I. Introduction

Welcome to the Shipping Biological Substance Category B, Genetically Modified Organisms, or Exempt Specimens course material. This course covers classification of materials, procedures for packaging, marking and labelling; permits and documention required as per regulations. This course provides individuals with knowledge and skills necessary to safely and compliantly transport Biological Substances Category B, Genetically Modified Organisms, or Exempt Specimens. This course is required once every 2 years.

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

Note: If you anticipate the need to use dry ice for your biological substance shipment, we advise taking the Shipping with Dry Ice course (BIO200) before proceeding with this course.

Objectives

At the conclusion, participants should be able to:

1. Identify and adequately classify samples considered a Category B Biological Substance, Genetically Modified Organisms (GMOs), Exempt Human or Animal Specimens.
2. Pack samples with the appropriate primary and secondary containment.
3. Mark and label shipping packages as per regulations.
4. Complete the appropriate shipping documents or permits.
5. Follow necessary safety guidelines avoiding any accidents, injuries, or spills.

II. Regulatory Agencies

When shipping Category B Biological Substances, Genetically Modified Organisms (GMOs), or Exempt Human or Animal Specimens, you are bound by rules established by international and national regulatory agencies. These regulatory bodies ensure infectious substances or materials are transported as safely as possible, most notably, by air.

Regarding the shipping and receiving of Category B Biological Substance, Genetically Modified Organisms (GMOs), Exempt Human or Animal Specimens, the University of Alabama at Birmingham (UAB) follows:

- **International Air Transportation Association Dangerous Goods Regulations (IATA-DGR)**
  Major organization that regulates the transport of dangerous goods by air is the International Air Transport Association (IATA). IATA is a member-driven, industry organization which helps regulate all shipments on air crafts or by air carriers.

- **United States Department of Transportation (DOT) Hazardous Materials Title 49 Code of Federal Regulations Parts 171-180**
  In the United States, the Pipeline and Hazardous Materials Safety Administration (PHMSA), a branch of the U.S. Department of Transportation (DOT), publishes regulations for the transport of hazardous materials.

III. Classifications

Classification of an item to be shipped is used to identify the actual hazard and not the substance itself. Classification is necessary to follow both International and National regulations.

1. Biological Substances, Category B:

Samples not meeting the criteria for Infectious Substances, Category A may qualify for classification as Biological Substances, Category B (meaning an infectious substance that is not in a form generally capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs) (www.phmsa.dot.gov). Blood, blood components, excreta, secreta, unfixed tissues, etc. shipped for purpose of research, diagnostics, investigational activities all meet the criteria of category B, unless a trained professional has determined the materials have a minimum likelihood to contain a pathogen. Infectious substances in Category B must be assigned to UN 3373.

Examples of category B: Viral vectors (e.g., Adenovirus, HSV-1, Lentivirus); Recombinant viral vectors (replication defective) (e.g., AAV). Blood drawn from a HepB/HIV-positive patient would be classified as Category B (only CULTURES of HepB/HIV are Category A).

Keep in mind, professional judgement must be used to classify the biological material being shipped. If there is any doubt on how to classify a particular pathogen it must be shipped as a Category A Infectious Substance.

Use this Classification Flowchart to determine the classification and regulatory requirements for your shipping sample or specimen.

2. Genetically Modified Micro-Organisms and Organisms:

Genetically modified micro-organisms (GMMOs) and genetically modified organisms (GMOs) are micro-organisms and organisms in which genetic material has been purposely altered through genetic engineering in a way that does not occur naturally. GMMO and GMO which do not also qualify as class 6.2 Infectious Substances (Category A or B) are considered Class 9 (Miscellaneous Hazard), and must be assigned to UN 3245.

Examples of GMO's: Non-infectious bacterial strain containing a foreign plasmid, bacterial strain with a gene knockout or insertion, transgenic mouse tissue etc.,

Note: COVID-19 vaccines containing GMOs or GMMOs, including those in clinical trials, are not subject to these Regulations.

3. Exempt Human or Animal Specimens:

If your sample is not Category A or B, it may fall under the definition of an Exempt Human or Animal Specimens. This category includes samples from healthy subjects for simple blood test or drug testing which are called "Exempt Human Specimens/Exempt Animal Specimens". These Exempt Human or Animal Specimens are those that have a minimal likelihood of containing pathogens, as determined by an expert. Do not assume your sample is an Exempt Human or Animal Specimen. Professional judgment is required to determine if a substance is exempt. Base any professional judgment on known medical history, symptoms, and the likelihood of pathogens present in the local population from which the sample was obtained. If the professional judgment is not available, the specimen must not be shipped as Exempt Human or Animal Specimen.

Use this **Classification Flowchart** to determine the classification and regulatory requirements for your shipping sample or specimen. If you have questions, call a UAB Biosafety representative in Department of Environmental Health and Safety (EH&S) at (205) 934-2487.

Examples of Exempt Specimens: Blood or urine taken from healthy individuals for routine drug testing. Dried blood spots (onto absorbent material), Fecal occult blood screening samples, biopsies to detect cancer.

4. Toxins:

Toxins from plant, animal or bacterial sources which do not contain any infectious substances or toxins that are not contained in substances which are infectious substances should be considered for classification in Division 6.1 and assigned to UN 3172 or UN 3462. Any toxins that are considered by the Select Agent program can only be shipped by prior approval of the UAB Select Agent Program Responsible Official. See list here: https://www.selectagents.gov/sat/list.htm

IV. Identification and Packaging System

1. United Nation (UN) Number

The United Nations (UN) Numbers are taken from the **List of Dangerous Goods** and used to identify a substance or group of substances. The UN Number always precedes the Proper Shipping Name (PSN):

- UN 3373 Biological Substance, Category B
- UN 3245 Genetically Modified Micro-Organisms (GMMOs) or Genetically Modified Organisms (GMOs)
- Exempt Human or Animal Specimens do not have a UN Number

2. Proper Shipping Name (PSN)

The Proper Shipping Name (PSN), is assigned by IATA, ICAO, or 49 CFR, and is the name used on shipping documents to describe substances.

The words diagnostic specimen and clinical specimen are no longer allowed as Proper Shipping Names (PSN).

3. Selecting the Proper Packaging Biological Substance, Category B

Packaging components for Biological Substance, Category B must pass testing requirements as a system. Mixing and matching packaging components from different manufacturers is not allowed. For example, you cannot ship Biological Substance, Category B in an EXAKT-PAK™ secondary container, and a SAF-T-PAK™ outer container (fiberboard box).

Outside Packaging

The recommended outside packaging must be sturdy, rigid, corrugated fiberboard, and the appropriate size for the intended content. The box also serves as a surface for displaying clear marks, labels, and other relevant information. Always use boxes meeting approved standards and look for the UN mark. The UN Mark indicates

the box has been tested and meets standards. If you have questions about which boxes are approved, contact EH&S Biosafety representative at (205) 934-2487.

Disposable components of a packaging system must be replaced by components from the same vendor tested and certified for that packaging system. Substituting alternative products is a violation of the law!

Inside Packaging

- Use Packing Instructions 650 (P.I. 650) (IATA) when shipping Biological Substances, Category B.
- Exempt Human Specimens do not have designated Packaging Instructions, so they should be triple-packed (Primary Container→Secondary Container →Tertiary Container) to prevent any release or leak of substances in the shipment.
- Non-infectious Genetically Modified Organisms (GMOs) are packed using P.I. 959.
- Use triple package approved boxes only for any substances identified as UN 3373.

All packaging components for Biological Substances, Category B must be assembled per the manufacturer's closing instructions specific to the packaging system purchased.

Shipping Solid Substances

- The primary and secondary containers must be siftproof.
- The secondary packaging must be siftproof.
- If multiple fragile primary containers are placed in a single secondary packaging, they must be either individually wrapped or separated to prevent contact between them.
- Except for packages containing body parts, organs or whole bodies, the outer packaging must not contain more than 4 kg (This quantity excludes ice, dry ice or liquid nitrogen).

Shipping Liquid substances

- Shipping liquids are of particular concern when traveling by air due to air pressure changes occurring during a flight. If the shipment is liquid, follow the below requirements:
- The primary container must be leakproof and must not contain more than 1 L.
- The secondary packaging must be leakproof.
- Absorbent material must be placed between the primary receptacle and the secondary packaging.
- Primary or secondary container must be able to withstand air pressure changes (95 kpa) without leakage.
- The outer packaging must not contain more than 4 L (This quantity excludes ice, dry ice or liquid nitrogen).
- Make sure that documentation of testing is available from the manufacturer.

V. 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.

2. Biological Substance, Category B

Biological Substance, Category B shipments require the following labels:

- Biological Substance, Category B Black & White Diamond-On-Point Label (minimally, 50 x 50 mm diamond, 6 mm text height, and 2mm line thickness)
- Proper Shipping Name and UN Number is "UN 3373 Biological Substance, Category B." (Minimally, 6mm tall).
- Complete name and address of the Shipper and Consignee (Receiver)
- Name and telephone number of a responsible, reliable, and trustworthy person that will answer the phone (no voicemail and no answering machines). They should be able to answer any questions about the content, shipper, recipient details, and permit inquiries.

Biological Substance, Category B

3. Genetically Modified Organisms (GMOs)

Genetically Modified Organisms (GMOs) shipments require the following:

- The complete name and address of the Shipper and Consignee (Receiver)
- The name and telephone number of a responsible person
- The UN 3245 Genetically Modified Organisms mark (minimally, 50 x 50 mm diamond, 6 mm text height, and 2mm line thickness)
- Remove or completely cover any irrelevant marks or labels

4. Exempt Human or Animal Specimens

Exempt Human or Animal Specimen shipments require the following:

- Packed to prevent leakage (minimal dimensions 100 mm x 100 mm on one side)
- Include the complete name and address of the Shipper and Consignee (Receiver)
- Name and telephone number of a responsible person.
- EXEMPT HUMAN/ANIMAL SPECIMEN label
- DO NOT use a UN 3373 Diamond-on-Point Label. Remember to remove or completely cover any irrelevant marks or labels.
- If the US Postal Service is used as the courier, the outer package must be rigid and contain a Biohazard Symbol of the outside.

Appendix A: Pictures at the end of this course material showing the correct shipping label requirements for each one below:

- Shipping Biological Substance, Category B (UN 3373)
- Shipping Genetically Modified Organisms (UN 3245)
- Shipping Nonhazardous or Exempt Specimens

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

VI. Documentation

1. Centers for Disease Control (CDC) Import and Transport Permits:

The Department of Health and Human Services, through the CDC, regulates the transport of biological materials that could cause illness in humans (including pathogens and biological toxins). In general, a permit is needed for any infectious agent known or suspected to cause disease in humans that you wish to import into the United States. In some cases, acquisition or subsequent distribution of an agent (e.g., bacteria, viruses requiring BSL-3 or BSL-4 containment) is prohibited within the United States, requires CDC authorization, and permits before transfer to another location within the United States.

Select Agent permits may only be obtained through UAB's Responsible Official (RO), in coordination with the Federal Select Agent Program. A list of Select Agents and Toxins can be found **here**. Domestic transport may or may not require a permit. To determine if your shipment requires a permit, see the CDC Import Permit Program.

2. USDA/APHIS Import and Transport Permits

The USDA/APHIS (Animal and Plant Health Inspection Service) regulates the transport of materials that potentially harm U.S. agricultural products, including livestock, poultry, and crops. APHIS permits are required for import, export, and interstate transport of potentially hazard animal or animal products, pathogen vectors, potentially hazard plants, plant products or plant pathogens, and the introduction of genetically modified organisms into the environment. For more information, see **Import and Export**.

USDA/APHIS Import and Transport permits must be obtained by the intended receiver of the material before shipment is made and are good for one year, amendable, and renewable. The application can be found **here**. The application form is for foreign import or interstate transfer. This application requires 6 to 8 weeks for processing.

i) Animal-Related: USDA/ADPHIS permits are required for imports and exports and interstate transport of:

- Animal or plant pathogens including challenge material from the USDA

- Specimens believed to contain animal or plant pathogens[1]
- Vectors of animal or plant disease[1]
- Potentially hazardous animal or plant products

ii) Plant Related: USDA/APHIS Regulation 7 CFR Part 330 Federal Plant Pest Regulations covers the transport of plant pests.

For more information refer links below:

USDA APHIS | Import and Export: Animal and Animal Products

USDA APHIS | Plants and Plant Products Permits

To determine if a permit is needed to import or transport a GMO, contact the APHIS Biotechnology permit branch via a letter of notification.

3. Permits

Additional documentation (i.e., permits or certificates) may be required when shipping any biological substances, particularly those designated infectious substances. Federal permits are required to import and export disease-causing agents for humans and animals, vectors for those agents, animal products, plants, plant products, and plant pests. Chemically inactivated agents are exempt from Dangerous Good Regulations, but may still require permits for receipt or transfer. Permits may also be required for the domestic transport of some agents. Complying with import regulations should prevent packages from being held at customs or denied entry. For more information about responsibilities of shipper and receiver, please refer section VII. Responsibilities in the course.

[1] *USDA/APHIS regulation 9 CFR Animals and Animal Products Parts 94, 95, and 122 covers transport of organisms or vectors that can cause infectious diseases of animals. The regulation defines material requiring a permit as, "(d) Organisms. All cultures or collections of organisms or their derivatives, which may introduce or disseminate any contagious or infectious disease of animals (including poultry). (e) Vectors. All animals (including poultry) such as mice, pigeons, guinea pigs, rats, ferrets, rabbits, chickens, dogs, and the like, which have been treated or inoculated with organisms, or which are diseased or infected with any contagious, infectious, or communicable disease of animals or poultry or which have been exposed to any such disease.*

4. Department of Commerce Export Licenses

Exports of designated biological agents and toxins having the potential to pose a threat to human, animal, or plant life require a license from the U.S. Department of Commerce Bureau of Industry and Security (BIS). The scope of items subject to this licensing requirement is broader than "select agents," and researchers must consult with the University's Export Controls Officer at exportcontrol@uab.edu, or (205) 996-2735, to conduct a separate review to determine if a BIS export license is required.

Export Control at UAB is mediated through the Director of Export Control & International Compliance, located within the Office of Research Regulatory Oversight. BIS may require a license for the export of:

- Designated human, animal and plant pathogens, zoonotic agents, and toxins.
- Genetically Modified Microorganisms or genetic elements containing nucleic acid sequences associated with the pathogenicity of controlled organisms or that code for a controlled toxin.
- Genetic material and products which might be used for the culture of large amounts of agents.

For further guidance on whether or not the agents you are shipping or receiving require permits, contact EH&S at (205) 934-2487.

Foreign imports of the following materials require a permit to import and transport microbial agents or vectors of human disease:

- Etiologic agent
- Arthropod or other animal host or vector of human disease
- Exotic living arthropod or another animal capable of being a host or vector or human disease
- Non-human primate material (e.g., blood, plasma, tissue, urine, and feces) requires an import permit unless it has been specifically treated and rendered non-infectious.

Before shipping anything internationally, please submit the UAB International Shipment Export Control Review Form.

Link to Form: https://www.uab.edu/exportcontrol/exportcontrol/international-shipping

A review will be performed in consideration of the item being shipped; its destination; its recipient; and its use abroad.

5. Before You Ship Anything Internationally

Although UAB does not have an overall centralized shipping process for international or domestic shipments, there remain export control regulatory requirements for international shipping. All physical items, equipment, materials, commodities (including food and medicines), software and biologics (collectively "things") are subject to export control regulations and require some form of shipping documentation prior to shipping abroad.

It is important to understand that everything that crosses the border is an export, even if the item is abroad only temporarily, or if it will be used for research.

6. Security

After preparing the package for shipment, the package must remain under the direct control of trained personnel until handed over to the carrier. This reduces the chances of tampering, theft, destruction, invalidation of the shipper's signature, and signifying the package was prepared by 49 CFR/IATA Regulations. Before handing the package over to the carrier for shipment, it is the shipper's responsibility to ensure all Federal and International Regulations are met. International shipments may require additional permits.

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

Shipper's Declaration is NOT required for Biological Substance, Category B. You must include the following information on the waybill:

- UN Number
- Complete name and address of the Shipper and Consignee (Receiver)The number of packages

- The Net Weight of the Dry Ice in each package (if appropriate)

Appendix B: Pictures at the end of this course material, has examples of Waybill information for each one below:

- Shipping Biological Substance, Category B (UN 3373)
- Shipping Genetically Modified Organisms (UN 3245)
- Shipping Nonhazardous or Exempt Specimens

VII. RESPONSIBILITIES

1. Operator (or Carrier) Responsibilities

Not all couriers or carriers transport Biological Substance, Category B, and not all countries or states in the U.S. accept Biological Substance, Category B. Where there are variations (restrictions) by state, country, courier, or carrier, they may be more restrictive than the IATA DGR or ICAO Technical Instructions, but never less restrictive.

The airline industry is very strict about transporting potentially infectious biological materials. You cannot carry these materials or samples onto a passenger plane no matter how it is packaged. You must use commercial couriers such as UPS, USPS, FedEx, or DHL. There are quantity limitations, depending on the samples being shipped, and on the courier's method of transport. For more information, check with EH&S, UAB and your carrier company.

2. Shipper Responsibilities

When shipping a Category B Biological Substance, Genetically Modified Organism (GMOs), or Exempt Human or Animal Specimen from UAB, your responsibilities are:

- Request a copy of applicable permits from the recipient
- Classifying and identifying the substance or material
- Selecting the appropriate packaging system
- Accurately marking, labeling, and packing the substance or material
- Complete the appropriate shipping documents or permits

3. Receiver (or Consignee) Responsibilities

If you are expecting to receive packages containing Biological Substance, Category B at UAB, your responsibilities are:

- Send import permits to shipper if necessary and check documentation
- Inspecting packages upon arrival
- Reporting any packet damages to the shipper and UAB EH&S

- Notifying the sender of package arrival
- Keeping all shipping documents and permits for a minimum of three years
- The U.S. receiver is responsible for the package being sent to them from a foreign country. The receiver should make sure that the foreign shipper has packed and labeled the material according to U.S. Public Health Service and IATA Regulations

VIII. Conclusion

By successfully completing the "Biological Substances Category B, Genetically Modified Organisms, or Exempt Specimens" course, you have gained the essential knowledge and skills to navigate the safe and compliant transportation of these materials. This section concludes the Shipping Biological Substance Category B Genetically Modified Organisms, or Exempt Specimens" (BIO201) Course Material. You must now complete the Reality Check.

Other Trainings

- If you intend on shipping samples containing Dry Ice, you are also required to complete **Shipping with Dry Ice (BIO200)**.
- If you intend on shipping samples considered Infectious Substances, Category A, you are also required to complete **Shipping Infectious Substances, Category A (BIO202)**.
- UAB Campus Employees whose job duties put them at increased risk for exposure to bloodborne pathogens are required to complete **Bloodborne Pathogens Training (BIO500)**.

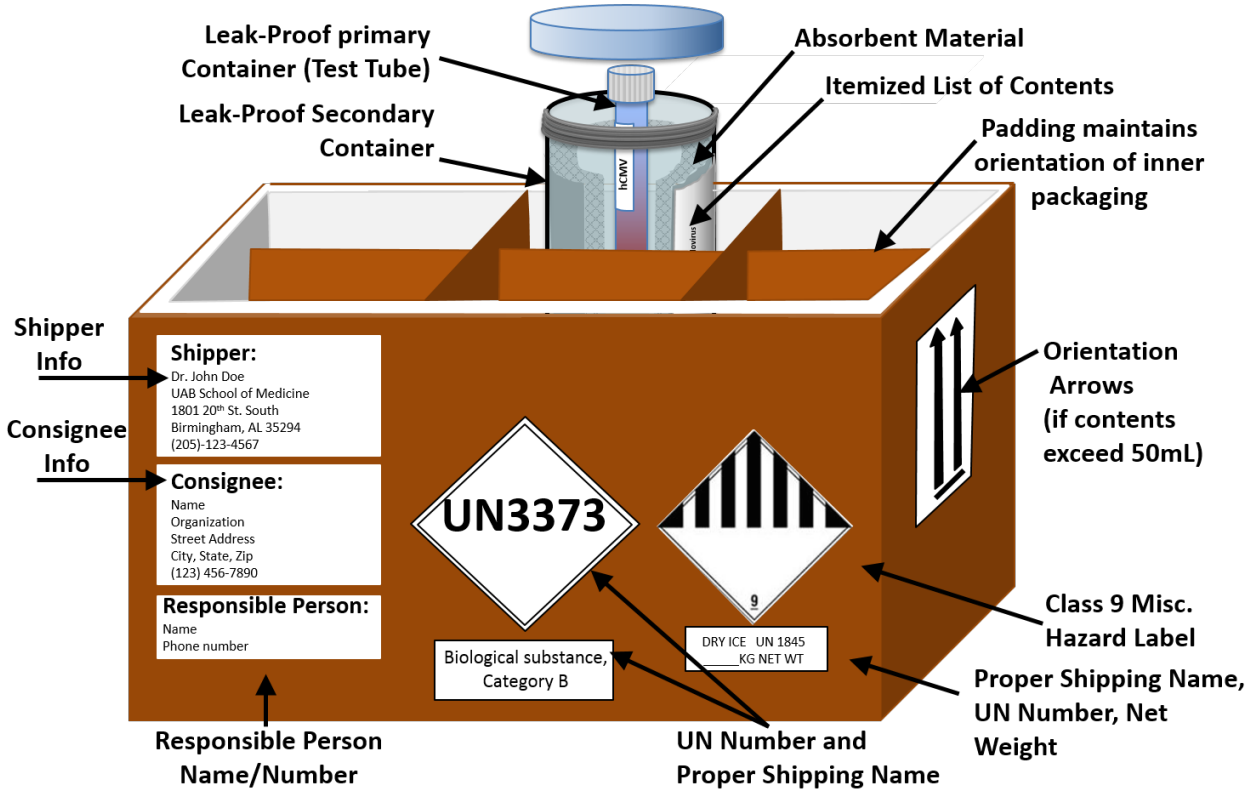
EH&S has many training courses available to all UAB active employees and students. A **decision tree** is available to assist you in choosing the right training courses to supplement the knowledge and skills you may need at work. If you have any questions or comments, contact EH&S at (205) 934-2487.

IX. APPENCIDES

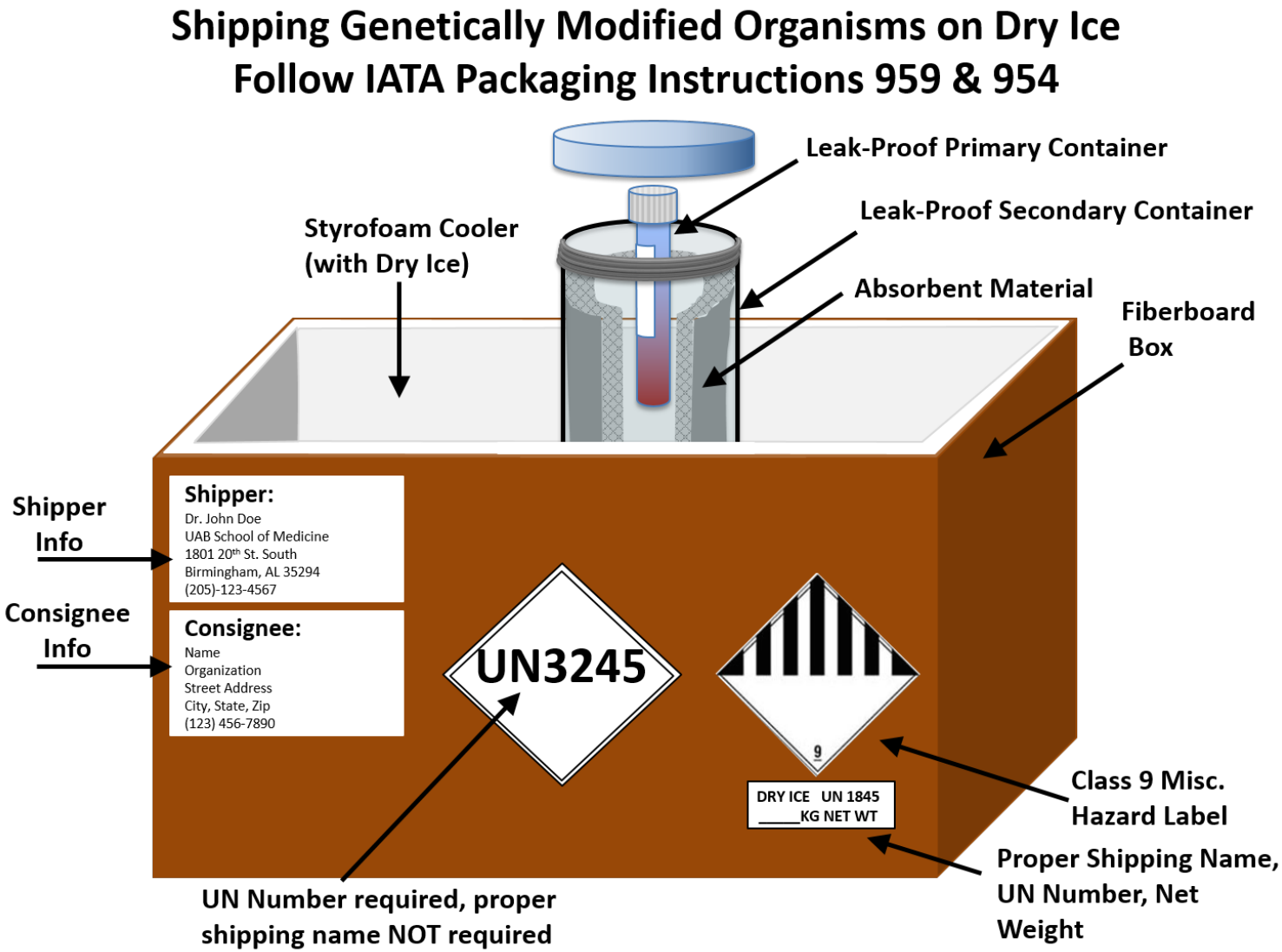
APPENDIX A: SHIPPING LABEL REQUIREMENTS

1. Biological Substances, Category B (UN 3373)

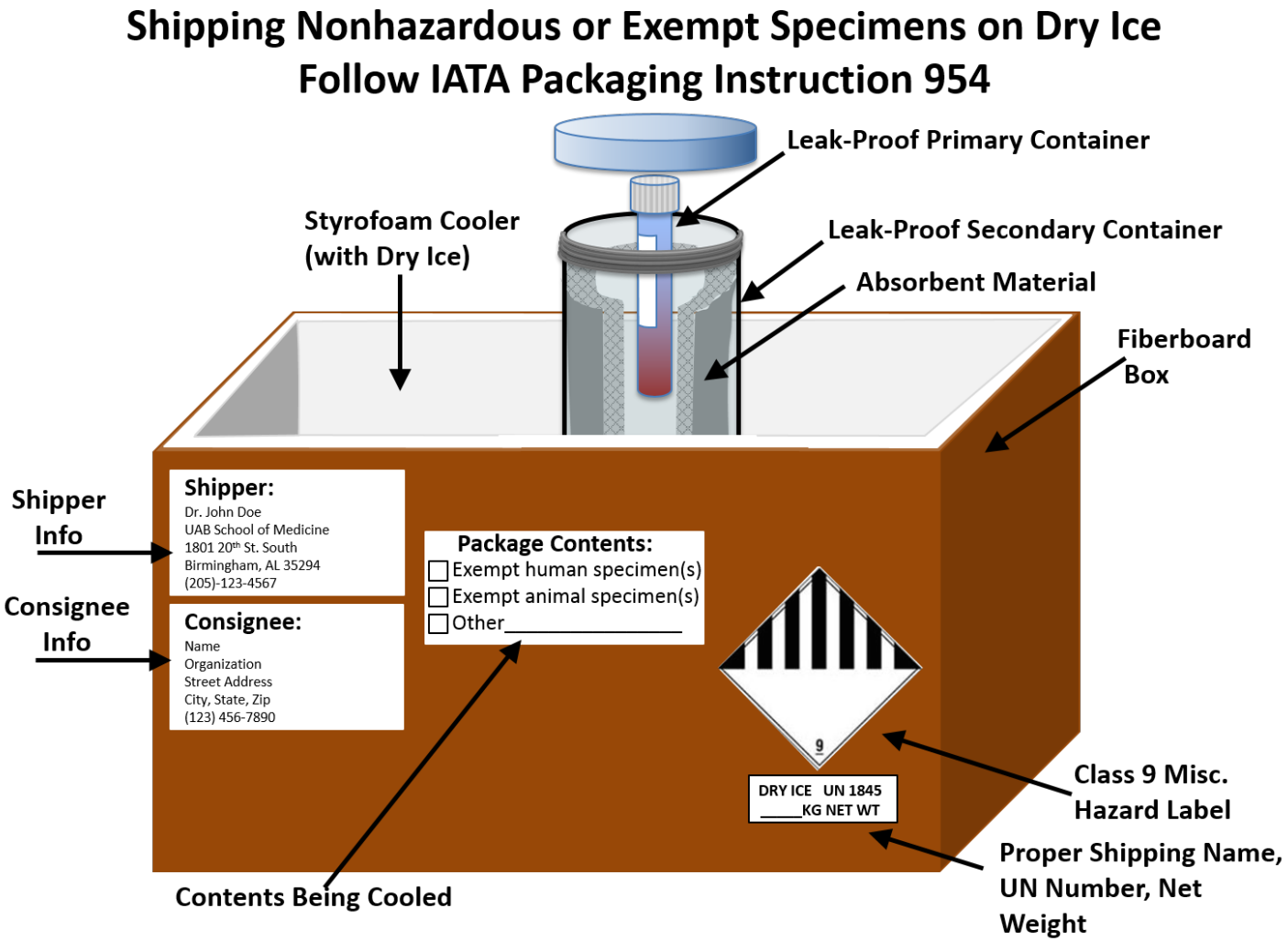
Shipping Biological Substances, Category B, on Dry Ice
Follow Commercial System Instructions; IATA Packaging Instructions 650 & 954



2. Genetically Modified Organism (UN 3245)

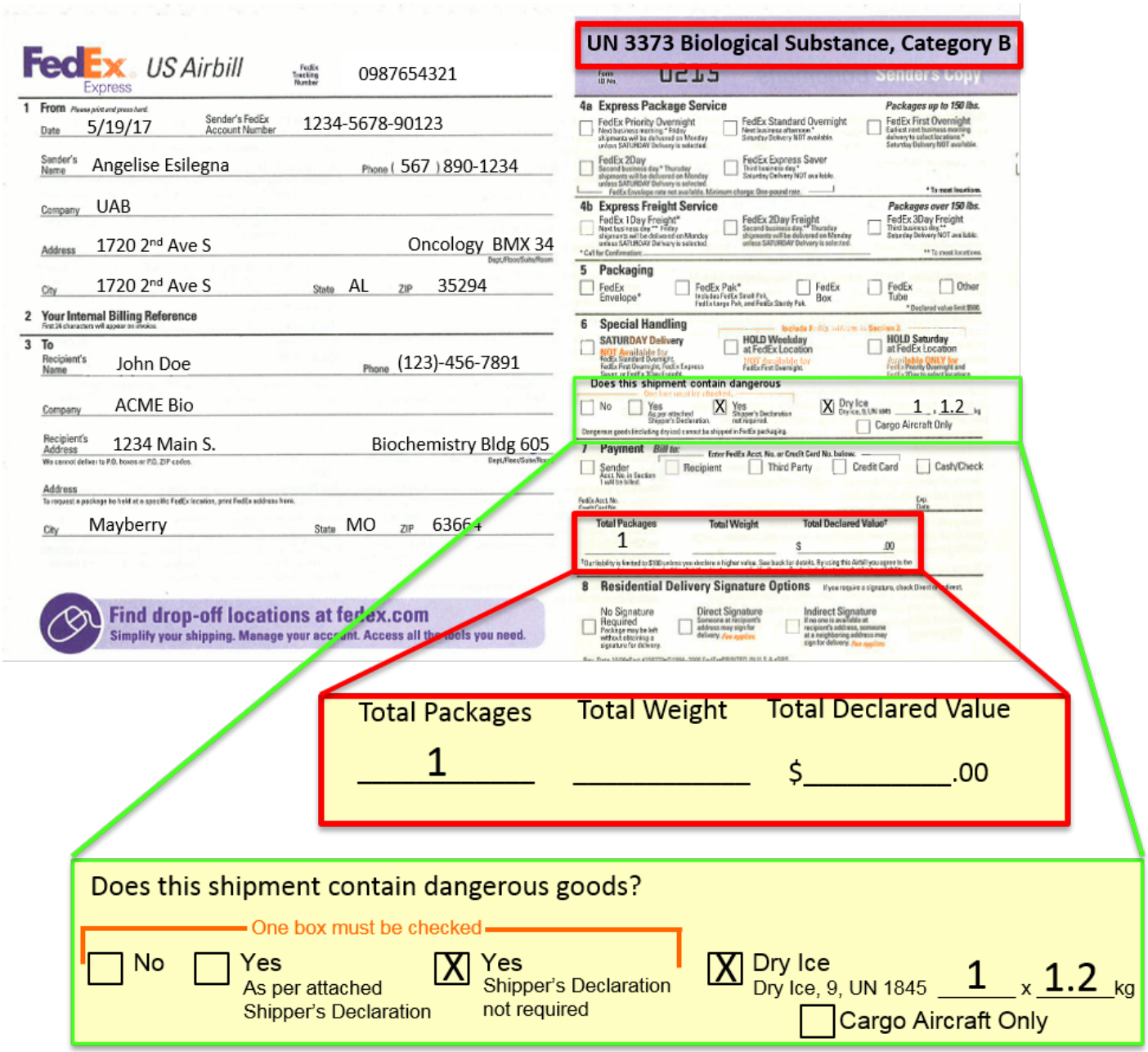


3. Exempt Human/Animal Specimens

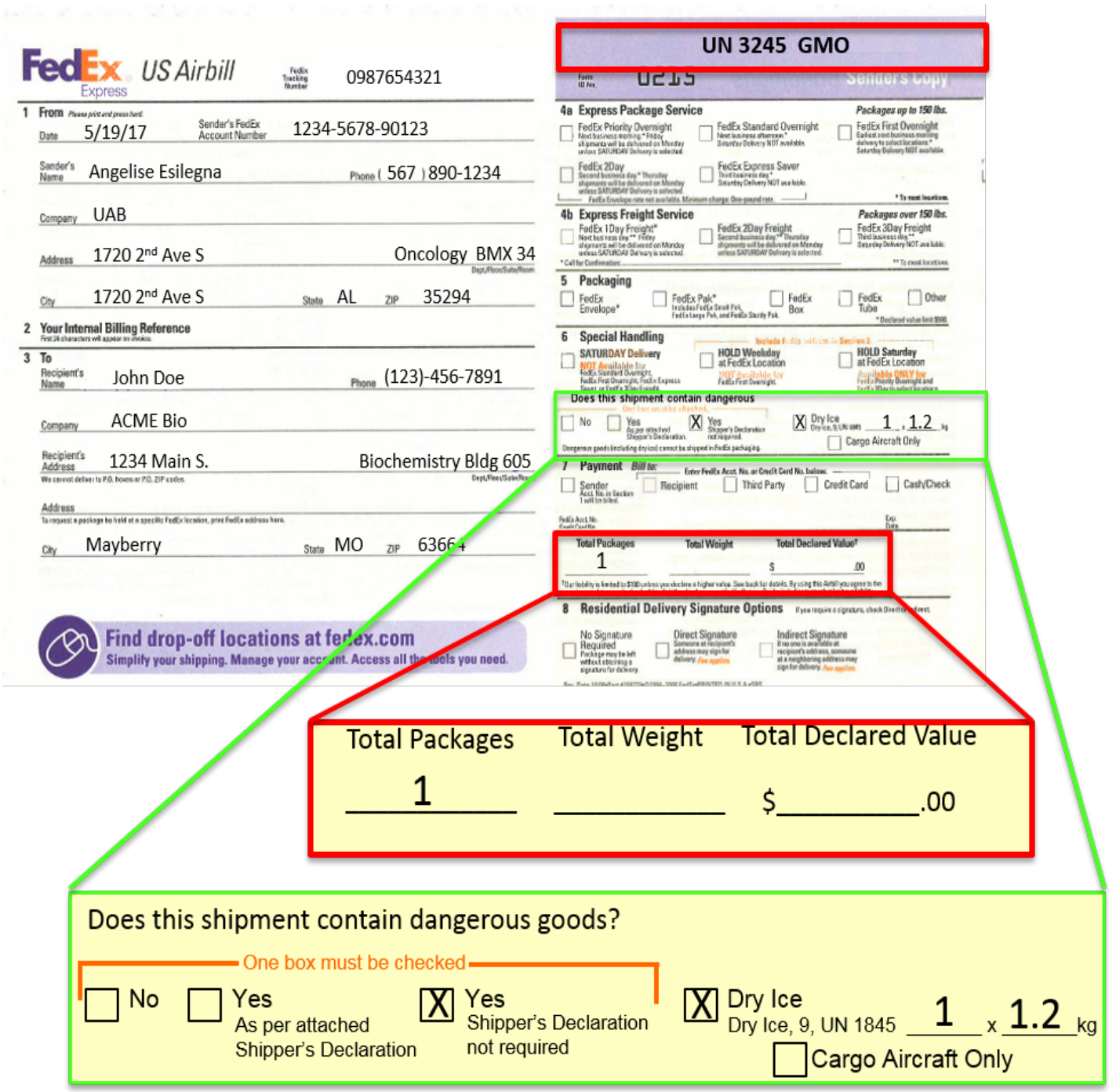


APPENDIX B: EXAMPLES OF WAYBILL INFORMATION

1. Biological Substances, Category B (UN 3373)



2. Genetically Modified Organism (UN 3245)



3. Exempt Human/Animal Specimens