

## Transportation of Dangerous Goods Training for Queen's University Shippers and Receivers.





# Transportation of Dangerous Goods

Welcome to the Transportation of Dangerous Goods (TDG) online refresher/training course specifically designed for Queen's University staff responsible for preparing, packaging and/or receiving dangerous goods.

The intent of this course is to provide you with the necessary information to safely handle dangerous goods and meet the requirements of the regulations.

The course covers transportation of dangerous goods products, i.e. goods sent/received via mail and courier services, and the preparation of hazardous waste chemicals for pickup by EH&S. These instructions focus primarily on the ground transportation and TDG Clear Language Regulations.

- **Definitions**
- *Carrier*: means a person who has possession of dangerous goods while they are in transport
- *Dangerous Good*: A product, substance or organism included by its nature or by the TDG regulations in any of the classes listed in the schedule of the act.
- *ERAP*: Emergency Response Assistance Plan is required for quantities exceeding those listed in column 7 of schedule 1 of the TDG Clear Language Regulations. It is a document outlining the specific emergency procedures in case of accidental release or spill

- **Definitions Cont.**
- **Handling:** means loading, unloading, packaging or unpacking dangerous goods in a means of containment for the purposes of, in the course of, or following transportation, and includes storing them in the course of transport
- *IAEA:* International Atomic Energy Agency
- *IATA:* International Air Transportation Association
- *Receiver (Consignee):* Initial person who receives a consignment of dangerous goods
- *Shipper (Consignor):* a person who offers a consignment of dangerous goods for shipment
- *TDG:* Transportation of Dangerous Goods



# Transportation of Dangerous Goods

- **Procedures**
- Two procedures at Queen's University address the handling and Transportation of Dangerous goods
- [Hazardous Waste Disposal Procedures](#) (SOP-CHEM-01)
  - [Hazardous Materials Disposal Form/Request](#)
- [Transportation of Dangerous Goods Procedures](#) (SOP-CHEM-02)



# Transportation of Dangerous Goods

- **Applicable Acts and Regulations**
- Dangerous Goods
- Transportation of Dangerous Goods Act, 1985
- Transportation of Dangerous Goods Act, and regulations R.R.O. 1992
- <http://www.tc.gc.ca/tdg/clear/part4.htm>
- ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air.
- IATA Dangerous Goods Regulations, International Air Transport Association, 1999
- Radioactive Substances
- CNSC Transport Packaging of Radioactive Materials Regulation 2000
- IAEA Regulations for the Safe Transport of Radioactive Material TS-R-1 1996
- Hazardous Waste
- Environmental Protection Act
- Ontario General Waste Management Regulation, Reg. 347 and 558/00



# Transportation of Dangerous Goods

- **Training Requirements**
- Queen's University staff must receive the appropriate TDG training when dangerous goods are:
  - Packaged for Transport
  - Shipped
  - Received
  - Transported by road, air, or rail

# Transportation of Dangerous Goods

- A training certificate is valid for three years under TDG Regulations and two years under IATA Regulations, after which the individual must undergo re-certification.
- An un-trained individual may handle dangerous goods provided the goods are handled in the presence and under the direct supervision of an individual who holds a training certificate.
- A trained person will be issued a training certificate that they must carry when ever handling dangerous goods. This certificate must be provided to an inspector immediately upon request.

- **Responsibilities of Shipper (Consignor)**
- Ensure all aspects of the regulation are met
- Classify the dangerous goods
- Verify limits, special provisions
- Package and separate incompatible dangerous goods
- Ensure the proper display of safety marks
- Prepare shipping document
- Report accidents and incidental release

- **Responsibilities of Receivers**
- Ensure all aspects of the regulation are met
- Recognize all safety marks, be knowledgeable of what you are handling
- Unload the goods safely
- Advise responsible person when consignment is non compliant
- Report accidents and incidental release
- Keep a copy of shipping document for two years

- **Offences under the Act**
- Failure to comply with the requirements of the transportation of dangerous goods act could result in charges which may include :
  - Fines
  - Jail time
  - Prohibition from transporting dangerous goods for up to one year
  - Compensation for damage to the environment or spill cleanup
  - Payment for conducting technical research and investigation

# Transportation of Dangerous Goods

- **TDG Hazard Classification**

- TDG Regulations classify dangerous goods into nine hazard **classes**.
- Some **classes** are further divided into **divisions**, ex class 2 (gases) has a division 2.1 (flammable gas) , 2.2. (non-flammable gas) and 2.3 (toxic gas).



## The 9 Hazard Classes

**Class 1 - Explosives (e.g. dynamite, black powder)**



## Class 2 - Gases (e.g. propane, natural gas)



## Class 3 - Flammable liquids (e.g. gasoline, fuel oil)



**Class 4 - Flammable solids; spontaneously combustible and substances that, on contact with water, emit flammable gases (e.g. phosphorus)**



**Class 5 - Oxidizing substances and organic peroxides  
(e.g. hydrogen peroxide, ammonium nitrate)**



## Class 6 – Poisonous (toxic) and infectious substances (e.g. anthrax, medical waste)



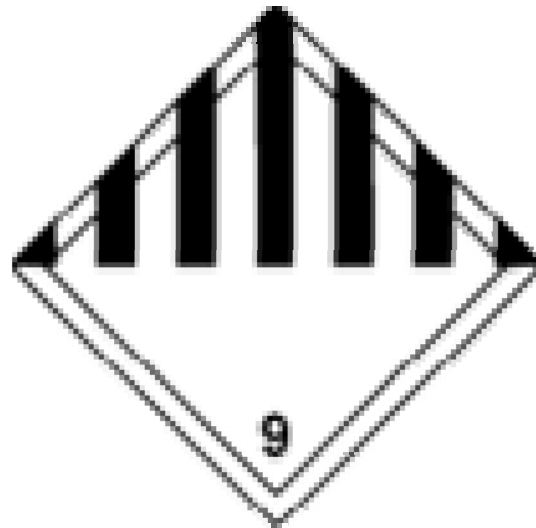
## Class 7 - Radioactive materials (e.g. Phosphorus-32, Tritium)



## Class 8 - Corrosives (e.g. sulfuric acid, caustic soda)

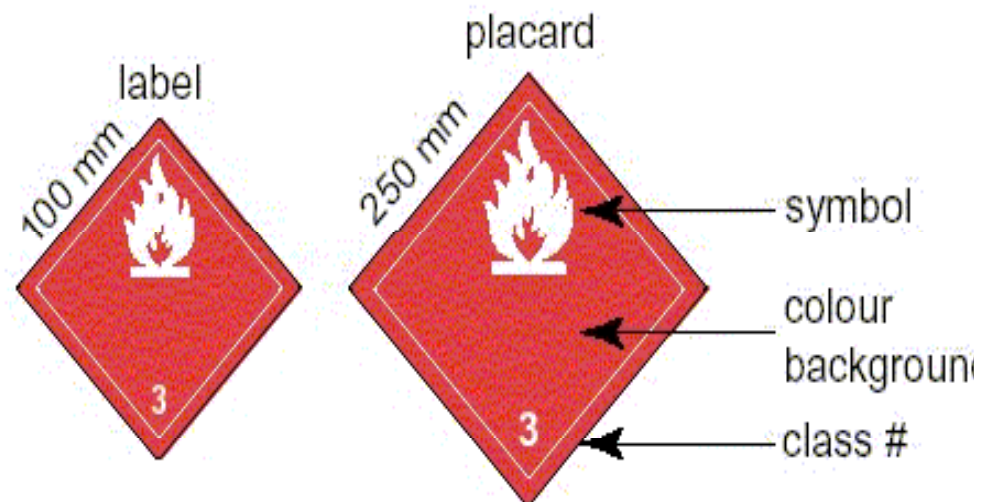


## **Class 9 - Miscellaneous products, substances, organisms**



# Transportation of Dangerous Goods

- **Labels & Placards**
- Labels and placards are diamond-shaped symbols representing the hazard class. The colour, design and size must meet specific requirements. Labels can be obtained from online suppliers or by contacting EH&S



- **Dangerous Goods Classification**
- The shipper is responsible for the proper classification of dangerous goods. Dangerous Goods Classification can be obtained by:
  - Consulting Schedule 1 of the TDG regulation for a list of shipping classes. An online search can be made by finding the TDG regulation at: <http://www.tc.gc.ca/tdg/> and then finding Schedule 1 which is searchable
  - For transport by air consult the following shipping guideline. <http://www.fedex.com/us/services/options/dangerousgoods>
  - Obtaining the TDG classification from the manufacturer or original shipper
  - Consulting an MSDS for the specific material
  - Contacting Environmental Health and Safety

# Transportation of Dangerous Goods

- **Dangerous Goods Classification cont...**
- All chemicals are classified according to a primary hazard class and some may have a subsidiary class.
- For example Acetone is listed in schedule 1. col. 3 as a class 3 (flammable substance). It has no subsidiary class.

Col. 1 UN Number	Col. 2 Shipping Name and Description	Col. 3 Class	Col. 4 Packing Group/ Risk Group	Col. 5 Special Provisions	Col. 6 Explosive Limit and Limited Quantity Index	Col. 7 ERAP Index	Col. 8 Passenger Carrying Ship Index	Col. 9 Passenger Carrying Road or Rail Index	Col. 10 Marine Pollutant
UN1750	CHLOROACETIC ACID SOLUTION	6.1 (8)	II		0.1	1 000		1	
UN 1090	ACETONE	3	II		1		forbidden	5	

- **Dangerous Goods Classification cont...**
- Chloroacetic Acid Solution is classified as a class 6.1(8). 6.1 (toxic) is the primary classification and 8 (corrosive) is the subsidiary class.

Col. 1 UN Number	Col. 2 Shipping Name and Description	Col. 3 Class	Col. 4 Packing Group/ Risk Group	Col. 5 Special Provisions	Col. 6 Explosive Limit and Limited Quantity Index	Col. 7 ERAP Index	Col. 8 Passenger Carrying Ship Index	Col. 9 Passenger Carrying Road or Rail Index	Col. 10 Marine Pollutant
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# Transportation of Dangerous Goods

- **ERAP**
- According to the TDG Clear Language Regulation, some dangerous goods cannot be shipped above certain specified quantities unless an Emergency Response Assistance Plan (ERAP) has been developed. Consult schedule 1 of the regulation, or appendix 3 of the Queen's TDG Policy to see if your shipment falls under the amount specified in column 7 of schedule 1. The quantity limit is expressed as L or Kg for liquids and solids. A blank in col. 7 indicates no ERAP is required.
- If an ERAP is required for your shipment consult EH&S.



# Transportation of Dangerous Goods

- **Dangerous Goods Packaging**

Dangerous goods must be packaged in a container that has met set design and testing requirements. These containers are stamped with the appropriate UN certification mark.

- Different packages are available depending on the type of material you are shipping, for example if biological samples are shipped on dry ice, an appropriate package that allows for the venting of CO<sub>2</sub> gas must be used.
- UN approved boxes are available at selected areas on campus, or may be ordered from the International Compliance Centre <http://www.thecompliancecenter.com>

- **Dangerous Goods Packaging cont.**
- The means of transport (ground or air) further determines the type of packaging that is required.
- Packages shipped only by ground must meet the packaging instructions of the TDG Clear Language Regulations.
- If your package will at any point be transported by air, it must meet the packaging requirements set out in the IATA Regulation.
- Consult EH&S for advice.

# Transportation of Dangerous Goods

- Below is an example of a UN certification mark you might see on a cardboard box.
- The regulations or EH&S should be consulted to identify the correct package to use.



**4G/Y75/S/06/CAN/ACME**



- **Packing Groups**
- There are 3 packing groups indicating the severity of the hazard involved
  - Packing Group I – Great Danger
  - Packing group II – Medium Danger
  - Packing Group III – Minor Danger

# Transportation of Dangerous Goods

- **Packing Groups Cont.**
- Packing groups appear in col. 4 of schedule 1 and as the name suggests, they specify the packing requirements for that chemical.

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- **General Packaging guideline:**

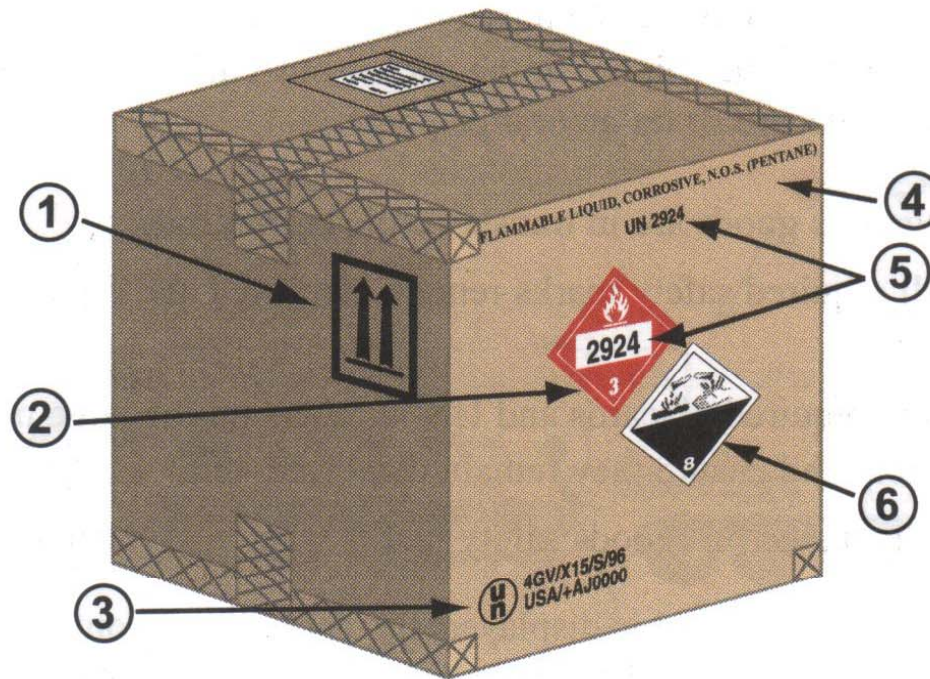
1. Ensure primary containers (bottles, vials etc) are labelled and well sealed to prevent leaking.
2. Line your UN approved box with a secondary waterproof container (Sealable bag, plastic closable container etc.)
3. Place chemical(s) into box.
4. When shipping liquids, fill the bag inside the box with an absorbent material such as vermiculite or chemical absorbent pads. Ensure enough material is used to absorb all of the chemical in the event of a spill

- **General Packaging guideline Cont.**
- 5. When shipping solids, fill the box with non reactive padding material, preferably vermiculite to ensure the chemicals are secure and can not move inside the box.
- 6. Seal the bag
- 7. Close and seal the box with shipping tape
- 8. When shipping a product or samples via courier services, attach all appropriate labels and markings to the outside of the box.

- **Outer Package Requirements**
- When shipping a product or samples via mail or courier, the following items must be attached to the outside of the box. All information can be found in schedule 1 of the regulations.
  1. Orientation label (for liquids only when transported by air)
  2. Hazard class label(s) (Primary & Subsidiary)
  3. Standardized UN certification mark (Automatically appears on UN certified packaging)
  4. Shipping Name (as it appears in the regulations – case sensitive)
  5. Identification number (UN number)

# Transportation of Dangerous Goods

## Example of Dangerous Goods Safety Marks: Small Means of Containment



- ① Orientation label (optional)
- ② Primary class label
- ③ Standardized UN certification (according to standard)
- ④ Shipping name
- ⑤ UN number
- ⑥ Subsidiary class label

- **Shipping Radioactive Materials of Class 7**
- EH&S must be contacted when sending packages containing class 7 radioactive substances. The staff at EH&S have received additional training under TDG and CNSC Transport Packaging of Radioactive Materials Regulation



## Shipping Biohazardous Materials

- Infectious, biohazardous materials and clinical specimens have special shipping requirements.
- After completing this general TDG training and quiz, **you must also complete the Biohazards TDG training module and quiz before you will be TDG certified at Queen's for Class 6.2 materials, Biological Substance Category B (UN3373) or clinical specimens.**



# Transportation of Dangerous Goods

- **Damaged Packages/Spills**
- Damaged packages containing dangerous goods must be accepted by University receivers. Under the Packaging and Transport of Nuclear Substances Regulation, a consignee cannot refuse a shipment that is damaged, or allow it to be shipped from their possession if the shipment is knowingly not in compliance. This will apply to all shipments of dangerous goods.
- If you receive a damaged package note that it has been damaged on the accompanying shipping documentation and notify the shipper for reimbursements.
- If you receive a damaged Class 7 Radioactive shipment, immediately notify the Radiation Safety officer in the Department of EH&S.

- **Spills/Damaged Packages**
- Clean up only small spills if you have been properly trained, and you have the appropriate spill cleanup materials.
- In case of an emergency such as a large spill contact the ERC or EH&S.
- Damaged goods shall be disposed through the Queen's University hazardous waste disposal system.





# Transportation of Dangerous Goods

- Four (4) documents apply to the shipment of dangerous goods depending on the mode of transport and the type of goods being shipped:
  - 1 Straight Bill of Lading Form- for shipments by ground under TDG
  - 2 Shippers Declaration of Dangerous Goods Form- for shipments by air under IATA
  - 3 Waste Manifest- for shipments of hazardous waste (filled out **ONLY** by EH&S or under special approval from EH&S)

Forms can be obtained from EH&S or courier companies.



# Transportation of Dangerous Goods

- A dangerous goods form must include the following information:
  - Proper Shipping name
  - Class
  - UN Number (Must include “UN” ex. UN 1090)
  - Packing Group
  - Contents information and packaging information
    - For Example,
    - ACETONE (Shipping name taken from schedule 1)
    - Class 3
    - UN 1090
    - PG II
    - Net Quantity 5.0 L in 1 Fibreboard box
- \*Additional information is required when transporting dangerous goods by air. Contact EH&S for assistance.



# Transportation of Dangerous Goods

- **Hazardous waste Request Forms**
- Hazardous waste request forms can be filled out on the EH&S website at:  
<http://www.safety.queensu.ca/hazwaste/wasteform.htm>
- Please see the *Hazardous Waste Disposal Procedures* and *Quick Reference Guide* for disposal instructions.



# Transportation of Dangerous Goods

- **International Shipments**
- For international Shipments, Queen's University contracts Thompson Ahearn & Co. Ltd., as a custom broker. We recommend that Thompson Ahearn be used to ensure that your shipment clears customs without delay or other problems. Dangerous goods documentation must accompany the shipment. Contact Procurement Services for further information on obtaining the proper documentation for international shipments. There is a 3-day "turnaround time" to obtain the proper forms.



# Transportation of Dangerous Goods

- **Shipping Record Retention**
- Departments are responsible for maintaining shipping documentation on record for two (2) years following the date of shipment.
- Receivers are not required to maintain shipping documentation.

- **In Summary...**
- **Know what you are handling:** Does your shipment contain hazardous materials or dangerous goods? Hazardous material shipments should only be handled by knowledgeable and trained staff.
- **Prepare for emergencies.** Keep spill supplies and emergency contact numbers on hand. Take time to review response and clean up procedures before you need them.