

# Dangerous Goods Shipping

Environmental Health and Safety

<http://www.ehs.pitt.edu>

(412)624-9505



# Instructions for Training Module

- There are four sections in this training module. Once the content of each section has been reviewed, complete the quiz at the end of each section.
- **Passing Score** – Once a **total minimum score of 12 correct answers** between the four quizzes is achieved, you will immediately receive a Certificate of Training via Pitt email (@pitt.edu) and be certified to ship the materials covered in this training.
- **If you score below 12 correct answers**, you will need to review the content again and re-take the quizzes.
- The training can be exited at any time and started at the exact point where leaving off **as long as you use the same computer and the same browser (without deleting cookies) on which the training was started.** The training must be completed within one week of starting it.

# Introduction

Upon completion of this module, **shippers will only be certified to ship the materials listed below**. This training will focus on transportation regulations for shipping the following materials:

- Infectious Substances
- Biological Substances, Category B
- Exempt Patient Specimens
- Genetically Modified Micro-Organisms
- Dry Ice or Carbon Dioxide, solid

If shipping any other Dangerous Goods (such as: ethanol, formalin, methanol, corrosive materials, etc.) please contact EH&S at 412-624-9505. Additional training is required.

# Training Requirement

Each person who offers Dangerous Goods for transportation must properly classify, package, mark, label, and document the shipment. All persons coming in contact with and directly affecting the safe transportation must be trained and certified.

The shipper (individual that signs the paperwork) is ultimately responsible for ensuring compliance.



# Dangerous Goods (DG)

*Dangerous Goods are defined as articles or substances capable of posing a risk to health, safety, property or the environment and which are shown in the Dangerous Goods Table found in the IATA Dangerous Goods Regulations.*

# Regulatory Oversight of Dangerous Goods Transportation

Safe transport of Dangerous Goods is regulated by the United States Federal Government

- United States Federal Regulations  
**US DOT** – United States Department of Transportation



- International Regulations  
**IATA** – International Air Transport Association  
**ICAO** – International Civil Aviation Organization



- IATA is more strict than DOT in some cases
- Contact carriers (FedEx, UPS, DHL, etc.) for information related to carrier-specific variations. Carriers may have variations that are more strict than the IATA regulations.

**This training program focuses specifically on IATA standards.**

# Purpose of Training and Goals of Program

## **Purpose**

- Ensure safe handling of Dangerous Goods
- Compliance. Training is required every two years!

## **When this training is completed, you will be able to:**

- Use information to help make decisions regarding Dangerous Goods shipments
- Determine if a material is classified as a Dangerous Goods
- Provide documentation of training. Keep a copy of your certificate of training for your records.

# The Training Requirement

## 49 CFR 172.704 – IATA 1.5

Everyone who directly affects hazardous material transportation safety in commerce must be trained.

**Training is to take place every 2 years (IATA).**

A test must be taken to demonstrate understanding of the training content.

Training must provide information in the following areas:

1. **General Familiarization** – recognize Dangerous Goods and provide familiarity with requirements
2. **Function Specific** – requirements for specific tasks
3. **Safety Training** – emergency response information and safe handling procedures.



# Dangerous Goods Hazard Classes

## Class 1: Explosives

article suspected of having explosive characteristics



## Class 2.1: Flammable Gas

forms flammable mixture when mixed with air



## Class 2.2: Non-Flammable

displaces oxygen (asphyxiant) / oxidizing gases



## Class 2.3: Toxic Gas

toxic/corrosive gas and cause health hazards



# Dangerous Goods Hazard Classes

## Class 3: Flammable Liquids

liquids with a flashpoint  $<140^{\circ}$  F



## Class 4.1: Flammable Solids

solids which may cause fire through friction



## Class 4.2: Spontaneously Combustible

liable to spontaneous heating under normal conditions



## Class 4.3: Dangerous When Wet

contact with water generates flammable gases



# Dangerous Goods Hazard Classes

## Class 5.1: Oxidizer

contribute to combustion of other material by yielding oxygen



## Class 5.2: Organic Peroxide

hydrogen peroxide derivatives in which one or both of the hydrogen atoms have been replaced by organic radicals



## Class 6.1: Poison/Toxic

cause injury/harm/death if swallowed, inhaled, or contacted by skin



# Dangerous Goods Hazard Classes

## Class 6.2: Infectious Substance

known or expected to contain pathogens, which can cause disease in humans or animals



## Class 7: Radioactive



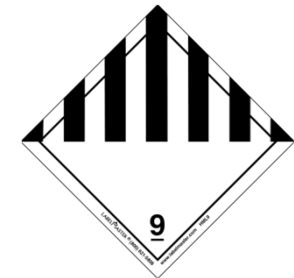
## Class 8: Corrosive

causes severe damage when in contact with tissue



## Class 9: Miscellaneous

substances that present a danger not covered by other classes



# Identifying Dangerous Goods

- **Dangerous Goods Table**
  - Lists alphabetically approximately 3,000 regulated articles, which are likely to be offered for transportation by air
  - To properly prepare, offer, or transport these materials, you must use this table

NOTE – This training only covers the Dangerous Goods listed on Slide 3. Upon the completion of this course, you will be certified to ship the materials listed on Slide 3. If shipping any other Dangerous Goods, additional training is required. Contact EH&S at 412-624-9505 for details.

# Dangerous Goods Table

[Abbreviated to include information reviewed in this training module]

UN/ID no. A	Proper Shipping Name/Description B	Class or Div C	Hazard Label(s) D	PG E	Passenger & Cargo Pkg Inst I	Passenger & Cargo MaxNet Qty/Pkg J	Cargo Only Pkg Inst K	Cargo Only MaxNet Qty/Pkg L
UN3373	<b>Biological substance, Category B</b>	6.2	-		See 650	See 650	See 650	See 650
UN1845	<b>Dry Ice</b>	9	Miscellaneous		954	200 kg	954	200 kg
UN3245	<b>Genetically modified micro-organisms</b>	9	-		959	No limit	959	No limit
UN2900	<b>Infectious substance, affecting animals</b> only (liquid)	6.2	Infectious Substance		620	50 mL	620	4 L
UN2900	<b>Infectious substance, affecting animals</b> only (solid)	6.2	Infectious Substance		620	50 g	620	4 kg
UN2814	<b>Infectious substance, affecting humans</b> (liquid)	6.2	Infectious Substance		620	50 mL	620	4 L
UN2814	<b>Infectious substance, affecting humans</b> (solid)	6.2	Infectious Substance		620	50 g	620	4 kg



# Dangerous Goods Table

- **Column A** – UN number/ID number
- **Column B** – Proper Shipping Name
- **Column C** – Class or Division and Subsidiary Risk
- **Column D** – Hazard Labels (outside of package)
- **Column E** – Packing Group

## **Dangerous Goods Table (continued)**

- **Column I** – Passenger and Cargo Aircraft Packing Instructions
- **Column J** – Passenger and Cargo Aircraft, Maximum Net Quantity
- **Column K** – Cargo Aircraft Only, Packing Instructions
- **Column L** – Cargo Aircraft Only, Maximum Net Quantity

# Shipper's Responsibilities

- The shipper is responsible for properly:
  - Classifying substances for shipment
  - Identifying the UN number and proper shipping name
  - Assembling packages
  - Marking and labeling packages
  - Documenting shipments

# Classification

- Shippers must make the determination as to whether shipped material is a regulated Dangerous Good
  - Refer to the IATA definitions for proper classifications
  - Refer to Slides 35, 36, and 85
- Each decision is based on the shipper's understanding and interpretation of the definitions

# Identification

- A **Proper Shipping Name** is assigned for all Dangerous Goods
- Examples of Proper Shipping Names:
  - Infectious substance, affecting humans
  - Infectious substance, affecting animals
  - Biological substance, Category B
  - Genetically modified micro-organisms
  - Dry Ice

# Proper Packaging

All packaging used to transport Dangerous Goods must be designed, constructed, and maintained to prevent the release of Dangerous Goods.

## Performance Packaging

- inner receptacle
- cushioning/absorbent materials
- secondary receptacle
- outer packaging





# Re-use of Packaging

Containers and packages may be used again **ONLY IF:**

- The package complies with the US DOT Hazardous Material Regulations and IATA specifications
- The packages are in like-new condition
- Previous markings and labels that do not apply are **removed/obliterated/completely covered**
- The package has been disinfected/sterilized to eliminate hazards

# Outer Package is Not Acceptable to be Re-used (must completely remove labels)



# Packing Instructions

Packing Instructions are documents which outline packing, marking, and labeling procedures to ensure that packages containing Dangerous Goods arrive at their destination in good condition and present no hazards during transport.

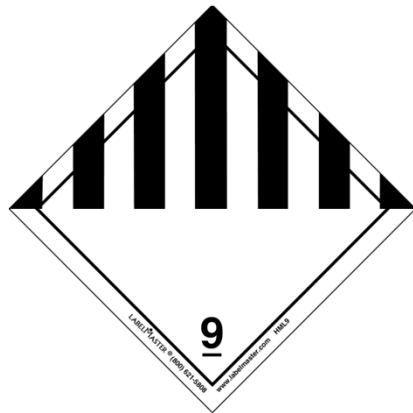
# Proper Packaging

## **The shipper must:**

- Comply with applicable Packing Instructions for each type of material shipped (see Dangerous Goods Table - Slide 14)
- Follow packaging manufacturer's instructions for packing materials
- Restrict quantity to limits specified in Columns J or L of Dangerous Goods Table (see Slide 14)

# Labeling

- **Labels** identify the primary and subsidiary/secondary hazards of the material being shipped
- Shipper must apply appropriate labels to each package
- **Hazard Labels must be:**
  - Placed in a “diamond on point” position (shown below)
  - 100mm x 100mm (4” x 4”)



# Marking

**Marking** – required information on the outer package containing Dangerous Goods (DG)

## **Markings required on most packages of DG:**

- Proper shipping name (with technical name if applicable);
- UN number or ID number;
- Name and address of shipper and consignee (receiver);
- Name and phone number of person responsible for shipment (**required if shipping Infectious Substance, Category A**);
- Net Weight of Dry Ice (declared in kg), if used.



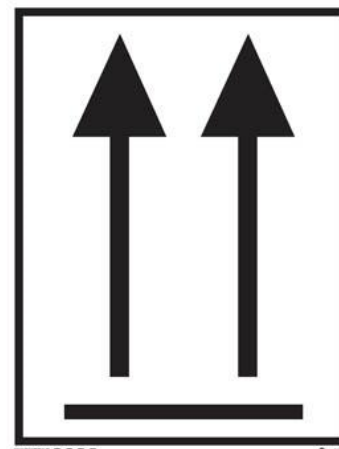
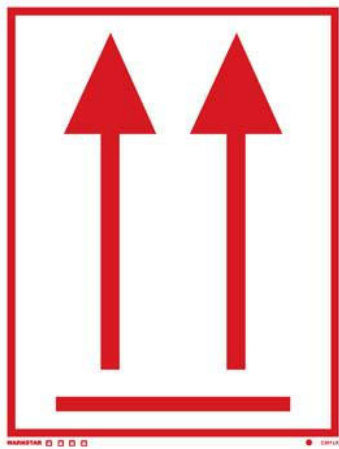
# Marking/Labeling

- Package must be large enough to accommodate all marks and labels;
- Labels/marks must be printed on or affixed to the same surface of the package near the proper shipping name;
- Labels/marks must be on a background of contrasting color and may not wrap around corners;
- Labels/marks must not be obscured/overlapped by other labels, marks, or attachments.

# Marking – Package Orientation Markings

Package Orientation markings must be placed on opposing vertical sides of packages used to transport liquid Dangerous Goods

(marks must be **Red** or **Black**)



# **Two-Tiered Classification System for Infectious Substances**

**Category A**

**or**

**Category B**

**Category A Infectious Substances pose a higher degree of risk than Category B.**

# **Shipping of Infectious Substance, Category A**

# Infectious Substances – Definition

Substances which are known or reasonably expected to contain human or animal pathogens.

Pathogens are defined as micro-organisms, (bacteria, viruses, parasites, fungi) and other agents which can cause disease in humans or animals.

Note: Toxins from plant, animal, or bacterial sources which do not contain any infectious substances should be considered for classification in Division 6.1. Additional training is required to ship these toxins.

***UN3172, Toxins, extracted from living sources, liquid, n.o.s., 6.1, PG II***

# Infectious Substance - Category A

**Category A** – An infectious substance which is transported in a form that, when **exposure** to it occurs, is **capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals**. (see lists on Slides 35 and 36 for indicative examples)

An exposure occurs when the substance is released outside of the protective packaging, resulting in physical contact with humans or animals.



# Infectious Substance - Category A

Assignment to Category A must be based on known medical history, symptoms of the source patient/animal, endemic local conditions, or professional judgment.

**Consider the risk of transmission and infection posed during transport**

# Infectious Substance - Category A

## Proper Shipping Names:

Infectious Substance, affecting humans, UN2814

Infectious Substance, affecting animals, UN2900

\*Select UN2814 if substance affects both humans and animals

If shipping Category A Infectious Substances, you must use specially designed packaging (UN-rated packaging).

# Indicative Examples of Category A Infectious Substances

## *UN2814, Infectious Substance, Affecting Humans*

- Bacillus anthracis (cultures only)
- Brucella abortus, melitensis, suis (cultures only)
- Burkholderia mallei, psuedomallei (cultures)
- Chlamydia psittaci – avian strains (cultures)
- Clostridium botulinum (cultures only)
- Coccidioides immitis (cultures only)
- Coxiella burnetti (cultures only)
- Crimean-Congo hemorrhagic fever virus
- Dengue virus (cultures only)
- Eastern equine encephalitis virus (cultures only)
- Esherichia coli verotoxigenic (cultures only)
- Ebola virus
- Flexal virus
- Francisella tularensis (cultures only)
- Guanarito virus
- Hantaan virus
- Hantavirus: hemorrhagic fever/renal syndrome
- Hendra virus
- Hepatitis B virus (cultures only)
- Herpes B virus (cultures only)
- HIV (cultures only)
- Avian influenza, highly pathogenic (cultures only)
- Japanese encephalitis virus (cultures only)
- Junin virus
- Kyasanur Forest disease virus
- Lassa virus
- Machupo virus
- Marburg virus
- Monkeypox virus
- Mycobacterium tuberculosis (cultures only)
- Nipah virus
- Omsk hemorrhagic fever virus
- Poliovirus (cultures only)
- Rabies virus (cultures only)
- Rickettsia prowazekii, rickettsia (cultures only)
- Rift Valley fever virus (cultures only)
- Russian spring/summer encephalitis virus (cultures)
- Sabia virus
- Shigella dysenteriae type 1 (cultures only)
- Tick-borne encephalitis virus (cultures only)
- Variola virus
- Venezuelan equine encephalitis virus (cultures only)
- West Nile virus (cultures only)
- Yellow fever virus (cultures only)
- Yersinia pestis (cultures only)

\*List is not exhaustive. Emerging pathogens, which do not appear on this list but meet criteria, must be assigned to Category A.

## Indicative Examples of Category A Infectious Substances

### *UN2900, Infectious Substance, Affecting Animals*

- African swine fever virus
- Avian paramyxovirus type 1 (Velogenic Newcastle virus)
- Classical swine fever virus
- Foot and mouth disease
- Lumpy skin disease virus
- Mycoplasma mycoides-contagious bovine pleuropneumonia
- Peste des petits ruminant virus
- Rinderpest virus
- Sheep-pox virus
- Goatpox virus
- Swine vesicular disease virus
- Vesicular stomatitis virus

\*List is not exhaustive. Emerging pathogens, which do not appear on this list but meet criteria, must be assigned to Category A.

# Infectious Substance - Category A

## CULTURES

Cultures are the result of a process by which pathogens are intentionally propagated or grown. Patient specimens are not considered cultures.

# Packaging – Triple Packaging

- Category A Infectious Substances must be triple-packed
- Three elements of triple packaging
  - Leak-proof/watertight primary receptacle
  - Leak-proof/watertight secondary receptacle
  - Rigid outer packaging

# Packaging – IATA Packing Instruction (PI) 620 for Infectious Substances, Category A (previously listed as PI 602)

- Minimum Dimensions of rigid outer package must be at least 100 mm (4 inches) in smallest dimension and UN rated/certified;
- Leak-Proof – Primary and secondary receptacles must be watertight;
- Absorbent – Sufficient absorbent to absorb the contents of primary receptacle (placed between primary and secondary);
- Multiple primary receptacles must be individually cushioned, and the shipper must enclose an itemized list of contents between the secondary and outer packaging.

## Packaging – IATA PI 620 (continued)

- Maximum Quantity Per Outer Package
  - Passenger and Cargo Aircraft – 50ml or 50g
  - Cargo Aircraft Only – 4L or 4kg
- Packages containing Infectious Substances **must** be marked on the outside of the package with the NAME and TELEPHONE NUMBER OF PERSON RESPONSIBLE FOR THE SHIPMENT



# Infectious Substance - Category A

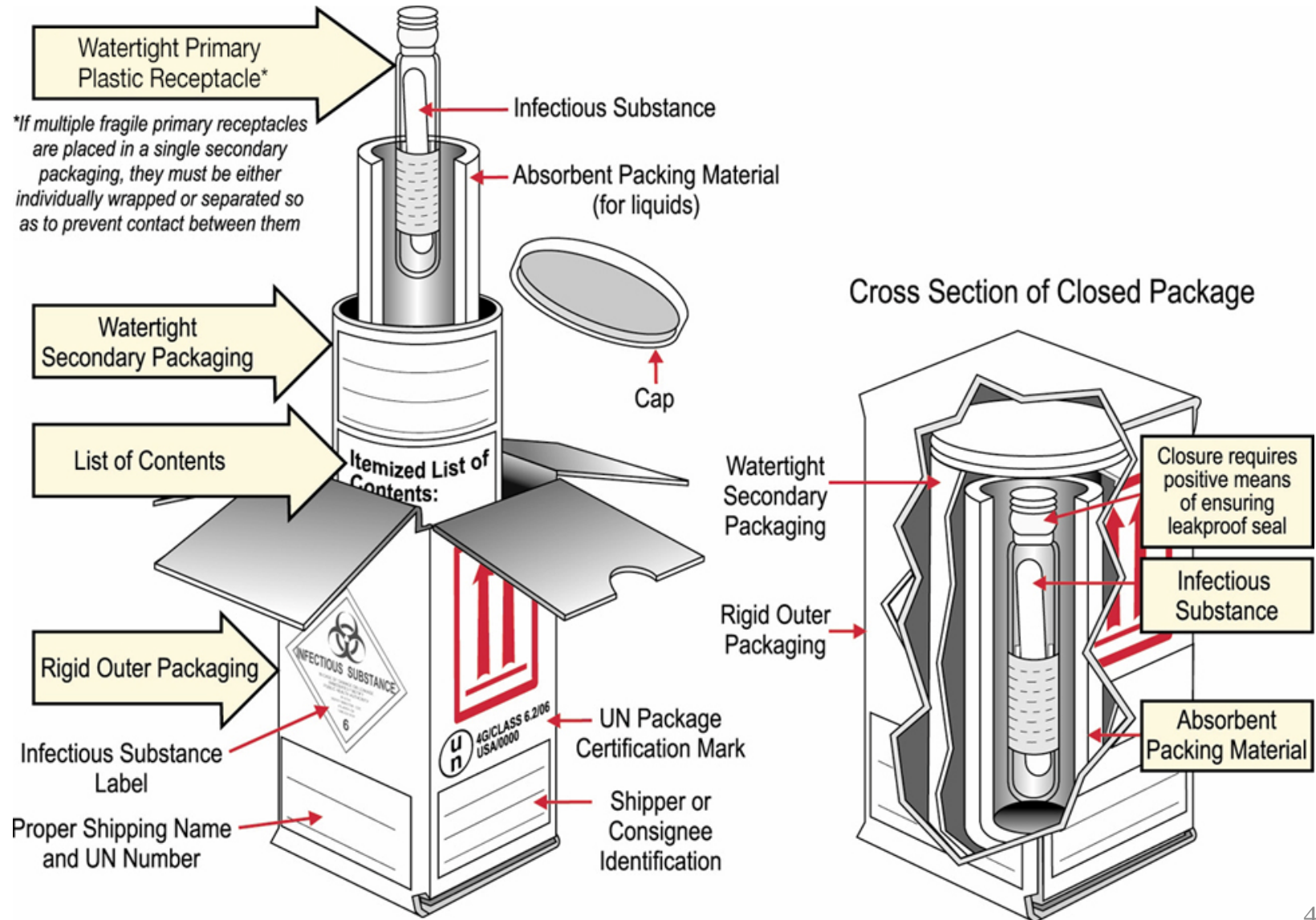
## Technical Name

The name of the pathogen need not be marked on the outer package. However, it is **required** on the Shipper's Declaration.

Examples – Infectious Substance, Affecting Humans  
(Hepatitis B virus culture)

Infectious Substance, Affecting Humans (HIV culture)

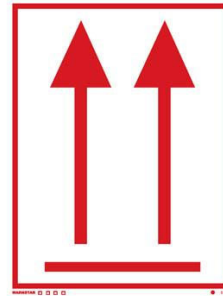
# Triple Packaging for Infectious Substances, Category A



# Marking/Labeling – Infectious Substance, Category A

The following is required on the outer package:

1. Class 6 Infectious Substance Hazard Class label on one side and Package Orientation markings on opposing sides




2. Shipper and consignee addresses and name and phone number of person responsible for the shipment
3. Proper Shipping Name “Infectious Substance, Affecting Humans, UN2814” or “Infectious Substance, Affecting Animals, UN2900”
  - Must be on same side of package as Hazard Class label

# Marking/Labeling – Infectious Substance, Category A (continued)

The following additional information is required on the outer package:

4. UN Certified Marking (stamped on box)

Example (UN marking will vary) :  **4G/Class6.2/11/USA/STP**

5. “Cargo Aircraft Only” label (below) is required on the outer package only if shipping a total quantity over 50mL or 50g



# Infectious Substance Labeling



- As of October 1, 2014, the hazard label above must be used when shipping Division 6.2 Infectious Substance.
- The text “In case of Damage or Leakage Immediately Notify Public Health Authority” must appear on the lower part of the label.
- The text “In U.S.A. Notify Director – CDC, Atlanta, GA 1-800-232-0124” has been removed and must not be included on the label.

# Shipper's Declaration

- A Shipper's Declaration must be used when shipping Category A Infectious Substances
- If shipping Category A Infectious Substances with dry ice, a Shipper's Declaration is required
- A Shipper's Declaration is not required when shipping Biological Substances, Category B or dry ice.

# Shipper's Declaration

- Shipper's Declaration is used to communicate the hazards of the material in the packages and on the vehicle of transport
- Shipper must retain a copy of the Declaration (or electronic image) for not less than two years after date of acceptance
- Declaration must be in color (red hatching along both sides)
- Declaration must include:
  1. Proper shipping name
  2. Hazard class or division
  3. Identification number (UN or NA)
  4. Packing group

Complete 3 copies – One copy stays with shipper and two copies go to carrier
- Errors or omissions on the Shipper's Declarations are the most common cause for package refusal

# Shipper's Declaration

- Shipper's Declaration is a legal document, and the shipper is responsible for completion of the document
  - Declaration must be accurate, legible, complete, in English, and all words must be spelled correctly
  - Declaration must be typewritten or computer-generated
  - Margins of declaration must have red hatchings along side
  - **Person who signs the Shipper's Declaration must be trained and certified for shipping**
    - Accepts full responsibility for: correct identification, proper packaging, and correctly describing the material
- Complete 3 copies – One copy stays with shipper and two copies go to carrier



# Documentation – FedEx

**Since 2011, FedEx requires that all Shipper's Declarations originating in the US be prepared using the following methods:**

- FedEx approved vendor software;**
- Pre-approved shipper software;**
- FedEx Automated Shipping Solutions that have Dangerous Goods error check.**

Download FedEx Ship Manager Software (free):

<http://www.fedex.com/us/ship-manager/software/downloads.html>

Visit [www.fedex.com/us](http://www.fedex.com/us) (search “Dangerous Goods”) for additional information.

# 24-Hour Emergency Number

Not required for Biological Substances, Category B or for Dry Ice.

Required when using a Shipper's Declaration

A 24-hour emergency phone number must be provided on the Shipper's Declaration.

- Emergency phone number must be monitored at all times (when in transport/storage)
- Contact person must be aware of:
  - Hazards/risks
  - Emergency response information
  - Accident mitigation information
- Or have access to someone who has that knowledge
- Unacceptable Phone Numbers:
  - Lab phone number, Pager, CDC reporting number
- Contract services are available. Contact EH&S at 412-624-9505 for additional details.

# Sample Scenario – Shipment containing Dry Ice and Infectious Substances

- Substances to be shipped
  - Hepatitis B culture (5 mls)
  - Dry Ice (2 kg)
- *Step 1* – Classify the shipment
  - Classify as UN2814 Infectious Substance, affecting humans (see Slide 35); and
  - UN1845 Dry Ice
- *Step 2* – Select packaging
  - Vented fiberboard box. Outer package must bear UN specification marking.

## **Sample Scenario – Shipment containing Dry Ice and Infectious Substances**

- *Step 3* – Pack the substances per Packing Instruction 620 and 954.
  - Use triple packaging
  - Dry Ice should be placed outside of the secondary package
  - Include itemized list of contents outside of the secondary package

# Sample Scenario – Shipment containing Dry Ice and Infectious Substances

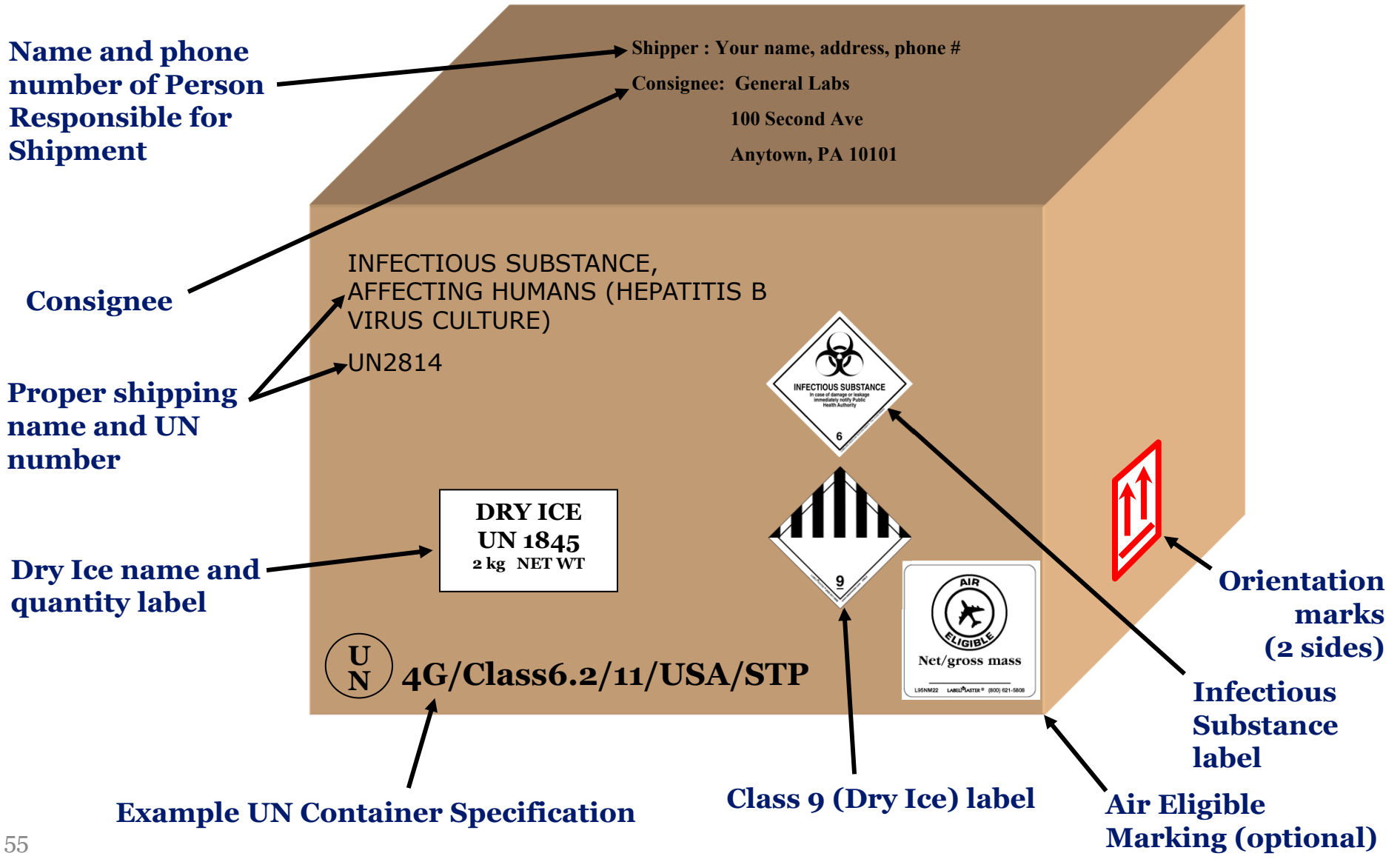
- *Step 4* – Ensure package is properly labeled and marked (see Slide 55)
  - Division 6.2 (Infectious Substance) Label
  - Class 9 (Miscellaneous) Label
  - Proper Shipping Names and appropriate UN numbers
    - Infectious Substance, affecting humans, UN2814
    - Dry Ice, UN1845
  - Net weight of Dry Ice (listed in kg)
  - Package Orientation Arrows on two opposing sides
  - Shipper and Consignee Information
  - Name and phone number of person responsible for shipment

# Sample Scenario – Shipment containing Dry Ice and Infectious Substances

## *Step 5* – Prepare proper shipment documentation

- Shipper's Declaration is required since shipping Category A Infectious Substance (see Slide 56)
  - Declaration must be signed by a trained/certified individual
  - Must provide 24-hour Emergency Number (monitored 24 hours by person knowledgeable of the shipment)
  - Shipper's Declaration – must be prepared using approved software program, such as FedEx Ship Manager Software (free) or other approved shipping software

# Properly Labeling Infectious Substance, Category A with Dry Ice Package - Sample Scenario



# Infectious Substance, Category A with Dry Ice – Example Shipper's Declaration

SHIPPER'S DECLARATION FOR DANGEROUS GOODS				(Provide at least three copies to the airline.)			
Shipper Your name, address, and phone number		Air Waybill No. Page 1 of 1 Pages Shipper's Reference Number <i>(optional)</i>					
Consignee Recipient's address		This shipper's declaration was prepared using a FedEx Express template. It must be used ONLY for: * Class 7 radioactive shipments * Shipments using an 023 air waybill (IP1, IXF or ATA service) * Shipments originating from a non-US location					
Two completed and signed copies of this Declaration must be handed to the operator		<b>WARNING</b>					
<b>TRANSPORT DETAILS</b> This shipment is within the limitations prescribed for: <i>(delete non applicable)</i>		Airport of Departure Carrier will complete		<b>Failure to comply with all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.</b>			
<table border="1"> <tr> <td>PASSENGER AND CARGO AIRCRAFT</td> <td>CARGO ONLY</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>		PASSENGER AND CARGO AIRCRAFT	CARGO ONLY				<input type="checkbox"/>
PASSENGER AND CARGO AIRCRAFT	CARGO ONLY						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
		Shipment type: <i>(delete non-applicable)</i> NON-RADIOACTIVE <input checked="" type="checkbox"/> <del>RADIOACTIVE</del>					
NATURE AND QUANTITY OF DANGEROUS GOODS							
Dangerous Goods Identification				Quantity and type of packaging	Packing Inst.	Authorization	
UN or ID No.	Proper Shipping Name	Class or Division (Subsidiary Risk)	Pack-ing Group				
UN 2814	Infectious Substance, Affecting Humans (Hepatitis B Virus Culture)	6.2		2 x 15 ml	620		
UN 1845	Dry Ice	9	III	2 kg	954		
				All packed in one fiberboard box			
Additional Handling Information							
I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and National Governmental Regulations. I declare that all of the applicable air transport requirements have been met.				Name/Title of Signatory			
				Place and Date			
				Signature <i>(see warning above)</i>			
Enter 24-hour number				Emergency Telephone Number			
FOR RADIOACTIVE MATERIAL SHIPMENT ACCEPTABLE FOR PASSENGER AIRCRAFT, THE SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN OR INCIDENT TO RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT. ADR EUROPEAN TRANSPORT STATEMENT: CARRIAGE IN ACCORDANCE WITH 1.1.4.2.1							



# **Biological Substance, Category B Shipping**

# **Category B Infectious Substance: Biological Substance Category B (UN3373)**

Infectious Substances which do not meet the criteria for inclusion in Category A, must be assigned to Category B – Biological Substance Category B (UN3373)

If the substance does not “fall into” Category A, it most likely should be classified as Category B.

# **Category B Infectious Substance: Biological Substance Category B (UN3373)**

- The proper shipping name for UN3373 is **Biological Substance Category B**
- The terms “Diagnostic Specimen” and “Clinical Specimen” **are not recognized and no longer permitted!**

## **Category B Infectious Substance: Biological Substance Category B (UN3373)**

### **Advantages to Category B classification and shipments:**

- Shipper's Declaration for Category B shipments is not required (use carrier-issued air waybill when shipping Biological Substance, Category B);
- 24-hour emergency contact number is not required;
- Specially designed packaging is required, but packaging is not required to be UN-rated

# Shipping Exceptions

- Substances which are not likely to cause disease in humans or animals are not regulated unless they meet the criteria for inclusion in another class.
- Micro-organisms which are non-pathogenic to humans or animals are not regulated unless they meet the criteria for inclusion in another class.
- Pathogens which have been neutralized or inactivated such that they no longer pose a health risk are not regulated unless they meet the criteria for inclusion in another class (i.e. – sterilization, chemical disinfection).
- Dried blood spots, fecal occult blood screening tests, and blood/organs which have been collected for transfusion or transplantation are not regulated.

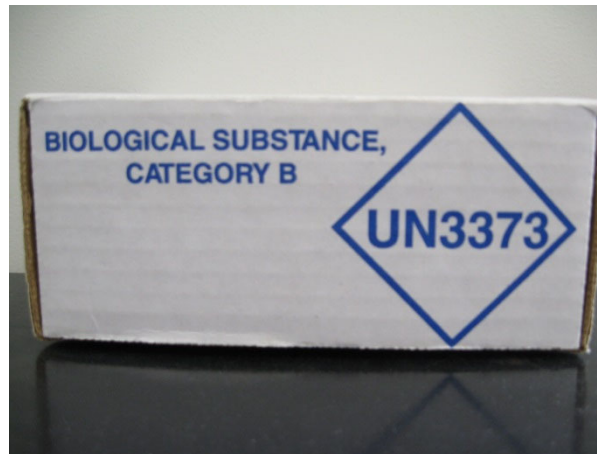
# Packaging– IATA Packing Instruction (PI) 650 (Biological Substance Category B)

- Use Triple packaging (see Slide 38)
- Leak-Proof – Primary and secondary receptacles must be watertight
- Primary or secondary receptacles must be capable of withstanding an internal pressure of 95 kPa
- Use absorbent material between primary and secondary packaging. Not required for solids.
- Minimum dimension of outer container: 4 x 4 inches
- Place an itemized list of contents between the secondary packaging and outer packaging.

# Packaging – IATA PI 650

(Biological Substance Category B)

- Each package containing Biological Substance, Category B must be marked with the **UN3373 marking and Proper Shipping Name** (adjacent to the marking)
  - “**Biological Substance Category B**” must be marked in letters at least 6 mm high



# Packaging – IATA PI 650

(Biological Substance Category B)

## Required marking:

- Name and address of both shipper and consignee must be on the outer package
- Name and phone # of person responsible for shipment must be either on air bill or on the outer package

The “Nature and Quantity of Goods” box on the air waybill must show “**UN3373**” and “**Biological Substance, Category B**” and the number of packages being shipped.



# **Packaging – IATA PI 650**

**(Biological Substance Category B)**

## **Quantity Limits**

### **Liquids:**

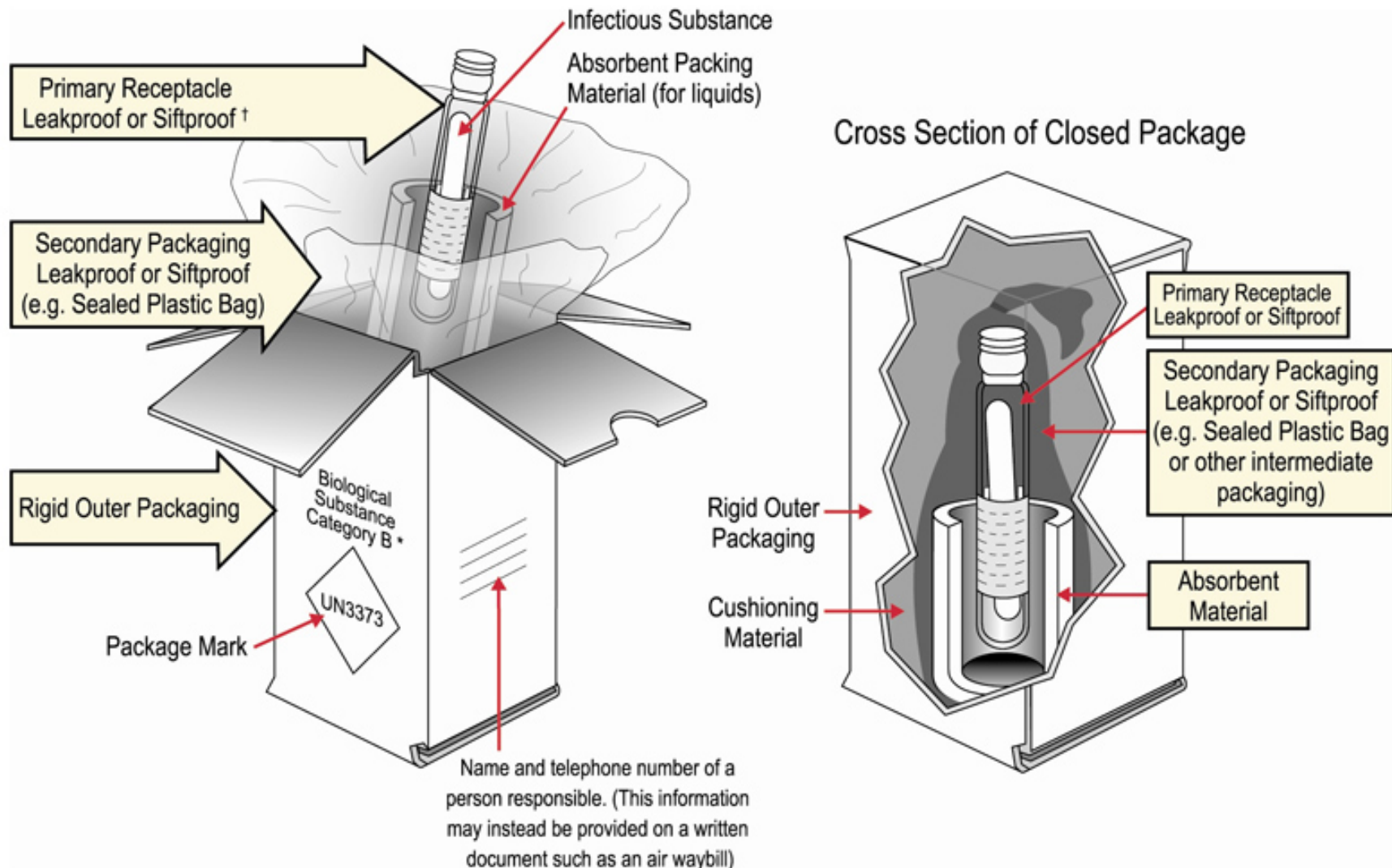
- Primary container must not contain more than 1L
- Net quantity of entire package must not contain more than 4L

### **Solids:**

- Outer packaging must not contain more than 4kg

Contact EH&S if your shipment exceeds the quantity limits.

# Triple Packaging for Biological Substances, Category B



# Proper Marking: Biological Substance Category B



- 2" x 2" (minimum) mark with UN3373 must be displayed on the outer package
- Width of line on the UN3373 marking must be at least 2mm thick and letters/numbers must be at least 6mm high
- "Biological Substance Category B" must be marked on the outer package

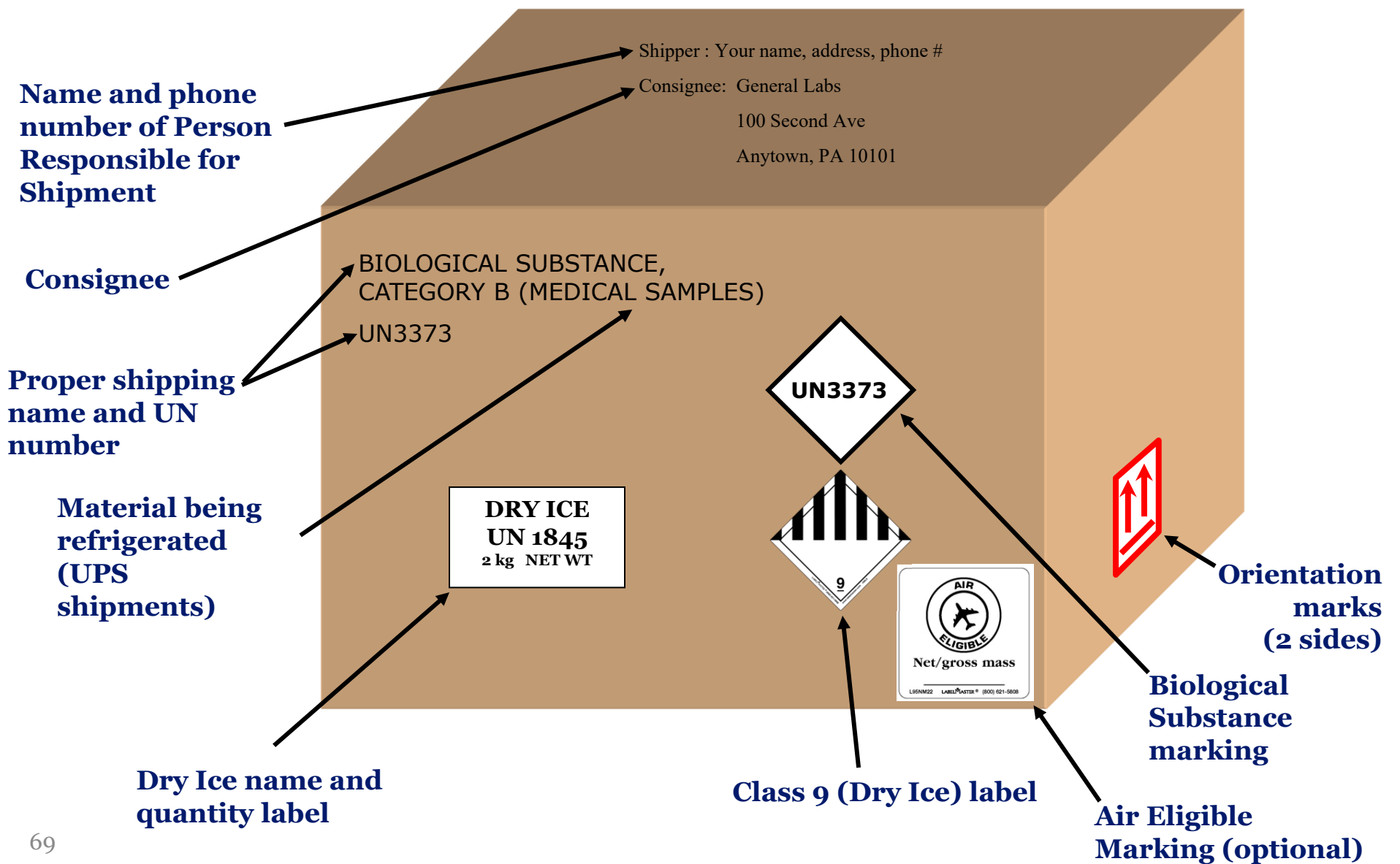
# Marking/Labeling – Biological Substance, Category B

The following is required on the outer package :

1. UN3373 marking
2. “Orientation Arrows” on opposing sides
3. Shipper and consignee addresses and phone number of person responsible for the shipment
4. “Biological Substance, Category B”



# Properly Marked/Labeled Biological Substance, Category B with Dry Ice Package - Sample Scenario



# Air Waybill

The Air Waybill must include the following documentation information:

- Shipper's Name and Address
- Consignee's Name and Address
- Nature and Quantity of Goods being Shipped
  - Biological Substance, Category B
  - Quantity
  - DRY ICE (if applicable) – net weight expressed in kg

Complete all other carrier specific information (account number, total weight, special handling instructions, authorized signatures, etc.)

# **Exempt Patient Specimen Shipping**

# Patient Specimens

## **Defined:**

*Specimens collected directly from humans or animals, including but not limited to excreta, secreta, blood and its components, tissue and tissue fluid swabs, and body parts being transported for purposes such as research, diagnosis, investigational activities, disease treatment and prevention.*



# Patient Specimens

## Exempt Patient Specimen Rules

Examples of specimens which may be shipped as exempt patient specimens:

- Blood or urine tests to monitor cholesterol, glucose, hormone levels;
- Tests required to monitor organ function for humans/animals with non-infectious diseases;
- Tests conducted for insurance or employment purposes intended to determine drugs/alcohol;
- Pregnancy tests, biopsies to detect cancer, antibody detection in humans/animals.

# Patient Specimens

## Exempt Patient Specimen Rules

Patient specimens for which there is minimal likelihood that pathogens are present are not regulated if the specimen is packed in packaging which will prevent any leakage.

### **Must use:**

1. Leak-proof/watertight primary receptacle;
2. Leak-proof/watertight secondary receptacle;
3. Outer package of adequate strength for its capacity and have one surface of 100 mm x 100 mm; and
4. Absorbent materials between the primary and secondary receptacles for liquids

For multiple primary receptacles, ensure each is individually wrapped or cushioned to prevent contact between them.

# Patient Specimens

## Exempt Patient Specimen Rules

Packages containing patient specimens must be appropriately marked using one of the following two markings:

**“Exempt Human Specimen”**

or

**“Exempt Animal Specimen”**

# Patient Specimens

## Exempt Patient Specimen Rules

### Documentation

- If shipping exempt patient specimens, do not mark UN3373 on the air waybill or on outer package.
- Mark both outside of package and air waybill with: “Exempt Human Specimen” or “Exempt Animal Specimen.”

# Properly Marked Exempt Human Specimen Package - Sample Scenario

**Shipper and  
Consignee**

Shipper : Your name and address  
Consignee: General Labs  
100 Second Ave  
Anytown, PA 10101

**Exempt  
specimen  
marking**

EXEMPT  
HUMAN  
SPECIMEN

# Patient Specimens

## Exempt Patient Specimen Rules

### Note:

\*In determining whether a patient specimen has a minimal likelihood that pathogens are present, an **element of professional judgment is required** to determine if a substance is exempt. The judgment should be based on the known medical history, symptoms and individual circumstances of the source patient or animal, and prevalent local conditions.

If there is **any** reason to suspect that the specimen contains a pathogen, it **cannot** be shipped as an exempt specimen.

**\*Must be able to provide documented “professional judgment” if called upon.**

**Genetically Modified Micro-  
Organisms Shipping  
(Non-infectious/Non-toxic)**

# Genetically Modified Micro-Organisms (NON-INFECTIOUS/NON-TOXIC)

- Defined as organisms in which genetic material has been purposely altered through genetic engineering in a way that does not occur naturally
- Capable of altering animals, plants, or microbiological substances in a way which is not normally the result of natural reproduction must be classified in Class 9 and assigned UN3245
- Replication defective vectors are often shipped under this classification
- If a Genetically Modified Micro-Organism (GMO) meets the definition of an Infectious Substance, must ship as such.



# Genetically Modified Micro-Organisms (NON-INFECTIOUS/NON-TOXIC)

- Pack in accordance to Packing Instruction 959;
- Triple packaging – Leak-proof primary and secondary receptacles with absorbent materials;
- Rigid outer packaging of adequate strength/capacity; smallest surface dimension of 100mm
- If packed in compliance with PI 959, GMO is not subject to the Regulations.
- Display UN3245 mark, on outer package
- Minimum dimension of mark must be 2 inches in length and text must be at least 6 mm high.



# **Packaging – IATA PI 959**

**(for Genetically Modified Micro-organisms)**

PI 959 requires shippers to prepare package similar to PI 650, but packaging need not be tested.

The mark below must be displayed on external surface (2 inches minimum length; letters and numbers 6 mm high)



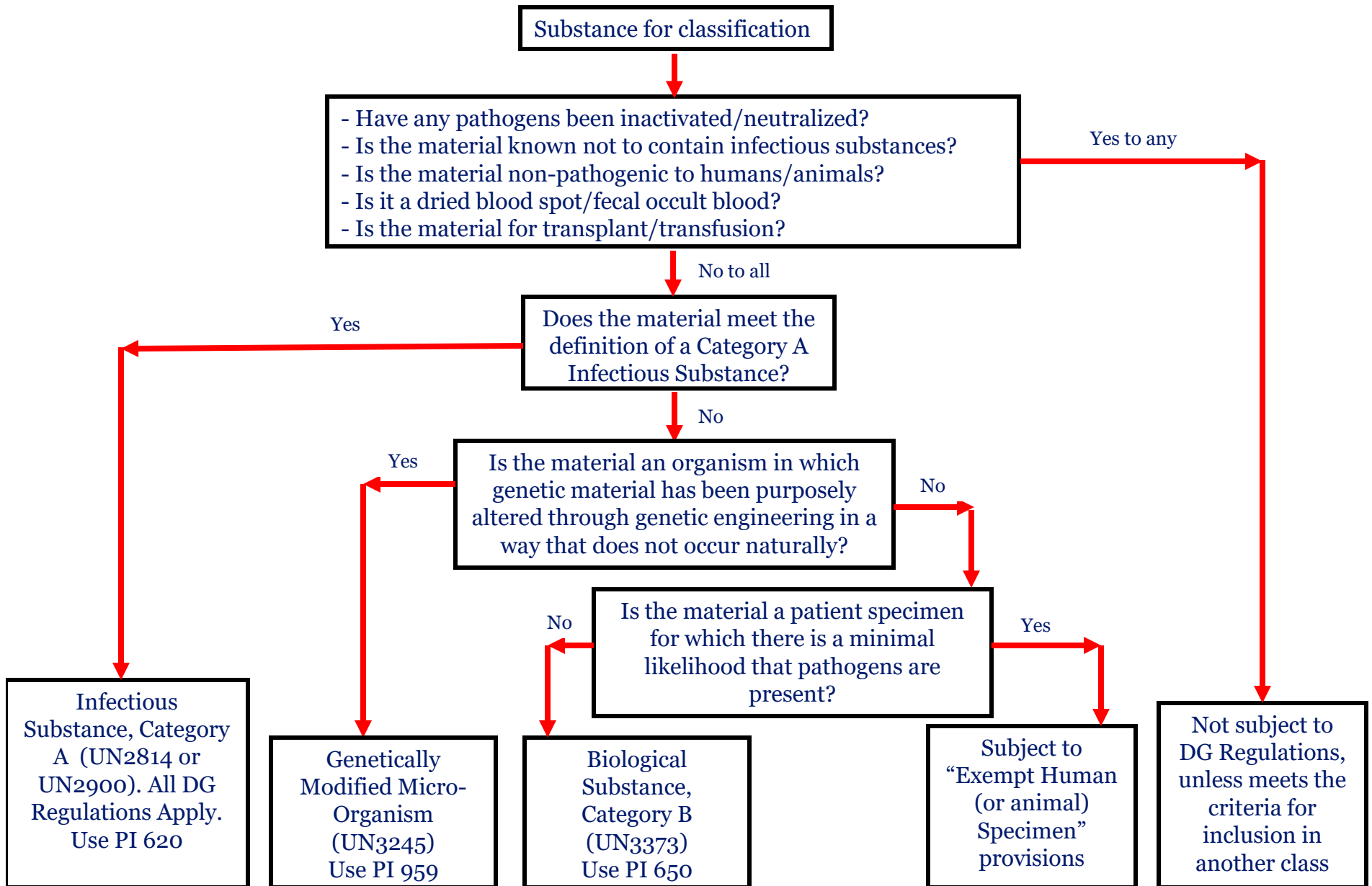
# Proper Marking: Genetically Modified Micro-organisms



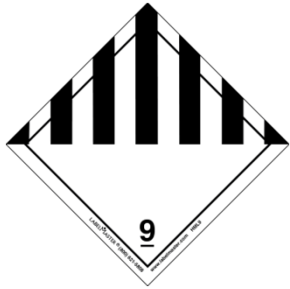
- 2" x 2" (minimum) diamond with UN3245 must be displayed on the outer package.
- The width of the line must be at least 2 mm and letters and numbers must be at least 6 mm high.

# Classification Flowchart

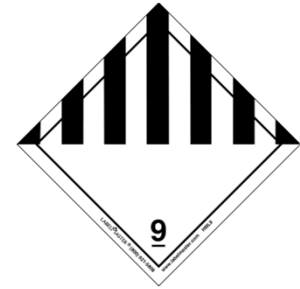
## Category A, Category B, Genetically Modified, & Exempt Specimens



# Dry Ice Shipping



## Shipping with Dry Ice

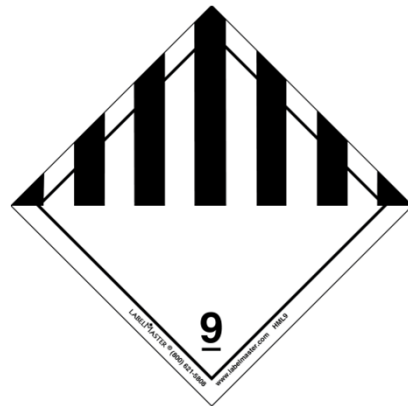


- Carbon Dioxide, solid (dry ice) is a regulated Dangerous Good and must always be declared by marking, labeling, and documentation. Use Packing Instruction 954.
- If there are no other dangerous goods in a shipment with dry ice, a shipper's declaration is not required.
- Must use Class 9 Miscellaneous label
- Timing is critical
- Ventilation must be provided – **Never ship dry ice in a sealed container**
- **Net weight of dry ice and identity of contents which are being refrigerated must be marked on outside of package**

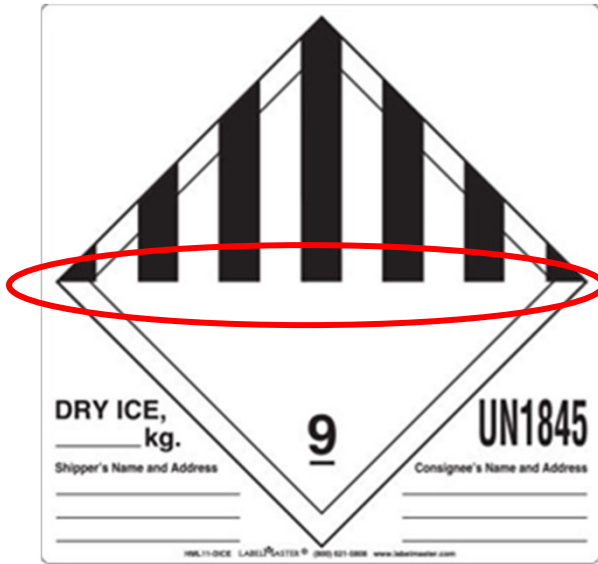
# Marking/Labeling – Dry Ice

The following is required on the outer package:

1. Class 9 Miscellaneous label
2. “Dry Ice, UN1845”
3. Shipper and consignee addresses
4. “Orientation Arrows” on opposing sides
5. Net weight of Dry Ice used (expressed in kg)



# Dry Ice Labeling



As of October 1, 2014 the Class 9 label has been modified. **The new Class 9 label is shown above on the left.** The new label does not contain a horizontal line in the center of the diamond.



# Labeling – Dry Ice

shippers declaration not required

airwaybills/airbills must have the following:

part B is required

1. "Dangerous Goods - shippers declaration not required"

dry ice amount must be in kilograms

2. Dry Ice; 9; UN1845

note 2 lbs = 1 kg

3.          x          kg  
(number of packages) (weight)

shippers name and address

consignee name and address

**9**

**DRY ICE, \_\_\_\_\_ kg**

**UN1845**

# Marking/Labeling – Dry Ice

## **WHEN SHIPPING WITH UPS**

**Note: Must have a University CampusShip UPS account to ship internationally**

When shipping Dry Ice with UPS, abide by the following:

- Shipment may contain Biological Substance, Category B or Exempt Patient Specimens.
- Use Class 9 Miscellaneous label.
- Waybill (or address label) which includes UN1845, Dry Ice.
- Label outer package with **DRY ICE \_\_\_\_\_ kg, UN1845 and Biological Substance Category B** (or exempt specimen) information.
- UPS does not accept Infectious Substance, Category A.
- Identify the contents of the material being refrigerated.

# Shipping Dry Ice with UPS

**UPS provides Dry Ice services via CampusShip to the countries below:**

Andorra	Finland	Italy, mainland*	Norway	Slovenia
Australia*	France, mainland*	Japan*	Panama	South Korea*
Austria	Germany	Latvia	Philippines*	Spain, mainland
Belgium	Greece*	Liechtenstein	Poland (excludes postal codes 72600-72605)	Sweden*
Bulgaria	Hong Kong	Lithuania*	Portugal, mainland	Switzerland
Canada	Hungary	Luxembourg	Puerto Rico	Taiwan*
Czech Republic	Malaysia*	Romania	Thailand*	Denmark*
Indonesia*	Monaco	Saudi Arabia	Turkey*	Dominican Republic
Ireland	Netherlands	Singapore	Ukraine*	Estonia, mainland
Israel	New Zealand	Slovakia	United Arab Emirates	United Kingdom, mainland

\*Limited Service Area – contact UPS for details

**Note: Must have a University UPS CampusShip account to ship internationally.**

# Air Waybill – Dry Ice

When a Shipper's Declaration is not required, the following must be contained in the "Nature and Quantity of Goods" section on the air waybill:

- UN1845
- Dry Ice or Carbon Dioxide, solid
- Number of packages
- Net weight of dry ice in each package

# Properly Marking/Labeling a Dry Ice Package - Sample Scenario

**Name of Person Responsible for Shipment**

Shipper : Your name and address

Consignee: General Labs  
100 Second Ave  
Anytown, PA 10101

**Consignee**

CONTAINS NON-HAZARDOUS/  
NON-INFECTIOUS SAMPLES

**Material being refrigerated (UPS shipments)**

**DRY ICE**  
**UN 1845**  
2 kg NET WT

**Dry Ice name and quantity label**



**Class 9 (Miscellaneous) label**



**Orientation marks (2 sides)**

# General Safety Training

- Dangerous Goods emergencies/incidents may include:
  - Package failure, spills, leaks
  - Contamination of the work area
  - Personal injury or exposure



# General Safety Training- Emergency Procedures for Spills

- Isolate area. Keep unauthorized personnel away.
- Identify substance involved.
- Do not touch or walk through material.
- Do not touch damaged containers unless wearing appropriate Personal Protective Equipment (PPE).
- Damaged packages containing dry ice may produce water. Do not touch liquid, it could be contaminated by contents of package.
- Disinfect Category A and B materials with liquid bleach diluted with water 1:10; allow 15-20 minutes contact time
- Absorb material and dispose properly. Avoid direct contact.
- Notify shipper and/or the consignee.

# General Safety Training- Response to Emergencies

- **Isolate** – keep people away
- **Evaluate** – obtain information about the package and its contents
- **Report** –
  - **Environmental Health and Safety – 412-624-9505**
  - **Campus Emergency Number – 412-624-2121**

Avoid handling the package. If you must touch the package, wear appropriate protective equipment (safety glasses, gloves, lab coat etc). **Keep handling to a minimum!**



# General Safety Training- Exposure or Injury

- Call **412-624-2121 (Campus Emergency Number)** for emergency medical care if necessary
- In the event of contact, immediately flush skin or eyes with running water for at least 15 minutes

# DOT Security Plan for Hazardous Materials

Goal: Identify and reduce security risks related to transportation of Dangerous Goods/Hazmat

## Personnel Security

- Background and reference checks for newly-hired employees who handle hazardous materials

## Unauthorized Access

- Keep doors locked, store hazmat in secure areas
- Maintain control of packages, report suspicious activity

## En Route Security

- Use reputable carriers

# Shipping Dangerous Goods

Presented by: Environmental Health & Safety  
Public Safety Bldg – 4<sup>th</sup> Floor  
3412 Forbes Avenue  
[safety@ehs.pitt.edu](mailto:safety@ehs.pitt.edu)

Please call 412-624-9505 with any questions about shipping Dangerous Goods.

Copies of this training presentation can be obtained by visiting the EH&S website at <https://www.ehs.pitt.edu/training/overview/dangerous-goods-shipping>

# Important Phone Numbers

- 1-800-554-9964, UPS Hazmat Hotline
- 1-800-377-4877, UPS Customer Service, questions related Customs, import/export, etc.
- 1-800-463-3339 ext. 81, FedEx Dangerous Goods Hotline

# Useful Links

IATA – International Air Transport Association  
<http://www.iata.org/index.htm>

DOT – Hazmat Safety  
<http://www.phmsa.dot.gov>

DOT – Department of Transportation  
<http://www.transportation.gov>

CDC – Center for Disease Control  
<http://www.cdc.gov>

ABSA – American Biological Safety Association  
<http://absa.org>

# More Useful Websites

Pathogen Safety Data Sheets (PSDS)

<http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/index-eng.php>

FedEx Dangerous Goods

<http://www.fedex.com/us/service-guide/our-services/dangerous-goods-hazmat/index.html>

FedEx – Shipping Biological Substances

<http://images.fedex.com/downloads/shared/packagingtips/pointers.pdf>

University of Pittsburgh EH&S

<http://www.ehs.pitt.edu/>

# Websites for Publications and Supplies

[www.fishersci.com](http://www.fishersci.com)

[www.airseacontainers.com](http://www.airseacontainers.com)

[www.iata.org/en/publications/store](http://www.iata.org/en/publications/store)

[www.jjkeller.com](http://www.jjkeller.com)

[www.labelmaster.com](http://www.labelmaster.com)

[www.inmarkinc.com](http://www.inmarkinc.com)