Chapter 11
Sample Shipment

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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 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, CFR 49 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. DOT regulations cover all modes of transportation for shipments originating within the United States and imported to the United States.

11.2 Definitions

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

Dangerous Goods – "Articles or substances which are capable of posing a significant risk to health, safety or to property when transported by air and which are classified according to" the UN hazard classes.

Hazardous Material – "A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. The term includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials..."

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." CFR 49 Part 172, Subpart H – Training, has similar training requirements.

11.4 Shipper's Responsibility

A shipper must comply fully with the IATA and DOT 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 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 in CFR 49 Part 172.101 – Hazardous Materials Table. In all cases the dangerous good must be checked to determine if it is 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 Dangerous Goods Regulations and USDOT regulations, CFR 49 Part 173.

According to the DGR, 5.0.1.2, "When preparing each package of dangerous goods, the shipper must: (a) 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, CFR 49 Part 173 – Subparts D, E and F must also be complied with.

11.8 Documentation

For all shipments of dangerous goods or hazardous materials, a Shipper's Declaration for Dangerous Goods must be completed and accompany the dangerous goods package. A certified 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 in order to extend the viable "life" 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 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	0.4 weight percent
Sulfuric acid	0.4 weight percent
Hydrochloric acid	0.4 weight percent
Sodium hydroxide	0.2 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. To purchase a copy of the, *Determination of Corrosivity of Preserved Environmental Samples* go to http://www.catalystinforesources.com.

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 must be shipped according to regulatory requirements.

Table 11.1 Hazard Classes and Applicable Regulations

Hazard Class	DGR References	CFR 49 References
Class 1 - Explosives*	3.1	173.50-173.63
Class 2 - Gases Div. 2.1 - Flammable Gas Div. 2.2 - Non-flammable gas; non-toxic gas Div. 2.3 - Toxic Gas	3.2	173.115-173.116
Class 3 - Flammable Liquids	3.3	173.120-173.121; 173.150
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	173.124-173.125; 173.151
Class 5 - Oxidizing Substances and Organic Peroxide Div. 5.1 - Oxidizer Div. 5.2 - Organic peroxide	3.5	173.127-173.129; 173.152
Class 6 - Toxic and Infectious Substances Div. 6.1 - Toxic substances Div. 6.2 - Infectious Substances	3.6	173.132-173.134; 173.153
Class 7 - Radioactive material	3.7	173.401-173.476
Class 8 - Corrosives	3.8	173.136-173.137; 173.154
Class 9 - Miscellaneous Dangerous Goods	3.9	173.140-173.141; 173.155

* 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 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

International Air Transport Association, Dangerous Goods Regulations, 42nd Edition, Montreal – Geneva, 2001

Office of the Federal Register, National Archives and Records Administration, 49CFR Parts 171-179, US Government Printing Office, Washington, D.C., 2000