>
Category B	
Packed according to PI 650	<input type="checkbox"/>
UN 3373 label as a diamond on a point	<input type="checkbox"/>
« Biological Substance, Category B » on the same surface as the label	<input type="checkbox"/>
A telephone number with the words « 24 hr no. »	<input type="checkbox"/>
Category A	
Packed according to PI 620	<input type="checkbox"/>
UN2814 Infectious material affecting humans, OR	<input type="checkbox"/>
UN2900 Infectious material affecting animals	<input type="checkbox"/>
Classe 6.2 (diamond on a point), next to the UN no.	<input type="checkbox"/>
Package certification mark (UN4G/class 6.2...)	<input type="checkbox"/>
SHIPPING DOCUMENT – CAT A ONLY	
Name and address of shipper	<input type="checkbox"/>
The date	<input type="checkbox"/>
Emergency number with the words 24-hr no.	<input type="checkbox"/>
Description, in the following order	<input type="checkbox"/>
• UN2814 Infectious material affecting humans, OR	<input type="checkbox"/>
• UN2900 Infectious material affecting animals	<input type="checkbox"/>
Include name of pathogens (in brackets)	<input type="checkbox"/>
Number of packages	<input type="checkbox"/>
Total qty. In kg or L	<input type="checkbox"/>
ERAP information (if required – 16 pathogens)	<input type="checkbox"/>
Shipper's certification and name	<input type="checkbox"/>
PLACARDS	
Supply / affix placards if required	<input type="checkbox"/>
LOADING	
Packages are secured	<input type="checkbox"/>
TRAINING	
My training certificat is valid and in your possession	<input type="checkbox"/>

EMERGENCY MEASURES

UN1845 – DRY ICE – CLASS 9 PG III

POTENTIAL HAZARDS

HEALTH Vapors may cause dizziness or asphyxiation without warning. Vapors from liquefied gas are initially heavier than air and spread along ground. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.

FIRE OR EXPLOSION **Non-flammable gases.** Containers may explode when heated. Ruptured cylinders may rocket.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Keep out of low areas. Ventilate closed spaces before entering.

PROTECTIVE CLOTHING: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

EMERGENCY RESPONSE

FIRE Use extinguishing agent suitable for type of surrounding fire. Move containers from fire area if you can do it without risk. Damaged cylinders should be handled only by specialists.

SPILL OR LEAK Do not touch or walk through spilled material. Stop leak if you can do it without risk. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Do not direct water at spill or source of leak. Prevent entry into waterways, sewers, basements or confined areas. Allow substance to evaporate. Ventilate the area.

FIRST AID Move victim to fresh air. Call 911 or emergency medical services. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Clothing frozen to the skin should be thawed before being removed. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

UN 3373 and UN2814 CLASS 6.2

POTENTIAL HAZARD

HEALTH Inhalation or contact with substance may cause infection, disease or death. Runoff from fire control may cause pollution. Note: Damaged packages containing solid CO₂ as a refrigerant may produce water or frost from condensation of air. Do not touch this liquid as it could be contaminated by the contents of the parcel.

FIRE OR EXPLOSION Some of these materials may burn, but none ignite readily. Some may be transported in flammable liquids.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Obtain identity of substance involved.

PROTECTIVE CLOTHING Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

EMERGENCY RESPONSE

FIRE **Small Fire:** Dry chemical, soda ash, lime or sand.

Large Fire: Use extinguishing agent suitable for type of surrounding fire. Do not scatter spilled material with high pressure water streams. Move containers from fire area if you can do it without risk.

SPILL OR LEAK Do not touch or walk through spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Absorb with earth, sand or other non-combustible material. Cover damaged package or spilled material with damp towel or rag and keep wet with liquid bleach or other disinfectant. **DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.**

FIRST AID Move victim to a safe isolated area.

CAUTION: Victim may be a source of contamination. Call 911 or emergency medical service. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. **For further assistance, contact your local Poison Control Center.** Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.