

Section 6.2. Packing and Shipping Biological Samples

Prepared by
Wendy Weisman, Wildlife Conservation Society,
Kristine Smith, EcoHealth Alliance,
Brett Smith, University of California, Davis,
and the PREDICT One Health Consortium

Objective: To provide guidance to ensure safe, proper, and efficient packaging and shipping of biological samples.

THIS DOCUMENT IS NOT TO SERVE AS A REPLACEMENT FOR CERTIFIED TRAINING TO SHIP INFECTIOUS SUBSTANCES.

This document was made possible by the generous support of the American people through the United States Agency for International Development (USAID) Emerging Pandemic Threats PREDICT program. It was drafted to support activities conducted under PREDICT and is intended for an audience of qualified professionals trained in standard, associated best practices. This guide is not intended for use by untrained individuals.

The contents of this document are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government. USAID, PREDICT, and the authors of this guide bear no responsibility for the actions of non-PREDICT-affiliated individuals implementing the material herein.

For more information about the contents of this guide, please contact predict@ucdavis.edu.

Suggested Citation Form: PREDICT One Health Consortium 2016. PREDICT Operating Procedures: Packing and Shipping Biological Samples.

Table of Contents: Packing and Shipping Biological Samples

[Section 6.2.1. Learning Objectives and Confirmation](#)

[Section 6.2.2. Introduction](#)

[Section 6.2.3. Summary of Key Terms](#)

[Section 6.2.4. Classifying and Identifying Biological Samples](#)

[Section 6.2.5. Packing Instructions](#)

[Section 6.2.6. Marking and Labeling](#)

[Section 6.2.7. Documentation](#)

[Section 6.2.8. Summary of Protocol for Packing Biological Samples for Shipment](#)

[Section 6.2.9. References and Acknowledgments](#)

Section 6.2.1. Learning Objectives and Confirmation

If you understand the material in this Guide, you should be able to:

- Classify biological substances based on the specifications of US Code of Federal Regulations Title 49 (49 CFR) Parts 171-175.
- Select the proper shipping name and United Nations (UN) identification number for biological substances.
- Complete a shipper's declaration to accompany biological substance shipments.
- Package biological substances safely and in accordance with regulations.
- Mark and label shipments containing biological substances in accordance with regulations.
- Properly notify the receiver of a shipment containing biological substances.

Confirm you understand the material of this Guide:

When you are familiar with the information in this Guide, take the PREDICT quiz on [Packing and Shipping Samples \(Section 8.4.15.\)](#).

Section 6.2.2. Introduction

Correct packing and shipping of biological substances is necessary to prevent potential exposure to infectious diseases that affect people, animals or both. Samples collected from wildlife, domestic animals and people for the purpose of disease surveillance often fall into Categories A and B:

Infectious Substances, Category A -- Samples collected from sources that are known to be infected with a Category A pathogen (See Section 3 for definition of Category A).

Biological Substances, Category B -- Samples that *may be infected with a pathogen*, but are collected for diagnostic purposes,¹ or samples that are likely infected with a non-Category A pathogen. Most samples, such as blood serum and swabs collected from apparently healthy animals, fall into this category.

Non-regulated Biological Materials -- Samples that do NOT contain pathogens and/or samples that have been treated such that the pathogens have been inactivated (heat treated, formalin, etc.). This category also includes environmental samples such as food and water that are not considered to pose significant risk of infection. (However, it is important to note that certain sample preservatives, namely formalin, are considered "dangerous goods"; samples in formalin cannot be shipped without adhering to the appropriate restrictions, as discussed later in this guide.)

⁶ Note that prior to 2006, *Category B* samples (whose status of infectiousness was unknown) were referred to as "Diagnostic Specimens".

Exempt Patient Specimens – Patient specimens not likely to contain a pathogen that are undergoing testing for non-infectious disease. In order to classify a patient specimen as Exempt, professional judgment is required. Factors such as the known medical history, symptoms and individual circumstances of the source, human or animal, and endemic local conditions must be considered. This label is inappropriate for specimens being tested for infectious disease.

Samples of Category A and Category B are legally considered to be “*Dangerous Goods*” and are regulated by the United States International Air Transport Association (IATA) and the United States Department of Transportation (DOT). Keep in mind that these organizations use the word “dangerous” as a technical term for substances that you may not normally consider being dangerous (including dry ice).

United States regulations state that anyone involved in preparing “dangerous goods” such as biological samples for shipment must be trained to perform these tasks. A record of current training must be maintained by the employer, and training must be provided for anyone involved in any aspect of packing and shipping samples, from the investigator and/or technician who handles the samples, to the administrative staff who may complete the DHL or Federal Express labels for the shipping containers.

If you are shipping anything into or out of the US, failure to comply with the correct packing and shipping regulations is punishable by significant fines, and can jeopardize your and/or your home institution’s current and future ability to obtain permits to import and export samples.

Keeping good records and knowing the regulations will be helpful if you encounter problems when the carrier, the laboratory receiving the samples, or authorities, inspects a shipment.

Problems can and do arise even if you follow these instructions. Complications that may occur include differences in national and local laws that you must follow in each country regarding importing, exporting and shipping samples, in addition to the US and international regulations discussed here. In the event that the country’s local or national regulations are less stringent, use the regulations described here as your guide.² Sometimes problems arise because there are many authorities and individuals involved in the process, each of whom may interpret the regulations differently.

Be prepared by familiarizing yourself with the regulations and double check that you have completed each step using the checklist provided at the end of this section.

² These protocols follow rules for air transport of samples, which are somewhat stricter than those for ground transport; one cannot always control how samples are shipped once they are given to the carrier, and therefore it is safer to follow the stricter rules, in keeping with the precautionary principle.

The protocols discussed below will enable you and your staff to comply with the highest standard of safety for packing and shipping biological samples. The underlying principles are:

- 1) Minimize the risk of inadvertent exposure to an infectious agent through shipping, importing or exporting biological samples (including samples from domestic and wild animals and humans).
- 2) Prevent human injury, as well as damage to the samples, the environment and property, that can be caused by improper handling and packing of storage and shipping materials that are flammable and/or toxic (e.g., alcohol, formaldehyde) and/or volatile (e.g., dry ice).

Investigators and project supervisors must be trained to ensure that hazards to human and animal health are clearly identified and communicated to project personnel; that all personnel fully understand the techniques to be used for handling known biohazards specific to the species under study; and that written procedures and any necessary protective packing materials and equipment are made available.

Investigators or project supervisors are responsible for:

- Keeping a record of personnel who have been trained and the content and date of that training.
- Staying informed about changes in regulations at the regional or national level, so that appropriate updates in training can be provided to personnel.
- Providing a “Useful Contacts” list for staff, with numbers of local offices that handle import and export permits for domestic animals, wildlife, migratory birds, and CITES samples.
- Creating and posting first response guidelines in the event of exposure to a known or suspected infectious or toxic agent while handling, packing and/or shipping samples.

COORDINATE WITH US OFFICIALS WHEN IMPORTING SAMPLES:

When importing samples to the USA by air you must be met at the airport by an agent from 1, 2 or 3 US agencies (USFWS, USDA, CDC), depending on your samples. Work with them by phone and fax in advance to encourage efficient and positive interactions with agents (who have the power to help or hinder your imports and exports, and even to destroy samples.)

<u>Example of samples being imported:</u>	<u>Agents to meet you at the airport:</u>
Common duck serum and/or feathers	USFWS, USDA
Endangered duck serum and/or feathers	USFWS, USDA
Wild orangutan serum	USFWS, CDC
Serum from wild rats trapped in an urban market	USFWS
Ticks from rats at an urban market	USFWS, USDA
Serum from domestic cows	USDA

CHECKLIST FOR PLANNING TO SHIP SAMPLES

DO YOU HAVE...?

- Valid **export** permit from the country you are exporting from
- Valid **import** permit from the USA (or other country of import) to bring field samples into the USA (or other country) for analysis and/or storage
- Valid CITES I, II, III, and/or Migratory Bird permits, if applicable. (For CITES species search www.cites.org/eng/resources/species.html; for Migratory Birds: <http://www.fws.gov/birds/policies-and-regulations.php>)
- Permits that explicitly allow for the **fixative and containers** you will use. (Permits specify how biological samples are expected to be fixed and stored for shipping.)
- Arrangements with all the relevant authorities about your planned shipment, e.g.
 - United States Fish and Wildlife Service (USFWS), management authority for importation of ALL wildlife samples, whether from threatened, vulnerable, endangered, OR common species not listed by IUCN or CITES.
 - United States Department of Agriculture (USDA), regulator of importation of biological materials from wild and domestic birds, ungulates, and plants. Permits are required to import parasites and materials potentially containing bacteria, viruses, or fungi, which may pose a threat to U.S. livestock or agriculture.
 - United States Centers for Disease Control (CDC), regulator of importation of ALL non-human primate samples. (See www.fws.gov/le/ImpExp/Info_Importers_Exporters.htm)
- Flight arrangements that facilitate the safe arrival of your samples; specifically, if bringing the samples to the USA in person by air:
 - Fly into a *designated* U.S. port of entry (see list at: <http://www.fws.gov/le/designated-ports.html>).
 - Arrive during USFWS business hours (9:00 am-5:00 pm M-F) so that inspectors will be able to meet you with the least inconvenience to all of you. (It is your responsibility to know which inspectors must meet you and to alert the proper agencies; see text box 2 below.) Make arrangements with the agent IN ADVANCE if you cannot arrive at these times.
 - Have all your forms in order for imports:
 - USFWS Import Declaration Form 3-177
 - Sample Inventory
 - **Copies** of relevant **import** permits (CITES, USDA, CDC, Migratory Bird)
 - **Originals** of all relevant **export** permits (from country of origin) or letters of permission from the regional ministry, with required signatures and stamp.
 - Letter on official letterhead from your institution giving you permission to use EACH permit, if any of the permits are not in your name.
 - Make sure your inventory of all your samples contains NO errors and that it EXACTLY matches your physical samples.

Section 6.2.3. Summary of Key Terms

Biological Sample – A biological specimen including, for example, blood, tissue, hair, feathers, skin, urine, nail clippings etc. collected from a human, domestic or wild animal. Samples collected from any part of a plant are also biological samples.

Dangerous Goods (also known as Hazardous Materials) – The United Nations (UN) Economic and Social Council’s Recommendations on the Transport of Dangerous Goods defines these as: “substances which are capable of posing a risk to health, safety, property or the environment.” IATA and the DOT regulate the movement of dangerous goods within and between countries and global regions.

Infectious Substances – Substances which are known to contain, or can reasonably be expected to contain, pathogens including bacteria, viruses, parasites, fungi and other agents such as prions that can cause disease in humans or animals. Infectious substances include BOTH “Infectious Substances, Category A” and “Biological Substances, Category B.”

Infectious Substances, Category A – Infectious substances in a form(s) capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs. An exposure occurs when an infectious substance is released outside of its protective packaging, resulting in physical contact with humans or animals (49CFR 173.134).

Biological Substances, Category B – Potentially infectious substances not in a form generally capable of causing permanent disability of life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs. This includes Category B infectious substances transported for diagnostic or investigational purposes (49CFR 173.134). Most biological samples collected during disease surveillance among human and animal populations will fall into Category B.)

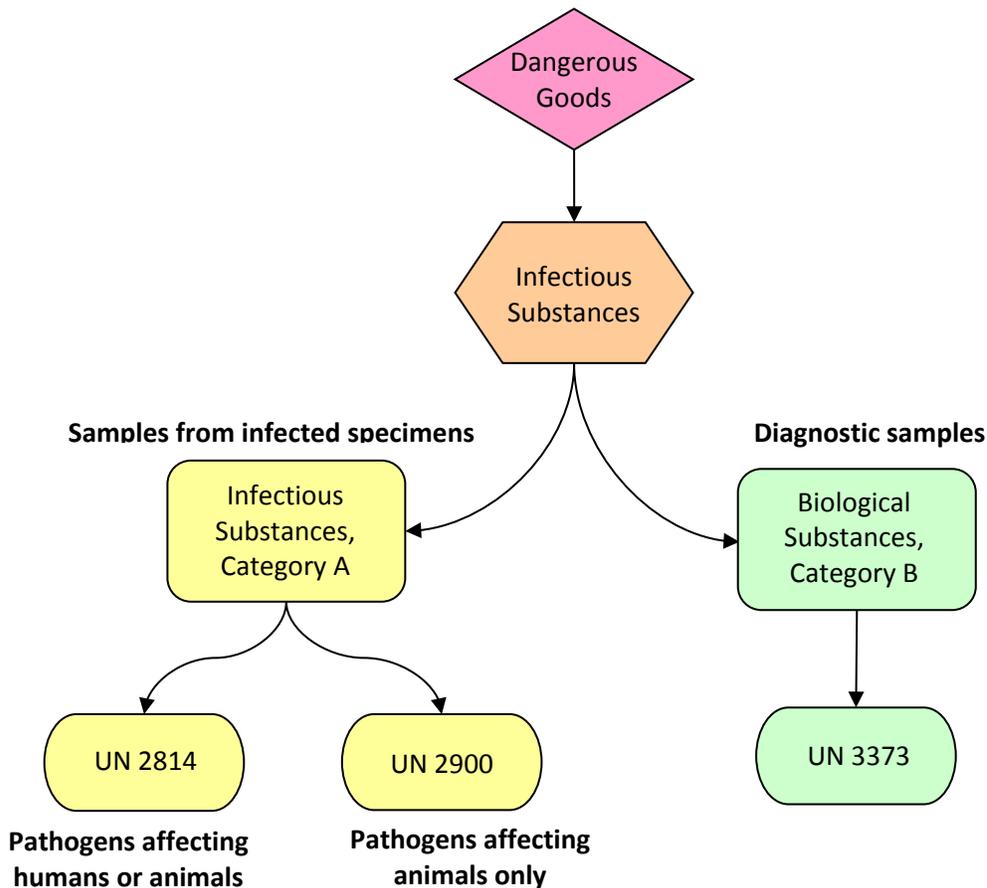
Exempt Patient Specimens – Patient specimens not likely to contain a pathogen that are undergoing testing for non-infectious disease. Examples include, but are not limited to, samples taken for routine testing not related to the diagnosis of an infectious disease (such as for drug/alcohol testing, cholesterol testing, blood glucose level testing). Factors such as the known medical history, symptoms and individual circumstances of the source, human or animal, and endemic local conditions must be considered in making this determination. If testing for infectious diseases is being performed, or if a medical history is not known, the sample must not be shipped as an exempt patient specimen. Samples are packaged the same as Category B substances, but do not require a UN number or PSN, and instead must have the term “Exempt Human Specimen” or “Exempt Animal Specimen” on the box.

Non-regulated Biological Substances – Substances that are not subject to the regulations unless they meet the criteria for inclusion in another Class or Division of dangerous goods. Examples include, but are not limited to, microorganisms that do not cause disease in humans or animals, DNA, RNA or other non-infectious genetic elements, environmental samples such as food and water, dried blood spots, or blood taken for the purpose of transfusion. For a full list of exemptions, please refer to 49 CFR 173.134, searchable at <http://www.ecfr.gov>.

Section 6.2.4. Classifying and Identifying Biological Samples

In order to determine the correct way to package and label your biological samples for shipment, you need to know how to classify and identify the sample.

STEP 1: Assign the sample to one of nine “hazard classes” as defined by the United Nations. The following diagram gives an overview of the process you will use to identify your biological samples, which will be explained in more detail in this section. If the sample is known to be infected with a non-category A pathogen, it can be placed in Category B.



Hazard Classes

There are nine categories of “dangerous goods” specified by the UN Globally Harmonized System of Classification and Labeling for Chemicals (GHS). Some of the nine classes have further sub-categories. In the case of samples collected for disease surveillance in humans and animals, we will primarily be working with two hazard classes:³

Class 6.2 – Infectious Substances

Class 9 – Miscellaneous Dangerous Goods (dry ice and formalin)

Each hazard class is identified by a diamond symbol containing the class number, class name and a unique icon.

STEP 2: *Assign a UN Number based on the hazard classification and the composition of the sample.*

UN Identification Numbers

The United Nations Committee of Experts on the Transportation of Dangerous Goods has developed a system of 4-digit numbers to identify substances that fall into one of the nine hazard classes. This number is accompanied by a “proper shipping name” as well as a “technical name” for each substance. Proper shipping names are used in shipping documents, notifications and on package labels.

You should be familiar with the following four UN numbers:

UN 2814: assigned to Infectious Substances, Category A, which cause disease in humans or both in humans and animals. The proper shipping name for UN2814 is *“Infectious substances, affecting humans.”*

UN 2900: assigned to Infectious Substances, Category A that causes disease only in animals. The proper shipping name for UN 2900 is *“Infectious substances, affecting animals only.”*

UN 3373: assigned to *all* Category B (see above) infectious substances. The proper shipping name for UN 3373 is *“Biological Substance, Category B.”*

UN 1845: assigned to shipments that contain dry ice. The proper shipping name for UN 1845 is *“Carbon Dioxide, solid”* or *“Dry Ice.”*

³ The other classes include: Class 1-Explosives; Class 2-Gases; Class 3-Flammable Liquids; Class 4-Flammable Solids; Class 5-Oxidizing Substances and Organic Peroxides; Class 7-Radioactive Material; Class 8–Corrosives.

Class 6.2 – Infectious Substances and Class 9 – Miscellaneous Dangerous Goods:

Hazard class and UN numbers should be assigned to biological samples based on the known medical history and symptoms/signs of the source human or animal, endemic local conditions, and professional judgment concerning the individual circumstances of the source human or animal. Likely hazard classes for human and animal disease surveillance work includes the following:



Class 6.2 – Infectious Substances:

All samples collected from humans or animals which are known to contain, or are reasonably expected to contain, pathogens including bacteria, viruses, parasites, fungi and other agents such as prions which can cause disease in humans or animals should be assigned to hazard class 6.2 - Infectious Substances. Samples collected for the purpose of diagnosing an infectious disease fall within Class 6.2 – Infectious Substances.



Infectious Substances, Category A (UN 2814 and UN 2900):

If you think your sample contains a pathogen 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, it should be assigned to Category A. These are assigned the following UN numbers and proper shipping names:

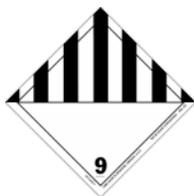
- UN 2814 – Infectious Substance, affecting humans; or
- UN 2900 – Infectious Substance, affecting animals only



Biological Substances, Category B (UN 3373):

Biological samples that do not meet the criteria for inclusion in Category A are assigned to Biological Substances, Category B. This includes samples collected for the purpose of diagnosing infectious diseases. They are assigned the following UN number and proper shipping name:
UN 3373 – Biological Substance, Category B

Most biological samples collected as part of human and animal disease surveillance activities will fall into Biological Substances, Category B.



Class 9 – Miscellaneous Dangerous Goods:

According to IATA and the DOT, dry ice is considered a “dangerous good”. Dry ice falls into Class 9 - Miscellaneous Dangerous Goods, which are hazardous substances that do not fall into the other categories (this class also includes asbestos, air-bag inflators, and self-inflating life rafts). The amount of dry ice that you are allowed to ship with your samples will vary with each carrier or airline, and you must determine this BEFORE shipping your samples. Dry ice is assigned the following UN number and proper shipping name:

UN 1845 – Carbon dioxide, solid, or
UN 1845 - Dry ice

Section 6.2.5. Packing Instructions

The classification and identification of your biological sample determine how you will pack and ship it. The following guidelines apply to shipments classified as 6.2 – Infectious Substances (both Category A and Category B).

Class 6.2 – Infectious Substances must be packed in triple packaging consisting of:

- 1) A primary receptacle that contains the infectious substance and must be watertight to prevent leakage. Primary receptacles include those made of glass, metal, or plastic and include screw-cap tubes or rubber-stopped glass vials fitted with metal seals. The primary receptacle should have a specimen ID label. The primary container must be capable of withstanding without leakage an internal pressure producing a pressure differential of not less than 95 kPa and temperatures in the range of -40°C to 55°C.
- 2) One or more primary receptacle placed in a water tight secondary packaging. The secondary packaging should also bear a label with the name, address, and telephone number of the shipper. If multiple fragile receptacles are in a single secondary package they must be individually wrapped to prevent contact. Absorbent material must be placed between the primary receptacle and secondary packaging. The absorbent material must be sufficient to absorb the entire contents of the primary containers. An itemized list of contents must be placed between the secondary packaging and outer packaging. Filling out the submission form of the laboratory receiving the samples can meet this requirement.
- 3) The secondary packaging should be placed within a styrofoam container inside of a shipping box. The outer shipping box must be of adequate strength for its capacity, mass, and intended use. You must be able to drop the complete package from a height of 1.2 meters without it suffering any damage. Outer package dimensions must be at least 4”L x 4”W x 4”D (10 cm x 10 cm x 10 cm).

It is best to obtain appropriate outer packing materials used by your carrier (both DHL and FedEx sell them). Packaging should be used exactly as written in the directions supplied with the packaging.

If dry ice is used as a refrigerant, tape only some of the seams between the dry ice and outer packaging. Seal the outside package such that the carbon dioxide gas that forms is able to escape, preventing the build-up of pressure that could rupture the package or put transporters at risk.

Examples of the CORRECT packaging of biological samples:

Example 1:



These three screw-cap tubes contain specimens being sent to a laboratory for diagnostic testing. The tubes have been sealed with parafilm, to prevent leakage around the cap. Parafilm should always be on hand when you package your samples for shipping.



Tubes should be packed with absorbent material into a leak-proof secondary container. Multiple primary receptacles are individually wrapped to prevent contact between them. The absorbent material must be sufficient to absorb the entire contents of the primary containers.



The container with the tubes is placed in the center of an insulated styrofoam carton inside a shipping box. Dry ice is added above the samples (and below if possible). The lid of the styrofoam

carton is added. The plastic liner is folded around the styrofoam carton.

REMEMBER: The lid of the styrofoam carton is NEVER taped shut when you are shipping with dry ice, to allow gas to escape cartons.

Example 2:

Absorbent material sufficient to absorb the entire contents of the primary receptacle

Leak-proof primary receptacles (screw-top plastic jar)



Leak-proof secondary packaging (Ziploc biohazard bag)

Examples of POORLY packaged biological samples:



Tubes with cork stoppers are NOT acceptable; evidence of leakage is visible on the labels and in the box.



Ensure that your packaging can withstand wear and tear.

Packaging must be constructed and closed so as to prevent loss of contents that might occur under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure.

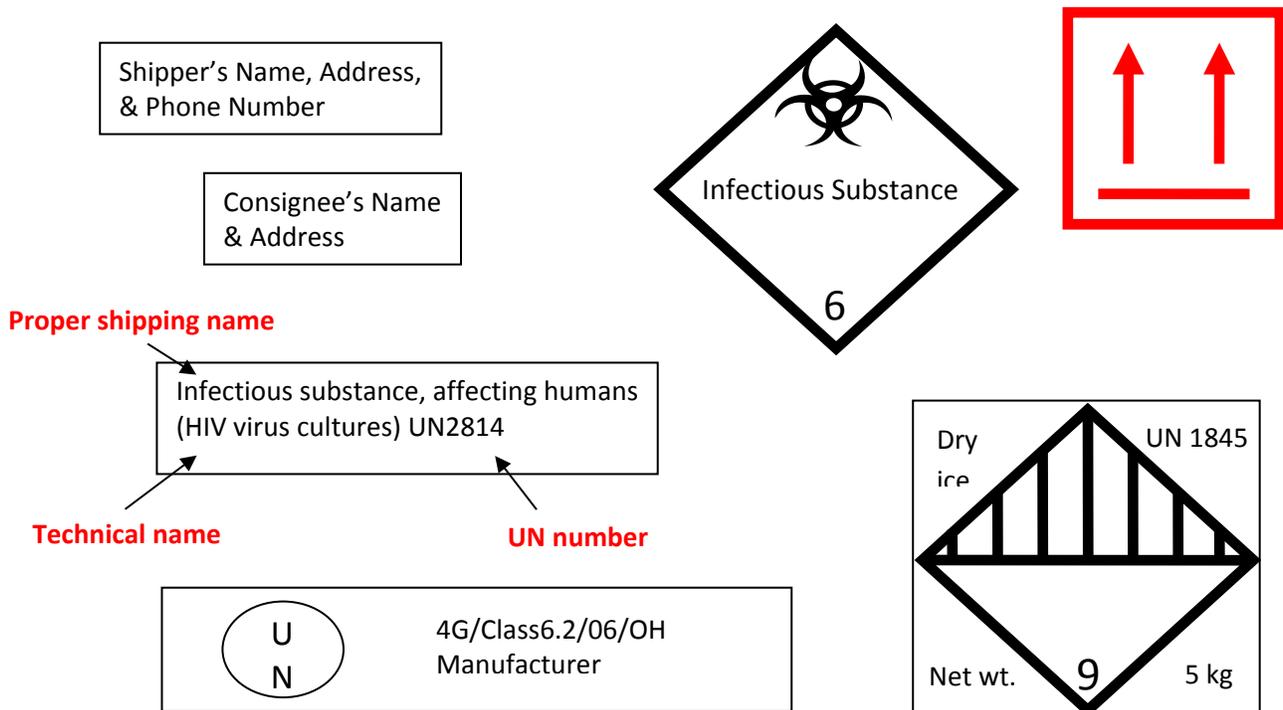
Section 6.2.6. Marking and Labeling

The labeling requirements differ depending on whether your biological samples are classified as Infectious Substances, Category A or Biological Substances, Category B. Make sure to follow the guidelines that are appropriate for the type of samples you have.

INFECTIOUS SUBSTANCES, CATEGORY A (UN 2814 & UN 2900), Marking and Labeling:

Packages containing Category A, Infectious Substances, must be marked on the outside of the shipping container with the following:

- Diamond shaped label for Class 6.2 – Infectious Substances.
- Diamond shaped label should be 50mm on all sides.
- Diamond shaped label should have a line width of 2mm.
- The proper shipping name of the dangerous goods and corresponding UN number in type that is at least 6mm. The technical name of the suspected infectious agent must be listed on the shipper’s declaration per “Special Provision A140”. It should NOT be marked on the box.
- Package orientation (This Way Up) labels affixed on opposite sides of the outer package.
- The full name and address of the shipper and the consignee.
- 24-Hour emergency response number and name of the person responsible for the contents (this information can be on the waybill for Category B).
- Successful drop and pressure test certification labels.
- For dry ice, Class 9 diamond label and the net weight of the dry ice contained.





Example of PROPER Infectious Substances, Category A marking and labeling:

Side 1 of outer packaging:



Package orientation

Label alerting receiver to keep package frozen

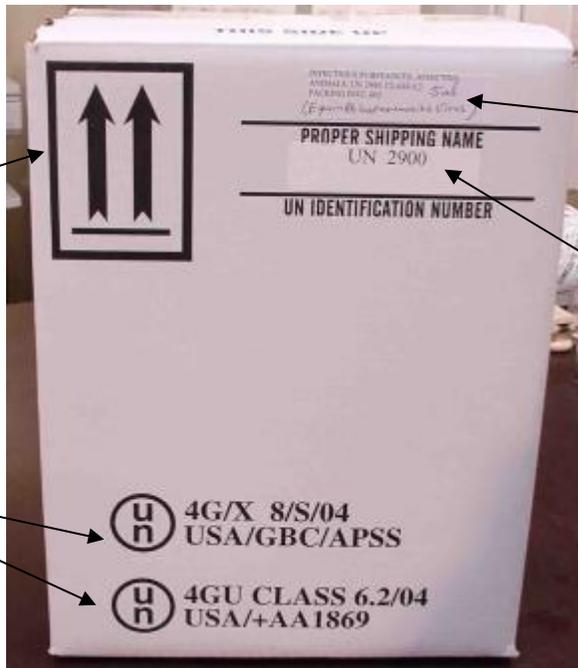
Class 9 Miscellaneous Dangerous Goods diamond label, specifying net weight of dry ice within the package

Class 6.2 Infectious Substances diamond label

Shipper and the name, address, phone of the person responsible for the contents

Consignee's Name and Address

Side 2 of outer packaging:



Package orientation label

Manufacturer's certification of successful drops and pressure tests

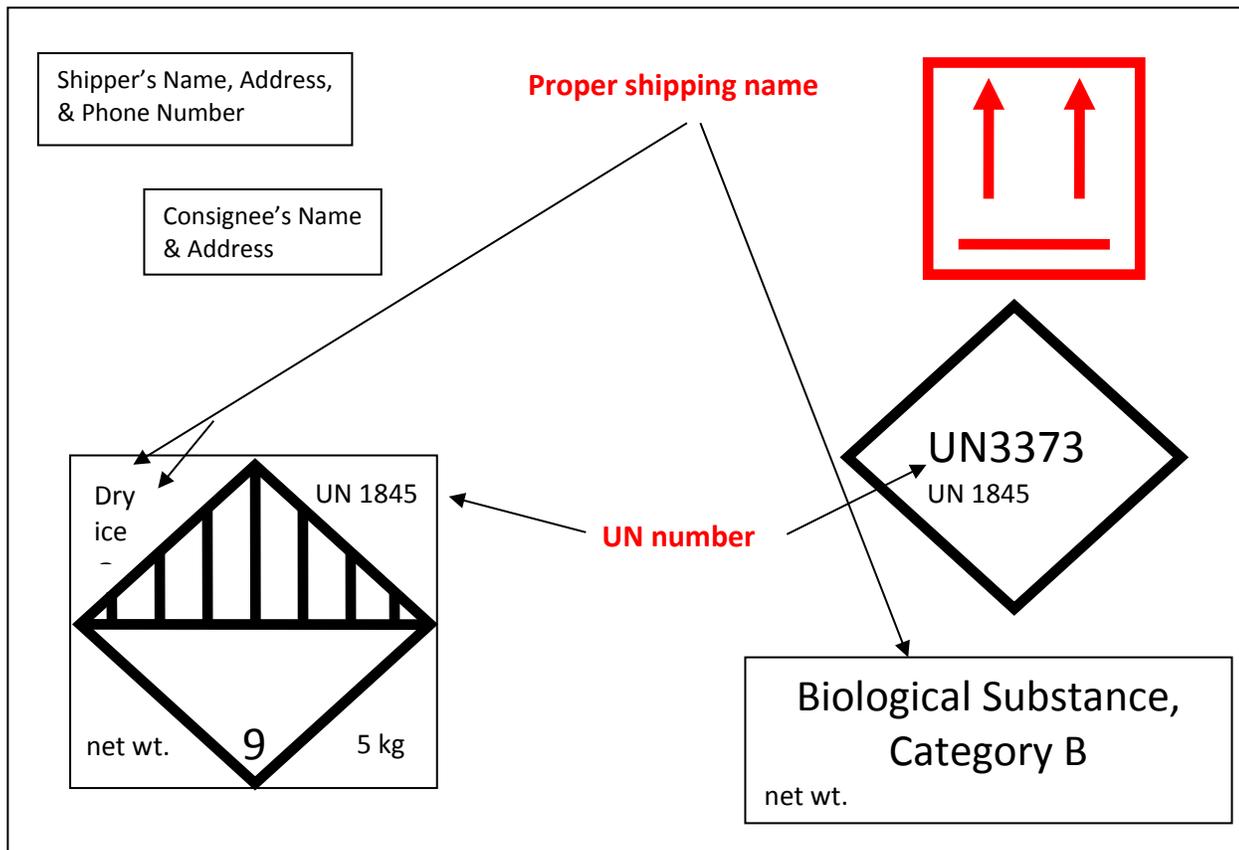
Proper UN shipping name (Infectious substances, affecting animals only)

Proper UN number (UN 2900)

Biological Substances, Category B (UN 3373) marking and labeling:

Packages containing Category B, Biological Substances must be marked on the outside of the shipping container with the following:

- The proper shipping name of “Biological Substances, Category B” and corresponding UN number 3373 in font at least 6mm tall.
- Package orientation (This Way Up) labels affixed on opposite sides of the outer package.
- The full name and address of the shipper and the consignee.
- For dry ice, Class 9 diamond label and the net weight of the dry ice contained.



Example of PROPER Biological Substances, Category B marking and labeling:

Side 1 of outer packaging:



Side 2 of outer packaging:



Section 6.2.7. Documentation

Shipper's Declaration of Dangerous Goods:

Packages containing Infectious **Substances, Category A** that are transported by air must contain a "Shipper's Declaration for Dangerous Goods" form. This is a legal document and must be fully and accurately completed by you, the shipper. Carriers will refuse incomplete, illegible or inaccurate documents.

Shipments of Infectious Substances, Category A require the shipper to make advance arrangements with the consignee and the operator to ensure that the shipment can be transported and delivered without unnecessary delay.

A Shipper's Declaration is NOT required for Biological Substances, Category B and it is not required for dry ice without other dangerous goods.

Enter the following information on the Shipper's Declaration:

Shipper – enter the full name and address of person responsible for sending the shipment

Consignee – enter the full name and address of person who will receive the shipment

Air Waybill Number – if known, enter the air waybill number provided by the courier, this information may also be entered or amended by the shipper, a brokering agent or by the airline or its handling agent

Page of pages – enter the page number and the total number of pages (for a single page Shipper's Declaration, enter "page 1 of 1 pages")

Transport Details – Indicate whether the shipment is packaged to comply with the limitations for passenger and cargo aircraft OR cargo aircraft only, mark X in the box that *does NOT apply*

Airport of Departure – enter the full name of the airport or city of departure, if known; this information may also be entered or amended by the shipper, a brokering agent, or by the airline or its handling agent

Airport of Destination – enter the full name of the airport or city of arrival, if known; this information may also be entered or amended by the shipper, a brokering agent or by the airline or its handling agent

Shipment Type – enter X's to block out "RADIOACTIVE" (for shipments which do not contain radioactive material) or to block out "NON-RADIOACTIVE" (for shipments which contain radioactive material)

Nature and Quantity of Dangerous Goods – Enter the required information strictly in accordance with IATA 8.1.6.9. Per IATA, the following information fields *must be* entered in sequence within the columns provided. If your information will not fit without going over the lines separating the columns, enter text on another line below the first line.

Emergency Contact Number – you must include a telephone number for a 24-hour emergency response agency (in the US this would be the Center for Disease Control, CDC, 1-800-232-0124).

Name and Title of Signatory – Enter the name and title of the person actually signing the Shipper’s Declaration. Only a *certified* shipper may fill out a declaration (this training guide does NOT count as a certification).

Place and Date – Enter the place and date to indicate where and when the form was actually signed.

Proper shipping name – Enter the appropriate UN proper shipping name either “Infectious substances, affecting humans” or “Infectious substances, affecting animals only” or “Carbon dioxide, solid”

Class or Division – Enter hazard class “6.2” for Infectious Substances or hazard class “9” for dry ice.

UN or ID Number – Enter the appropriate UN number to match the shipping name either *UN 2814* or *UN 2900* or *UN 1845*.

Packing Group – Leave blank (Class 6.2 does not have a packing group).

Subsidiary Risks – Leave blank.

Quantity and Type of Packing – List the amount of dangerous good included in shipment and type of packing used to contain it.

Packing Instruction – Enter *602* for Category A Infectious Substances; enter *904* for dry ice.

Dry ice -- If using dry ice in your shipment, be sure to include it in the declaration list.



Example of Shipper's Declaration for Dangerous Goods:

SHIPPER'S DECLARATION FOR DANGEROUS GOODS (Provide at least three copies to the airline.)

Shipper Dr. Jane Smith Ebola Research Program 123 Research Street New York, NY, 10000, United States		Air Waybill No. 12345678 Page 1 of 1 Pages Shipper's Reference Number				
Consignee Generic Laboratory 4567 Laboratory Avenue Chicago, IL, 60000, United States Telephone: 1-800-123-4567						
<i>Two completed and signed copies of this Declaration must be handed to the operator</i>		WARNING Failure to comply with all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.				
TRANSPORT DETAILS This shipment is within the limitations prescribed for: (delete non applicable)						
Airport of Departure LaGuardia, NY		Airport of Destination: O'Hare, IL				
<input type="checkbox"/> PASSENGER AND CARGO AIRCRAFT		<input checked="" type="checkbox"/> CARGO AIRCRAFT ONLY				
Shipment type: (delete non-applicable) <input type="checkbox"/> NON-RADIOACTIVE		<input checked="" type="checkbox"/> RADIOACTIVE				
NATURE AND QUANTITY OF DANGEROUS GOODS						
Dangerous Goods Identification						
UN or ID No.	Proper Shipping Name	Class or Division (Subsidiary Risk)	Packing Group	Quantity and type of packaging	Packing Inst.	Authorization
UN 2814	Infectious substance, affecting humans (Ebola virus)	6.2		5 ml in plastic screw-top vial	602	
UN 1845	Carbon dioxide, solid (Dry ice)	9		5 kg in unsealed styrofoam cooler	904	
Additional Handling Information Prior arrangements as required by the IATA Dangerous Goods Regulations 1.3.3.1 have been made						
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 John Doe Place and Date Ebola Research Program, New York, NY 1/1/2010 Signature [A typed signature may be used if the origin and destination are in the United States or its territories.] John Doe				
CDC, 1-800-232-0124		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						





Air Waybill:

A waybill is different from a Shipper's Declaration. All shipments require a waybill regardless of contents. Forms may vary depending on the shipping company (FedEx, DHL, Compass Forwarding, etc.). In the following example from FedEx you will need to specify in Box 6 that the package contains dangerous goods.

FedEx USA Airbill Tracking Number: 5463454205

1 From (please print)
 Date: _____ Sender's FedEx Account Number: 1504-1658-2
 Sender's Name: _____ Phone: _____ Dept./Floor/Suite/Room: _____
 Company: UNC COMPUTER SCIENCE/SITTERSON
 Address: SOUTH COLUMBIA STREET
 City: CHAPEL HILL State: NC Zip: 27599

2 Your Internal Billing Reference Information
 (Optional) (First 24 characters will appear on invoice)

3 To (please print)
 Recipient's Name: _____ Phone: _____ Dept./Floor/Suite/Room: _____
 Company: _____
 Address: (Do "HOLD" at FedEx location, print FedEx address here) (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes)
 City: _____ State: _____ Zip: _____

4a Express Package Service Packages under 150 lbs.
 FedEx Priority Overnight (Next business morning) FedEx Standard Overnight (Next business afternoon) FedEx 2Day* (Second business day)

4b Express Freight Service Packages over 150 lbs.
 FedEx Overnight Freight (Next business day service for any distance) FedEx 2Day Freight (Second business day service for any distance) FedEx Express Saver Freight (Two to three business day service based on distance)

5 Special Handling
 Letter Pak Box Tube Mailer
 Dry Ice (Dry Ice, 9, UN 1845 III) Yes (As per attached Shipper's Declaration) Yes (Shipper's Declaration not required) CA Cargo Aircraft Only

7 Payment
 Account no. in which I will be billed Recipient Third Party Credit Card Cash Check

Total Packages	Total Weight	Total Declared Value*	Total Charges
		\$.00	\$

8 Release Signature Sign to authorize delivery without obtaining signature.
 Your signature authorizes Federal Express to deliver this shipment without obtaining a signature and agrees to indemnify.

6 Special Handling
 Does this shipment contain dangerous goods? Yes (As per attached Shipper's Declaration) Yes (Shipper's Declaration not required)

Dry Ice
 Dry Ice, 9, UN 1845 III _____ x _____ kg, 904 CA Cargo Aircraft Only
 (Dangerous Goods Shipper's Declaration not required)

If you are shipping Biological Substances Category A mark "Yes (As per attached Shipper's Declaration)".

6 Special Handling
 Does this shipment contain dangerous goods? Yes (As per attached Shipper's Declaration) Yes (Shipper's Declaration not required)

Dry Ice
 Dry Ice, 9, UN 1845 III _____ x _____ kg, 904 CA Cargo Aircraft Only
 (Dangerous Goods Shipper's Declaration not required)

If you are shipping Biological Substance Category B, mark "Yes (Shipper's Declaration not required)."

The proper shipping name and UN number need to be on the waybill. For FedEx, there is no designated area for this information and it should be written in by the shipper.

If your shipment includes dry ice, mark "Dry Ice (Dangerous Goods Shipper's Declaration not required)" and include the number of blocks and their weight in kg.

When shipping infectious substances, your waybill is a legal document. It must be legible (typed), CANNOT contain spelling errors and must be in triplicate – one copy each for the shipper, the carrier and the recipient. Shippers must keep their copies for 375 days.

Section 6.2.8. Summary of Protocol for Packing Biological Samples for Shipment

Review the basic procedures:

Before you begin packing samples, refer to the checklist on page 7 regarding all relevant permits and regulating authorities that must be advised, and all travel-related details that can facilitate or hinder the success of your shipment.

Keep an updated log of all the sample shipments you send, and include relevant details including the contents, recipient, contact names and phone numbers of agencies, etc.

Assemble required materials: The following materials can be ordered from commercial suppliers:

1. *Outer packaging* (box) in good condition. If you re-use packing containers be mindful of when the container needs to be replaced. Outer package (box) must be:
 - a. At least 4 in. length x 4 in. width x 4 in. depth (10 cm x 10 cm x 10 cm)*
 - b. Sturdy
 - c. Able to be dropped from 1.2 meters without suffering damage*
2. *An insulating styrofoam container* that fits snugly into the cardboard outer box
3. *Primary containers* (containers in direct contact with the biological material) that are watertight (e.g. vacutainer tube, screw-top cryo-tube, etc.). Primary or secondary containers must withstand 95kPa internal pressure differential⁴. Parafilm works well to ensure that tubes do not leak in transit and is mandatory for Category A shipments.
4. *Absorbent material* (e.g. cotton or paper towels) to wrap each primary container individually, in an amount sufficient to absorb the entire contents of the primary container(s) in the event that they should leak or break.
5. *Watertight secondary container* (e.g. zip-lock bag) in which to place the individually wrapped primary containers
6. *Itemized list of contents* between the secondary and outer packaging.
7. *Diamond-shaped shipping labels* for Class 6.2 – Infectious Substances (UN 2814 or UN2900) and Class 9 – Miscellaneous Dangerous Goods (UN 1845, Dry ice).
8. *Shipping labels* for UN3373 – Biological Substances, Category B

⁴ When you purchase packing materials for shipping dangerous goods, they will have been tested to meet these specifications. However, you are only in compliance when using these packages if you follow the manufacturer's instructions on how to use them.

Shipping instructions for samples WITHOUT dry ice:

1. Prepare an itemized list of samples that you will ship and type the list in Excel or other easily read format. Keep a backup for your records.
2. Locate all the materials you will need from the above list.
3. Make sure all the samples are contained in watertight primary containers (e.g., vacutainer tube, screw-top cryo-tube, etc.)
4. Wrap each sample individually with absorbent material such as cotton or paper towels.
5. Place the individually wrapped samples in a watertight secondary container (such as a ziploc bag)
6. Place the secondary container in styrofoam container and secure it.
7. Place the Styrofoam container in the box.
8. Place the itemized list of contents between the styrofoam container and the box (outside the top of styrofoam container, but within cardboard box).
9. Seal the box with strong tape for shipping.
10. Label the box appropriately depending on the contents of the package:
 - a. Infectious Substances, Category A
 - Label with UN number and proper shipping name: **UN2814** - *Infectious substances, affecting humans* OR **UN2900** - *Infectious substances, affecting animals only*. The technical name for the pathogen of concern should be placed on the shipper's declaration.
 - Successful drop and pressure test certification labels
 - 24 hour emergency response contact and the name and telephone number of the person responsible for the shipment
 - b. Biological Substances, Category B
 - Label with UN number and proper shipping name: **UN3373** *Biological Substances, Category B*
11. Label the box with shipper's name & address and the receiver's (consignee) name & address. Include contact telephone information if applicable.
12. If shipping Category A, fill out a Shipper's Declaration and attach to the outside of the package (see instructions above).
13. Fill out the Air Waybill as per the courier's instructions.
14. Log your shipment for the record in a format agreed upon with the investigator or project supervisor.

Shipping instructions for samples WITH dry ice:

1. Prepare the itemized list of samples that you will ship and type the list in Excel or other easily read format.
2. Locate all the materials you will need from the above list.
3. Make sure all the samples are contained in watertight primary containers (e.g., vacutainer tube, screw-top cryo-tube, etc.)
4. Wrap each sample individually with absorbent material such as cotton or paper towels.
5. Place the individually wrapped samples in a watertight secondary container (such as a zip-lock bag)

6. Place the secondary container in styrofoam container and surround with dry ice. DO NOT SEAL the secondary container. You must allow for the carbon dioxide to escape as the dry ice sublimates.
7. Place the Styrofoam container in the box.
8. Place the itemized list of contents between the styrofoam container and the box (outside the top of styrofoam container, but within cardboard box).
9. Seal the outer box only for shipping, allowing gases to escape if necessary.
10. Label the box appropriately depending on the contents of the package:
 - a. Infectious Substances, Category A
 - Diamond-shaped label for Class 6.2 – Infectious Substances
 - Label with UN number, proper shipping name, and technical name for pathogen contained: **UN2814** - *Infectious substances, affecting humans* OR **UN2900** - *Infectious substances, affecting animals only* (Successful drop and pressure test certification labels)
 - 24 hour emergency response contact and the name and telephone number of the person responsible for the contents of the shipment
 - b. *Biological substances, Category B*
 - Label with UN number and proper *shipping name*: **UN3373** *Biological Substances, Category B*
11. Label with appropriate dry ice labels:

Diamond-shaped label for Class 9 – Miscellaneous Dry Goods

 - Label with UN number, proper shipping name, and technical name for dry ice: UN1845 *Carbon dioxide, solid* (dry ice).
 - Include Net weight of dry ice contained within package.
12. Label the box with the shipper's name & address and the receiver's (consignee) name & address. Include contact telephone information if applicable.
13. If shipping Category A, fill out a Shipper's Declaration and attach to the outside of the package (see instructions above).
14. Fill out the Air Waybill as per the courier's instructions. Be sure to mark inside the box "contains dangerous goods" and specify the net weight of the dry ice contained within the package.
15. Log your shipment in your records in the format agreed upon with the investigator or project supervisor.

Section 6.2.9. References and Acknowledgments

Birr, A. (2006) *Shipping & Receiving Diagnostic Specimens*. PowerPoint presentation. AZVT.

CFR. (2010) Transportation, Hazardous Materials Regulations, 49 CFR, pt. 171-177.

United Nations. (2009) Committee of Experts on the Transport of Dangerous Goods. Globally Harmonized System of Classification and Labeling of Chemicals. New York and Geneva.

Walsh, L. and C. Henry (2005) *Shipping Specimens to the National Veterinary Services Laboratories*. PowerPoint presentation. NVSL, USDA.

Walsh, P. and K. Ingerman (2008) *Shipping Training 2008 Transportation of Dangerous Goods*. PowerPoint presentation. Global Health Program, WCS.

A technical review incorporating recent modifications to USG regulations was conducted in June, 2013, by Kenneth Conley, Wildlife Pathologist, Wildlife Conservation Society. The material was originally compiled and edited with the assistance of Sarah Pilzer.