

Shipping with Dry Ice (BIO200) Course Material

I. Introduction

Welcome to the Shipping with Dry Ice (BIO200) Course Material. This course is required for anyone mailing shipments refrigerated with solid Carbon Dioxide (Dry Ice). This training follows IATA and US federal regulations ensuring the individual is aware and understands how to classify, package, label, and documents required to transport materials using dry ice. As per regulations this training is required once every two years (or if regulations change).



Failure to properly pack and ship materials is a violation of the law and is punishable with fines or imprisonment.

Objectives

At the conclusion of this course, participants should be able to:

1. Identify and use the United Nations (UN) Classification and Proper Shipping Names (PSN) for Dry Ice.
2. Pack any primary or secondary containment and overpack boxes correctly.
3. Correctly mark and label shipping packages containing dry ice.
4. Complete a Shipper's Declaration, if required.
5. Follow all safety guidelines avoiding any accidents, injuries, or spills

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II. Overview

Dry ice is a commonly used refrigerant for shipping biological samples and classified as a Class 9 Miscellaneous Dangerous Good. If you need to send refrigerated shipments, you can choose gel packs or Solid Carbon Dioxide (Dry Ice). Gel packs are not regulated and not capable of cooling to the temperature achieved by dry ice. Wet ice (ice made from water) is not allowed due to the likelihood of leaks.



[The United States Department of Transportation \(US DOT\)](#) and the [International Air Transportation Association \(IATA\)](#) regulate dry ice shipments and dictate the specific procedures to follow when shipping with dry ice. Generally, dry ice refrigerated packages are shipped by air. If you have questions, contact EH&S at (205) 934-2487.

Safety precautions when handling dry ice:

1. It is a cryogenic that can cause frost bite and burns upon direct contact with skin. Always wear insulated gloves when handling dry ice.
2. Never place dry ice in a sealed or leak proof container. Pressure buildup caused by the expansion of carbon dioxide gas as the dry ice sublimates leads to explosion.
3. Store dry ice in a well ventilated area in room to avoid oxygen deficiency.

III. Identification and Packaging System

1. United Nation (UN) Number and Proper Shipping Name (PSN)

Proper identification requires both a UN number and the Proper Shipping Name (PSN). For dry ice, the UN Number is UN 1845. The Proper Shipping Name is “Dry Ice” or “Carbon Dioxide, Solid.” Together the proper identification would look like this: “UN 1845 Dry Ice” or “UN 1845 Carbon Dioxide, Solid.”

2. Selecting the Proper Packaging

All packaging intended for shipment with Dry ice must be designed and constructed to allow the release of Carbon Dioxide gas (which prevents the build-up of pressure). Shippers must make arrangements with the carrier before transporting shipments with dry ice.

Packaging components for hazardous samples must pass testing requirements as a system. Mixing and matching packaging components from different manufacturers is not allowed for Category A or B shipments.

3. Outside Packaging

The outside packaging is typically a fiberboard box or container used to hold the gas-permeable insulated cooler (preferably Styrofoam, containing the dry ice). The outer fiberboard box serves as a surface for displaying visible marks, labels, and other relevant information.

4. Inside Packaging

- Correctly classify and identify the samples or materials, you are shipping with the dry ice. Refer to the [Classification Flowchart](#) if you are unsure of the proper classification and determine if there is any required additional training.
- Once the sample or material is packed with the appropriate packaging material, and according to the proper packing instructions, you can begin the process of packing it according to Packing Instructions 954.

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5. Sealed Containers

Dry ice is frozen Carbon Dioxide gas and expands as it sublimates. Never place dry ice in a sealed container. Watch this [video](#) to see how dangerous dry ice in a sealed container can be. UAB professionals performed this demonstration. UAB Police were present, and all safety precautions were followed.

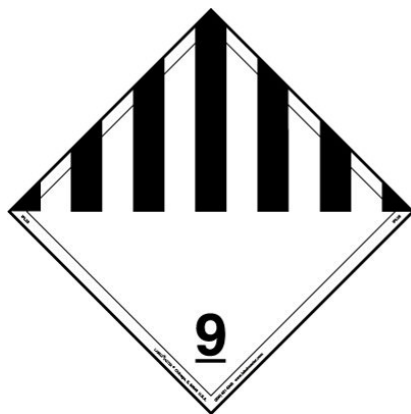
IV. Marks and Labels

1. General Information

Marks and labels should provide information about the contents of the package, the nature of the hazard, and any special handling requirements. All marks and labels should be durable, placed so that they are completely visible (i.e., all on the same face of the package), and not obscured by any other labels or markings.

Dry ice shipments require the following information:

- Class 9 Miscellaneous Hazard Black & White Diamond-On-Point Label
- Proper Shipping Name and UN Number (either “UN 1845 Dry Ice” or “UN 1845 Carbon Dioxide, Solid”)
- The weight of the dry ice (in Kilograms) listed adjacent to the Black & White Diamond On-Point Label or the Proper Shipping Name (PSN)
- Any additional substance-specific marks and labels required for refrigeration by dry ice
- The minimum dimensions of the hazard label are 100 mm × 100 mm
- The maximum allowable net quantity of dry ice per package is 200 kg.



Vendors provide marks and labels with the appropriate packaging components. If you have any questions, contact EH&S at (205) 934-2487.

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2. Pre-Printed Label

Below is an example of a pre-printed label you complete and place on the outside of packages not containing Category A or B substances. If you are not shipping Category A or B substances but are shipping with dry ice, you must label the contents being cooled.

Name of the Contents Being Cooled: For <input type="checkbox"/> Exempt Animal Specimens <input type="checkbox"/> Exempt Human Specimens <input type="checkbox"/> Diagnostic or Treatment Purposes

The package should be marked with the text "Dry ice" or "Carbon dioxide, solid", Name of the contents being cooled and material is being shipped for "diagnostic" or "treatment" purposes.

3. Non-Dangerous Goods

There are exceptions in regulations for non-dangerous goods shipments by air within the U.S. When using less than 2.5 kg (5.5 pounds) of dry ice, the packages must allow for the release of the CO₂ gas, be marked "Dry Ice," list the quantity of dry ice and the contents of the package. These packages can be checked on commercial air flights as long as the airline knows ahead of time.

4. Overpacks

Placing multiple fully compliant dangerous goods packages within a fiberboard box is considered an overpack. Reproduce all marks and labels on the inner packaging on the overpack. Place the word "overpack" on the outside of the overpack.

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5. Security

After preparing the package for shipment, the package must remain under the direct control of trained personnel until handed over to the carrier. By maintaining possession of any shipments, reduces the chances of tampering, theft, destruction, invalidation of the shipper's signature, and signifies the package was prepared according to [49 CFR/IATA Regulations](#).



If you suspect a package has been tampered with, notify EH&S immediately at (205) 934-2487.

Appendix A at the end of this document contains pictures showing the correct shipping label requirements for each one below:

- Shipping Nonhazardous or Exempt Specimens
- Shipping Genetically Modified Organisms
- Shipping Biological Substances, Category B
- Shipping Infectious Substances, Category A

If you have any questions about the appropriate required marks and labels, contact EH&S Biosafety representative at (205) 934-2487.

V. Documentation

1. Shipper's Declaration

A Shipper's Declaration for dangerous goods is required for UN 1845 dry ice only when used as a refrigerant for Infectious Substances, Category A. If it contains dry ice as the packing refrigerant, then list the dry ice also on the Shipper's Declaration.

Note: Shipping Biological Substance, Category B," or Exempt Human/Animal Specimens in dry ice do not require shippers declaration.

Refer to [49 CFR 173.127](#) to confirm meeting all requirements.

Appendix B at the end of this document contains picture showing Shipper's Declaration Example.

2. Waybill

If the items you are shipping do not require a Shipper's Declaration (non-dangerous goods, "Biological Substance, Category B," or Exempt Human/Animal Specimens) then the following information must be included on the waybill in the "Nature and Quantity of Goods" section:

- UN Number: UN 1845
- Proper Shipping Name: "Carbon Dioxide, Solid" or "Dry Ice"
- The number of packages
- The Net Weight (in kg) of the dry ice in package
- "UN3373, Biological Substances, Category B" (if appropriate)
- Example: For a package containing dry ice, the waybill needs to contain the text, "UN 1845, Dry ice, 1 package, 5 kg net weight"

VI. RESPONSIBILITIES

1. *Operator (or Carrier) Responsibilities*

- Detecting errors
- Using acceptance checklist
- Ensuring safe loading, storage, and transport
- Inspecting for damage or leaks
- Reporting any problems to the proper authorities
- Replenish the dry ice during transit as requested by shipper.

2. *Shipper Responsibilities*

- Classifying and identifying the substance or material
- Selecting the appropriate packaging system
- Accurately marking, labeling, and packing the materials in dry ice.
- Complete the appropriate shipping documents
- Request a copy of permits (if applicable) from the recipient

3. *Receiver (or Consignee) Responsibilities*

- Assisting with import permits
- Inspecting received packages for damage or leaks.
- Verifying the itemized list of contents
- Reporting receipt to the shipper
- Reporting any damages to hazardous materials immediately to EH&S at (205) 934-2487.

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4. Things You Need To Remember

There are several things you should remember when shipping refrigerated items:

- Using “wet ice,” is never allowed due to the likelihood of leaks. You should use dry ice or gel packs.
- Read and pack according to Packing Instructions 954 when using dry ice
- Use a styrofoam box when packing with dry ice.
- Never place dry ice within a sealed container due to the possibility of an explosion.
- If you are shipping a package containing Infectious Substances, Category A on dry Ice, the Shipper’s Declarations must include the information for dry ice as well as the Infectious Substance, Category A.
- You must use a waybill if your shipment does not require a Shipper’s Declaration.

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VII. Conclusion

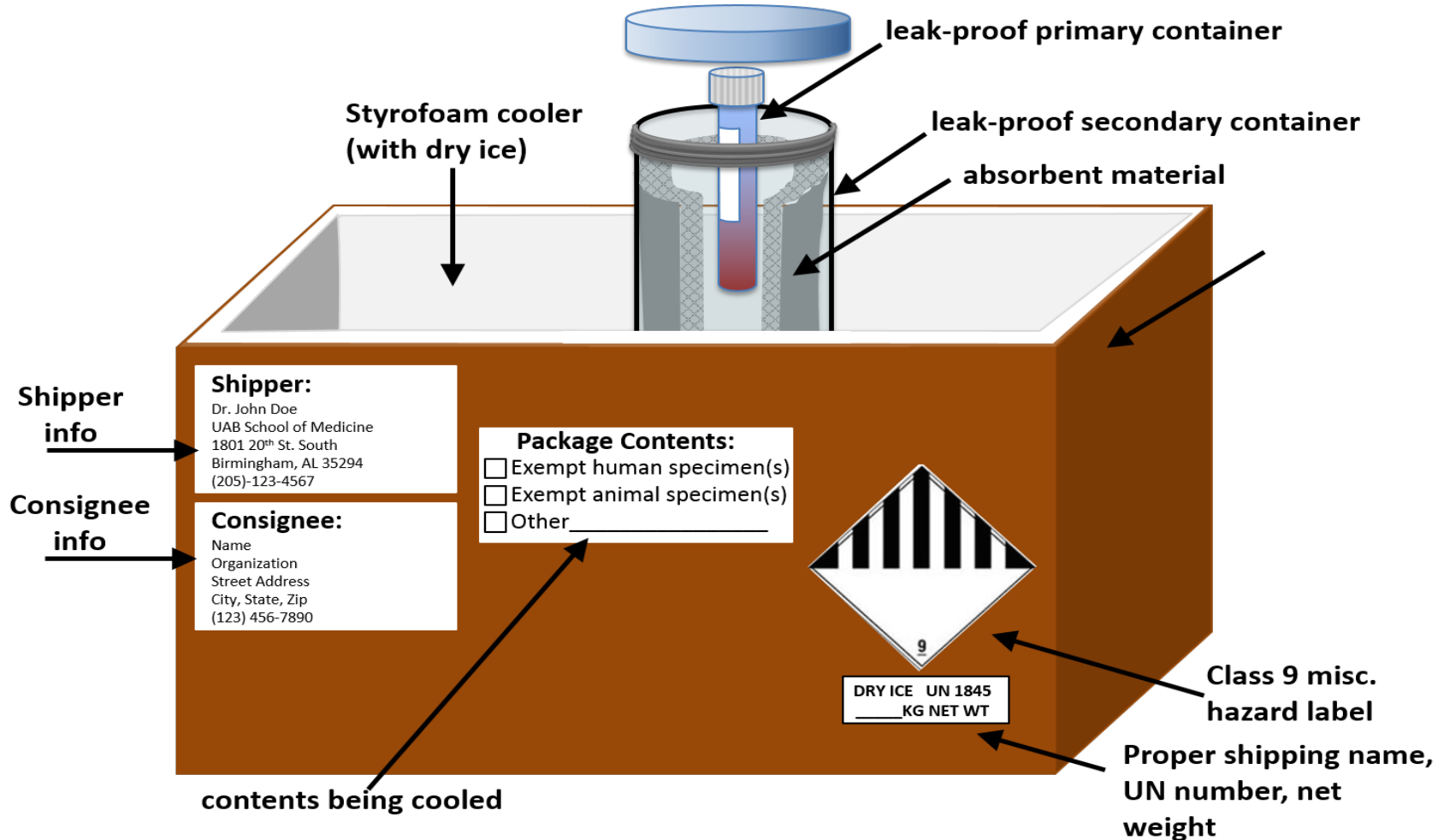
This section concludes the Shipping with Dry Ice (BIO200) Course Material. By successfully completing the "Shipping with Dry Ice (BIO200) Course", you have gained the essential knowledge and skills to navigate the safe and compliant transportation of materials in dry ice. You must now complete the Reality Check.

Other Trainings

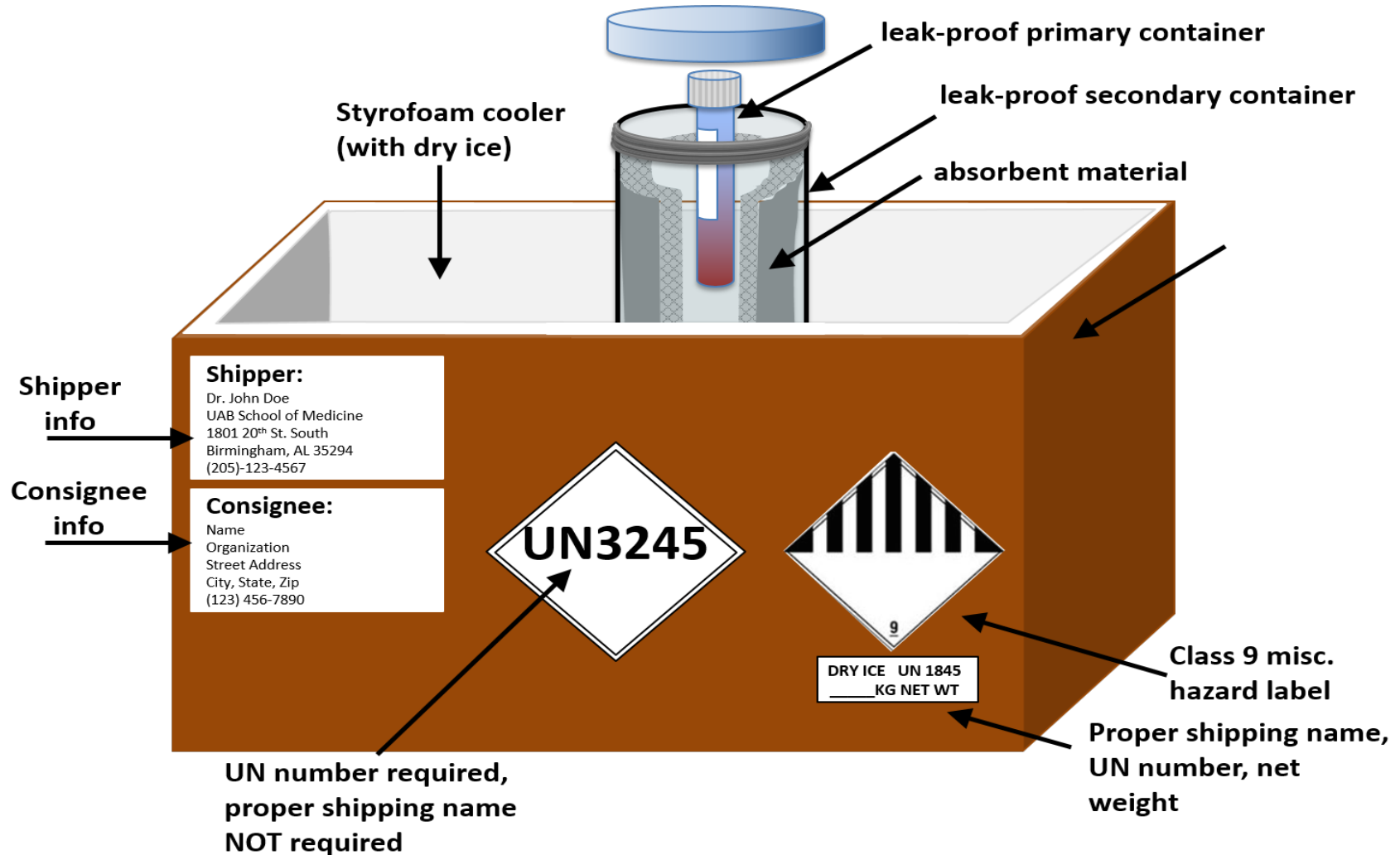
- If you intend on shipping samples considered Biological Substance Category B, Genetically Modified Organisms, or Exempt Specimens it is required to complete [Shipping Biological Substance Category B, GMO or Exempt Specimens \(BIO201\)](#).
- If you intend on shipping samples considered Infectious Substances, Category A it is required to complete [Shipping Infectious Substances, Category A \(BIO202\)](#).
- UAB Campus Employees whose job duties put them at an increased risk for exposure to bloodborne pathogens, it is required to complete [Bloodborne Pathogens Training \(BIO500\)](#).

EH&S has many training courses available to all UAB active employees and students. A [decision tree](#) is available to assist you in choosing the right training courses to supplement the knowledge/skills you may need at work. If you have any questions, contact EH&S at (205) 934-2487.

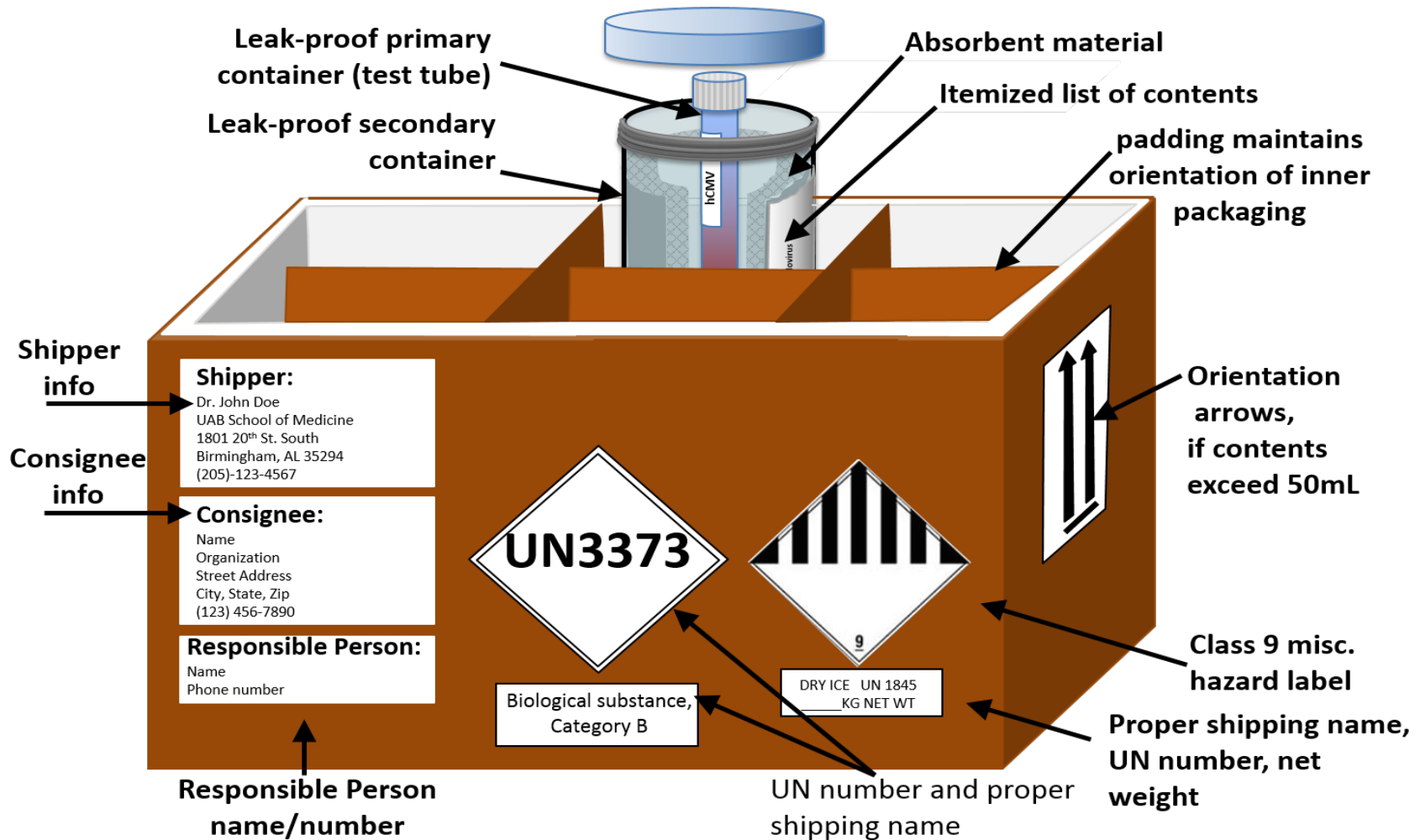
Shipping Nonhazardous or Exempt Specimens on Dry Ice Follow IATA Packaging Instruction 954



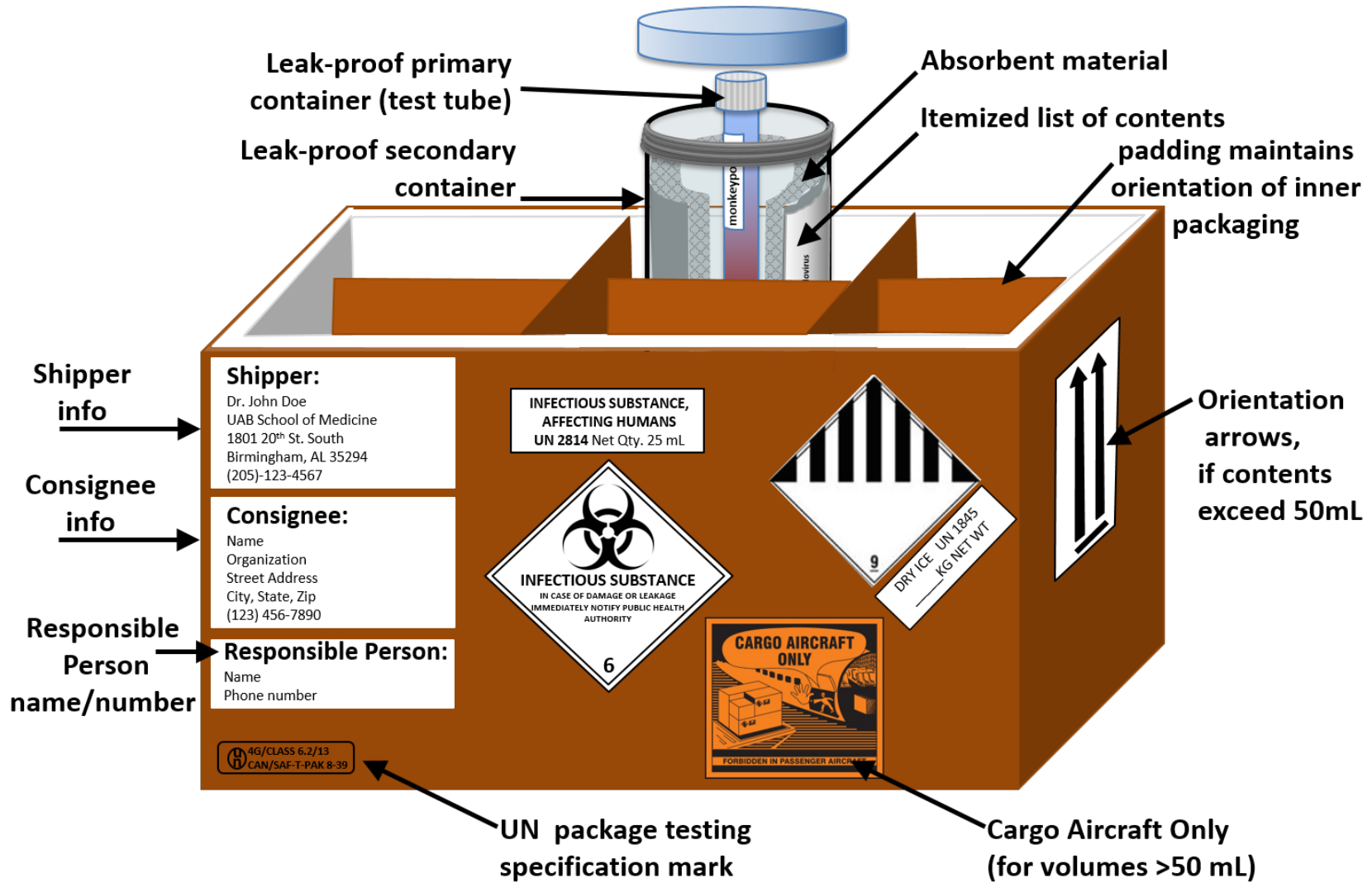
Shipping Genetically Modified Organisms on Dry Ice Follow IATA Packaging Instructions 959 & 954



Shipping Biological Substances, Category B, on Dry Ice Follow Commercial System Instructions; IATA Packaging Instructions 650 & 954



Shipping Category A, Infectious Substances on Dry Ice Follow Commercial System Instructions; IATA Packaging Instructions 620 & 954



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Appendix B: Shipper's Declaration Example

SHIPPER'S DECLARATION FOR DANGEROUS GOODS				(Provide at least three copies to the airline.)				
Shipper		Air Waybill No. _____ Page _____ of _____ Pages Shipper's Reference Number _____ <small>(optional)</small>						
Consignee		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		WARNING						
TRANSPORT DETAILS This shipment is within the limitations prescribed for: <small>(delete non applicable)</small> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 50%;">PASSENGER AND CARGO AIRCRAFT</td> <td style="text-align: center; width: 50%;">CARGO AIRCRAFT ONLY</td> </tr> </table>		PASSENGER AND CARGO AIRCRAFT	CARGO AIRCRAFT ONLY	Airport of Departure _____ Failure to comply with all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. Shipment type: <small>(delete non-applicable)</small> <input type="checkbox"/> NON-RADIOACTIVE <input type="checkbox"/> RADIOACTIVE				
PASSENGER AND CARGO AIRCRAFT	CARGO AIRCRAFT ONLY							
Airport of Destination: _____								
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					
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 labelled/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 _____ <small>(see warning above)</small>				
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								