

**OFFICE OF ENVIRONMENTAL HEALTH & SAFETY
SHIPPING DANGEROUS GOODS:
UNIVERSITY GUIDELINES**

(Updated 07/14/09)

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I. Introduction.

A. The International Civil Aviation Organization (ICAO) is the United Nations (UN) body that regulates all international civil aviation involving UN member states. ICAO promulgates the Technical Instructions for the Safe Transport of Dangerous Goods by Air. The Technical Instructions include requirements applicable to the shipping of dangerous goods by air.

B. The International Air Transport Association (IATA) is a trade association of the world's major airlines that publishes the Dangerous Goods Regulations (DGR), which comply with the ICAO Technical Instructions. The annually updated DGR provides practical assistance to shippers involved in all aspects of dangerous goods transport by air.

C. The United States Department of Transportation (DOT) has incorporated the DGR regulations into the Code of Federal Regulations (CFR) Title 49 Sections 171-180. To view CFR 49, please visit the following URL: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title49/49cfrv2_02.tpl

D. The Federal Aviation Administration (FAA) is the regulatory body within DOT which enforces CFR 49. The FAA investigates incidents regarding potential violations of CFR 49 and may levy substantial fines to individuals and/or institutions failing to comply with requirements. The penalties for not complying with CFR 49 may involve:

1. Individual civil penalty of not less than \$250 or more than \$25,000 per violation.
2. Willful individual violations may be fined up to \$250,000 and/or receive up to 5 years in prison.
3. Business entities or institutions may be fined up to \$500,000 per violation.

E. Reading of these guidelines alone is not intended to provide training or certification as required by 49 CFR. Staff who are interested in achieving certification or are required by regulation to be certified to ship/package dangerous goods should refer to Section VI for details regarding training opportunities.

II. Classification of Dangerous Goods.

A. There are nine classes of dangerous goods.

Class 1: Explosives.

Class 2: Compressed gasses (flammable, non-flammable, toxic).

Class 3: Flammable liquids.

Class 4: Flammable solids.

Class 5: Oxidizers and organic peroxides.

Class 6: Poisonous (Division 6.1), and infectious materials (Division 6.2).

Class 7: Radioactives.

Class 8: Corrosives.

Class 9: Miscellaneous (includes dry ice and genetically modified organisms).

B. This document only addresses shipping requirements for packages containing infectious materials (Class 6.2), biological products, genetically modified organisms (Class 9), and dry ice (Class 9). For assistance on shipments involving other types of dangerous goods, contact OEHS at 828-1392 or Paul Smith at pasmith@vcu.edu. Generalized definitions of infectious substances, biological products, genetically modified organisms, and dry ice are provided below:

1. Infectious Substances, as defined by the DOT, "are materials known or reasonably expected to contain a pathogen. A pathogen is a micro-organism (including bacteria, viruses, rickettsiae, parasites, fungi) or other agent that can cause disease in humans or animals." Two categories have been established by IATA for which infectious substances may be shipped.

a. Category A Infectious Substances: These items are capable of causing permanent disability, life-threatening or fatal disease to humans or animals. Agents listed on [IATA Table 3.6.D](#), are always assigned to Category A but this table is not to be all inclusive.

b. Infectious Substances, Category B: These items are potentially infectious substances not meeting criteria for inclusion in Category A, shipped for research, diagnostic, clinical, or patient care purposes.

2. Biological Products.

a. Biological products as defined by IATA are those products derived from living organisms which are manufactured and distributed in accordance with the requirements of appropriate national authorities, which may have special licensing requirements, and are used either for prevention, treatment, or diagnosis of disease in humans or animals, or for development, experimental or investigational purposes related thereto. They include, but are not limited to, finished or unfinished products such as vaccines.

b. According to 49 CFR and 42 CFR (Department of Health & Human Services – Interstate Shipment of Etiological Agents), a biological product is: "A virus, therapeutic serum, toxin, antitoxin, vaccine, blood component/derivative, allergenic product, or analogous product, used in the prevention, diagnosis, treatment, or cure of disease in humans or animals."

3. Genetically modified organisms are organism whose genetic makeup has been changed by any method including natural processes, genetic engineering, cloning, mutagenesis,

or others. Genetically modified organisms which do not meet the definition of infectious substance but which are capable of altering animals, plants or microbiological substance in ways which is not normally the result of natural reproduction must be assigned to UN 3245.

4. Dry ice is solidified carbon dioxide that, at -78.5°C and ambient pressure, changes directly to a gas as it absorbs heat.

III. Responsibilities of the Shipper.

A. In accordance with 49 CFR, personnel involved in the preparation of shipping parcels, transportation, receipt, or other handling of dangerous goods in relation to shipment must receive training that addresses the following topics:

1. General Familiarization Training:

a. Must be aimed at providing general familiarity with the provisions of IATA DGR/49 CFR including requirements for:

- (1) Packaging
- (2) Labeling
- (3) Training Requirements
- (4) Documentation
- (5) Declaration
- (6) Hazard Assessment
- (7) Emergency Response

b. General familiarization training may be completed through attending OEHS-offered courses (refer to Section VI for details) or services provided by outside vendors/institutions providing proof of training is issued.

c. Staff completing general familiarization training must receive/maintain a certification verifying satisfaction completion of all elements as required by DOT.

d. General familiarization training/certification must be renewed every two years.

2. Function Specific Training:

a. Must provide detailed training in the requirements applicable to the function(s) for which the person is responsible.

b. University policy stipulates that it is the responsibility of principal investigators (PIs), laboratory/clinical managers, or other supervisory staff to ensure that employees are fully notified and trained with regard to hazards within their workplaces.

c. Function-specific training is required at the time of employment, annually thereafter, and whenever any new potentially harmful agents and/or procedures are added to a worker's task list.

3. Safety Training:

a. Must cover the hazards presented by dangerous goods, safe handling, and emergency response procedures.

b. Safety training is provided during new employee orientation, and is a continual responsibility of supervisory staff, supported by OEHS upon request.

B. Department of Transportation Regulations (49 CFR) and VCU policies require that PIs maintain up-to-date training/certification records for all staff involved in shipping/receiving of dangerous goods.

IV. Packaging Infectious Substances: Categories A and B.

A. Water-tight primary and secondary containers.

B. Either the primary or the secondary container must be pressure resistant to a pressure differential of not less than 95 kilopascal (0.95 bar, 13.8 lb/in²).

C. For liquid materials, absorbent material must be placed in between the primary and secondary containers that are sufficient to absorb the entire contents of the primary vessel(s).

D. Proper outer packaging (per 49 CFR) must be utilized for containing primary/secondary vessel

E. Shipments containing dry ice must be packaged to allow release of sublimating carbon dioxide gas.

F. All packaging materials utilized must meet applicable testing requirements and specifications per IATA and 49 CFR.

G. All packages must bear a UN specification mark.

H. Packages utilized for shipment must be at least 100 mm x 100mm (4 in) to meet the minimal packaging dimension requirements.

V. Labeling.

A. Category A, Infectious Substances:

1. An itemized list of contents must be enclosed between the secondary vessel and the outer packaging.
2. All consignments containing infectious substances (IATA Packing Instruction 602) must bear a Class 6.2 Infectious Substances label and a Class 9 label if dry ice is shipped with the agent.
3. Outer packages must clearly display the common or technical name and the corresponding UN code number of the enclosed pathogen:
 - a. UN 2814: *“Infectious substance, affecting humans”*
 - b. UN 2900: *“Infectious substance, affecting animals”*
4. All packages containing liquids must bear the universal “arrow up” label on the shipping box.
5. When overpacks are used, the exterior of the package must state, "OVERPACK."
6. When package quantities exceed the passenger aircraft quantity limits (50 g, 50 ml), a “Cargo Aircraft Only” label must be placed on the package.

B. Infectious Substances, Category B.

1. All consignments containing infectious substances, category B must comply with IATA Packing Instruction 650 and must bear a "UN 3373" label and a Class 9 label if dry ice is shipped with the package.
2. Outer packages must clearly display the "Biological Substance, Category B."
3. Packages containing "Biological Substances, Category B" specimens must bear the universal biohazard symbol. The biohazard symbol should be orange in color and void of classification numbers or verbiage (**do not** use a division 6.2 Infectious Substance label for this application).
4. All packages containing liquids must bear the universal “arrow up” label on the shipping box.
5. When overpacks are used, the exterior of the package must state, "OVERPACK."

C. Genetically Modified Organisms.

1. An itemized list of contents must be enclosed between the secondary vessel and the outer packaging.

2. All consignments containing genetically modified organisms (IATA Packing Instruction 913) must bear a Class 6.2 Infectious Substances label and a Class 9 label if dry ice is shipped with the agent. Packing instruction 913 follows the instructions of packing instruction 602.

3. Outer packages must clearly display the common or technical name and the corresponding UN code number of the enclosed organism: “UN 3245: *Genetically Modified Organism.*”

4. All packages containing liquids must bear the universal “arrow up” label on the shipping box.

5. When overpacks are used, the exterior of the package must state, “OVERPACK.”

6. When package quantities exceed the passenger aircraft quantity limits (100 g, 100 ml), a “Cargo Aircraft Only” label must be placed on the package.

D. Dry Ice: All specimens shipped in dry ice must bear the Class 9 Miscellaneous Hazard label. Outer packaging must also bear the weight (kg) of the enclosed dry ice shipment.

VI. Dangerous Goods Training & Certification.

A. As specified within 49 CFR: All individuals involved in the preparation of packaging, transportation, receiving or other handling of dangerous goods throughout the shipping process must be trained, tested and certified every two years.

1. The shipper is responsible for maintaining training and certification records.

2. University policy dictates that principal investigators, laboratory/clinical managers, or other supervisory staff are responsible for assuring their staff receives all training required under 49 CFR.

B. In-House Dangerous Goods Shipping Training Programs:

1. Platform Training Sessions: As a service to VCU departments and staff, OEHS offers dangerous goods training/certification which focuses on the shipment of infectious substances, biological products, genetically modified organisms, and dry ice. The sessions are offered on a quarterly basis. For more information regarding training times/dates/locations, visit the OEHS [Dangerous Goods Training](#) web page.

2. Distance Learning: Individual training/certification can be achieved by utilizing the university’s Blackboard Academic Suite. To gain access, please visit the [Laboratory Safety Training Link](#) on the Chemical and Biological Safety website.

VII. Declaration & Documentary Requirements.

A. Category A, Infectious Substances:

1. When shipping a Category A, infectious substance a dangerous goods declaration form must be filled out. Suitable declaration forms may be acquired from your carrier. Hand-written notices are not acceptable.

2. When shipping category A, infectious substances there must be two typed/signed copies of the declaration attached to the package. A third copy must be maintained for the shipper's records. Suitable declaration forms may be acquired from the carrier.

NOTE: Declaration forms must bear "red candy stripes" on each side of the paper, if you do not have a color printer, you may purchase paper with the red candy stripes from Saf-T-Pak or other vendors.

B. Other Dangerous Goods: As indicated previously, there are nine hazard classes of dangerous goods which include thousands of regulated materials. If it is suspected that shipments may involve dangerous goods in hazard classes other than those addressed in the university dangerous goods training program, contact OEHS for assistance prior to the packaging, transporting, or otherwise handling such items.

C. Nondeclarable items: A dangerous goods declaration is not required when shipping biological substances category B, biological products, and/or dry ice (see note below).

NOTE: When shipments involve dry ice and no declarable dangerous goods materials, declaration is not required. Notification of the presence of dry ice and quantity involved must; however, be indicated in the "Nature and Quantity of Goods" box which is provided on the air waybill.

D. Air Waybills: For air shipments of all materials, regardless of classification, an air waybill must be filled out properly and must be typed.

VIII. Hazard Assessment.

A. Hazard assessments (assignment of risk groups) must be performed on all suspect materials prior to shipping to determine if substance(s) are regulated as dangerous goods under 49 CFR or are affected by other regulatory requirements (e.g., biological substance requiring packaging per IATA instructions).

B. Principal investigators, laboratory managers, or other senior staff members involved in laboratory/clinical supervision shall be responsible for performing hazard assessments on all suspect materials prior to allowing staff to engage in packaging, shipping, or other handling activities. Contact OEHS at 828-1392 if assistance is required.

C. Hazard assessments must also be conducted on suspect packages that may be received by university laboratories/clinics prior to allowing staff to open or otherwise handle such parcels.

IX. Emergency Contact.

A. An around-the-clock (“24/7”) emergency contact telephone number must be provided on dangerous goods declarations for all shipments containing Category A, Infectious Substances.

B. The emergency contact must be knowledgeable regarding the agent involved and must be experienced in prudent emergency response measures to be taken in the event of a release.

C. The emergency number must provide direct access to the emergency contact; use of telepaggers and/or answering machines is not acceptable.

The information provided in this document should not be considered adequate for satisfying the training/certification requirements for dangerous goods shipping as specified by DOT 49 CFR. Training, testing, and certifying is primarily available through OEHS, IATA-qualified training vendors, or other OEHS-approved means. For more information regarding participation in a training/certification program for shipping of dangerous goods refer to Section VI B.