

# University of Medicine and Dentistry of New Jersey EOHSS FACT SHEET

## Shipping Biological Materials, Recombinant DNA & Dry Ice

The Centers for Disease Control and Prevention (CDC), the Department of Transportation (DOT), and the International Air Transport Association (IATA) have requirements regarding shipment of hazardous materials, which are termed, "[dangerous goods](#)<sup>1</sup>". Dangerous goods are articles or substances which are capable of posing a risk to health, safety, property or the environment. **Infectious substances, diagnostic specimens, genetically modified microorganisms and dry ice are listed as dangerous goods and must be packaged and shipped accordingly.** Implementation of the IATA requirements ensures compliance with all of the other agencies' requirements.

IATA requirements are updated annually, are complex and may be non-intuitive. This fact sheet provides only an overview of the current requirements regarding training, packaging, labeling and transportation regulations. You will also need to know UN codes, specific packing instructions and other information from the IATA [Dangerous Goods Regulations Manual](#)<sup>2</sup> to properly prepare your shipment. Relevant pages and information are available on the EOHSS website and are also distributed during training sessions.



### 2005 Regulatory Update

Shipping regulations have changed significantly in 2005. The major updates include:

- Infectious agents and diagnostic specimens have been classified into lists known as "Category A agents" and "Category B agents." Category A agents are infectious materials that have the potential to cause serious/life threatening disease or disability, while Category B agents are generally diagnostic specimens which pose a low risk during transportation.
- Diagnostic and clinical specimens must be labeled with UN3373 and be marked "Diagnostic Specimen" or "Clinical Specimen."
- Airbills for diagnostic specimens will need to include the text "Diagnostic Specimen" or "Clinical Specimen," and package will require the UN3373 label.

### Training Requirements

IATA training is required for all UMDNJ personnel who

- prepare shipping documentation,
- mark and label packages,
- fill packages,
- accept packages, or
- supervise transport of packages.

Training is required initially and must be refreshed within 24 months of the previous training. The training will describe the shipper's responsibilities and provides the necessary guidelines and references to ensure the safe and compliant transport of dangerous goods. Similar training is also required for authorization to ship other [dangerous goods](#)<sup>1</sup>, including chemicals and radioactive materials. Follow the campus-specific links from the EOHSS web page (<http://www2.umdj.edu/eohssweb/eohss.htm>) to access training schedules and information.

## IATA Shipping Terms

**INFECTIOUS SUBSTANCES are class 6.2 Dangerous Goods.** IATA defines infectious substances as materials known or reasonably expected to contain pathogens. Pathogens are defined as microorganisms (including bacteria, viruses, rickettsiae, parasites, or fungi) and other agents such as prions, which have the potential to cause disease upon exposure to humans or animals. Infectious substances are assigned to UN classes based on the following definitions:

- **Category A:** An infectious substance which is transported in a form that is capable of causing permanent disability, life threatening or fatal disease in humans or animals. Category A infectious substances require [Packaging Instruction 602](#)<sup>4</sup> and are assigned to either **UN2814** (infectious substances affecting humans) or **UN2900** (infectious substances affecting animals). Examples of Category A materials are listed in Table 1.
- **Category B:** An infectious substance which does not pose a risk of causing permanent disability, life threatening or fatal disease to humans or animals. Most diagnostic or clinical specimens are considered Category B and are assigned **UN 3373** and follow [Packaging Instruction 650](#)<sup>5</sup>.

**CULTURES & LABORATORY STOCKS** are materials that have been amplified or propagated in order to generate high concentrations of organisms. This definition of cultures and stocks refers to items prepared for the intentional generation of pathogens and does not include cultures intended for diagnostic and clinical purposes. Cultures that meet the criteria of Category A or B infectious substances must be handled accordingly.

**GENETICALLY MODIFIED ORGANISMS (GMOs) are class 9 Dangerous Goods.** GMOs are defined as an organism in which genetic material has been purposely altered in a way that does not occur naturally. These materials are assigned **UN 3425** and should be packed according to [Packing Instruction 602](#)<sup>3</sup>. The maximum quantity in a primary receptacle must not exceed 100 ml. or 100 g. If GMOs meet the definition of Category A or B infectious substances, they must be handled accordingly.

**DRY ICE is a class 9 Dangerous Good.** Packages containing dry ice must always be declared as such by proper marking and labeling. A shipper's declaration form is not required if no other dangerous goods are in the shipment. Dry ice must be packaged to permit the release of carbon dioxide gas and to prevent a build-up of pressure that could rupture the packaging. [Packaging Instruction 904](#)<sup>6</sup> must be used. A [dry ice shipper's checklist](#)<sup>7</sup> is available on the EOHSS website. Special packaging and arrangements must be made with the carrier for packages containing [liquid nitrogen](#)<sup>8</sup>.

**BIOLOGICAL PRODUCTS** may be considered dangerous goods and are divided into two groups.

- Products manufactured and packaged in accordance with the requirements of appropriate national authorities (such as FDA). These products must be planned for use for personal health care by medical professionals or individuals. If these items are being transported for the purposes of final packaging or distribution they are not subject to dangerous goods regulations. However, [Packaging Instruction 650](#)<sup>5</sup> is recommended.
  - Examples of non-regulated biological products may include vaccines; licensed diagnostic kits; experimental product distributed prior to licensing; investigational new drugs; items used for prevention, treatment, or diagnosis of disease in humans or animals; and items used for development, experimental or investigational purposes.

- Substances which are not described above and are known or reasonably believed to contain infectious substances may meet the criteria for inclusion in Category A or Category B. If substances meet the definition of Category A or B materials, then they must be handled as an infectious substance.

**TABLE 1: CATEGORY A INFECTIOUS SUBSTANCES**

UN Number & Proper Shipping Name	Organism Name
<b>UN 2814: Infectious substances affecting humans</b>	<i>Bacillus anthracis</i> (cultures only)
	<i>Brucella abortus</i> (cultures only)
	<i>Brucella melitensis</i> (cultures only)
	<i>Brucella suis</i> (cultures only)
	<i>Burkholderia mallei</i> - <i>Pseudomonas mallei</i> – Glanders (cultures only)
	<i>Burkholderia pseudomallei</i> – <i>Pseudomonas pseudomallei</i> (cultures only)
	<i>Chlamydia psittaci</i> - avian strains (cultures only)
	<i>Clostridium botulinum</i> (cultures only)
	<i>Coccidioides immitis</i> (cultures only)
	<i>Coxiella burnetii</i> (cultures only)
	Crimean-Congo hemorrhagic fever virus
	Dengue virus (cultures only)
	Eastern equine encephalitis virus (cultures only)
	<i>Escherichia coli</i> , verotoxigenic (cultures only)
	Ebola virus
	Flexal virus
	<i>Francisella tularensis</i> (cultures only)
	Guanarito virus
	Hantaan virus
	Hantaviruses causing hantavirus pulmonary syndrome
	Hendra virus
	Hepatitis B virus (cultures only)
	Herpes B virus (cultures only)
	Human immunodeficiency virus (cultures only)
	Highly pathogenic avian influenza virus (cultures only)
	Japanese Encephalitis virus (cultures only)
	Junin virus
	Kysanur Forest disease virus
	Lassa virus
	Machupo virus
	Marburg virus
	Monkeypox virus
	<i>Mycobacterium tuberculosis</i> (cultures only)
	Nipah virus
	Omsk hemorrhagic fever virus
	Poliovirus (cultures only)
	Rabies virus
	<i>Rickettsia prowazekii</i> (cultures only)
	<i>Rickettsia rickettsii</i> (cultures only)
	Rift Valley fever virus
	Russian spring-summer encephalitis virus (cultures only)
Sabia virus	
<i>Shigella dysenteriae type 1</i> (cultures only)	
Tick-borne encephalitis virus (cultures only)	
Variola virus	
Venezuelan equine encephalitis virus	
West Nile virus (cultures only)	
Yellow fever virus (cultures only)	
<i>Yersinia pestis</i> (cultures only)	
<b>UN 2900: Infectious substances affecting animals only</b>	African horse sickness virus
	African swine fever virus
	Avian paramyxovirus Type 1 - Newcastle disease virus
	Bluetongue virus
	Classical swine fever virus
	Foot and mouth disease virus
	Lumpy skin disease virus
	<i>Mycoplasma mycoides</i> - Contagious bovine pleuropneumonia
	Peste des petits ruminants virus
	Rinderpest virus
	Sheep-pox virus
	Goatpox virus
	Swine vesicular disease virus
	Vesicular stomatitis virus

## Required Steps for Shipping Dangerous Goods

Shippers are responsible for following the eight steps below when shipping dangerous goods:

1. **Classify.** The materials must be classified according to hazard class 1-9 (ex. infectious substances are class 6.2, GMOs are class 9 ). Any additional hazards present such as dry ice or flammable materials must also be identified.
2. **Identify.** From the IATA Dangerous Goods Manual, identify a proper shipping name, UN ID number, hazard class, packing group, cargo/passenger air limitations and special provisions.
3. **Select the Proper Packaging.** The IATA Dangerous Goods manual sets out which packing instructions should be used. An example of a **triple-packaging** system for packaging infectious, diagnostic or biological shipments is shown on page 5.
4. **Pack.** Follow the directions provided by the packing material manufacturer. Make sure all of the components are included. Ensure a leak proof seal. Be sure to tape the screw cap of the primary containers.
5. **Mark and Label.** [Labels](#) identify that packages contain dangerous goods & give a broad indication of the type of material inside the box. Mislabeling or misrepresenting package contents is illegal.
6. **Complete the Documentation.** All shipments of dangerous goods must be accompanied by an airway bill or shipper's declaration that describes the consignment in detail. For an infectious substance, both a shipper's declaration and a 24-hour emergency response telephone # are required. EOHSS provides a service to use [Chemtel](#)<sup>9</sup> for the 24 hour contact number, if needed. See step 8 for additional information.
7. **Make Arrangements.** Inquire if there are any special handling or [permit requirements](#)<sup>10</sup> for your shipment. Ensure the person you are shipping the package to is aware of the contents and logistics of the package.
8. **Inform Chem-Tel.** Provide UMDNJ and Chem-tel with details about the package by using the form at: <http://www2.umdnj.edu/eohssweb/publications/chemtel.htm>. Chem-tel will be available 24 hours a day if there is any problem with the package during shipping. Persons filling out the Chem-tel form must be up to date on their IATA training requirements.

## Prohibited Modes of Transportation

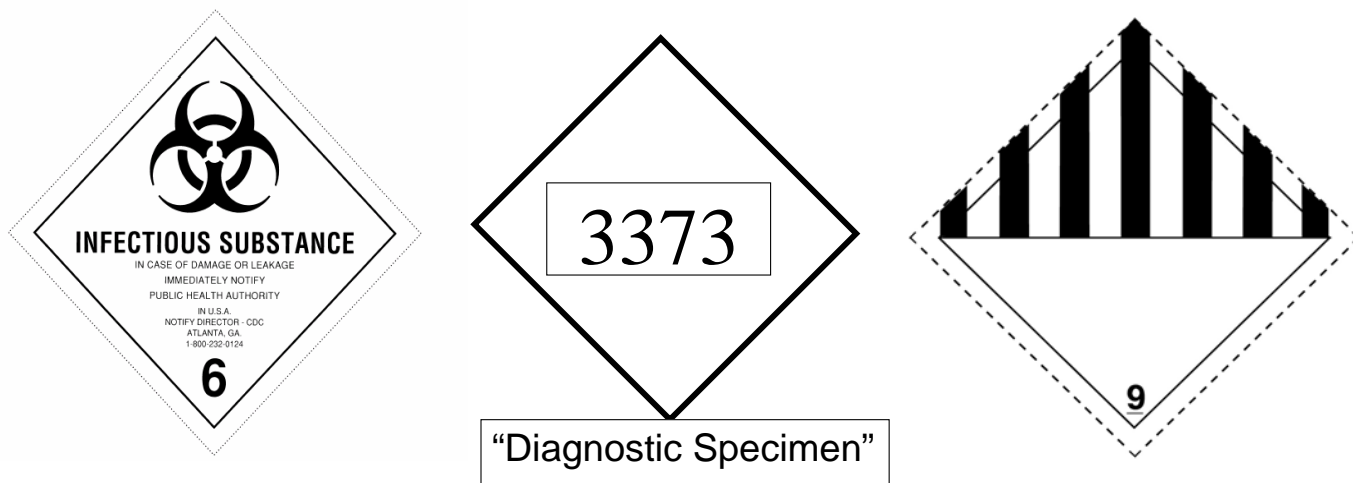
***Carrying dangerous goods by hand or in luggage is only permitted if explicit approval is given from the carrier.*** Dry ice, only if declared to the carrier and approved, may be put in carry-on or checked baggage.

IATA/DOT regulations cover any dangerous goods that are carried or transported including when boarding an airplane. Persons who violate IATA regulations are subject to fines and criminal prosecution. Recently, regulators have begun a crackdown on University shipping procedures. [Contact EOHSS](#)<sup>3</sup> if you are not sure if the materials you are shipping need to be handled as a dangerous good.

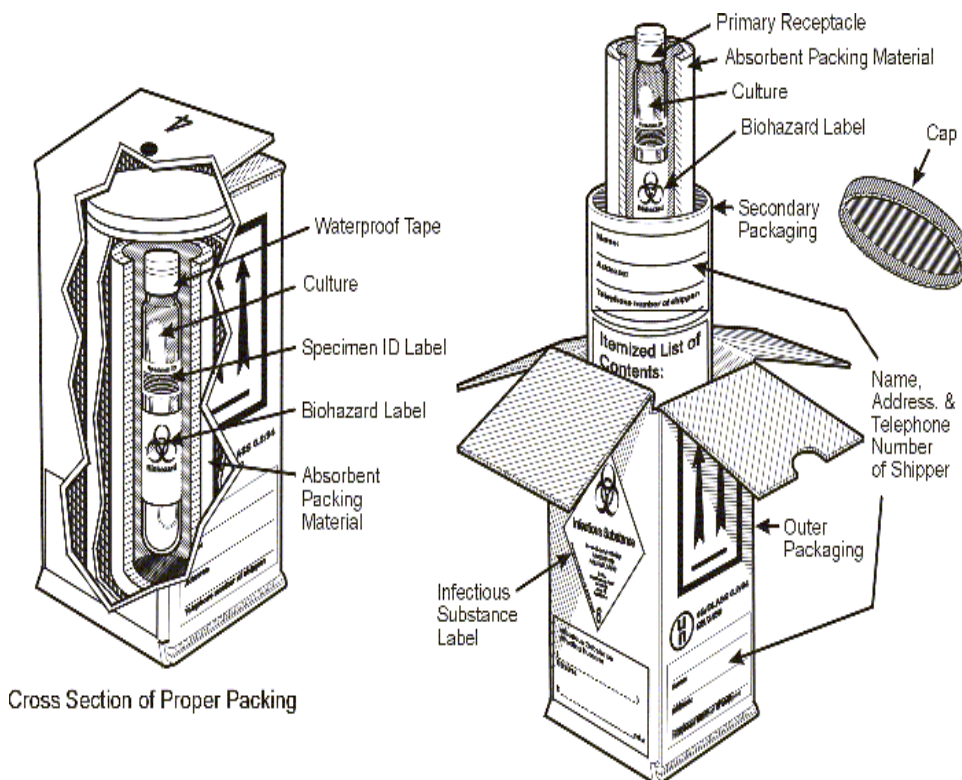
## Labels & Packaging

Infectious substances and other dangerous goods must be transported in appropriate containers. UN approved packaging materials meet stringent "test" criteria ensuring that the package can withstand leakage, shocks, temperature changes and pressure changes that can occur during transport. These UN approved packaging materials are acceptable for transport of shipments in motor vehicles, trains, boats and airplanes.

**Labels:** If package contains infectious materials, a class 6 infectious substance label must be placed on the outer packaging. A new diamond shaped label printed with UN 3373 is required for all diagnostic or clinical specimens. If dry ice is present in the shipment, a class 9 diamond label must be on the outer packaging. When shipping over 50 ml or 50g of infectious substance, you must also put a "Cargo air craft only" label on the outer package.



**Triple Packaging:** Biologicals, diagnostic and infectious materials must be packaged as depicted. The three elements of triple packaging system include; a primary watertight receptacle, a leak-proof secondary container, and a durable outer container.



## Receiving Dangerous Goods Packages

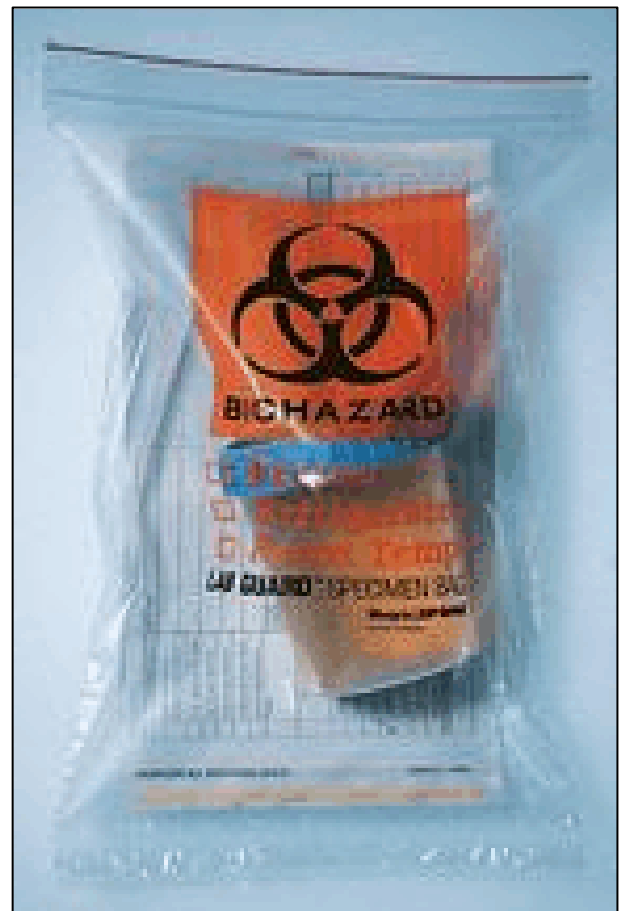
The following provisions should be incorporated into the SOP for receipt of packages containing infectious substances, diagnostic specimens or GMOs. Before being opened, the shipment should be examined for the following:

- Proper paperwork and labeling: The label and accompanying documentation should be examined and this information given to the PI, the recipient, or other designated personnel.
- Package integrity: The package should not be leaking or appear damaged in any way. If it is, notify the PI immediately. Disinfection & clean-up materials should be available for spills.
- Leaking Packages: Receiving departments should not handle a package that appears to be leaking or damaged. Receiving personnel should isolate the area around the package, and then notify the recipient as well as EOHSS. If anyone has become contaminated after handling the leaking package, they should wash the affected area for 15 minutes, and then contact Employee Health for additional medical follow-up. The recipient should clean up any spill and decontaminate the area according to procedures listed below.
- Package Delivery: The package should be delivered directly to the person who appears on the address label or to persons designated to receive hazardous material shipments. The Principal Investigator or personnel to whom the package is addressed should be notified of its arrival.
- Opening the package: *Use the following precautions when opening any package:*
  - The package should be opened in a room that has the appropriate biosafety level rating for the material received (e.g., a lab receiving BSL 2 materials should have a BSL 2 notation on the door & meet BSL 2 requirements). A Class II biological safety cabinet provides the best protection and is most suitable for opening and handling incoming specimens of Biosafety Level-2 (BL-2) organisms).
  - If the package appears to be leaking or damaged, it should only be opened in a biological safety cabinet by personnel who are trained in spill clean-up procedures and are wearing appropriate personal protective equipment. Laboratory coats, gloves and appropriate eye protection must be worn.
  - The EOHSS flipchart entitled "Emergency Response Guide" should be posted in a conspicuous place for immediate reference. Handle damaged or leaking shipments as biological spills. Follow instructions on the flipchart on how to deal with a biohazardous spill or exposure as appropriate. If you need to obtain a flipchart, [contact your campus EOHSS office](#)<sup>3</sup>.

## Personal Ground Transport of Specimens

If you are transporting infectious agents or human materials between facilities, follow these guidelines:

- Specimen containers must be watertight and leak-proof. All materials must be transported and stored in a secondary container to prevent breakage. The secondary container must be capable of containing the materials if the primary container breaks or leaks. Absorbent materials must be included between the primary and the secondary container in a quantity sufficient to absorb all liquids and to cushion the materials to prevent container breakage.
- If the specimen container is a tube, ensure it is tightly capped and placed in a rack to maintain an upright position.
- Place specimen containers and racks in robust, leak-proof plastic or metal transport boxes with secure, tight fitting covers.
- Secure the transport boxes in the transport vehicle.
- Label each transport box with its contents, a biohazard symbol, the name and telephone number of an emergency contact person, and the receiver's name, address and telephone number.
- Specimen data forms and identification data should accompany each transport box.
- Keep a spill kit containing absorbent material, a chloride disinfectant, a leak-proof waste container and heavy reusable gloves in the transport vehicle.
- When transporting multiple primary containers, package them in a manner that will prevent damage to the containers. For example, if you are preparing to transport a number of vacutainers, place these in a rack that will prevent contact between the tubes.
- Travel directly from the pick up location to the drop off point.



## Shipping Resources

- FED-EX Dangerous Goods Shipping  
<http://www.fedex.com/us/services/options/express/dangerousgoods/regulatory.html?link=4>
- AIHA Laboratory Health and Safety Committee Shipping Links  
<http://www2.umdj.edu/eohssweb/aiha/technical/biosafety.htm#Shipping>
- Guidelines for Products that do not Require an Import Permit  
[http://www.aphis.usda.gov/vs/ncie/fac\\_imp.html](http://www.aphis.usda.gov/vs/ncie/fac_imp.html)
- Additional information and resources:  
<http://www2.umdj.edu/eohssweb/publications/factsheets.htm#Shipping>

## References

1. Dangerous Goods Classifications  
<http://www2.umdj.edu/eohssweb/publications/dangerousgoods.htm>
2. Dangerous Goods Regulation Manual  
[http://www.iata.org/whatwedo/dangerous\\_goods](http://www.iata.org/whatwedo/dangerous_goods)
3. EOHSS Contact Information  
<http://www2.umdj.edu/eohssweb/eohss.htm#Contact>
4. IATA Packing Instruction 602  
<http://www2.umdj.edu/eohssweb/publications/PI602.pdf>
5. IATA Packing Instruction 650  
<http://www2.umdj.edu/eohssweb/publications/PI650.pdf>
6. IATA Packing Instruction 904  
<http://www2.umdj.edu/eohssweb/publications/PI904.pdf>
7. Dry Ice Shippers Checklist  
<http://www2.umdj.edu/eohssweb/publications/DryIceChecklist.pdf>
8. Liquid Nitrogen Dry Shippers , University of Washington, Tips  
<http://www.ehs.washington.edu/updates/TipsDryShipper.pdf>
9. Chemtel  
<http://www2.umdj.edu/eohssweb/publications/chemtel.htm>
10. Guidelines for Products that do not Require an Import Permit  
[http://www.aphis.usda.gov/vs/ncie/fac\\_imp.html](http://www.aphis.usda.gov/vs/ncie/fac_imp.html)

## Contact Information

### Environmental & Occupational Health & Safety Services (EOHSS)

**Newark Campus**  
(973) 972-4812  
Fax (973) 972-3694

**Piscataway/New Brunswick Campuses**  
(732) 235-4058  
Fax (732)235-5270

**Scotch Plains Campus**  
(908) 889-2486  
Fax (908) 889 - 2496

**Camden/Stratford Campuses**  
(856) 566-6189  
Fax (856) 566-6352