

Chapter 11

Hazardous Sample Shipment

Table of Contents

11.1	Introduction	2
11.2	Definitions	2
11.3	Training.....	3
11.4	Shipper’s Responsibility	3
11.5	Hazard Classes	3
11.6	Packing.....	3
11.7	Marking and Labeling.....	3
11.8	Documentation	4
11.9	Preservation of Samples Relative to Dangerous Goods Shipment.....	4
	References.....	5

Chapter 11

Hazardous Sample Shipment

11.1 Introduction

Samples collected during a planned sampling episode or in response to a hazardous material incident often must be transported elsewhere for analysis. The field sampling team will pre-determine the nature of the samples collected for shipping purposes. Routine environmental samples collected for site investigation and site remediation purposes may be shipped via laboratory-provided ground courier or third-party carrier (such as UPS, FedEx, and DHL Ground and Air carriers). Samples collected from materials and/or wastes determined to be hazardous (or potentially hazardous based on project knowledge not analytical results) must be packaged and shipped in accordance with applicable federal, state, and local requirements. This chapter is focused on the packaging, labeling, placarding, and shipment requirements for samples collected from hazardous materials and hazardous wastes. For non-hazardous materials shipment please see FSPM Chapter 2 for additional information.

The New Jersey Department of Environmental Protection (NJDEP) requires compliance with United States Department of Transportation (USDOT) regulations and the International Air Transport Association (IATA) regulations governing the shipment of hazardous materials. These regulations, 49 Code of Federal Regulations (CFR) Parts 171 through 180 for USDOT and the Dangerous Goods Regulations (DGR) for IATA, describe proper marking, labeling, placarding, packaging and shipment of hazardous materials, substances, and wastes. IATA regulations cover strictly air transportation, both domestic and international. USDOT regulations cover all modes of transportation for shipments originating within the United States and imported to the United States. Refer to: <https://www.fmcsa.dot.gov/regulations/hazardous-materials/how-comply-federal-hazardous-materials-regulations> for additional information on USDOT regulations concerning the transport of hazardous materials.

The NJDEP maintains a library of guidance manuals on its website at <https://www.nj.gov/dep/srp/guidance/>. The user of this manual should access the applicable websites and review the applicable guidance manuals and requirements pertinent to the respective task. Additional guidance may also be found at websites of the United States Environmental Protection Agency (USEPA) and the American Society for Testing and Materials (ASTM). Examples of some of the relevant guidance manuals pertaining to this chapter are:

IATA - DGR: <https://www.iata.org/en/publications/dgr/>

Quality Assurance Project Plan Technical Guidance:
https://www.nj.gov/dep/srp/guidance/#analytic_methods

Occupational Health and Safety Agency (OSHA): <https://www.osha.gov>

11.2 Definitions

The definitions of dangerous goods and hazardous materials as defined by IATA and USDOT are respectively described below.

Dangerous Goods – Articles or substances which are capable of posing a significant risk to health, safety property, or the environment when transported by air and which are classified according to the United Nations hazard classes. These may include explosives, gases, flammables, toxics, infectious agents, oxidizing agents, radioactive substances, and corrosives, and multiple hazard materials.

Hazardous Material – includes those materials designated by the Secretary of the US Department of Transportation as posing an unreasonable threat to the public and the environment. The term "Hazardous Materials" includes all the following: (1) Hazardous Substances, (2) Hazardous Wastes, (3) Marine

Pollutants, (4) Elevated Temperature Material (5) Materials identified in 172.101, and (6) Materials meeting the definitions contained in 49 CFR Part 173.

11.3 Training

According to the DGR, 1.5.0.2, *“Training must be provided or verified upon the employment of a person in a position involving the transport of dangerous goods by air.”* Additionally, 1.5.0.3 states, *“Recurrent training must take place within 24 months of previous training to ensure knowledge is current, unless a competent authority has defined a shorter period.”* 49 CFR Part 172, Subpart H – Training, has similar training requirements.

11.4 Shipper’s Responsibility

A shipper must comply fully with the IATA and USDOT regulations when offering a dangerous good or hazardous material consignment for commerce.

11.5 Hazard Classes

All dangerous goods or hazardous materials are divided into nine Hazard Classes, some of which have divisions. Substances in a particular class share certain unique characteristics. The classes are listed in Table 11.1 of this chapter. It is the shipper’s responsibility to determine the proper hazard class of the dangerous goods. According to the DGR 4.1.2.2, *“When the hazard class of a substance is uncertain and it is being transported for further testing, a tentative hazard class, proper shipping name and UN number must be assigned on the basis of the shipper’s knowledge of the substance....”*. Generic and Hazard Class Proper Shipping Names are listed in Table 4.1A of the DGR. All specific dangerous articles and substances are listed in the DGR in Section 4.2 – List of Dangerous Goods and/or in 49 CFR Part 172.101 – Hazardous Materials Table. In all cases the dangerous goods or hazardous materials must be checked to determine if it is a forbidden item. A list of forbidden dangerous goods on aircraft is in Table 2.1.A of the DGR and in the List of Dangerous Goods or Hazardous Materials Table.

11.6 Packing

All packages must comply with the IATA DGR and USDOT regulations, 49 CFR Part 173.

According to the DGR, 5.0.1.2, *“When preparing each package of dangerous goods, the shipper must: comply with the set of packing requirements appropriate to the type of packaging to be used; ... (b) use only the packaging permitted by... the List of Dangerous Goods; ... (e) ensure that his responsibilities for packing are completely fulfilled when the package is presented to the operator for shipment.”* Additionally, the overall quantity of the package is limited by the quantities specified in the List of Dangerous Goods and the Hazardous Materials Table.

11.7 Marking and Labeling

According to the DGR, 7.0.1, *“The shipper is responsible for all necessary marking and labeling of each package of dangerous goods, and each overpack containing dangerous goods, in compliance with these Regulations.”* Additionally, shippers must also comply with the requirements in 49 CFR Part 173 and relevant subparts.

11.8 Documentation

For all shipments of dangerous goods or hazardous materials internationally, a “IATA Dangerous Goods Shipper’s Declaration” or domestic shipping papers pursuant to 49CFR Part 172.200 - 172.205 must be completed and accompany the dangerous goods package. A registered shipper must sign these forms.

11.9 Preservation of Samples Relative to Dangerous Goods Shipment

Nearly all aqueous and some non-aqueous analytical methods require the addition of a chemical preservative to extend the viability of an environmental sample. Without the use of these preservatives, analytical data and subsequent end-used decisions would be questionable at best. The use of preservatives, however, has caused some confusion among the analytical and shipping community since acids and bases are regulated under the hazardous materials and dangerous goods shipping regulations. After research-design and execution by the USEPA (<https://www.epa.gov/hw-sw846/department-transportation-dot-letter-regarding-samples-preserved-according-epa>) and subsequent negotiation with the USDOT on this issue, it has been determined that the following maximum concentrations of acid or base are not considered corrosive materials by definition/testing under USDOT regulations to dermal, steel or aluminum. These concentrations are:

Nitric acid	0.28 weight percent
Sulfuric acid	0.38 weight percent
Hydrochloric acid	0.15 weight percent
Sodium hydroxide	0.20 weight percent

Based on the results of the USEPA research, environmental samples do not have to be declared as “hazardous materials” if they are preserved within the prescribed limits of the above acids or base and shipped via carriers obligated to follow USDOT regulations. The application of this determination to IATA regulations has not yet been formalized.

Non-aqueous samples preserved with methanol or sodium bisulfate must comply with all USDOT and IATA regulations. In addition, aqueous samples preserved with materials other than those listed above must comply with all USDOT and IATA regulations. Again, any sample of known waste or product that falls into a defined classification, prior to or after the addition of preservative, must be shipped according to regulatory requirements.

Table 11.1 Hazard Classes and Applicable Regulations

Hazard Class	DGR References	CFR 49 References for Definition
Class 1 - Explosives*	3.1	173.50
Class 2 - Gases Div. 2.1 - Flammable Gas Div. 2.2 - Non-flammable Gas; Non-toxic Gas Div. 2.3 - Toxic Gas	3.2	173.115
Class 3 - Flammable Liquids	3.3	173.120
Class 4 - Flammable Solids Div. 4.1 - Flammable Solid Div. 4.2 - Substances Liable to Spontaneous Combust Div. 4.3 - Substances Which, in Contact with Water, Emit Flammable Gases	3.4	173.124
Class 5 - Oxidizing Substances and Organic Peroxide Div. 5.1 - Oxidizer Div. 5.2 - Organic Peroxide	3.5	173.127
Class 6 - Toxic and Infectious Substances Div. 6.1 - Toxic Substances Div. 6.2 - Infectious Substances	3.6	173.132
Class 7 - Radioactive Material	3.7	173.403
Class 8 - Corrosives	3.8	173.136
Class 9 - Miscellaneous Dangerous Goods	3.9	173.140

* There are six divisions to Class 1:

1. Division 1.1 – Articles and substances having a mass explosion hazard.
2. Division 1.2 – Articles and substances having a projection hazard but not a mass explosion hazard.
3. 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.
4. Division 1.4 – Articles and substances presenting no significant blast hazard.
5. Division 1.5 – Very insensitive substances having a mass explosion hazard.
6. Division 1.6 – Extremely insensitive articles, which do not have a mass explosion hazard.

References

IATA - Dangerous Goods Regulations (DGR) <https://www.iata.org/en/publications/dgr/>

Office of the Federal Register, National Archives and Records Administration, 49 CFR Subtitle B, Chapter 1, Subchapter C, Hazardous Materials Regulations, Parts 171-185, US Government Printing Office, Washington, D.C., 2023