Shipping—Infectious Substances, Genetically Modified Microorganisms, and Exempt Specimens

This module provides Columbia personnel with training to safely and legally ship the following Dangerous Goods:

**Biological Substances, Category B (BSCB), Genetically Modified Microorganisms (GMMO) and Exempt Human (or Animal) Specimens.**

All persons involved in any aspect of the transport of Dangerous Goods must receive training based on US and international regulations.
Training Requirements

- Individuals wishing to ship Biological Substances Category B (BSCB) and/or Genetically Modified Microorganisms (GMMO) must complete separate biosafety training in order to understand the hazards posed by these materials and the corresponding safety practices that must be used to reduce or eliminate those hazards.

- Following completion of this module, a short quiz must be satisfactorily completed in order to be authorized to prepare packages, sign shipping documents, or perform any other shipping function discussed in this module involving dry ice or specimens.

- Individuals viewing this presentation outside of RASCAL, if unable to complete the related quiz in RASCAL, must contact biosafety@columbia.edu to obtain a hard copy of the quiz.

- Please note – certification to ship other dangerous goods requires separate training not satisfied by this module. Please contact EH&S with specific questions.
Introduction

A number of entities regulate shipment of biological materials that may be capable of transmitting infectious disease; the two with the most important roles are:

US Department of Transportation (DOT)-rules apply for ground shipments only.

International Air Transport Association (IATA)-an organization of the world’s commercial air carriers, their regulations are based on UN requirements and are applicable for all air transport of Dangerous Goods.

The organizations’ rules are almost identical since the autumn of 2006, modifications in the DOT regulations were designed to harmonize the requirements between the 2 groups.
Introduction

Many ordinary goods and materials are classified as “Hazardous Materials (HAZMATs*)” when offered for transport. The transportation of hazardous materials by air, road, rail or vessel is a significant element of daily commerce, economic activity and life sciences research.

The safe and legal transit of HAZMATs requires that many people perform specific functions properly and safely to ensure that dangerous goods* are recognized and handled appropriately.

The DOT has identified “human error” as a contributing factor in most transportation incidents. Proper training is the best means of preventing hazardous materials transportation incidents.

*Please note – The terms “HAZMATs” and “dangerous goods” are used interchangeably throughout this presentation.
Introduction – Limitations of this Training Module

The requirements discussed in this module pertain to *Biological Substances Category B (BSCB) and Genetically Modified Microorganisms (GMMO)*, specifically.

Packages containing other hazardous materials, including certain chemical, biological, radiological substances or dry ice are subject to additional requirements not covered in this module. For training regarding shipping dry ice, exempt human or animal specimens, or shipments that include *excepted (small) quantities* of hazardous materials such as formalin or alcohol (with or without specimens) see RASCAL module TC0076.

This module discusses the regulations specific to shipment *by air*. Please contact EH&S regarding the applicability of these regulations for shipment by other modes, such as ground or water.

If you are unsure if any materials you are shipping are hazardous materials, please contact EH&S.
General HAZMAT Awareness

Regulatory Overview
The federal regulations governing domestic air transport of dangerous goods are published in 49 CFR 100 to 185. These regulations have been harmonized with those published under the IATA Dangerous Goods Regulations, and must be followed anytime an air carrier that is an IATA member is used for transportation of dangerous goods.
General HAZMAT Awareness

Regulatory Overview
49 CFR contains information pertaining to the following areas of HAZMAT shipment:
• Definition of HAZMATs and Hazardous Materials Employees
• Training requirements
• Preparation of HAZMATs for shipment
• Container manufacturing and testing requirements
• Rejection of improperly prepared or incorrectly documented packages
• Safety and security requirements of HAZMAT shipments
General HAZMAT Awareness

Regulatory Overview - 49 CFR:
• Definition of Hazardous Materials
  – Materials classified by the DOT as explosive, radioactive, infectious, compressed gases, flammable, oxidizing, reactive, toxic, or corrosive.
  – These materials are identifiable by various hazard communications means, including placards, labels, and Material Safety Data Sheets (MSDS).
  – DOT also regulates other materials that pose “miscellaneous” hazards, such as dry ice. Miscellaneous hazards are designated as “Class 9.”
General HAZMAT Awareness

Regulatory Overview - 49 CFR:
• Definition of Hazardous Materials Employee (DOT)
  – A person* who is: (i) Employed on a full-time, part time, or temporary basis...and who in the course of such full time, part time or temporary employment directly affects hazardous materials transportation safety;... (ii) Loads, unloads, or handles hazardous materials; ... (iii) Prepares hazardous materials for transportation; (iv) Is responsible for safety of transporting hazardous materials

*The scope of the hazardous material employee definition is broad. It would include, for example, someone whose sole responsibility is the preparation of a shipping form.
General HAZMAT Awareness

Regulatory Overview of 49 CFR:
• Training requirements
  – Initial training upon hire
  – Refresher training every 2 years
  – Satisfactory completion of test
  – Certification
General HAZMAT Awareness - Identifying Hazardous Materials

Examples of HAZMAT Communication and Signage –
These placards may appear as placards on vehicles transporting HAZMATs and/or may appear as smaller labels on packages of HAZMATs, including infectious materials and GM/MCs.
General HAZMAT Awareness – Hazardous Materials Table and ICAO/IATA Technical Instructions

All the operational requirements for properly preparing a shipment of a dangerous good are located in the Hazardous Materials Table. This table forms the basis for the HAZMAT regulations

• The complete Hazardous Materials Table is located at 49 CFR 172.101.
• Understanding the proper use of the table is critical to the proper performance of many HAZMAT shipping functions.
• For air transport of dangerous goods, this information is located in the ICAO/IATA technical instructions (TI). Please contact EH&S to review a copy of the ICAO/IATA TI as they pertain to your particular shipment.
• Following the instructions located in the ICAO TI will ensure compliance with the DOT HAZMAT regulations.
General HAZMAT Awareness

The DOT Hazardous Materials Table Defines the materials regulated by DOT, and prescribes the proper packaging requirements for transit. These requirements are mirrored in the ICAO/IATA Technical Instructions

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Hazardous materials descriptions and proper shipping names</th>
<th>Hazard class or Division</th>
<th>Identification Numbers</th>
<th>PG</th>
<th>Label Codes</th>
<th>Special provisions (§172.102)</th>
<th>(8) Packaging (§173.***</th>
<th>(9) Quantity limitations</th>
<th>(10) Vessel stowage</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Infectious substances, affecting humans.</td>
<td>6.2</td>
<td>UN2814</td>
<td></td>
<td></td>
<td>A81, A82</td>
<td>134 Exceptions</td>
<td>196 Non-bulk</td>
<td>4 L or 4 kg</td>
</tr>
</tbody>
</table>

• This excerpt from the HAZMAT Table displays the entry for Infectious Substances, Affecting Humans (Category A). The full table is arranged alphabetically by shipping name. Genetically modified microorganisms appear only in ICAO/IATA technical instructions (TI) because they are not regulated by DOT.

• Each column of the table provides critical information used in the preparation of dangerous goods packages.
## General HAZMAT Awareness

The DOT Hazardous Materials Table

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Hazardous materials descriptions and proper shipping names</th>
<th>Hazard class or Division</th>
<th>Identification Numbers</th>
<th>PG</th>
<th>Label Codes</th>
<th>Special provisions ($172.102)</th>
<th>(8) Packaging ($173.***</th>
<th>(9) Quantity limitations</th>
<th>(10) Vessel stowage</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Infectious substances, affecting humans.</td>
<td>6.2</td>
<td>UN2814</td>
<td></td>
<td>A81, A82</td>
<td>134 ...</td>
<td>196 ...</td>
<td>None ...</td>
<td>50 mL or 50 g</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 L or 4 kg</td>
</tr>
</tbody>
</table>

- Columns 2, 3, 4 and 5 contain the proper shipping name, hazard class, UN Identification Number and packing group, respectively. These pieces of information will appear on the outside of packages containing dry ice, BSCB, or GMMO.

- Column 6 indicates the label(s) that must appear on the package. Labels are available through EH&S or for purchase through the vendors listed at the end of this module.
General HAZMAT Awareness

The DOT Hazardous Materials Table

- Column 7 contains information on special provisions or requirements.

- Column 8A, 8B, and 8C indicates the packaging instructions. These instructions can be found at 49CFR 173.217 for non-bulk packages.

- Columns 9A and 9B provide instructions on the maximum allowable quantities of shipped materials allowed in a package depending on the mode of transportation.
General HAZMAT Awareness

• Requires packaging capable of protecting against accidental release (see packing instructions).
• Requires the following to appear on the air waybill –
  – Proper shipping name (“Biological Substance Category B,” or “Genetically Modified Microorganism”);
  – Hazard class;
  – UN number;
  – The number of packages; and
  – The net weight of samples in each package.
Function Specific and Safety Information

- DOT and IATA regulations define two groups of **Infectious Substances, Categories A&B.**

- **Category A Infectious substances** (proper shipping name: ‘Infectious Substance, Affecting Humans [or Animals]’) are the highest risk microorganisms or materials expected to contain them, and pose a significant hazard to humans or animals.
- A ‘Shipper’s Declaration of Dangerous Goods’ is required.
- Category A materials may only be shipped by EH&S, 305-6780 (CUMC) or 854-8749 (MS). They will be discussed only in the context of distinguishing them from **Category B** materials.
Function Specific and Safety Information
Biological Substances, Category B (BSCBs)

• **BSCBs** are infectious substances in a form not generally capable of causing serious disease in humans or animals. They comprise low & moderate risk microorganisms and materials reasonably expected to contain them.

• Regulations enacted in 2006 require that “Biological Substance, Category B” be used on packages and shipping papers to replace the older terms “Diagnostic Specimen” and “Clinical Specimen”, which are no longer legally acceptable.

• Most BSCBs require BSL-2 procedures in the laboratory. Always wear a lab coat, single use nitrile gloves and eye protection when splash potential exists.
Function Specific and Safety Information
Exempt Specimens

Specimen – (material) collected directly from humans or animals, including, but not limited to, excreta, secreta, blood and its components, tissue and swabs, and body parts transported for research, diagnosis, investigational activities, disease treatment and prevention.

Exempt Specimen – specimen for which there is minimal likelihood that pathogens are present.

The ‘exempt’ designation allows for the shipment of low risk material with fewer restrictions/requirements than ‘infectious’ materials (Category A or B).

Examples: human or animal specimens in which, based on clinical or case history, the presence of pathogens is not suspected.

Material transported for testing related to the diagnosis of infectious disease may not be classified as exempt but rather Category A or B Infectious Materials.

Please see RASCAL course TC0076 if you intend to ship exempt specimens.
Function Specific and Safety Information
Genetically Modified Microorganisms

Genetically Modified Microorganisms (GMMO) are defined for shipping purposes as microorganisms in which genetic material has been purposely altered through genetic engineering in a way that does not occur naturally. (Ex.: Replication-deficient adenovirus expressing a foreign gene, e.g. GFP)

GMMOs must be shipped as Category A or B Infectious Substances if they contain or are reasonably expected to contain materials that fit into the Category A or B classification.

GMMO's must be handled at the biosafety level applicable to the wild type organism.
Function Specific and Safety Information

Recall – The requirements of the DOT HAZMAT Table are mirrored in the IATA/ICAO technical instructions. To see a copy of the relevant packing instructions, contact EH&S.

The table below summarizes relevant information for shipping biological materials.

<table>
<thead>
<tr>
<th>Shipment Type</th>
<th>Proper Shipping Name</th>
<th>UN Number</th>
<th>Hazard Class</th>
<th>Packing Group (PG)</th>
<th>Packing Instruction (PI)</th>
<th>Max. qty. per primary receptacle</th>
<th>Max. Net qty./pkg. for Passenger Aircraft</th>
<th>Max. Net qty./pkg. for Cargo Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category A infectious substance, affecting humans and possibly animals</td>
<td>Infectious substance, affecting humans</td>
<td>UN2814</td>
<td>6.2</td>
<td>-</td>
<td>602</td>
<td>Liquids: 4 L, Solids: 4 kg</td>
<td>50 ml or 50 g</td>
<td>4 L or 4 kg</td>
</tr>
<tr>
<td>Category A infectious substance, affecting only animals (not humans)</td>
<td>Infectious substance, affecting animals</td>
<td>UN2900</td>
<td>6.2</td>
<td>-</td>
<td>602</td>
<td>Liquids: 4 L, Solids: 4 kg</td>
<td>50 ml or 50 g</td>
<td>4 L or 4 kg</td>
</tr>
<tr>
<td>Category B infectious substance</td>
<td>Biological substance, Category B</td>
<td>UN3373</td>
<td>6.2</td>
<td>-</td>
<td>650</td>
<td>Liquids: 1 L, Solids: 4 kg</td>
<td>4 L or 4 kg</td>
<td>4 L or 4 kg</td>
</tr>
<tr>
<td>Dry Ice</td>
<td>Dry Ice or Carbon Dioxide, solid</td>
<td>UN1845</td>
<td>9</td>
<td>III</td>
<td>904</td>
<td>N/A</td>
<td>200 kg</td>
<td>200 kg</td>
</tr>
<tr>
<td>Non-infectious, transducing genetically modified organism or microorganism</td>
<td>Genetically modified microorganisms</td>
<td>UN3245</td>
<td>9</td>
<td>-</td>
<td>913</td>
<td>No Limit</td>
<td>No limit</td>
<td>No limit</td>
</tr>
</tbody>
</table>
Function Specific and Safety Information
Function Specific and Safety Information
Dry Ice

For shipping purposes, dry ice is considered a “Dangerous Good” because if it is packaged so that sublimating gas can not dissipate, the resulting pressure build-up may cause the package to burst.

Separate training is required for those shipping dry ice. Please see RASCAL training module TC0076.
Function Specific and Safety Information

Following the sequence of steps below will ensure that your package is secure and can be transported according to applicable laws.

• **Classify:** Does the product meet the definition of a BSCB? Infectious Substance, Category A? GMMO?

• **Identify:** BSCB’s and GMMOs require specific descriptions on packages and shipping papers.

• **Package:** The correct packaging must be used and the materials must be packaged properly to achieve the goal of risk reduction.
Function Specific and Safety Information

• **Marking & Labeling:** Appropriate hazard awareness information must be provided to those transporting the shipment.

  Shipping companies (FedEx, UPS) are legally required to refuse to transport any shipment that is improperly packaged, labeled, or accompanied by incorrect shipping documents.
Function Specific and Safety Information

Classification

• DOT and IATA list organisms that must be classified in *Category A- Infectious Substance Affecting Humans (or Animals)*. See pages 12-15 of this DOT brochure for the current list of organisms. Category A materials represent the highest hazard category of infectious materials for shipping.

• The list is not all inclusive; it delineates the hazard level above which an organism must be give the category A designation.

• ‘Cultures’ following a name indicates that only if that organism has been purposely amplified (on a slant, in liquid media) will it require category A designation. Otherwise, (when shipping a blood or tissue sample reasonably expected to contain the organism), BSCB rules will apply.
Classification

• BSCBs include infectious materials that are not considered as hazardous as Category A materials. BSCBs also include human and animal tissue, and material used for research, diagnosis, or disease treatment or prevention reasonably expected to contain such moderate risk microorganisms.

• Materials shipped for diagnostic testing for pathogens must be classified as Category A or B depending on the suspected agent.

• As Category A defines the upper hazard level for shipping of biological substances; the following materials are excepted from shipping regulations and thus help define the lower hazard level.
Function Specific and Safety Information

Classification – Excepted Materials
These items are not subject to any regulation. They should not be confused with exempt specimens, which are regulated.
Examples of excepted materials:
• substances unlikely to cause disease in humans or animals (e.g. BSL 1 microorganisms)
• substances containing pathogens that have been neutralized or inactivated so that they do not pose a health risk (e.g. autoclaved material)
• environmental samples not considered to pose a significant risk of infection
• blood collected for transfusion or preparation of blood products

* Contact EH&S for further information on the applicability of exceptions for biological materials.
Function Specific and Safety Information

Classification

**Question**: How is a blood sample sent for HIV testing classified?

**ANSWER**: “Biological Substance, Category B”. The testing exception would not apply because the testing is related to infectious disease diagnosis.

A culture obtained from this sample would be shipped under Category A Infectious Substance rules because of the amplification step.

**Note**: Specimens suspected of containing the highest risk microbes (eg, Ebola, which does not have the ‘cultures’ designation – refer to DOT brochure) are always shipped as category A infectious substances.
Function Specific and Safety Information

Classification

• In laboratories all blood & body fluids are treated as infectious, using Universal Precautions. The risks during shipping may be lower than when handled in a lab which is why some materials classified as ‘Bloodborne Pathogens’ may be classified as ‘exempt human specimens’ for shipping.

• Personnel who handle human blood/body fluids must attend Bloodborne Pathogens training provided by EH&S. See http://cpmcnet.columbia.edu/dept/ehs/bloodpathsched.html for a schedule.
Function Specific and Safety Information

Classification

• Although non-pathogenic organisms (non-toxigenic *E. coli*, *S. cerevesae*) are excepted from these regulations, they must be packaged to ensure intact arrival at their destination by following the instructions for BSCB’s (see Packaging section).
• Justification for classifying items as BSCB’s vs. Category A infectious substances should be documented and maintained.
• All personnel must be aware of the risk assessment that was part of the decision-making process.
Function Specific and Safety Information

Classification Examples

Category A Infectious Substances vs. Biological Substance, Category B

• Shipment of a white powder suspected of containing anthrax: Category A. White powder is the result of ‘culturing’ and there is the expectation that it is anthrax.

• Blood sample from a monkey suspected of Marburg virus infection: Category A. On high-risk list and not classifiable as a BSCB because its listing is not followed by “cultures”.
Function Specific and Safety Information

Classification Examples
Category A Infectious Substances vs. Biological Substance, Category B vs. “Exception” (not regulated)
• Blood screened and sent for transfusion: Excepted
• *Staph aureus* on agar slant: Biological Substance, Category B- capable of causing disease, not on the Category A list. If this were a novel, highly drug resistant isolate implicated in a serious outbreak, one would be allowed to classify it as a Category A material and use the more conservative shipping procedures.
Function Specific and Safety Information

Packaging

‘Triple packaging’ (primary container, secondary container, rigid outer packaging-see next slide) must be used to ship BSCB’s.

Outer packaging must be marked “Biological Substance, Category B”, the net quantity (metric), and name, address and business phone number of person responsible for the shipment.

Biohazard symbol must be on the primary or secondary container if the shipment consists of human blood/body fluids.

This label must also appear on the outer package:

For liquids, absorbent in sufficient quantity to absorb the entire contents must be placed between the primary and secondary containers.
PACKAGING-BSCB's

Cross Section of Proper Packing

LABEL: "Biological Substance Category B"

UN3373

Name, Address, & Telephone Number of Shipper

Outer Packaging

Absorbent Packing Material

Water tight Secondary Packaging (Sealed Plastic Bag)

Specimen ID

Biohazard Label

Water Tight Primary Receptacle

Itemized List of Contents

Water Tight Secondary Packaging (Sealed Plastic Bag)
Function Specific and Safety Information

Packaging
Primary containers (e.g. screw-top test tubes, vacuutainers) must be individually cushioned. An itemized list of contents placed between the secondary container and the outer packaging. Maximum volume: 500ml/0.5kg. per primary, 4 L/4kg. per total package.

Primary containers must have seals such as a screw top lid, which must be wrapped with water-proof tape. Petri dishes may not serve as primary container.

The outer packaging must meet design type tests, (see next slide). The minimum dimension for at least one surface of the outer package is 4 x 4 inches; “mailer tubes” are not allowed.
Function Specific and Safety Information

Packaging
Design type tests
The entire BSCB package must withstand a 1.2 meter drop test* and other tests without damage to the contents. While individuals may perform such tests, it is more practical to purchase packaging systems from vendors who will certify that their products meet these criteria (see “Supplies” section).

*Infectious substance, Category A packaging must withstand a 10 meter drop test.
Function Specific and Safety Information

**Packaging**
When shipping liquids:
- The primary and secondary containers must be leak proof.
- When shipping multiple primaries, each one must be wrapped or cushioned to prevent breakage.
- Sufficient absorbent materials (see “Supplies” section) must be placed between the primary and secondary to absorb the entire contents of the shipment.
- As per IATA, either the primary or secondary container must be able to withstand a 95kPa (13.8 lbs/sq. in.) pressure differential (see next slide) **when shipped by air.**
Function Specific and Safety Information

Packaging
Pressure Differential

Given the variety of vessels used as primary containers, it is almost impossible to find primary containers that meet the pressure differential criterion. The most effective way to meet the pressure differential requirement is through the use of certified secondary containers which are available from a number of sources, (see “Supplies” section).
Function Specific and Safety Information

Many BSCB shipments* take place during the course of clinical trials where the **sponsor** provides the packaging. Those with shipping responsibilities must obtain from the **sponsor** documentation that the packaging complies with regulations regarding labeling, package strength, and containment ability.

Shippers at the trial site (Columbia) are responsible for assuring that sponsors have provided the properly marked and labeled packages and for compliance with all applicable shipping rules.

*If material is reasonably expected to contain a pathogen or study involves testing for an infectious disease.
Function Specific and Safety Information

Overpacks
Placing several complete (primary, secondary & outer package) packages into one large container, an “overpack”, may be desirable to get several packages to a single destination. The overpack must then have all the package markings that the outer packages would have if they were being sent separately. It must be marked “overpack”.
Function Specific and Safety Information

Documentation for BSCB Shipments

• Air shipments require an “Air Waybill”. In the “Nature and Quantity of Goods” box of this document, “Biological Substance, Category B” and “UN3373” must appear.
• Check boxes to indicate ‘Dangerous Goods’ and ‘Shippers Declaration Not Required’. See example, next slide.
• On the FedEx waybill, where the question, “Does this shipment contain dangerous goods” appears, select “Yes Shipper’s Declaration not required”
• Category A materials (which only may be shipped by EH&S) and GMMO’s require a Declaration and the appropriate indication would be, “Yes as per attached Shipper’s Declaration”.
Function Specific and Safety Information

FedEx domestic air waybill
Function Specific and Safety Information
Genetically Modified Microorganisms

• GMMOs are only regulated when shipped by air (IATA), not ground (DOT).
• Refer to IATA Packing Instruction 959, available from EH&S.
• Packaging
  – Sturdy enough to withstand anticipated rigors of shipping
  – Leak proof primary for liquids
  – Sufficient absorbent between primary and secondary container to absorb entire contents in event of breakage
  – Sturdy outer packaging with no side less than 100mm. (4 inches)
  – Name and address of shipper and consignee on each outer package
  – Appropriate marking on outer package
• Check boxes to indicate ‘Dangerous Goods’ and ‘Shippers Declaration Not Required’.
  See example, previous slide.
HAZMAT Shipment Security

• The DOT regulations specify that all Hazardous Materials Employees receive a minimum level of security awareness training.
• For example, shippers of hazardous materials must limit access to their packages to trained personnel only, and must ensure their package remains in their possession until it is transferred to the carrier.
• Shippers must not leave packages containing hazardous materials at drop boxes.
• Dangerous goods must be picked up at designated mail rooms or in the laboratories.
HAZMAT Shipment Security

Several areas of potential security vulnerability are important to consider when offering HAZMATS for shipment.

• **Access**
  – Allow only trained personnel to handle your package prior to pick-up; **do not leave at a drop box location.**
  – Immediately report to Public Safety any suspicious persons or activity in your laboratory or in any area where hazardous materials may be present.

• **Personnel**
  – Only trustworthy individuals should be trained to perform HAZMAT functions.
  – If you are unsure if a person has been trained, ask to see their certificate.
HAZMAT Shipment Security

Improperly handled HAZMATs have the potential to cause harm to human health and the environment in transit. The following are examples of areas where HAZMATs in transit could affect pose security threats.

• Critical Transportation Infrastructure
  – Incidents involving HAZMATs in transit can affect the integrity of roads, bridges, tunnels, transportation routes and other vulnerable facilities.

• Personal Safety
  – HAZMATs are often loaded onto passenger aircraft for transportation. Improperly prepared packages can endanger passengers and vehicles.
HAZMAT Shipment Security

• Depending upon the nature of the dangerous goods to be shipped, additional training and an institutional security plan may also be required.
• Columbia has a DOT Security Plan in place to address these requirements, however BSCB, GMMO, and exempt specimen shipments are not subject to this additional training requirement.
Recommendations

• If shipping with dry ice, secure your samples in such a way that when the dry ice sublimes, they will not move freely inside of the insulated box. This can be accomplished by wedging your samples in place with cardboard or Styrofoam. Fragile containers such as glass tubes or vials should be wrapped with cushioning material and placed in a secondary container.

• Minimize the volume of air to which the dry ice is exposed in order to slow the rate of sublimation. If there is any air space after you fill your package with dry ice, fill it with packing peanuts or other material to reduce the volume of air space.
**SUPPLIES**
The following companies market packaging materials for the safe and legal transport of diagnostic specimens. This list is strictly informational; inclusion does not constitute an endorsement or recommendation by Columbia University.

<table>
<thead>
<tr>
<th>Company</th>
<th>Phone Number</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAF-T-PAK</td>
<td>800-814-7484</td>
<td><a href="http://www.saftpak.com">http://www.saftpak.com</a></td>
</tr>
<tr>
<td>Inmark</td>
<td>800-646-6275</td>
<td><a href="http://www.inmarkinc.com">http://www.inmarkinc.com</a></td>
</tr>
<tr>
<td>Source Packaging of New England</td>
<td>800-200-0366</td>
<td><a href="http://sourcepak.com">http://sourcepak.com</a></td>
</tr>
<tr>
<td>Therapak Corp.</td>
<td>888-505-7377</td>
<td><a href="http://therapak.com">http://therapak.com</a></td>
</tr>
<tr>
<td>EXAKT Technol.</td>
<td>800-923-9123</td>
<td><a href="http://exaktpak.com">http://exaktpak.com</a></td>
</tr>
<tr>
<td>HazMatPak</td>
<td>800-347-7879</td>
<td><a href="http://www.hazmatpac.com">http://www.hazmatpac.com</a></td>
</tr>
<tr>
<td>Polyfoam Packers Corp.</td>
<td>888-765-9362</td>
<td><a href="http://www.polyfoam.com">http://www.polyfoam.com</a></td>
</tr>
<tr>
<td>Air Sea Atlanta</td>
<td>404-351-8600</td>
<td><a href="http://airseaatlanta.com">http://airseaatlanta.com</a></td>
</tr>
<tr>
<td>All-Pak Inc.</td>
<td>800-245-2283</td>
<td><a href="http://all-pak.com">http://all-pak.com</a></td>
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