University of Pennsylvania Manual
Shipping Infectious Substances
Biological Materials
And DRY ICE

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A. Purpose of shipping regulations

Shipping regulations have been published by international and national regulators in order to provide procedures for the shipper by which articles and substances with hazardous properties can be safely transported by air or surface.

“In the interest of global public health, of progress in scientific research, and of the development of new drugs and treatments to combat diseases, human and animal specimens need to be transported safely, timely, and efficiently from the place where they are collected to the place where they will be analyzed. Regardless of the presumed infection status of the patient, specimens of human and animal origin should be packaged and transported in such a way as to protect those engaged in transportation from the risk of infection. Risks of infections of personnel involved in transport may not be fully eliminated. However, they can undoubtedly be kept to a minimum.” (World Health Organization; Transport of Infectious Substances.)
B. What are “Dangerous Goods” and who regulates them?

**Dangerous Goods** are defined as "articles or substances which are capable of posing a significant risk to health, safety, property or the environment when transported by surface or air“.

The recommendations for the transport of **Dangerous Goods** were first initiated to facilitate transport of those goods while ensuring the safety of people, property and the environment.

The United Nations publishes recommendations for packing and shipping **Dangerous Goods**. Although the International Civil Aviation Organization (ICAO) writes the technical instructions for the *Safe Transport of Dangerous Goods by Air*, the international community follows the **IATA** regulations.

The International Air Transport Association (**IATA**) is composed of the world’s major airlines. They write the “IATA Dangerous Goods Regulations” which are based on the ICAO Technical Instructions. The IATA Dangerous Goods Regulations designate the shipper as having the responsibility for making sure all packaging is done properly.

The Department of Transportation (**DOT**) regulates the transport of “Hazardous Materials” in the United States. The Federal Regulations (49 CFR) also defer to the Technical Instructions from ICAO. DOT uses the term “Hazardous Materials” instead of “Dangerous Goods”. Hazardous Materials are defined as a substance or material the Secretary of Transportation has determined as capable of posing an unreasonable risk to health, safety, and property when transported by commerce.

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**Structure Of Governmental Bodies**

- United Nations Committee of Experts
- ICAO
  - Technical Instructions
- DOT
  - 49 CFR
- IATA Dangerous Goods Regulations

Some other agencies that may be involved with regulating packing and shipping are:
- Occupational Safety and Health Administration (OSHA)
- US Public Health Service (PHS)
- United States Postal Service (USPS)
C. Classes of Dangerous Goods

- Dangerous goods are defined as those goods that meet the criteria of one or more of nine United Nations (UN) hazard classes. There are nine classes that relate to the type of hazard.

Class 1
Explosives

Class 2
Gases

Class 3
Flammable liquids

Class 4
Flammable solids

Class 5
Oxidizing Substances and Organic Peroxides

Class 6
Toxic and Infectious Substances

Class 7
Radioactive Material

Class 8
Corrosives

Class 9
Miscellaneous Dangerous Goods

- The scope of this document is to provide guidance in transporting those Dangerous Goods that fall under Class 6 (specifically Infectious Substances, division 6.2) and Class 9 (specifically dry ice and genetically modified organisms).
Class 6, Division 6.2 (Infectious Substances)

Class 9, Miscellaneous (genetically modified organisms and dry ice).

This manual will discuss classification, shipping, packaging, and documentation regulations for sending the following items by ground or by air:

- Infectious substances
- Biological substances
- Genetically-modified materials
- Patient specimens (human and animal)
- Biological products
- Dry Ice
D. Training is mandatory for anyone involved with the shipping of “Dangerous Goods”.

A “shipper” is defined as someone that does any of the following jobs:

- Marking and labeling packages
- Filling packages
- Accepting packages for shipment
- Supervising these activities
- Preparing shipping documentation
- Loading trucks

Training is an essential element in maintaining a safe regulatory regime. It is necessary for all individuals involved in the preparation or transport of dangerous goods to be properly trained to carry out these responsibilities prior to shipping.

Also, if you are a shipper, the carrier relies on your ability to properly package, label and declare goods.

It is the responsibility of the shipper to receive training on the proper packaging, documentation and shipping requirements in order to comply with the International Air Transport Association (IATA) and the Federal Department of Transportation (DOT). IATA requires training every two years for shipments by air and DOT requires training every three years.

The University of Pennsylvania’s training requirements follow the IATA regulations for training. Therefore, shipping training must be updated every two years and when there are significant changes made. Always check the EHRS website for changes in regulations January 1 of each year.

Non-compliance to these regulations can result in significant penalties and fines:

- Up to $250,000 and up to a year jail sentence for individuals
- Up to $500,000 per incident for organizations
Everyone intending to ship biological materials and/or dry ice must complete the appropriate training. Please go to EHRS website for specific instructions for the training program.
http://www.ehrs.upenn.edu

Once you have completed the shipping training, you will receive a “Shipping Certification Document” from EHRS. **Keep these certificates in your personnel file.**

If you will be shipping human source materials, you must also complete the initial OSHA Bloodborne Pathogens training. This is offered monthly by EHRS for new laboratory employees and annual refresher training is offered online at the EHRS website, [www.ehrs.upenn.edu/training/onlineTrain.html](http://www.ehrs.upenn.edu/training/onlineTrain.html).
Part II. How to Ship

Preparing the package properly for shipping is extremely important!! Use the following steps to help you get ready to ship!

A. Classification
B. UN Identification number and Proper Shipping Name
C. Packaging
D. Marking and labeling
E. Documentation
A. Classification (What are you sending?)

You must classify the materials you will be shipping. The categories are:

1. Infectious Substances, Category A
2. Biological Substances, Category B
3. Genetically modified organisms and microorganisms
4. Patient specimens, human or animal
5. Biological products
6. Exemptions

1. Infectious Substances

Infectious Substances are materials which are known or are reasonably expected to contain an animal or human pathogen. Pathogens are defined as microorganisms (including bacteria, viruses, rickettsiae, parasites, fungi) and other agents such as prions or recombinant microorganisms, which can cause disease in humans or animals.

There are two divisions in Class 6. Class 6.1 is dedicated to toxins while 6.2 is for Infectious Substances.

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.

Infectious Substances are divided into two categories, Category A and Category B. These categories are based on a detailed, case-by-case, risk assessment of microorganisms known to be pathogens (see Table 1). The categorization is the result of the consideration of scientific data concerning the risks of transmission and infection posed during transport of each species of microorganism.

Category A - an infectious substance which is transported in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals. An exposure occurs when an infectious substance is released outside of the protective packaging, resulting in physical contact with humans or animals. Substances that meet this criteria can be found in Table 1.

2. Biological substances, category B

Category B – an infectious substance that does not meet the criteria for inclusion in Category A. These are referred to as Biological Substances.
Biological substances, category B, are substances that do not fall into infectious substances, category A.

Category A and Category B can be........
- Cultures
  Cultures are the result of a process by which pathogens are intentionally propagated. This definition does not include patient specimens. Refer to Table 1 for those cultures designated as Category A.
- Patient specimens (human or animal)
- Biological products
- Genetically modified organisms and microorganisms

3. Genetically Modified Organisms

Genetically Modified Organisms (GMO) or Microorganisms (GMMO) are organisms or microorganisms in which genetic material has been purposely altered through genetic engineering in a way that does not occur naturally. GMOs and GMMOs that are not infectious but can alter animals, plants or microorganisms in a way that is not normally the result of natural reproduction are considered a miscellaneous hazard (Class 9).

4. Patient specimens

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

If patient specimens are not expected to be infectious, they are exempt; however, they must meet a minimum packing requirements which is basic triple packaging. Shipments must also be labeled "exempt human specimen" or "exempt animal specimen".

NOTE
In determining whether a patient specimen has a minimal likelihood that pathogens are present, an element of professional judgment is required to determine if a substance is exempt under this paragraph. That judgment should be based on the known medical history, symptoms and individual circumstances of the source, human or animal, and endemic local conditions. Examples of specimens which may be transported under this paragraph include the blood or urine tests to monitor cholesterol levels, blood glucose levels, hormone levels, or prostate specific antigens (PSA); tests required to monitor organ function such as heart, liver or kidney function for humans or animals with non-infectious diseases, or therapeutic drug monitoring; tests conducted for insurance or employment purposes and are intended to determine the presence of drugs or alcohol; pregnancy tests; biopsies to detect cancer; and antibody detection in humans or animals.

Patient specimens may fall under Infectious Substance, Category A if they are known or reasonably known to contain a pathogen from Table 1.
5. Biological Products

Biological products are those products derived from living organisms which are manufactured and distributed in accordance with the requirements of appropriate national authorities, which may have special licensing requirements, and are used either for prevention, treatment, or diagnosis of disease in humans or animals, or for development, experimental or investigational purposes related thereto. They include, but are not limited to, finished or unfinished products such as vaccines. Substances in this group are not subject to these Regulations.

6. Exemptions

There are particular biological materials that are exempt from the shipping regulations. Exempted materials are not excluded from triple packaging. They are exempted from DOT and IATA packing instructions (see C. Packaging, p. 17).

- Substances which do not contain infectious substances or substances which are unlikely to cause disease in humans or animals.
- Substances containing micro-organisms, which are non-pathogenic to humans or animals.
- Substances in a form that any present pathogens have been neutralized or inactivated such that they no longer pose a health risk.
- Environmental samples (including food and water samples), which are not considered to pose a significant risk of infection, are not subject to these regulations unless they meet the criteria for inclusion in another class.
- Dried blood spots.
- Fecal occult blood screening test.
- Blood or blood components which have been collected for the purpose of transfusion or the preparation of blood products to be used for transfusion or transplantation.
- Non-infectious biological materials from human, animals or plants. Examples include non-infectious cells, tissue cultures, blood or plasma from individuals not suspected of having an infectious disease, DNA, RNA, or other genetic elements.
- Biological products including an experimental or investigational product or component of a product, subject to federal approval, permit, review or licensing requirements such as those required by the Food and Drug Administration or the USDA.
- If patient specimens are not expected to be infectious, they are exempt; however, they must meet a minimum packing requirements which is basic triple packaging. Shipments must also be labeled “exempt human specimen” or “exempt animal specimen”.

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7. Transport by private or contract carrier exemption

- Any biological specimens, which includes patient samples, that are being shipped for research, diagnosis, investigational activities or disease treatment and prevention are exempt from the IATA and DOT regulations when being transported by a private or contract carrier as long as the motor vehicle being used is exclusively for transport of these materials. Infectious substances, Category A materials are NOT included in this exemption.

8. Shipping Formalin in Excepted Quantities

Documentation
- A shippers declaration is not required
- The “Nature and Quantity of Goods” box on the air waybill must be completed with the words “Dangerous goods in excepted quantities”

Packaging
- The inner receptacle must not exceed 30ml and the outer package must not exceed 500 ml. Liquids must not completely fill inner packaging at a temperature of 55°C (130°F)
- Closures of inner packaging must be held securely in place with tape, wire, or other positive means
- Intermediate packaging must contain enough absorbent to absorb all of the liquid
- The intermediate packaging must be securely packed in a strong rigid outer packaging

Marking and Labeling
- Use the excepted quantity label shown below by contacting EHRS at 215-898-4453.
9. What about infected animals?

The shipment of infected animals must not be transported by air unless specific regulations are met. Contact ULAR and EHRS with any questions concerning this issue. Also, any animals transported must be done under the terms and conditions approved by APHIS and USDA.

Make sure that you classify the material to be shipped properly. Correct packaging, marking and documentation will depend on this!
B. UN Identification Number and Proper Shipping Name

Dangerous goods are assigned to UN or ID numbers and proper shipping names according to their hazard classification and their composition.

Specific wording is used for the terms Infectious Substance, category A; Biological Substance, category B; and carbon dioxide, solid or “dry ice”.

1. Infectious substance, Category A is assigned either UN 2814 or UN 2900:

   UN 2814 is used for infectious substances that are considered human pathogens only or pathogens that infect humans and animals.
   The proper shipping name for UN 2814 must be written as “Infectious substance, affecting humans (name of pathogen)”.  
   - Example: Infectious substance, affecting humans (Hepatitis B virus).  Always write the entire proper name.

   UN 2900 is used for infectious substances that are considered pathogens for animals only.
   The proper shipping name for UN 2900 must be written as “Infectious substance, affecting animals (name of pathogen)”.  
   - Example: Infectious substance, affecting animals (Vesicular stomatitis virus).  Always write the entire proper name.

2. Biological substance, Category B is assigned UN 3373:

   The proper shipping name for UN 3373 must be written as “Biological substance, category B”.

3. Genetically Modified Organisms (GMO) are assigned UN 3245.

   The proper shipping name for GMO’s must be written as “Genetically modified organisms” or “Genetically modified microorganisms”.

4. Dry Ice or carbon dioxide, solid is assigned UN 1845.

   The proper shipping name for UN 1845 must be written as either “Dry Ice” or “Carbon dioxide, solid”.
C. Packaging

(No Leaking Please!!)

Once the specimen is properly classified:

Follow the Packaging Instructions (PI)

All potentially hazardous biological materials must be packaged to withstand leakage of contents, shocks, temperature, pressure changes and other conditions that can occur during ordinary handling in transportation. Please refer to Appendix A for vendors that supply certified packaging for biological materials. When ordering, specify what category of material you will be shipping: Infectious substances, category A or Biological substances, category B, dry ice, etc. Different categories have slightly different packaging needs as specified in the IATA Packaging Instructions, but all follow the basic triple packaging requirements (Appendix C).

When shipping infectious substances, you are required to use one manufacturer’s packaging. Using one manufacturer’s secondary container in another manufacturer’s outer box can be dangerous and is illegal.

1. Infectious Substances, Category A:

   IATA Packaging Instruction (PI) 602 must be used for this category. These requirements ensure that packages will arrive at their destination in good condition and present no hazard to persons or animals during transport.

PI 602

- Triple packaging
  - Primary receptacle*
    - Must be water tight
    - Must be labeled with the name of the contents.
  - Secondary container*
    - Must be water tight
    - Absorbent material in sufficient quantity to absorb the entire contents placed between the primary receptacle and the secondary packaging.
    - If multiple fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them.
  - Rigid outer container
    - Must be certified with a UN specification mark. This will be marked on the box. (Appendix B)
    - An itemized list of contents must be enclosed between the secondary and outer container.
    - The maximum quantity of infectious material that can be shipped by air in one package is 4L or 4kg.
• The maximum quantity of infectious material that can be shipped via passenger aircraft is 50mL or 50g.

*The primary receptacle or secondary container must be capable of meeting UN performance standards for PI 602. (Table 2)

2. Biological substance, category B

IATA Packaging Instruction (PI) 650 must be used for this category.

PI 650

• Triple packaging
  ▪ Primary receptacle*
    • Must be leak proof
    • Must be labeled with the contents
  ▪ Secondary container
    • Must meet UN performance standards for PI 650 (Table 2)
    • Must be leak proof
    • Absorbent material of sufficient quantity to absorb the entire contents of the primary receptacle.
  ▪ Rigid outer container
    • An itemized list of contents must be enclosed between the secondary and outer container.
    • Maximum quantity for Passenger and cargo aircraft is 4L or 4kg.

* Primary receptacles must be packed in secondary containers in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging.

3. Genetically Modified Organisms or Microorganisms (GMOs or GMMOs)

The IATA regulations state that GMOs must be packaged according to PI 602 (Category A).

  o Maximum quantity per primary receptacle is 100mL or 100g. There is no maximum net quantity per package.

4. Patient specimens

Patient specimens for which there is minimal likelihood that pathogens are present are not subject to these Regulations if the specimen is transported in a packaging which will prevent any leakage and which is marked with the words “Exempt human specimen” or “Exempt animal specimen”, as appropriate. The packaging must meet the following conditions:

A. The packaging must consist of three components:
   1. a leak-proof primary receptacle(s)
2. a leak-proof secondary packaging
3. an outer packaging of adequate strength for its capacity, mass and intended use, and with at least one surface having minimum dimensions of 100mm x 100mm (4in X 4in).

B. For liquids, absorbent material in sufficient quantity to absorb the entire contents must be placed between the primary receptacle(s) and the secondary packaging so that, during transport, any release or leak of a liquid substance will not reach the outer packaging and will not compromise the integrity of the cushioning material.

C. When multiple fragile primary receptacles are placed in a single secondary packaging, they must be either individually wrapped or separated to prevent contact between them.

D. Quantities allowed for passenger and cargo:
The primary receptacle must not exceed 500ml or 500g. The outer packaging must not contain greater than 4L or 4kg.

5. Biological Products

Although these materials are not subject to biological shipping regulations, they should be packaged to prevent leaking. Triple packaging should always be used.

6. Other Packaging Requirements

a. Overpacks

An overpack can be used to combine several triple packages into one large package. This may be done to save freight charges when shipping multiple samples.

Each triple package inside the overpack must be properly marked and labeled. The outside of the overpack must bear the same markings and labels as the triple packages within including hazard labels, proper shipping names and net quantities.

The outer container of the overpack must also be marked with the word “Overpack”. The overpack marking is an indication that packages contained within comply with prescribed specifications.

b. Ice and Dry Ice

If a shipment includes ice or dry ice, special packaging must be purchased.

If shipping dry ice, the packaging must be leak-proof and the outer packaging must allow for the release of carbon dioxide gas when the solid sublimes.

Dry ice and ice must be placed outside the secondary packaging. Interior supports must be provided to secure the secondary container as the refrigerant sublimes.

Dry ice is considered a miscellaneous hazard (Class 9) by IATA. Packages containing dry ice must bear a Class 9 label and be marked with the proper shipping name, UN number, and net quantity, (e.g., Dry Ice, UN 1845, 3 kg).

Packages designed for shipping dry ice most likely will be pre-labeled and marked.
A Shippers Declaration for Dangerous Goods is not required for shipments in which dry ice is the only hazardous material. Always include dry ice on the Declaration for shipments that include other hazardous materials, such as infectious substances.

c. Liquid Nitrogen

Biological materials can be shipped refrigerated with liquid nitrogen in dry shippers, which are insulated packages containing refrigerated liquid nitrogen fully absorbed in a porous material. Special packing regulations apply to shipments containing nitrogen. Contact EHRS if you intend to ship materials with liquid nitrogen.

d. Shipping specimens with preservatives

(See pg 14, “Shipping Formalin in Exempted Quantities”)

Infectious substances, category A with preservatives can be shipped with 30ml of preservatives (formalin, ethanol, etc.) with no added requirements. This is also currently allowed with Biological substances, Category B materials.
D. Marking and Labeling

Mark the outer packaging as follows:

1. Infectious Substances, category A, PI 602

The following labels are required:
- This "End Up" marked on two opposite sides.
- UN certification seal (already on box)
- Dry Ice UN 1845 (Fig. 1), amount_____. (If needed, fig. 1)
- Infectious Substance (Fig. 2)
- Cargo only (only if contents is over 50mL or 50g) (Fig. 3)

![Fig. 1](image1)
![Fig. 2](image2)
![Fig. 3](image3)

The following information must appear on the outer box (See examples 1 & 2 below):
- Sender and recipient's (consignee) full name, address and telephone number
- Infectious substance label
- Proper shipping name, UN number and net quantity of infectious substance*,**, 
- Name and telephone number of the a person responsible for the shipment
- Class 9 label, including UN 1845 and net weight, if packaged with dry ice
- Cargo aircraft label if shipping over 50mL or 50g

*Shippers of Category A infectious substances (UN 2814 may omit the technical name from the proper shipping name marking on the package. For example: “Infectious substance affecting humans, Ebola virus”
Infectious substance affecting humans is the proper shipping name, Ebola virus is the technical name. If the technical name were omitted, it would look like this: “Infectious substance affecting humans”

**When the infectious substances to be transported are unknown but suspected of meeting the criteria for inclusion in Category A, they must be assigned to UN 2814 or UN 2900. The words "Suspected Category A Infectious Substance” must be shown in parentheses following the proper shipping name on the itemized list of contents inside the outer packaging and on the Shipper’s Declaration for Dangerous Goods, but not on the outer packaging. Example: Infectious substance affecting humans, (Suspected Category A Infectious substance)

2. Biological substances, Category B, PI 650

(See Appendix I for UPS only)

The outer container must display the following information: (See example 3)
- The sender’s and recipient’s (consignee) full name, address and telephone number
- The words “Biological substances, category B, adjacent to UN 3373 label, at least 6mm high.
• UN 3373 label (Fig. 4)
• Class 9 label and net quantity if packaged in dry ice. (Fig. 5)

Net quantity is not required on outside of these packages.

3. Genetically Modified Organisms or Microorganisms

The outer container of a GMO or GMMO assigned to UN 3245 must display the following information:
• The sender and recipient’s (consignee) full name, address and telephone number
• Class 9 label if packaging in dry ice
• Genetically modified micro-organisms, UN 3245, and net quantity

4. Patient specimens

Specimens for which there is minimal likelihood that pathogens are present must have the following words marked on the outside package: “Exempt human specimen” or “Exempt animal specimen”, as appropriate.

5. Dry Ice or Carbon dioxide, solid
   (See Appendix I for UPS only)

Dry ice must be marked on the outer container with a Class 9 label and with the amount of dry ice in the package (fig. 6).
Example 1
Outer Box for Infectious Substance without Dry Ice

From: shipper
Tel. #

Infectious Substance
Affecting humans
(Hepatitis B virus)
UN2814 Net Qty. 30 ml

To: consignee
Tel. #

Responsible Official
Dr. John Smith
Tel. #
Example 2
Outer Box for Infectious Substance with Dry Ice

Infectious Substance with Dry Ice

From: shipper

Tel. #

Infectious Substance Affecting humans
(Hepatitis B virus)
UN2814 Net Qty. 30 ml

To: consignee

Tel. #

Dry Ice
UN1845
Net Weight: 3 kg

Responsible Person
Dr. John Smith
Tel. #
Example 3: 
Infectious Substance with an Overpack

From: shipper
Tel. #

Infectious Substance
Affecting humans
(Hepatitis B virus)
UN2814 Net Qty. 30 ml

To: consignee
Tel. #

Dry Ice
UN1845
Net Weight: 3 kg

“OVERPACK”

Responsible Person
Dr. John Smith
Tel. #
Example 4
Outer Box for “Biological substances, category B”

Biological substance, category B with Dry Ice

From: shipper
Tel. #

To: consignee
Tel. #

Biological substance, category B
UN 3373

Dry Ice
UN1845
Net Weight: 3 kg

Responsible Person
Dr. John Smith
Tel. #
Label and Marking Packages for non-regulated shipments

Shipping Exempt Human or Animal Specimens on Dry Ice

Shipper Address:

Consignee Address:

“Exempt Human Specimens”  
Or  
“Exempt Animal Specimens”

Dry Ice  
UN1845  
2.5kg

Shipping Exempt Human or Animal specimens on Dry Ice

Shipper Address:

Consignee Address:

Exempt Human Specimens  
Or  
Exempt Animal Specimens
Shipping Exempt Human or Animal Specimens NO Dry Ice

Shipping Biological Products (DNA, antibodies, proteins, etc) on Dry Ice

Shipping Biological Products (DNA, antibodies, proteins, etc) NO Dry Ice

Revised: March 2010
**Infectious Substances**

**Category A**
- Substances capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals; or included in Table 1.
- Class 6.2
  - PI 602
  - U 2814 or UN 2900

**Category B**
- Biological substances, category B are specimens or cultures containing pathogens not meeting the criteria in category A.
- Class 6.2
  - PI 650
  - UN 3373

**Substances not regulated**
- Always use triple packaging!!
- Biological Products (unless they fall under either of the infectious substance categories)
- Substances that have been deactivated and are not considered infectious.
- Dried blood spots, faecal occult blood screening tests, blood or blood products, or tissues to be used for transfusion or transplantation purposes.

**Genetically modified organisms (GMOs)**

**Infectious?**
- If yes, follow infectious substances (category A or category B).
- If no, regulated as:
  - Class 9
  - UN 3245
  - PI 913
E. Documentation
(See Appendix I for UPS only)

The proper declaration of dangerous goods by the shipper insures that all in the transportation chain know what kind of dangerous goods they are transporting, how to properly load and handle them and what to do if an incident or accident occurs either in flight or on the ground.

Required Documentation: For the IATA regulations, a "Shipper’s Declaration for Dangerous Goods" form and an "Air Waybill" must be completed for each consignment of dangerous goods.

Complete the Shippers Declaration for Dangerous Goods form then FAX a copy to EHRS for final review and approval before shipping. FAX number: 215-898-0767.

1. Shippers Declaration for Dangerous Goods

- A Shippers Declaration for Dangerous Goods must be completed when shipping a Category A Infectious Substance assigned to UN 2814 or UN 2900 or a GMO or GMMO assigned to UN 3245.
- The red hatching on the Shippers Declaration for Dangerous Goods is an indication that the item being shipped is a Dangerous Good. Forms for domestic and international transport are different.
- A Shippers Declaration for Dangerous Goods is not required for shipments in which dry ice is the only dangerous good or hazardous material for shipments of Category B infectious substances assigned to UN 3373.
- Declarations must be typewritten or computer-generated; handwritten declarations will not be accepted.
- **Always print at least four copies: provide three to the carrier and keep one for your records for 2 years.**
- Remember to sign and date each copy.
- A completed sample of a shipper’s declaration can be found in Appendix E.

**Regulations require that you must retain your copy for 2 years.**

**Important!!! Improperly completed declarations are the most common cause of package refusal. The Shippers Declaration must be:**

- Accurate
- Legible
- Complete
- Unaltered

A change may be made on the form only if it is signed by the shipper with a full signature. No whiteout is allowed!
The following is an explanation for each section appearing on the “Shippers Declaration for Dangerous Goods” form: (Appendix D)

a. **Shipper:** Enter the full name, address and telephone number of the person packing this shipment. **THIS PERSON MUST BE TRAINED!** The address must also include the University of Pennsylvania.

   **Example:** Jenna Brown  
   University of Pennsylvania  
   Microbiology Laboratory  
   Philadelphia, PA 19104

b. **Consignee:** Enter full name and address of recipient. When shipping infectious substances, include the text, “Person responsible for the shipment,” name and phone number.

   **Example:** Mycology Laboratory  
   University of Florida  
   Gainesville, FL 21345  
   Responsible Person: Dr. Emily Green 654-213-8476

c. **Transport Details:** Indicate here if your shipment is restricted to cargo aircraft only (if it is more than 50 ml or 50 g of an Infectious Substance). Airport of departure and airport of destination will be filled out by the carrier, leave blank.

d. **Shipment Type:** Cross out “Radioactive” to indicate the shipment of a non-radioactive substance. If radioactive you must contact EHRS 215-898-7187 for additional instructions.

e. **UN or ID Number:** Enter appropriate UN number as found in Table 3.

f. **Proper Shipping Name:** Enter the proper shipping name exactly as it appears in Table 3.  
   - When the infectious substances to be transported are unknown but suspected of meeting the criteria for inclusion in Category A and assignment to UN 2814 or UN 2900, the words “Suspected Category A Infectious Substance” must be shown in parentheses following the proper shipping name.

g. **Class or Division:** Enter appropriate hazard class as found in Table 3.

h. **Packing Group:** For Dry Ice, enter “III” in this column. Infectious substances are not assigned packing groups.
i. **Quantity and Type of Packaging:** Enter the net quantity for each material here. For example: 30 ml (if packaged in one primary container), or 15 ml X 2 (if packaged in two primary containers). Use only **metric** units. At the bottom of the column, indicate the number and type of packages used (usually, "All packed in one fibreboard box."). Do not spell like "fiberboard". If using an overpack, state "Overpack Used".

j. **Packing Instructions:** Enter appropriate packing instruction number. Refer to Table 3.

k. **Authorization:** Leave this column blank.

l. **Additional Handling Instructions:** An emergency contact number must put in this area. Use the statement:

   "Emergency Contact: CHEMTREC 1(800) 424-9300".

   **This number must be used by anyone from the University of Pennsylvania that will be shipping Dangerous Goods.**

   The University has a contract with CHEMTREC to provide 24-hour emergency telephone response service. A copy of the completed shippers declaration must be sent to CHEMTREC at least 24-hours prior to the shipment being sent. For more information on CHEMTREC’s services, please see the EHRS website: [http://www.ehrs.upenn.edu/resources/shippinghazmats/chemtrec.html](http://www.ehrs.upenn.edu/resources/shippinghazmats/chemtrec.html).

   It is imperative that the number given can be answered 24 hours a day until the package is delivered. This is a precaution in case of an emergency such as a spill.

m. **Name/Title of Signatory:** Name and title of the person signing the declaration.

   **This person must be trained!**

n. **Place and Date:** Place and Date of signing the declaration.

o. **Certification Statement:** The bottom of the Shipper’s Declaration for Dangerous Goods must state "I declare that all of the applicable air transport requirements have been met". If this is not printed on the declaration, you must write it in.

---

**All completed Shipper’s Declaration forms must be FAXed to EHRS 215-898-0767 for approval **before **the package is shipped! This is to ensure the declaration is completed correctly and the information is accurate. Please contact EHRS at 215-898-4453 with any questions regarding the completion of the Shippers Declaration for Dangerous Goods.**
2. Air Waybill
(UPS will NOT SHIP Infectious Substance, Category A!!)

a. Infectious substance, Category A
   i. For an infectious substance, under “Handling Information” on the Air waybill, state “Dangerous Goods per attached Shipper’s Declaration for Dangerous Goods” or “Dangerous Goods per attached Shipper’s Declaration for Dangerous Goods Cargo Aircraft only”.

b. Biological substance, Category B
   i. The name, address and phone number of the responsible person must be on this document if it is not on the box.
      
      NOTE: The phone number of the responsible person does not need to be CHEMTREC. The number should be available during regular business hours in case of questions or problems.
   ii. Dry Ice must appear as the following: (Dry Ice UN 1845 3kg)
   iii. The “Nature and Quantity Goods” box must show the text “BIOLOGICAL SUBSTANCE, CATEGORY B” and UN 3373.

c. Exempt specimens
   i. Human and animal specimens that are considered exempt only need an Air Waybill.
   ii. A description of the specimen should be included.
Part III. Special Regulations

A. Select Agents

B. Importing and Exporting Infectious Substances
A. Special Regulations for Select Agents

In 2003 the federal government designated certain biological agents and toxins as Select Agents (Appendix D) based on their potential to pose a threat to the public health. Select Agents are regulated by the Centers for Disease Control and Prevention (CDC) and the Animal Plant Health Inspection Service (APHIS).

Possession, use and/or transfer of Select Agents must be registered with EHRS and CDC or APHIS prior to bringing the materials to Penn’s campus.

All Select Agent transfers must be authorized in writing by the director of EHRS prior to the transfer. Additional shipping requirements and restrictions apply to Select Agents. They are not discussed in this document. Contact EHRS for assistance with Select Agents.
B. Import and Export of Biological Materials & Infectious Substances

The import or export of animals, animal-derived materials, insects, etiologic agents, biological toxins, or genetically-modified organisms may require a federal permit from the CDC, United States Department of Agriculture (USDA), or the US Fish and Wildlife Services (USFWS). (Appendix G)

1. International Shipments
Shipping and receiving animals and animal-derived materials, infectious or biohazardous agents, biological toxins, and genetically modified organisms may require the approval of federal agencies, both domestic and foreign. Regulations that govern the transfer of biological materials help to minimize or eliminate the possible threats to public health and agriculture.

Packages shipped internationally generally require increased preparation time due to the additional paperwork required. An import/export permit may be required when shipping biological materials internationally. Check with U.S. governmental agencies for permits and additional information. Countries may change their import requirement without notice!!

A. Importing into the United States
All shipments entering the United States are processed by the U.S. Bureau of Customs and Border Protection. An import permit may be required to deliver the package even if a permit is not required by the originating country. Check with the appropriate governmental organization prior to shipment of the material.

CDC Permits – www.cdc.gov/od/eaipp/
U.S. Fish and Wildlife Service Permits – www.fws.gov/

Remember: Select Agents require special registration with CDC or APHIS. Please contact EHRS concerning Select Agents.

Note: Packages may be opened and inspected upon entry into the United States. In order to assure that your package is safely delivered to its intended destination, always consider the following:
- If necessary, obtain an import permit from the appropriate governmental organization prior to shipment.
- Package and label the material according to the guidelines listed in this manual.

Importation permits are issued only to the importer, who must be located in the United States. The importation permit, with the proper packaging and labeling, will expedite clearance of the package of infectious materials through the United States Public Health Service Division of Quarantine and release by U.S. Customs.

The importer is legally responsible for assuring that foreign personnel package, label, and ship the infectious materials according to USPHS (Federal) and IATA (International) regulations. Shipping labels containing the universal biohazard symbol, the address of the importer, the permit number, and the expiration date are also issued to the importer with the permit. The importer must send the labels and one or more copies of the permit to the shipper. The permit and labels inform the U.S. Customs and Border Protection and U.S. Division of Quarantine personnel of the package contents.
B. Exporting from the United States *(SEE APPENDIX H for more information)*

Depending on the nature of the shipment, a U.S. export permit may be required when sending your package. Additionally, an import permit may be required in the country where the package is being shipped. If your shipment requires an export permit, it must be completed and approved by the appropriated government agency *prior* to shipment.

**Export Administration Regulations Database:**
http://www.access.gpo.gov/bis/ear/ear_data.html

Note: Packages may be opened and inspected when leaving the United States or at any time by any inspection service provided by other countries. In order to assure that your package is safely delivered to its intended destination, always consider the following:

- If necessary, obtain an export permit from the appropriate governmental organization prior to shipment.
- Package and label the material according to the guidelines listed in this manual.
Part IV. Mail

A. United States Postal Service (USPS)

- **Infectious substances, category A** cannot be mailed.

- **Biological substances, category B**, if packaged and labeled according to the requirements listed in this manual for category B shipments, may be mailed as First-Class Mail, Priority Mail, or Express Mail.

Please check their website for more information: [http://pe.usps.gov/text/dmm300/601.htm#wp1107780](http://pe.usps.gov/text/dmm300/601.htm#wp1107780)

- **Exempt human and animal specimens** can be mailed provided packaging and labeling follow the requirements listed in this manual for exempt human and animal specimens.

  - Outer packaging must be rigid
  - Total volume per package is limited to 500ml or 500g
Part V. Shipping Company Restrictions

Some shipping companies may have rules that are more restrictive than those discussed in this document. Consider the following details before planning a shipment:

**DHL/ Airborne Express.** DHL will accept shipments in accordance with IATA or DOT regulations. Shipments made according to instructions in this manual will be acceptable to DHL.

**FedEx Corporation (FedEx)** Fed Ex Express and Fed Ex Ground will accept shipments prepared according to instructions in this manual. Fed Ex will not accept any material considered to be in Risk Group 4. Please refer to the EHRS Biosafety Manual for the definition of Risk Groups.

**United Parcel Service, Inc. (UPS)** UPS does not accept Infectious substances, category A shipments at all. Please refer to Appendix I for shipping with UPS for the University of Pennsylvania.
Part VI. Emergency Response for an Infectious Substance in Transport

The best advice to give in case of an emergency:

1. Stay upwind.
2. Keep unauthorized personnel away.
3. Do not allow anyone to touch or walk through spilled material.
4. Do not allow clean up of the spill or disposal of the material except under the supervision of an expert.
Part VII. Summary

Things to remember

1. Identify your shipment correctly!! Classify, Mark and Label!

2. **TRAINING**!

If you are involved with shipping and put your name on the package as the "shipper", you absolutely must be trained. An individual, as well as the institution, can be fined and put in jail if the regulations are not followed. That means, if you ship and have your name specified as the shipper, you are responsible to go through the training!!


4. Check EHRS website for updates.

5. Refresher training every 2 years.

6. Use Chemtrek for the emergency phone number.
   
   1(800) 424-9300

7. After completion of the Shipper’s Declaration for Dangerous Goods, FAX to EHRS for approval.

   FAX number: 215-898-0767


9. Know the exemptions!

   **Sweat the details!!**

10. Follow this manual for packaging and documenting and you will be fine.

Remember, shipping hazardous chemicals and radioactive materials within and outside of the United States is subject to a variety of government regulations and airline industry and ground carriers’ requirements. Do not hesitate to ask for assistance. Contact the Office of Environmental Health and Radiation Safety with any questions!

*A special thank you to Andy Globe, University of New Hampshire.*
Table 1. Category A

This table is not exhaustive. Infectious substances, including new or emerging pathogens, which do not appear in the table but which meet the same criteria must be assigned to Category A. In addition, if there is doubt as to whether or not a substance meets the criteria if must be included in Category A.

<table>
<thead>
<tr>
<th>UN Number and Proper Shipping Name</th>
<th>Microorganism</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 2814 Infectious substance affecting humans</td>
<td>Bacillus anthracis (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Brucella abortus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Brucella melitensis (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Brucella suis (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Burkholderia mallei-Pseudomonas mallei-Glanders (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Burkholderia pseudomallei-Pseudomonas pseudomallei (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Chlamydia psittaci-avian strains (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Clostridium botulinum (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Coccidioides immitis (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Coxiella burnetti (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Crimean-Congo hemorrhagic fever virus</td>
</tr>
<tr>
<td></td>
<td>Dengue virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Eastern equine encephalitis virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td><em>Escherichia coli</em>, verotoxigenic (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Ebola virus</td>
</tr>
<tr>
<td></td>
<td>Flexal virus</td>
</tr>
<tr>
<td></td>
<td>Francisella tularensis (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Guanarito virus</td>
</tr>
<tr>
<td></td>
<td>Hantaan virus</td>
</tr>
<tr>
<td></td>
<td>Hantaviruses causing hemorrhagic fever with renal syndrome</td>
</tr>
<tr>
<td></td>
<td>Hendra virus</td>
</tr>
<tr>
<td></td>
<td>Hepatitis B virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Herpes B virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Human immunodeficiency virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Highly pathogenic avian influenza virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Japanese Encephalitis virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Junin virus</td>
</tr>
<tr>
<td></td>
<td>Kyasanur Forest disease virus</td>
</tr>
<tr>
<td></td>
<td>Lassa virus</td>
</tr>
<tr>
<td></td>
<td>Machupo virus</td>
</tr>
<tr>
<td></td>
<td>Marburg virus</td>
</tr>
<tr>
<td></td>
<td>Monkeypox virus</td>
</tr>
<tr>
<td></td>
<td><em>Mycobacterium tuberculosis</em> (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Nipah virus</td>
</tr>
<tr>
<td></td>
<td>Omsk hemorrhagic fever virus</td>
</tr>
<tr>
<td></td>
<td><em>Poliovirus</em> (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Rabies virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Rickettsia prowazekii (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Rickettsia rickettsii (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Rift valley fever virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Russian spring-summer encephalitis virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Sabia virus</td>
</tr>
<tr>
<td></td>
<td>Shigella dysenteriae type 1 (cultures only)</td>
</tr>
<tr>
<td></td>
<td><em>Tick-borne encephalitis virus</em> (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Variola virus</td>
</tr>
<tr>
<td></td>
<td>Venezuelan equine encephalitis virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td><em>West Nile virus</em> (culture only)</td>
</tr>
<tr>
<td></td>
<td>Yellow fever virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td><em>Yersinia pestis</em> (cultures only)</td>
</tr>
<tr>
<td>UN Number and Proper Shipping Name</td>
<td>Microorganism</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>UN 2900 Infectious substances affecting animals</td>
<td>African swine fever virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Avian paramyxovirus Type 1 – Velogenic Newcastle disease virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Classical swine fever virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Foot and mouth disease virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Lumpy skin disease virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td><em>Mycoplasma mycoides</em>-Contagious bovine pleuropneumonia (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Peste des petits ruminants virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Rinderpest virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Sheep-pox virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Goatpox virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Swine vesicular disease virus (cultures only)</td>
</tr>
<tr>
<td></td>
<td>Vesicular stomatitis virus (cultures only)</td>
</tr>
</tbody>
</table>

**Category B**

An infectious substance which does not meet the criteria for inclusion in Category A must be assigned to UN 3373.
Table 2. Comparison of PI 650 and 602

<table>
<thead>
<tr>
<th>Feature</th>
<th>PI 650</th>
<th>PI 602 (follow for PI 913)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary container</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Secondary container</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Outer container</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Absorbent material for entire contents</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>United Nations design type testing* (performance requirements)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2 m drop test</td>
<td>Must pass</td>
<td>Must pass</td>
</tr>
<tr>
<td>9 m drop test</td>
<td>Not required</td>
<td>Must pass</td>
</tr>
<tr>
<td>Puncture test</td>
<td>Not required</td>
<td>Must pass</td>
</tr>
<tr>
<td>Water immersion test</td>
<td>Not required</td>
<td>Must pass</td>
</tr>
<tr>
<td>Test reports</td>
<td>Should be available</td>
<td>Must be available</td>
</tr>
<tr>
<td>UN specification mark</td>
<td>Not required</td>
<td>Required</td>
</tr>
<tr>
<td>Minimum dimensions</td>
<td>Not defined</td>
<td>Defined</td>
</tr>
<tr>
<td>Volume and weight restrictions</td>
<td>Not defined</td>
<td>Defined</td>
</tr>
<tr>
<td>Packaging size restrictions</td>
<td>Not defined</td>
<td>Defined</td>
</tr>
</tbody>
</table>

*PI 650 packages are not required to meet UN performance requirements provided they pass a 1.2m drop test.

Pressure testing of either primary or secondary containers for both PI 602 and PI 650 must pass requirements 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 (-40°F to 130°F).
## Table 3. Summary of Shipping Information

<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. 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</td>
<td>Infectious substance, affecting humans (technical name)</td>
<td>UN 2814</td>
<td>6.2</td>
<td>-</td>
<td>602</td>
<td>50 ml or 50 g</td>
<td>4 L or 4 kg</td>
</tr>
<tr>
<td>Category A infectious substance, affecting animals</td>
<td>Infectious substance, affecting animals (technical name)</td>
<td>UN 2900</td>
<td>6.2</td>
<td>-</td>
<td>602</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>UN 3373</td>
<td>6.2</td>
<td>-</td>
<td>650</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>UN 1845</td>
<td>9</td>
<td>III</td>
<td>904</td>
<td>200 kg</td>
<td>200 kg</td>
</tr>
<tr>
<td>Non-infectious, transducing GMOs</td>
<td>Genetically Modified Micro-organisms</td>
<td>UN 3245</td>
<td>9</td>
<td>-</td>
<td>913</td>
<td>No limit</td>
<td>No limit</td>
</tr>
<tr>
<td>Non-infectious, non-transducing GMOs</td>
<td>None-not regulated</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Infectious GMOs</td>
<td>Infectious substance, affecting humans ( ) OR Infectious substance, affecting animals ( )</td>
<td>UN 2814 Or UN 2900 Or UN 3373</td>
<td>6.2</td>
<td>-</td>
<td>602</td>
<td>50 mL or 50 g</td>
<td>4L or 4 kg</td>
</tr>
<tr>
<td>Patient Specimens</td>
<td>&quot;Exempt human specimens&quot; or &quot;Exempt animal specimens&quot;</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Triple packaging</td>
<td>Primary receptacle (500ml or 500g) Outer packaging (4L or 4kg)</td>
<td>Primary receptacle (500ml or 500g) Outer packaging (4L or 4kg)</td>
</tr>
</tbody>
</table>
Appendix A

Manufactures of Certified Shipping Containers for Infectious substances, Biological substances and Dry Ice

Air Sea Atlanta
1234 Logan Circle
Atlanta, GA 30318
Phone: 404-351-8600
http://www.airseaatlanta.com

DG Supplies, Inc.
5 Boxal Drive
Cranbury, NJ 08512
Phone: 800-347-7879
http://www.dgsupplies.com

Inmark, Inc.
220 Fisk Drive S.W.
Atlanta, GA 30336-0309
Phone: 800-646-6275
http://www.inmarkinc.com

SAF-T-PAK, Inc.
10807-182 Street Edmonton,
Alberta, Canada T5S 1J5
Phone: 800-814-7484
http://www.saftpak.com

All-Pak, Inc.
Corporate One West
1195 Washington Pike
Bridgeville, PA 15017
Phone: 800-245-2283
http://www.all-pak.com

EXACT Technologies, Inc.
7416 N Broadway Ext., Suite E
Oklahoma City, OK 73116
Phone: 800-923-9123
http://www.exaktpak.com

Casing Scientific
5015 Addison Circle
Addison, Texas
Phone: 800-358-6866
http://www.casing.corp

Source Packaging of New England, Inc.
405 Kilvert St.
Warwick, RI 02886
Phone: 800-200-0366
http://www.sourcepak.com

CARGOpak Corporation
3215-A Wellington Court
Raleigh, NC 27615
Phone: 800-266-0652
http://www.cargopak.com

HAZMATPAC, Inc
5301 Polk St., Bldg 18
Houston, TX 77023
Phone: 800-347-7879
http://www.hazmatpac.com

Polyfoam Packers Corporation
2320 S. Foster Avenue
Wheeling, IL 60090
Phone: 888-765-9362
http://www.polyfoam.com

Therapak Corporation
1440 Arrow Highway, Unit A
Irwindale, California 91706
Phone: 888-505-7377
http://www.therapak.com
Appendix B

UN Specification Marking for Infectious Substances

![UN Marking]

UN = United Nations
4 = box, G = fiberboard
CLASS6.2 = Infectious Substances
04 = year box was made
PA = state
SP-9989-ERIKSSON = manufacturer

This marking must be on boxes being used for shipping Infectious Substances unless using an overpack. When using an overpack, the outer box must be marked “Overpack”. This indicates that packages on the inside comply with prescribed specifications.

Performance Testing

Each primary or secondary container must have passed the performance testing required by the UN. The primary receptacle or secondary 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 (-40°F to 130°F).

The following are also performance tests for the primary and or secondary containers:

- **Drop test**
  - PI 602 for Infectious Substances must pass a drop of 9 m
  - PI 650 for Diagnostic Specimens must pass at least a 1.2 m drop
- **Puncture test**
  - PI 602 must pass puncture tests
- **Water immersion test**
  - PI 602 must pass water immersion testing
Appendix C

Packing and Labeling of Infectious Substances
# APPENDIX D

**SHIPPER'S DECLARATION FOR DANGEROUS GOODS**

<table>
<thead>
<tr>
<th>a.</th>
<th>Air Waybill No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>Page 1 of 1 Pages</td>
</tr>
<tr>
<td>c.</td>
<td>Shipper's Reference Number (optional)</td>
</tr>
</tbody>
</table>

**Person Responsible for Shipment:**

Two completed and signed copies of this Declaration must be handed to the operator.

**TRANSPORT DETAILS**

This shipment is within the limitations prescribed for:

<table>
<thead>
<tr>
<th>d.</th>
<th>Shipment Type (delete unsuitable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>c.</td>
<td>Passenger and Cargo Aircraft</td>
</tr>
</tbody>
</table>

**Airport of Departure**

**Airport of Destination**

**NATURE AND QUANTITY OF DANGEROUS GOODS**

| e. | Dangerous Goods Identification |
| f. | UN or ID No. |
| g. | Proper Shipping Name |
| h. | Class or Division (Subcategory) |
| i. | Packing Group |
| j. | Quantity and Type of Packing |
| k. | Packing Instructions |

**Additional Handling Information**

**Emergency Telephone Number**

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/packaged, and are in all respects in proper condition for transport according to the applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.

**Name/Title of Signatory**

**Place and Date**

**Signature**

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/packaged, and are in all respects in proper condition for transport according to the applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.

**Name/Title of Signatory**

**Place and Date**

**Signature**

Created by Andy Giode at the University of New Hampshire Office of Environmental Health and Safety
# Appendix E

**SHIPPER'S DECLARATION FOR DANGEROUS GOODS**

|------------------|------------|----------------------------|-------------------------|-------------------------|---------------|

| Co-signee       | Mycology Laboratory | University of Florida | Gainesville, FL 21345 |

|Person Responsible for Shipment| Dr. Emily Green | 654-213-8476|

Two completed and signed copies of this Declaration must be handed to the operator.

## TRANSPORT DETAILS

<table>
<thead>
<tr>
<th>Airport of Departure</th>
<th>Airport of Destination</th>
<th>Shipment Type (delete un-applicable)</th>
</tr>
</thead>
</table>

## WARNING

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.

## NATURE AND QUANTITY OF DANGEROUS GOODS

<table>
<thead>
<tr>
<th>UN or JD No.</th>
<th>Proper Shipping Name</th>
<th>Class or Division (Subsidiary Risk)</th>
<th>Packing Group</th>
<th>Quantity and Type of Packing</th>
<th>Packing Instructions</th>
<th>Authorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN2814</td>
<td>Infectious substance, affecting humans (Mycobacterium tuberculosis)</td>
<td>6.2</td>
<td>30 mL</td>
<td>602</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN1845</td>
<td>Dry ice</td>
<td>9</td>
<td>III</td>
<td>3 kg &quot;Packed in one fibreglass box&quot;</td>
<td>904</td>
<td></td>
</tr>
</tbody>
</table>

## Additional Handling Information

Emergency Telephone Number: Chem trek 1-800-424-9200

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 the applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.

Name/Title of Signatory: Dunn Brown, Principal investigator

Place and Date: University of Pennsylvania, December 1, 2006

Signature: [Signature]

*Created by Andy Grode at the University of New Hampshire Office of Environmental Health and Safety*
APPENDIX F
APHIS Plant Pathogens, HHS Select Infectious Agents, and USDA High Consequence Livestock Pathogens or Toxins

Viruses
1. African horse sickness virus β
2. African swine fever virus β
3. Akabane virus β
4. Avian influenza virus (highly pathogenic) β
5. Blue tongue virus (exotic) β
6. Camel pox virus β
7. Cercopithece herpes virus (Herpes B virus) γ
8. Classical swine fever virus β
9. Crimean-Congo haemorrhagic fever virus γ
10. Eastern equine encephalitis virus γ
11. Ebola viruses γ
12. Foot and mouth disease virus β
13. Goat pox virus β
14. Japanese encephalitis virus β
15. Lassa fever virus γ
16. Lumpy skin disease virus β
17. Malignant catarrh fever β
18. Marburg virus γ
19. Menangle virus β
20. Monkeypox virus γ
21. Newcastle disease virus (exotic) β
22. Nipah and Hendra complex viruses γ
23. Peste des petits ruminants β
24. Plum pox potyvirus γ
25. Rift Valley fever virus γ
26. Rinderpest virus β
27. Sheep pox β
28. South American haemorrhagic fever viruses (Junin, Machupo, Sabia, Flexal, Guanarito) γ
29. Swine vesicular disease virus β
30. Tick-borne encephalitis complex (flavi) viruses [Central European Tick-borne encephalitis, Far Eastern Tick-borne encephalitis (Russian Spring and Summer encephalitis), Kyasanur Forest disease, Omsk Hemorrhagic Fever)] γ
31. Variola major virus (Smallpox virus) and Variola minor (Alastrim) γ
32. Venezuelan equine encephalitis virus γ
33. Vesicular stomatitis virus (exotic) β

Prion
1. Bovine spongiform encephalopathy agent β

Toxins
1. Abrin γ
2. Botulinum neurotoxins γ
3. Clostridium perfringens epsilon toxin γ
4. Conotoxins γ
5. Diacetoxyscirpenol γ
6. Ricin γ
7. Saxitoxin γ
8. Shigatoxin and Shiga-like ribosome inactivating proteins γ
9. Staphylococcal enterotoxins γ
10. Tetrodotoxin γ
11. T-2 toxin γ

Bacteria
1. Bacillus anthracis γ
2. Botulinum neurotoxin producing strains of Clostridium
3. Brucella abortus γ
4. Brucella melitensis γ
5. Brucella suis γ
6. Burkholderia mallei γ
7. Burkholderia pseudomallei γ
8. Caviella burneti γ
9. Cowdria Ruminantium (Heartwater) γ
10. Francisella tularensis γ
11. Libreobacter africanus, Libreobacter asiaticus γ
12. Mycoplasma capricolum/M. F38/M. mycoides capri (contagious caprine pleuropneumonia agent) β
13. Mycoplasma mycoides mycoides (contagious bovine pleuropneumonia agent) β
14. Ralstonia solanacearum Race 3 γ
15. Rickettsia prowazeki γ
16. Rickettsia rickettsii γ
17. Xanthomonas oryzae pv. oryizcola γ
18. Xylella fastidiosa (citrus variegated chlorosis strain) γ
19. Yersinia pestis γ

Fungi
1. Coccidioides immittis γ
2. Coccidioides posadasii γ
3. Peronosclerospora philippinensis γ
4. Phakopsora pachyrhizi γ
5. Sclerotiorum rayssiae var zeae γ
6. Synchytrium endobioticum γ

Exemptions
The following agents or toxins are exempt if the aggregate amount under the control of a principal investigator does not, at any time, exceed:
- 0.5 mg of Botulinum neurotoxins
- 5 mg of Staphylococcal enterotoxins
- 100 mg of abrin, Clostridium perfringens epsilon toxin, conotoxin, ricin, saxitoxin, shigatoxin, shiga-like ribosome inactivating protein, and tetrodotoxin
- 1,000 mg of diacetoxyscirpenol and T-2 toxin

The following agents or toxins are also exempt:
- Any agent or toxin that is in its naturally occurring environment provided it has not been intentionally introduced, cultivated, collected, or otherwise extracted from its natural source.
- Non-viable select agent organisms or nonfunctional toxins.
- The vaccine strains of Junin virus (Candid #1), Rift Valley fever virus (MP-12), Venezuelan Equine encephalitis virus vaccine strain TC-83.

The medical use of toxins for patient treatment is exempt.

Genetic Elements, Recombinant Nucleic Acids, and Recombinant Organisms
1. Select agent viral nucleic acids (synthetic or naturally derived, contiguous or fragmented, in host chromosomes or in expression vectors) that can encode infectious and/or replication competent forms of any of the select agent viruses.
2. Nucleic acids (synthetic or naturally derived) that encode for the functional form(s) of any of the listed toxins if the nucleic acids: a) are in a vector or host chromosome; b) can be expressed in vivo or in vitro; or c) are in a vector or host chromosome and can be expressed in vivo or in vitro.
3. Listed viruses, bacteria, fungi, and toxins that have been genetically modified.

Other Restrictions
1. Experiments utilizing recombinant DNA that involve the deliberate transfer of a drug resistance trait to the listed agents that are not known to acquire the trait naturally, if such acquisition could compromise the use of the drug to control disease agents in humans, veterinary medicine, or agriculture.
2. Experiments involving the deliberate formation of recombinant DNA containing genes for the biosynthesis of listed toxins lethal for vertebrates at an LD50 < 100 mg/kg body weight.

* APHIS Plant Pathogen  † HHS Select Infectious Agent  ‡ USDA High Consequence Livestock Pathogen or Toxin  ‡ USDA-HHS Overlap Agent

Revised: March 2010
Appendix G

CDC Permit to Import or Transport Agents or Vectors of Human Disease

http://www.cdc.gov/od/eaipp/
Telephone: 1-404-498-2260

CDC uses the term “etiologic agents” when referring to infectious agents. Etiologic agents are those microorganisms and microbial toxins that cause disease in humans and include bacteria, bacterial toxins, viruses, fungi, rickettsiae, protozoans, and parasites. Arthropods and other organisms that transmit pathogens to animals (including humans) are called vectors.

CDC permits are required when shipping any infectious agent known or suspected to cause disease in humans, unsterilized specimens of human or animal tissues (including blood and other fluids), or biological vectors of infectious animals, bats, insects, arthropods and snails.

INFECTIOUS SUBSTANCES
- It is impractical to list all of the several hundred species of infectious substances. In general, an import permit is needed for any infectious substance known or suspected to cause disease in man.

BIOLOGICAL MATERIALS
- Unsterilized specimens of human and animal tissues (such as blood, body discharges, fluids, excretions or similar material) containing an infectious agent requires a permit in order to be imported.

VECTORS
- **Animals:** Any animal known or suspected of being infected with an organism capable of causing disease transmissible to man may require a CDC permit. Importation of live turtles of less than 4 inches in shell length and all nonhuman primates requires an importation permit issued by the Division of Quarantine.
- **Bats:** All live bats require an import permit from the CDC and the U.S. Department of Interior, Fish and Wildlife Services.
- **Insects or Arthropods:** All live fleas, flies, lice, mites, mosquitoes, or ticks require a CDC import permit, regardless of infection status. Permits are required for adult forms, as well as eggs, larvae, pupae, and nymph states. Any other living insect or arthropod, known or suspected of being infected with any disease transmissible to man requires a CDC import permit.
- **Snails:** Any snail species capable of transmitting a human pathogen require a permit from the Centers for Disease Control.

APHIS Agricultural Permits
(http://aphisweb.aphis.usda.gov/ppq/permits/)
Telephone: 1-877-770-5990

APHIS permits are required to import or domestically transfer a plant pest, plant, biological agent or other material.

Export/Import
- Arthropods (insects and mites
- Arthropods inhabiting dung or of medical/veterinary significance
- Bees and bee related articles
- Biological materials containing animal material
- Butterflies
- Cell cultures of bovine or other livestock origins
- Cut flowers
- Earthworms
- Endangered species
- Endangered species of wild fauna and flora
- Entomopathogens
- Farm animals
- Foreign cotton and covers
- Fruits and vegetables
- High consequence livestock pathogens and toxins
- Indian corn or maize, broomcorn and related plants
- Infectious agents of livestock
- Khapra beetle products
- Live arthropods for display or educational purpose
- Livestock
- Moths
- Noxious weeds
- Nursery stocks (including seeds)
- Parasitic plants
- Plant pathogens
- Predators and parasitoids of arthropods
- Prohibited material for research purposes
- Rice and rice related articles
- Seeds
- Snails and slugs
- Soil
- Sugarcane products and by-products
- Tissue culture materials of bovine or other livestock origins
- Weed biocontrol
- Wildlife
- Wood products
United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) permits are required for infectious agents of livestock and biological materials containing animal material. Tissue culture materials and suspensions of cell culture grown viruses or other etiologic agents containing growth stimulants of bovine or other livestock origins are controlled by the USDA due to the potential risk of introduction of exotic animal diseases into the U.S.

**U.S. Fish and Wildlife Service Permits**
http://www.fws.gov/
Telephone: 1(800) 344-WILD

**U.S. Department of Commerce**
http://www.bis.doc.gov/index.htm
Department of Commerce Bureau of Export Administration: Telephone: 1-(202) 482-4811
Go to Commerce Control List for information.
Export controls on biological and chemical materials being sent out of the country

The transfer of biological and chemical materials outside of the United States may trigger the need for an export license. In most cases, the transfer of such biological and chemical materials will be allowed without the need to apply for a license from the federal government. In some cases, however, a license may be required from the U.S. Department of Commerce, the U.S Department of State, and /or the U.S. Department of the Treasury, depending upon: the nature and amount of materials: to whom the materials are being sent: the destination: and the purpose for which the materials are being sent.

Examples of materials that may require a license include biological materials that could be used in chemical or biological weapons (pathogens, toxins, etc). The lists of materials that could require a specific license application are contained in the applicable regulations. (To review the lists of biological and chemical materials that the Department of Commerce regulates for export control licenses, see http://www.access.gpo.gov/bis/ear/pdf/ccl1.pdf particularly sections IC350 through IC360.)

In addition to the export controls described above, based on the nature of the materials being transferred, there are regulations administered by the Department of the Treasury applying to exports going to specific countries, individuals, or entities. Examples would include individuals the government has identified as being involved with terrorism, drug trafficking or other illicit activities. Countries against which the federal government has imposed trade sanctions and travel embargoes (such as Cuba, Iran, etc.) also have restrictions and might require applying for an export license before shipping materials. The lists are maintained by the federal government and need to be checked prior to shipping biological or chemical materials. (Links to the various government lists are available from the Office of Research Service’s web site at http://www.upenn.edu/researchservices/exportcontrols.html).

Any individual planning to transfer materials should work with the University to check the regulations and if necessary, apply for the appropriate license. Failure to do so may result in significant criminal and civil liabilities. Contact the Office of Research Services as soon as possible, because the federal government can take significant time in determining whether to grant the export license. If you are transferring materials pursuant to an outgoing material transfer agreement, sponsored research agreement, clinical trial agreement, or other agreement negotiated and signed by the Office of Research Services, they (ORS) will work with you in advance to determine whether an export license might be needed as part of performing the contract.

For information on export control matters, as well as contact for additional information/guidance please review the website of the Office of Research Services at http://www.upenn.edu/researchservices/exportcontrols.html or contact:
APPENDIX I
UPS and Campus Ship

The University of Pennsylvania is using UPS as its primary courier for mail and packages.

Certain items cannot be shipped using UPS. If you will be shipping Infectious substances, category A, radioactive materials, or chemicals, please contact EHRS at 215-898-4453.

“Campus Ship” is a UPS program developed for shipping biological materials and dry ice. In order to receive “Campus Ship” you must be up to date with shipping training, “Shipping and Packaging Infectious and Biological Materials” provided by EhRS. After completion of this training, you must contact Express ship using express-ship@upenn.edu to request your new PIN code and ID for use of this program.

The Express Ship program established for the University of Pennsylvania by UPS, must not be used to ship biological materials and dry ice.
Reference Guide for Shipping Packages:

<table>
<thead>
<tr>
<th>Description:</th>
<th>Carrier</th>
<th>Airbill/System</th>
<th>Labeling for UPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domestic</strong> Dry Ice with no other dangerous goods</td>
<td>UPS</td>
<td>Campus Ship</td>
<td>For Dry Ice, use appropriate markings*</td>
</tr>
<tr>
<td><strong>International</strong> Dry Ice with no other dangerous goods</td>
<td>UPS or FedEx</td>
<td>Campus Ship (UPS) Before shipping using UPS, be cognizant of time (how long it will take to reach destination) depending on the country.</td>
<td>For dry ice, use appropriate markings*</td>
</tr>
<tr>
<td><strong>Domestic or International</strong> Biological Products With or without Dry Ice</td>
<td>UPS</td>
<td>Campus Ship (UPS) Before shipping using UPS, be cognizant of time (how long it will take to reach destination) depending on the country.</td>
<td>For dry ice, use appropriate markings*</td>
</tr>
<tr>
<td><strong>Domestic or International</strong> Exempt human and animal specimens with or without Dry Ice</td>
<td>UPS</td>
<td>Campus Ship (UPS) Before shipping using UPS, be cognizant of time (how long it will take to reach destination) depending on the country.</td>
<td>Shipping label and exterior of package “exempt human/animal specimens” If Dry Ice, use appropriate label and markings*</td>
</tr>
<tr>
<td><strong>Domestic</strong> Biological substances, category B (with or without Dry Ice)</td>
<td>UPS</td>
<td>Campus Ship (UPS)</td>
<td>UN3373 label, “Biological substances, category B”. If Dry Ice, use appropriate label and markings*</td>
</tr>
<tr>
<td><strong>International</strong> Biological substances, category B (with or without Dry Ice)</td>
<td>UPS FedEx or other</td>
<td>Campus Ship (UPS) FedEx may be used depending on country of destination</td>
<td>UN3373 label, “Biological substances, category B”. If Dry Ice, use appropriate label and markings*</td>
</tr>
<tr>
<td><strong>Infectious substances, Category A</strong> (with or without Dry Ice)</td>
<td>UPS will not handle category A – Use another courier or FedEx</td>
<td>FedEx air waybill Other world couriers (Not UPS)</td>
<td>Contact EHRS (Sue Souder) for assistance</td>
</tr>
<tr>
<td><strong>Radioactive materials</strong> Domestic or International RAM with dry ice</td>
<td>FedEx</td>
<td>FedEx air Waybill</td>
<td>Contact EHRS (Keith Brown) for assistance</td>
</tr>
<tr>
<td><strong>Chemicals</strong> (International/Domestic) Dangerous goods in excepted quantities</td>
<td>UPS</td>
<td>Campus Ship (UPS)</td>
<td>Contact EHRS (Jim Crumley) for assistance</td>
</tr>
<tr>
<td><strong>Chemicals</strong> (International/Domestic) Limited QTY</td>
<td>UPS</td>
<td>Campus Ship (UPS)</td>
<td>Contact EHRS (Jim Crumley) for assistance</td>
</tr>
<tr>
<td><strong>Chemicals</strong> Requiring a Shipping Paper (Domestic/International)</td>
<td>UPS</td>
<td>Worldship</td>
<td>Contact EHRS (Jim Crumley) for assistance</td>
</tr>
</tbody>
</table>

* Shipping dry ice requires labeling the package with a Class 9 label and marked: Dry Ice, UN1845, weight in kilograms (____ kgs)