SAMPLE PACKING AND SHIPPING

CONTENTS

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SAMPLE PACKING AND SHIPPING

1.0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to summarize the requirements for packing and shipping of environmental samples by the United States Environmental Protection Agency (U.S. EPA) Environmental Response Team's (ERT) contractor personnel on behalf of the ERT.

2.0 APPLICABILITY

This SOP is applicable to ERT contractor personnel for packing and shipping l hazardous and non-hazardous environmental samples on behalf of U.S. EPA.

3.0 DESCRIPTION

3.1 General

Environmental samples collected by ERT contractor personnel are shipped to the ERT Laboratory, U.S. EPA Regional laboratories, U.S. EPA Contract Laboratory Program (CLP) laboratories or other laboratories contracted by ERT or their contractor for analysis. The samples are required to be transported in a manner that will ensure their integrity, guard them from leakage/breakage, and will protect the health and safety (H&S) of the shipping and receiving personnel. Regulations for packing and shipping of environmental samples by all forms of transportation (land, sea, and air) are regulated and enforced by the U.S. Department of Transportation (U.S. DOT) and published in the Code of Federal Regulations (CFR) Title 49: *Transportation*. All sample shipments, regardless of the form of transportation, must always be in compliance with 49 CFR.

Due to holding time limitations, most environmental samples are shipped by commercial air carrier (e.g., Federal Express). The International Air Transport Association (IATA) regulates the shipping of dangerous goods and publishes the IATA Dangerous Goods Regulations (DGR) manual annually. The IATA DGR is a globally-accepted field source reference for shipping hazardous materials by commercial air carriers and includes all federal regulations along with country-specific and carrier-specific regulations. All air shipments made by ERT contractor personnel must be in accordance with the IATA DGR. The IATA Hazard Class Definitions can be found in Appendix A,

3.2 Shipment of Environmental Samples and Hazardous Samples

Prior to shipment, the ERT contractor's Task Leader (TL) must determine if the samples contain hazardous material (also referred to as dangerous goods). Dangerous goods are defined as substances or materials, which have been determined by the U.S. DOT, to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce [Refer to 49 CFR 171.8].

Generally, environmental samples collected from matrices such as air, surface water, soils or sediments are classified as non-hazardous environmental samples; whereas samples collected from drums, storage tanks (above ground and underground), contaminated ponds, impoundments, lagoons, pools, and leachate from hazardous waste sites (e.g. landfills) can potentially be classified as hazardous samples.

3.3 APHIS-Regulated Soils

Regardless of whether collected soil is deemed to be non-hazardous environmental samples or hazardous samples, the samples need to be evaluated to determine whether they are U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) regulated soil samples. Soil samples from all foreign countries, all U.S. territories (i.e., Puerto Rico, United States Virgin Islands (USVI) and North Mariana Islands), Hawaii, and parts of the United States fall under federal quarantine as authorized under 7 CFR 301. To determine if there are regulated soils in a specific sample area, refer to the following link to retrieve contact information for State Plant Health Directors (SPHDs):

https://www.aphis.usda.gov/aphis/ourfocus/planthealth/ppq-program-overview/sphd

Because designations of regulated soil areas are updated frequently by the USDA APHIS, obtaining recent information is critical. Soils from these regulated areas may contain bacteria, viruses, fungi, nematodes, invertebrates or seeds of undesirable plant species that could be harmful to U.S. agriculture or natural resources. The movement of these soils within the continental U.S. is regulated under 7 CFR 330.300.

When soils consist of organic materials containing unidentifiable material of biological origin, the USDA classifies the soil as a mixture of inorganic and organic materials. This classification includes most soil samples, but generally exempts sediment samples, geologic samples, drilling core samples or soil samples consisting purely of inorganic material such as pure sand or rock.

In addition to other packaging requirements specified in section 3.5, when shipping APHIS-regulated soils, the samples must be shipped in a securely closed, watertight or leak-proof container (e.g., vial, glass jar, etc.) contained in a secondary durable watertight or leak-proof container (e.g., self-sealing plastic bag). Both the primary and secondary container must be capable of containing soil independently. A copy of the APHIS Soil Permit should be included with the chain-of-custody (COC) record inside the sample container. An APHIS Soil Permit Label (Figure 1, Appendix B) must be attached to the outside of the package. Prior to shipping the soil samples, the laboratory must be informed the samples are APHIS-regulated samples and that they are being shipped from a quarantined area. This is done to ensure the laboratory is capable of handling quarantined soil samples and so adequate precautions are followed by the laboratory during handling, analysis and disposal of the samples.

3.4 Sample Storage

Samples are collected in labeled containers, jars or bags and documented according to ERT SOP, *Sample Documentation*. Sample containers, jars or bags should be wiped clean and are required to be closed tightly before they are stored. Samples are required to be stored, preserved, and handled according to ERT SOP, *Sample Storage, Preservation and Handling*.

3.5 Sample Packaging

Sample packaging is dependent upon the sample matrices being shipped as specified below:

- Soil, sediment, water and air samples collected on tube media are shipped in durable intact insulated sample coolers

- Biological samples may be shipped in secure jars or resealable plastic bags depending on the nature of the sample and the analyses needed. For example, small crayfish may be placed in small glass jars but a large fish filet may need to be shipped in a large resealable plastic bag.
- SUMMA canisters are shipped in metal SUMMA canister boxes.
- Cassette media are shipped in sample coolers or cardboard boxes.
- Tedlar bags should not be shipped, but hand delivered whenever possible, due to issues with pressure changes that may impact the samples during air transportation. If Tedlar bags are to be shipped, the bags should not be filled more than 70 percent (%) to allow for atmospheric expansion (ERT SOP, *Tedlar® Bag Sampling)*.
- When shipping hazardous samples, the inner and outer packing must be compliant with specifications listed in IATA DGR.
- When shipping non-hazardous samples with dry ice, the container must be vented and a dry ice label affixed to the container.

Additional packaging is needed for certain types of samples as specified below:

- Potentially breakable (e.g., glass) sample containers must be placed in a re-sealable plastic bags to contain any breakage or spillover of sample. Small bubble wrap bags, specifically made for holding glass sample jars and tubes, are readily available, convenient, and effective.
- Tedlar bag media must be placed inside an opaque bag, to prevent degradation.
- Cassettes and tube media for air samples must be placed inside of a Whirl Pak® bag to maintain integrity.

Prior to placing samples in an intact insulated sample cooler, the cooler should be lined with a garbage bag or drum liner. As needed, bubble wrap or other inert packing material may be used to protect glass or potentially breakable sample containers during shipping. Once all the samples have been placed in the cooler, the garbage bag/liner should be sealed with duct tape to ensure that if the contents were to get damaged during shipping the garbage bag/liner would contain the spill.

A COC record is required to accompany all samples. The COC is placed in a waterproof zip-top bag and taped to the inside of the lid of the outer packaging so it is easily located upon opening the shipment. If shipping samples from outside the contiguous United States or areas within the United States under Federal, state or local quarantine, an APHIS soil permit must be included with the COC (see Section 3.3).

Sample coolers are required to be closed and sealed with duct or strapping tape. A minimum of two custody seals must be placed across the shipping container/cooler's opening following ERT SOP, *Chain of Custody Procedures*. All custody seals and labels (see section 3.7) are secured in place on the cooler with clear tape. Duct tape on the outside of the shipping container should also be covered with clear packing tape prior to shipping.

3.6 Sample Temperature Maintenance

Many samples, depending on the analysis, are required to be maintained at a temperature less than or equal to (≤) 6 degrees Celsius (°C) from time of collection through shipment. Some samples must be frozen following collection and maintained frozen through the shipping process. For detailed

information on sample storage requirements, see ERT SOP, *Sample Storage, Preservation, and Handling*.

Wet ice, Blue Ice® or dry ice is typically used to maintain appropriate sample temperatures during shipment. The quantity of ice will vary depending on the time of year and the length of time the samples will be in transit. If wet ice is used for temperature maintenance during shipment, it should be double bagged to prevent leakage. When shipping samples immediately after collection or during hot weather, an ice bath may be needed to chill the samples prior to packing and shipment. Blue Ice® may be used in place of wet ice for shipping samples with extended transit times. Temperature blanks are included with the samples in the shipping containers when requested by the laboratory conducting the analysis.

Dry ice is used primarily for shipping biological samples. When shipping with dry ice, it is recommended that the cooler is vented by leaving the drain on the side of the cooler open.

3.7 Package Documentation and Labeling

When shipping with a commercial carrier such as Federal Express, an airbill must be completely and accurately completed and included with each sample cooler (Figure 2, Appendix B). The airbill must include a name and phone number for both the sender and recipient. All shipments are required to have address labels including the name and addresses of the shipper and recipient (laboratory). In addition, samples that contain APHIS-regulated soils (see Section 3.3) must have APHIS Soil Permit Labels attached to the outside of the sample cooler (Figure 1, Appendix B).

For convenience, FedEx on-line shipping tools are also available to prepare an Air Waybill, get rates and transit times, schedule a pick-up and receive automated status notifications about your shipment at http://www.fedex.com/gy/ebusiness/shipping.html

3.7.1. Non-Hazardous Environmental Samples

All sample coolers containing non-hazardous environmental samples must include "Environmental Sample" labels (Figure 3, Appendix B) on the outside of the cooler.

3.7.2 Hazardous Samples (Dangerous Goods)

The TL or their designee is required to determine the composition of the sample for shipping purposes [such as asbestos containing materials (ACMs), polychlorinated biphenyls (PCBs), etc.]. If the hazardous material/sample materials are not listed, the TL has to determine the most appropriate hazard class and packing group (PG) applicable. The applicable hazard class and PG is dependent on the physical and chemical properties of the environmental hazardous samples. Definitions of the hazard classes specified by the IATA DGR are included in Appendix A.

For hazardous samples, the appropriate hazard class label(s) (Figure 4, Appendix B) must be included on the outside of the sample cooler as designed in the IATA DGR manual. A computer-generated Shipper's Declaration for Dangerous Goods (Figure 5, Appendix B) form must be filled out completely and accurately and provided to the shipper at the time of shipment.

3.8 Sample Shipment

Samples are sent Priority Overnight using a commercial shipping carrier (e.g. Federal Express), picked up by a laboratory courier, or hand-delivered to the laboratory. For samples being delivered to the ERT Laboratory, coordination with the ERT contractor's Sample Receiving Technician is required prior to shipping samples. For samples being shipped to an outside laboratory (CLP, U.S. EPA or subcontracted), the laboratory should be informed of the shipment by either the CLP Sample Coordinator, the TL, or the ERT contractor's Analytical Subcontracting Representative along with a delivery date and any appropriate shipper tracking numbers.

3.9 Equipment and Materials

- United Nations (UN) approved inner and outer shipping containers for dangerous goods
- Intact insulated sample coolers for non-hazardous environmental samples
- SUMMA cases
- Bubble Wrap, Bubble Bags or other inert cushioning material
- Airbills
- Custody seals
- "Environmental Samples" Labels
- Hazard Class Labels
- Copies of valid APHIS Soil Permits and labels
- Typewritten "Shipper's Declaration for Dangerous Goods"
- COCs
- Wet ice/Blue Ice/Dry Ice
- Garbage Bags or Drum Liners
- Plastic Resealable Bags
- Dark colored bags
- Whirl-Pak®
- Duct or strapping tape
- Clear tape
- Nitrile and work gloves
- Paper towels

3.10 Training Requirements

According to 40 CFR Parts 171-177, all personnel responsible for packing and shipping samples must be trained. Training for all ERT contractor personnel hired after November 15, 1992, is required to be completed within the first 90 days of their employment. ERT contractor personnel who have been re-assigned to perform shipping/receiving tasks are required to complete training within 90 days after their new job responsibilities have been assigned. ERT contractor personnel hired after November 15, 1992, may perform sample packing and shipping functions prior to the completion of training with the supervision by the ERT contractor's Shipping and Receiving Coordinator or other trained personnel. All personnel potentially involved with shipping of regulated soils must take Soil Permitting training on an annual basis.

According to U.S. DOT 40 CFR 171-177, hazardous shipping training must be taken once every three years; however, IATA specifies training once every two years. ERT contractor personnel

potentially involved with shipping of hazardous samples must take Hazardous Materials (HM)-181 training every two years.

4.0 RESPONSIBILITIES

4.1 ERT Work Assignment Manager

The ERT Work Assignment Manager (WAM) is responsible for providing technical expertise and technical direction to the contractor, preparing task orders/work assignments, reviewing deliverables, interacting with the Regional customers and monitoring the financial and administrative management of the project.

4.2 ERT Quality Coordinator

The ERT Quality Coordinator provides quality assurance oversight for all projects and implements/maintains the ERT Quality Assurance Program.

4.3 ERT Contractor Health and Safety Officer

The ERT contractor's Health and Safety Officer (HSO) or their designee is responsible for providing packing and shipping training to ERT contractor employees.

4.4 ERT Contractor Quality Assurance/Quality Control Officer

The ERT contractor's Quality Assurance/Quality Control (QA/QC) Officer is responsible for approving any updates to this SOP, informing contractor personnel when the SOP has been updated and where the document is located. The QA/QC Officer may conduct audits to determine if contractor personnel are in compliance with this SOP.

4.5 ERT Contractor Task Leaders and Field Staff

ERT contractor TLs and field staff are responsible for packing and shipping samples in accordance with IATA *Dangerous Goods Regulations* and guidelines outlined in this SOP, and must attend training once every two years.

4.6 ERT Contractor Shipping and Receiving Coordinator

The ERT contractor's Shipping and Receiving Coordinator is responsible for providing appropriate packing and shipping information as requested by the contractor's TL and field staff.

4.7 ERT Contractor Program Manager

The ERT contractor's Program Manager or their designee is responsible for the implementation of the guidelines outlined in this SOP and ensuring the timely update of this SOP.

5.0 REFERENCES

Code of Federal Regulations. *Domestic Quarantine Notices*: 7 CFR Part 301.

Code of Federal Regulations. *Soil from Foreign Countries or Territories or Possessions:* 7 CFR 330.300.

Code of Federal Regulations. *Hazardous Materials Regulations (DOT):* 40 CFR 171-177.

Code of Federal Regulations. *Transportation:* 49 CFR.

International Air Transport Association. 2016. Dangerous Goods Regulations, 57th Edition. Montreal, Quebec, Canada.

6.0 APPENDICES

A - IATA Hazard Class Definitions
B – Figures

APPENDIX A
IATA Hazard Class Definitions
SOP: ERT-PROC-2004-20
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IATA Hazard Class Definitions

Dangerous goods are defined as articles or substances which are capable of posing a risk to health, safety property or the environment and which are shown in the list of dangerous goods according to IATA Regulations. In addition, Dangerous Goods are defined as those goods which meet the criteria of one or more of nine UN hazard classes and, where applicable, to one of three UN Packing Groups. The nine classes relate to the "type of hazard" whereas the packing groups relate to the applicable "degree of danger" within the class. Some hazard classes are further subdivided into hazard divisions due to the wide scope of a class. The division number does not imply a hazard level.

Class 1 – Explosives

Division 1.1	Articles and substances having a mass explosion hazard
Division 1.2	Articles and substances having a projection hazard, but not a mass explosion hazard
Division 1.3	Articles and substances having a fire hazard, a minor blast hazard, and/or a minor projection hazard, but not a mass explosion hazard
Division 1.4	Articles and substances presenting no significant hazard
Division 1.5	Very insensitive articles and substances having a mass explosion hazard
Division 1.6	Extremely insensitive articles and substances which do not have a mass explosion hazard

Class 2 – Gases

Division 2.1	Flammable gas
Division 2.2	Non-flammable, non-toxic gas
Division 2.3	Toxic gas

Class 3 - Flammable Liquids

Class 4 - Flammable Solids, Substance Liable to Spontaneous Combustion, Substance Which, in Contact with Water, Emit Flammable Gases

Division 4.1	Flammable Solids, self-reactive substances and solid desensitized explosives
Division 4.2	Substances liable to spontaneous combust
Division 4.3	Substances which, in contact with water, emit flammable gases

Class 5 - Oxidizing Substances and Organic Peroxides

Division 5.1	Oxidizer
Division 5.2	Organic peroxides

Class 6 – Toxic and Infectious Substances

Division 6.1	Toxic Substances
Division 6.2	Infectious Substances

Class 7 - Radioactive Material

Class 8 - Corrosives

Class 9 - Miscellaneous Dangerous Goods

APPENDIX B
Figures
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FIGURE 1. Example of APHIS Soil Permit Label

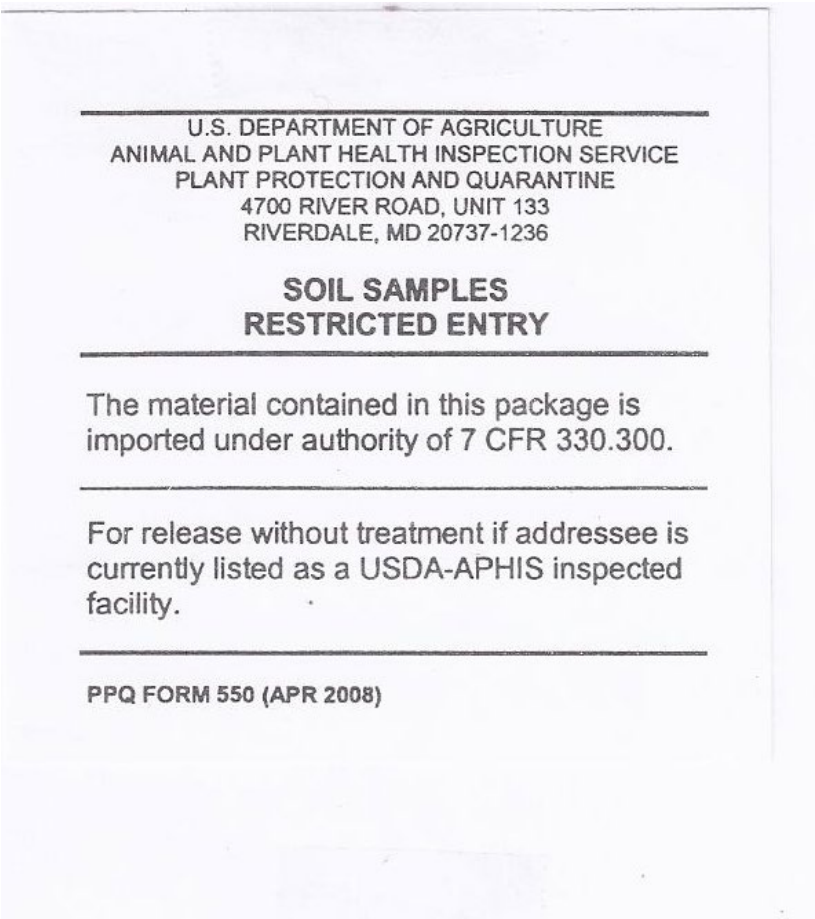

FIGURE 2. Example of an Airbill

FIGURE 3. Environmental Samples Label

FIGURE 4. Hazard Class Labels

FIGURE 5. Example of Shipper's Declaration for Dangerous Goods

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

Shipper
Your Name
Company Name
Address
City, State Zip Code
Country

Air Waybill No.

Page 1 of 1 Pages

Shipper's Reference Number *(optional)*

Consignee
Name
Company Name
Address
City, State Zip Code
Country

powered by www.ShipHazmat.net

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

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.

TRANSPORT DETAILS

This shipment is within the limitations prescribed for *(delete non-applicable)*

PASSENGER AND CARGO AIRCRAFT	~~CARGO AIRCRAFT ONLY~~ XXXX

Airport of Departure

Airport of Destination

Shipment Type *(delete non-applicable)*

NON-RADIOACTIVE	~~RADIOACTIVE~~ XXXX

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification				Quantity and Type of Packing	Packing Instr.	Authorization
UN or ID No.	Proper Shipping Name	Class or Division (Subsidiary Risk)	Packing Group			
UN1956	Compressed gas, n.o.s. (NITROGEN)	2.2		1 FIBREBOARD BOX X 1 kg	200	

Additional Handling Information

Emergency Response 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 labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.

Name/Title of Signatory

Place and Date

Signature *(see warning above)*