



STANDARD OPERATING PROCEDURES

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SAMPLE PACKING AND SHIPMENT

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*These sections affected by Revision 0.0.

SUPERCEDES: SOP #2004; Revision 0.0; 08/11/94; U.S. EPA Contract 68-C4-0022.



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1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to summarize requirements for the packaging, marking/labeling, and shipping of environmental and hazardous materials samples.

2.0 APPLICABILITY

This SOP is applicable to all Response, Engineering, and Analytical Contract (REAC) personnel when packaging, marking/labeling, and shipping environmental and hazardous material samples.

3.0 DESCRIPTION

3.1 General

Samples collected by REAC personnel are typically shipped to the REAC laboratory or a subcontract laboratory for analysis. Samples must be transported in a manner that will ensure their integrity, guard the samples from the detrimental effects of sample leakage or breakage and protect the health and safety of shipping/receiving personnel. Regulations for packaging, marking/labeling, and shipping of hazardous materials and wastes are promulgated by the U.S. Department of Transportation (U.S. DOT). Air carriers which transport hazardous materials, in particular Federal Express, require compliance with the current edition of the International Air Transport Association (IATA) *Dangerous Goods Regulations*, which applies to shipment and transportation of hazardous materials samples by air carrier. Following current IATA regulations will ensure compliance with U.S. DOT.

Employees should be aware that regulatory agencies with jurisdiction have the authority to levy substantial fines and penalties to violators. Failure on the part of any employee to comply with the requirements of these procedures may be cause for disciplinary action, including discharge.

3.2 Environmental Samples versus Hazardous Material Samples

Samples collected by REAC personnel are classified as either environmental or hazardous material samples. In general, environmental samples (soils, sediments, surface and ground waters) are those collected from off-site areas and are not expected to contain high concentrations of contaminants considered to be hazardous. Soils, sediments, surface and ground waters collected from on-site areas may be classified as hazardous material samples if they contain hazardous levels of contaminants. On-site materials collected from drums, bulk storage tanks, obviously contaminated ponds, impoundments, lagoons, pools, and leachates from hazardous waste sites are generally considered hazardous material samples. It should be noted that the sample collection location (on-site versus off-site) is not the dominant factor in determining whether the sample is an environmental or hazardous waste sample, but rather the concentration of the contaminants and the nature of the matrix. The following are examples of the types of information that the Task Leader may use to determine if a matrix should be considered either an environmental or hazardous material samples:

- proximity of the sampling location to the suspected source of contamination
- field screening results (HNu, OVA, XRF, etc.)



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- environmental indicators such as living biota (vegetation, fish, etc.), staining, matrix characteristics (i.e., does the soil or water appear "normal"?)
- historic sampling and analytical results
- type of site and activities conducted on the site

Distinctions must be made between environmental and hazardous material samples:

- To determine the IATA requirements for the transportation of samples. If there is any doubt, a sample should be considered hazardous and shipped accordingly.
- To protect the health and safety of sample receiving personnel. Special precautions may be necessary when samples other than those of an environmental nature are received.

3.3 Environmental Samples

3.3.1 Packaging

Environmental samples must be packaged as follows:

1. The sample jars should be properly labeled in accordance with ERT/REAC SOP #2002, *Sample Documentation*, and the exteriors of the sample jars should be wiped clean and dried, if necessary. The sealed sample jars should be placed in a polyethylene bag (one sample per bag), and the bag should be sealed.
2. The sample jars may be placed in a U.S. DOT-approved fiberboard box or cooler (shipping container) which has been lined with a large polyethylene bag or plastic sheeting.
3. The shipping container must be packed with enough noncombustible, absorbent, cushioning material to minimize the possibility of sample jar breakage, and to absorb any material that may have leaked. If there are multiple sample jars, there must be sufficient cushioning material between them to prevent breakage if the shipping container is dropped or severely shocked.
4. If maintenance of the sample jars at 4°C is necessary, wet or blue ice must be placed into two sealable polyethylene bags which must be sealed and placed in the shipping container. Additional absorbent material may be added, if necessary.

NOTE: If dry ice is used, it should be limited to 4 pounds or less per shipping container. Use of more than 4 pounds of dry ice will require the completion of the Federal Express Air bill for Dangerous Goods Shipments. In addition, the shipping container must be vented to allow for escape of carbon dioxide gas. It is recommended to use a dry ice shipping container.



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5. The Chain of Custody Record, completed in accordance with ERT/REAC SOP #4005, *Chain of Custody Procedures*, must be placed in a polyethylene bag which must be sealed and taped to the inside of the shipping container lid.
6. The shipping container must be closed and sealed with duct or strapping tape.

3.3.2 Marking/Labeling of Shipping Containers and Shipping Papers

1. Sample jars must have completed sample labels, and the shipping container must be marked "Environmental Samples" (Appendix A, Figure 1). When liquid samples are included in the shipping container, two sides of the shipping container must be marked "This End Up" or arrow labels (Appendix A, Figure 2) should be affixed. No IATA marking or labeling are required. However, the shipping container must be labeled with the names and addresses of both the sender and the receiver. At least two custody seals must be placed across the shipping container openings as per ERT/REAC SOP #4005, *Chain of Custody Procedures*.
2. No IATA shipping papers are required.

3.3.3 Transportation

1. There are no IATA restrictions on the mode of transportation.
2. In general, Federal Express is used for all overnight sample shipment. Due to holding time restrictions, this is highly recommended unless the samples personally can be transported to the appropriate laboratory for analysis.
3. When environmental samples are shipped by Federal Express, a Federal Express Airbill (Appendix A, Figure 3) must be completed. If Federal Express service is not available for a particular location, the REAC Shipping/Receiving Department must be contacted to determine the appropriate overnight carrier and make arrangements for shipment.

3.4 Hazardous Material Samples

3.4.1 Determination of Hazard Class

Prior to mobilization in the field and any sampling activities, the following steps must be taken to determine the Hazard Class(es) of the materials to be shipped.

1. The Task Leader or designee shall identify the material for which samples are being collected and analyzed. If it is a class of materials (i.e., BNAs, VOAs, etc.), the specific compound/analyte considered to be the most hazardous should be identified.
2. The Task Leader or designee shall provide the REAC Shipping/Receiving Department with the proper shipping name (usually the chemical name or a



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synonym) of the material to be shipped. If the material is not included in the IATA List of Dangerous Goods, the Task Leader, or designee, shall assist the Shipping/Receiving personnel in determining the appropriate Hazard Class and Packing Group, if applicable. This is usually dependent on the physical properties of the hazardous material.

The appropriate Hazard Class and Packing Group for hazardous material samples can be determined through professional judgment and logical elimination of inappropriate classes for the material being shipped. Definitions of the nine Hazard Classes specified by the IATA *Dangerous Goods Regulations*⁽¹⁾ are included in Appendix B.

3. The Shipping/Receiving personnel will consult the IATA *Dangerous Goods Regulations* (current edition) for packing, marking and labeling, and documentation instructions. REAC personnel will implement the "Limited Quantities" regulations unless they are not applicable.
4. Instructions provided by the Shipping/Receiving Department must be documented in the site specific Work Plan.

3.4.2 Packaging

Unless otherwise directed by the IATA *Dangerous Goods Regulations*, samples must be packaged as described in Section 3.3.1 of this SOP.

3.4.3 Marking/Labeling of Shipping Containers and Shipping Papers

Shipping containers must be marked, labeled and shipping documentation completed as described in the IATA *Dangerous Goods Regulations*. Shipping containers must be labeled with the names and addresses of both the sender and the receiver, and at least two custody seals must be placed across the shipping container openings.

3.4.4 Transportation

1. Generally, Federal Express is used for all overnight shipment of samples. Due to holding time constraints, this is highly recommended unless the samples can be personally transported to the appropriate laboratory for analysis.
2. When hazardous material samples are shipped by Federal Express, a Federal Express Airbill (Appendix A, Figure 3) in conjunction with a Shipper's Declaration for Dangerous Goods (Appendix A, Figure 4) must be completed. If Federal Express service is not available for a particular location, the REAC Shipping/Receiving Department must be contacted to determine the appropriate overnight carrier and to make arrangements for shipment.

3.5 Training Requirements



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All personnel responsible for packing and shipping samples shall be trained as required by 40 CFR 171-177, as follows:

3.5.1 Initial Training Requirements

- C Training for employees employed after November 15, 1992, shall be completed within 90 days of their employment.
- C Employees who change job functions shall complete training within 90 days after the change if packing and shipping samples are to be part of the employee's new responsibilities.
- C Employees employed after November 15, 1992, or have changed job functions may perform sample packing and shipping functions prior to the completion of training provided they are supervised by properly trained and knowledgeable employees.

3.5.2 Recurrent Training Requirements

- C Employees shall receive training in packing and shipping samples as required by 40 CFR 171-177 at least once every three years.

4.0 RESPONSIBILITIES

4.1 Field Personnel

Field personnel are responsible for packaging and shipping samples in accordance with this SOP and the IATA *Dangerous Goods Regulations*. Field personnel must attend initial and recurrent training as described above.

4.2 Task Leaders

Task Leaders are responsible for assuring samples are packaged and shipped in accordance with this SOP and the IATA *Dangerous Goods Regulations*, for obtaining packaging and shipping information, when required, from the REAC Shipping/Receiving Department and assuring that all field personnel have the required training.

4.3 Shipping/Receiving Department

The REAC Shipping/Receiving Department is responsible for providing appropriate packaging and shipping information when requested by Task Leaders or field personnel. The REAC Shipping/Receiving Department in conjunction with Health and Safety are responsible for providing initial and recurrent training as described above.

4.4 Section Leaders and the QA Office

The Section Leaders and the QA Office are responsible for assuring this SOP is implemented.



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5.0 APPENDICES

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- B - IATA Hazard Class Definitions

6.0 REFERENCES

- ⁽¹⁾ International Air Transport Association (IATA). 2000. *Dangerous Goods Regulations*. Montreal, Quebec, Canada.



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APPENDIX A
Figures
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FIGURE 1. Environmental Samples Label



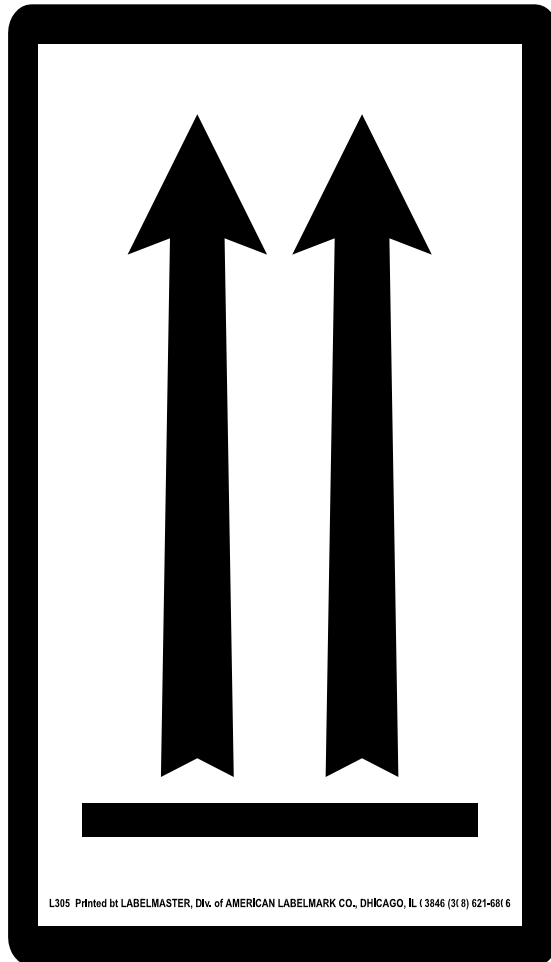


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FIGURE 2 Arrow Label





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FIGURE 3 Federal Express AirBill

FedEx USA Airbill 8235 8971 7040 0215 FedEx Copy

1 From
Sender's Name: [Blank]
Address: [Blank]
City: [Blank] State: [Blank] ZIP: [Blank]

2 To
Recipient's Name: [Blank]
Address: [Blank]
City: [Blank] State: [Blank] ZIP: [Blank]

3 Service
Express Package Service
 FedEx Priority Overnight FedEx Standard Overnight FedEx 2Day
 FedEx Home Delivery FedEx International Priority FedEx International Economy

4 International Billing Reference

5 Special Handling
 Signature Required Signature Required - Adult Signature Signature Required - Restricted Signature
 Insured Registered Mail Registered Mail - Restricted Registered Mail - Signature Required

6 Payment Method
 Cash Credit Card Debit Card Bill Me Collect on Delivery

7 Return Signature

Barcode: 8235 8971 7040
Tracking Number: 0189017364
Label: 402



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APPENDIX B
IATA Hazard Class Definitions
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IATA Hazard Class Definitions

Class 1 - Explosives

This class includes:

- (a) Explosive substances, except those whose predominant hazard should be in another class.
- (b) Explosive articles, except devices containing explosive substances in such a limited quantity or of such a character that their inadvertent or accidental ignition or initiation, during transport, will not cause any manifestation of projection, fire, smoke, heat, or loud noise external to the device.
- (c) Articles and substances not mentioned above which are manufactured with a view to producing a practical explosion or pyrotechnic effect.

Class 2 - Gases

This class comprises compressed gases, liquefied gases, gases in solution, refrigerated liquefied gases, mixtures of gases, mixtures of one or more gases with one or more vapors of substances of other classes, articles charged with a gas, tellurium hexafluoride, and aerosols.

Class 3 - Flammable Liquids

This class comprises liquids or mixtures of liquids or liquids containing solids in solution or in suspension which give off a flammable vapor at temperatures of not more than 60.5°C (141°F) closed-cup test or not more than 65.6°C (150°F) open-cup test.

Class 4 - Flammable Solids

Class 4 is divided into three divisions as follows:

Division 4.1 - Flammable Solids

Flammable solids are readily combustible solids and those which may cause fire through friction. Readily combustible solids are powdered, granular, or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly. The danger may not only come from the fire but also from the toxic combustion products. Metal powders are especially dangerous because of the difficulty of extinguishing a fire since normal extinguishing agents such as carbon dioxide or water can increase the hazard.

Division 4.2 - Substances Liable to Spontaneous Combustion

Substances which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up in contact with air, and being then liable to catch fire.

Division 4.3 - Substances Which, on Contact With Water, Emit Flammable Gases (Dangerous When Wet)



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Substances which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

Class 5 - Oxidizing Substances and Organic Peroxides

Oxidizing substances are substances which, in themselves are not necessarily combustible, but may generally cause or contribute to the combustion of other material by yielding oxygen.

Organic peroxides are organic substances which contain the bivalent structure -O-O- and may be considered derivatives of hydrogen peroxide in which one or both of the hydrogen atoms have been replaced by organic radicals. Organic peroxides are thermally unstable substances which may undergo exothermic, self-accelerating decomposition. In addition, they may have one or more of the following properties:

- Be liable to explosive decomposition
- Burn rapidly
- Be sensitive to impact or friction
- React dangerously with other substances
- Cause damage to the eyes

Class 6 - Poisonous (Toxic) and Infectious Substances

Poisonous (toxic) substances are substances which are liable to cause death or injury or harm to human health if swallowed, inhaled, or contacted by the skin.

Infectious substances are substances containing viable micro-organisms including a bacterium, virus, rickettsia, parasite, fungus, or a recombinant, hybrid, or mutant, that are known or reasonably believed to cause disease in humans or animals.

Genetically modified organisms or micro-organisms

Biological products

Diagnostic specimens

Class 7 - Radioactive Material

For the purpose of these regulations, a radioactive material is any article or substance with a specific activity greater than 70 kBq/kg (0.002 uCi/g).

Class 8 - Corrosives

Substances which, in the event of leakage, can cause severe damage by chemical action when in contact with living tissue or can materially damage other freight or the means of transport.

Class 9 - Miscellaneous Dangerous Goods



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Substances and articles which during air transport present a danger not covered by other classes. Included in this class are: other regulated substances, magnetized material, and miscellaneous articles and substances.

Other regulated substances are liquids or solids which have anesthetic, noxious, or other similar properties which could cause extreme annoyance or discomfort to passengers and/or flight crew members.

Magnetized material is any material, which, when packed for air transport, has a magnetic field strength of 0.159 A/m (0.002 gauss) or more at a distance of 2.1 m (7 ft) from any point on the surface of the assembled package.

Examples of miscellaneous articles and substances are as follows:

- Asbestos
- Dry ice
- Environmentally hazardous substances
- Polymeric beads
- Zinc dithionite