



UNIVERSITY OF OREGON

Shipping Hazardous Materials

ENVIRONMENTAL HEALTH & SAFETY
SECOND EDITION

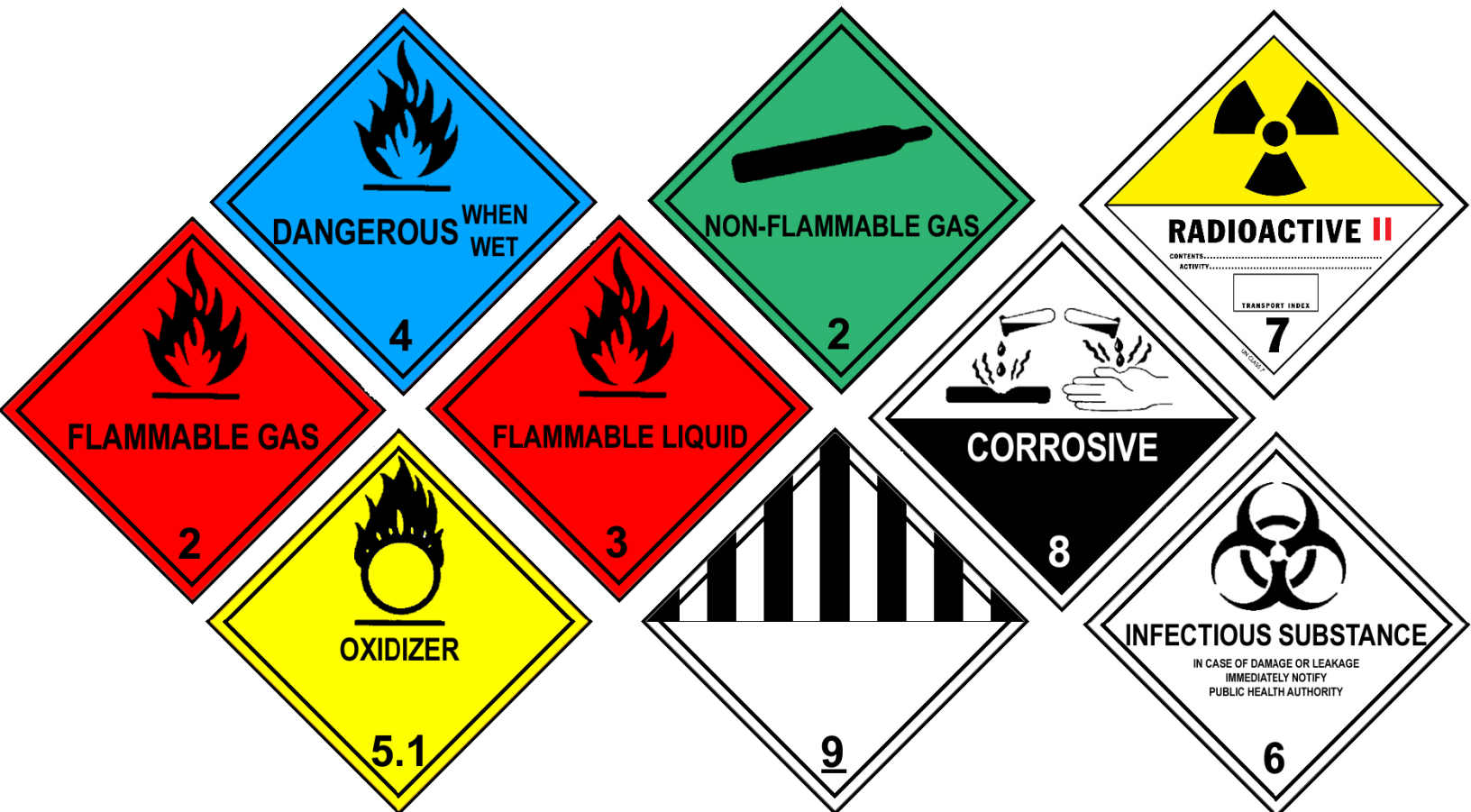


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I. Introduction

Shipments of hazardous materials are regulated by several governmental and non-governmental organizations. Hazardous materials shipping regulations administered by the International Air Transport Association (IATA) and the US Department of Transportation (DOT) are the most comprehensive and widely applicable, however some shipping companies have developed specific rules, which are stricter than DOT and/or IATA regulations. Examples of these companies include the US Postal Service (USPS), Federal Express (FedEx) and United Postal Service (UPS). Penalties for non-compliance with regulations are significant and can result in:

- Up to \$250,000, and up to a year jail sentence for individuals.
- Up to \$500,000 per incident for organizations.

To illustrate the complexity of a hazardous materials shipping process, and to serve as a guide for trained shippers, Appendix A outlines the workflow that is required within the IATA system (DOT is similar). ***Individuals who are involved with the shipping process, including marking, labeling, packaging, preparing shipping documents, or signing for transport of a shipment including hazardous materials must receive Hazardous Materials Transportation Training.*** This training must be updated every three years for domestic ground shipments, and every two years for air shipments. EHS employs staff with current Hazardous Materials Transportation training and is available to assist University personnel with training and shipping needs.

II. Definition of Hazardous Material

A Hazardous material is generally defined as any substance that could adversely affect the safety of the public or the environment, handlers or carriers during transportation. Hazardous materials, as defined by the DOT, are any substance that appears in the 49 CFR 172.101 Hazardous Materials Table. This table is searchable by clicking on the following link:

<http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=9b912a795dcdd036cfd0654da044baf1&ty=HTML&h=L&mc=true&n=pt49.2.172&r=PART#sp49.2.172.b>

Hazardous material regulations may apply to commercial products, chemical mixtures, and newly synthesized compounds. Various types of batteries, fuel containers and cleaning products are examples of materials that are regulated for shipment. See Appendix B for examples of the DOT packaging labels associated with the 9 classes and 16 divisions of hazardous materials.

III. Scope of Regulations

Shippers of hazardous material must comply with regulations any time they are transported by air. Shipments by ground are regulated when they are considered to be “in commerce”, and material carried by any commercial transport company such as FedEx or through U.S. Mail meets this designation.

Certain hazardous materials, when used in direct support of a business, such as transportation in a university vehicle for use in a university project, are being shipped “in commerce”, but are exempted from the fully scope of regulation as “Materials of Trade.” These materials, in 12 specific divisions and classes, are still required to meet DOT packaging, and various other requirements. EHS has provided a Transportation, Storage and Use Guideline (Appendix C) to assist University units with compliance in the safe transport and use of materials of trade.

If you are shipping a hazardous material that is a commercially available product, it may be more cost-effective to purchase the material at the location to which you wish to ship it. For example, if you are planning field-work which requires the use of hazardous chemicals, you may find it easiest to have a vendor ship the chemicals directly to (or near) the location where you will be working. Additionally, certain hazardous materials are exempt from shipping regulations when shipped in small or limited quantities; excepted quantity limits vary by material, a shipper is required to have adequate training on interpreting the regulation, and must meet packing and labeling requirements.

IV. Planning Your Shipment

An Intent to Ship Hazardous Materials form (Appendix D) should be filled out and submitted to DOT or IATA trained shippers for review. Submit an Intent to Ship Hazardous Materials form for your material at least two weeks prior to your expected shipping date; Close coordination between shipper, purchasing agent, and reviewer will minimize delays. Staff trained on shipping dangerous goods will determine the regulatory status of your material, including any possible exceptions, based on information submitted in the Intent form.

For shipments of biological materials or dry ice, refer to additional detail within the UO Biosafety Manual (<http://ehs.uoregon.edu/biosafety>), and the associated Guide to Shipping Dry Ice. For shipments using small quantity exemptions, refer to Appendix F, Shipment of Dangerous Goods using Small Quantity Exemptions.

V. Executing Your Shipment

Departments are responsible for providing all packaging materials required for your shipment. Departmental shipping agent are responsible for placing transactions.

Appendix A – IATA Dangerous Goods Shipment Checklist

Is the following information correct for each entry? YES NO N/A

SHIPPER'S DECLARATION FOR DANGEROUS GOODS (DGD)

- | | | | |
|---|--------------------------|--------------------------|--|
| 1. Two copies in English and in the IATA format | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Full name and address of Shipper & Consignee | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Air Waybill number is assigned | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. The number of pages is shown | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. The non-applicable Aircraft Type is deleted | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Full name of Airport or City of Departure and Destination is shown | <input type="checkbox"/> | <input type="checkbox"/> | |
| 7. The word "Radioactive" is deleted | <input type="checkbox"/> | <input type="checkbox"/> | |

IDENTIFICATION

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| 8. UN or ID Number, preceded by prefix | <input type="checkbox"/> | <input type="checkbox"/> | |
| 9. Proper Shipping Name, and technical name in brackets for asterisked entries | <input type="checkbox"/> | <input type="checkbox"/> | |
| 10. Class or Division, and for Class 1, the Compatibility Group | <input type="checkbox"/> | <input type="checkbox"/> | |
| 11. Subsidiary Risk, in parentheses, following Class or Division | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Packing Group | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

QUANTITY AND TYPE OF PACKING

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| 13. Number and Type of Packages | <input type="checkbox"/> | <input type="checkbox"/> | |
| 14. Quantity and unit of measure (net, or gross followed by "G", as applicable) within per package limit | <input type="checkbox"/> | <input type="checkbox"/> | |
| 15. When different dangerous goods are packed in one outer package, the following rules are complied with: | | | |
| - Compatible according to Table 9.3.A | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - UN packages containing Division 6.2 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - "All packed in one (type of packaging)" | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Calculation of "Q" value must not exceed 1 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Overpack | | | |
| - Compatible according to Table 9.3.A | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Wording "Overpack Used" | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

PACKING INSTRUCTIONS

- | | | | |
|--------------------------------|--------------------------|--------------------------|--|
| 17. Packing Instruction Number | <input type="checkbox"/> | <input type="checkbox"/> | |
|--------------------------------|--------------------------|--------------------------|--|

AUTHORIZATIONS

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| 18. Confirm application of relevant special provisions (Special Provision Number A1, A2, A51, A81, A88, A99, or A130) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Indication that governmental authorization is attached (in English) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Additional approvals for other items | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ADDITIONAL HANDLING INFORMATION

YES NO N/A

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| 21. The mandatory statement shown for self-reactive and related substances of Division 4.1 and organic peroxides of Division 5.2, or samples thereof and for Protective Breathing Equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Name and Telephone Number of a responsible person for Division 6.2 Infectious Substance shipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. The air certification statement included | <input type="checkbox"/> | <input type="checkbox"/> | |
| 24. Name and Title (or Department) of Signatory, Place and Date | <input type="checkbox"/> | <input type="checkbox"/> | |
| 25. Signature of Shipper | <input type="checkbox"/> | <input type="checkbox"/> | |
| 26. Amendment or alteration signed by Shipper | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

AIR WAYBILL – HANDLING INFORMATION

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| 27. The statement: “Dangerous Goods as per attached Shipper’s Declaration” or “Dangerous Goods as per attached DGD” | <input type="checkbox"/> | <input type="checkbox"/> | |
| 28. “Cargo Aircraft Only” or “CAO”, if applicable | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Where non-dangerous goods are included, the number of pieces of dangerous goods shown | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

PACKAGE(S) AND OVERPACKS

- | | | | |
|--|--------------------------|--------------------------|--|
| 30. Packaging conforms with packing instruction and is free from damage or leakage | <input type="checkbox"/> | <input type="checkbox"/> | |
| 31. Same number and type of packaging and overpacks delivered as shown on DGD | <input type="checkbox"/> | <input type="checkbox"/> | |

MARKINGS

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| 32. UN Specification Packaging, marked according to 6.0.4 and 6.0.5: | | | |
| - Symbol and Specification Code | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - X, Y, or Z meets or exceeds Packing Group/Packing Instruction Requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Gross Weight within limits (Solids, Inner Packagings or Intermediate Bulk Containers) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Infectious Substance package marking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. The UN or ID number(s) | <input type="checkbox"/> | <input type="checkbox"/> | |
| 34. The Proper Shipping Name(s) including technical name where required | <input type="checkbox"/> | <input type="checkbox"/> | |
| 35. The full name(s) and Address(es) of Shipper and Consignee | <input type="checkbox"/> | <input type="checkbox"/> | |
| 36. For consignments of more than one package of all classes (except 7) the net quantity, or gross weight followed by “G”, as applicable, unless contents are identical, marked on the packages | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Carbon Dioxide, Solid (Dry Ice), the net quantity marked on the packages | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. The Name and Telephone Number of a responsible person for Division 6.2 Infectious Substances shipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. The Special Marking requirements shown for Packing Instruction 202 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Limited Quantities mark | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

LABELLING

YES NO N/A

- 41. The label(s) identifying the Primary risk as per 4.2, Column D
- 42. The label(s) identifying the Subsidiary risk next to Primary risk label(s), as per 4.2, Column D
- 43. Cargo Aircraft Only label, on the same surface near the Hazard label(s)
- 44. "Orientation" labels on two opposite sides, if applicable
- 45. "Cryogenic Liquid" labels, if applicable
- 46. "Keep Away From Heat" label, if applicable
- 47. All required labels correctly affixed and all irrelevant marks and labels removed

FOR OVERPACKS

- 48. Packaging Use markings and hazard and handling labels must be clearly visible or reproduced on the outside of the overpack
- 49. The word "Overpack" marked if all markings and labels are not visible
- 50. If more than one overpack is used, identification marks shown and total quantity of dangerous goods
- 51. "Cargo Aircraft Only" restrictions

GENERAL

- 52. State and Operator variations complied with
- 53. Cargo Aircraft Only shipments, a cargo aircraft operates on all sectors

Comments:

Checked by: _____ Place: _____

Signature: _____

Date: _____ Time: _____

IF ANY BOX IS CHECKED "NO", DO NOT SUBMIT FOR, OR ACCEPT, SHIPMENT.

Appendix B – Hazard Classes, Divisions, and Associated Labels



Explosives – 1.1, 1.2, 1.3, 1.4, 1.5, 1.6



Gases – 2.1, 2.2, 2.3



Flammable Liquids – 3



Flammable/Reactive Solids – 4.1, 4.2, 4.3



Oxidizers and Organic Peroxides – 5.1, 5.2



Toxic and Infectious Substances – 6.1, 6.2



Radioactive Materials – 7



Corrosives – 8



Miscellaneous Dangerous Substances and Articles – 9

Appendix C – Guidelines for Hazardous Material Transportation, and associated Storage and Use

Objective

This guide illustrates best management practices associated with transportation, storage, and use of hazardous materials at University of Oregon research and teaching laboratories, laboratory support operations, and research field operations. These practices and procedures are intended to provide a safe working environment, promote a culture of forward-thinking risk mitigation, and to promote compliance with federal, state, and local regulations pertaining to hazardous materials.

Applicability

- University laboratories, chemical storage areas, and other research-related work areas that use hazardous materials (**with the exception of Biological Substance Category A materials or Radioactive Materials**).
- Remote field operations using hazardous materials in laboratory research.

Responsibilities

- Department Chair or Institute Director
 - Implement procedures which prevent inappropriate transportation and storage of hazardous materials within Departmental/Institute operations.
 - Promote concept of minimization of use of hazardous materials.
 - Facilitate communication between University administrative support units, and managers of Departmental/Institute users of hazardous materials.
- Faculty, Supervisory staff, Employee, and Students
 - Implement procedures within local units that prevent inappropriate transportation and storage of hazardous materials.
 - Facilitate communication between University administrative support units, and local users of hazardous materials.
- Environmental Health and Safety (EHS)
 - Provide information and technical assistance regarding transportation and storage regulation and best practices.
 - Provide regulatory required training to shippers of hazardous materials.
 - Act as the University representative during regulatory inspections.

Hazardous Material Transportation, Storage, and Use

Hazardous materials being transported are in an environment of increased risk of probability and exposure to spill events. Transportation within commerce and other areas that involve exposure of the general public are highly regulated for the public's safety. Other prudent best practices are used to minimize exposures within the workplace. This guideline provides a general orientation to these topics; the office of Environmental Health and Safety is available for training and consultation.

Improper methods of transporting hazardous materials:

- Transportation via personal automobiles for work purposes.
- Transportation via Public Transit.
- Transportation across or on public roads, except when in compliance with Materials of Trade Exemption.
- Transportation in hazardous severe weather conditions.

Transportation requirements and best practices:

- Transportation between buildings should be done by walking, and should use indoor corridor connections whenever possible.
- Transport all hazardous materials using the container-within-a-container concept.
 - Small containers may be carried within an easily-handled secondary container.

- Large containers should be transported in a bucket, or in a secondary container on a cart.
 - When transporting materials outdoors use a cart with pneumatic tires, and have a spill clean-up kit on the cart.
- Transport incompatible materials (such as corrosives) within independent secondary containers.
- DOT-approved containers not requiring secondary containment
 - Transport 20L metal cans on a cart.
 - Transport gas cylinders using a cylinder cart.
 - Transport liquid nitrogen dewars on a cart, or on stable rollers.
- Move carefully; especially around corners and when on uneven terrain.
- Transport via elevator may present special entrapment hazards; warn potential riders to use the stairs or wait for an unoccupied car.
- Off-site transportation should involve consultation with EHS, and careful review to ensure compliance with Materials of Trade (MOT) exemptions.
- Common Courier shipping of Hazardous Materials must comply with Department of Transportation (DOT) or International Air Transport Association (IATA) regulations. Consult with EHS.

A Materials of Trade (MOT) exemption applicable to many DOT requirements exists for the transportation of small quantities of hazardous material, when transportation is a support function rather than the primary business function. MOT exemptions may only be applied to hazardous materials classified into Division 2.1, 2.2, 4.1, 4.3, 5.1, 5.2, 6.1, 6.2, or Class 3, 8, 9, or ORM-D. Examples of applicability include: paints, thinners, gasoline, etc. used in maintenance operations; research field operations; and, educational demonstrations.

This exemption allows a business to transport hazardous materials on the public roads as long as the following specific conditions on packaging and labeling are met:

- Packaging is the original manufacturers, or an equivalent.
- Packaging is labeled with either common chemical name, or a proper shipping name.
- Packaging is leaktight.
- Outer packaging is securely closed, and secured against movement and damage.
 - Outer packaging is not required for receptacles (containers) secured within crates, bins, or compartments.
- Cylinders and pressure vessels must conform to DOT regulations, but do not require outer packaging.
 - Proper shipping name, UN identification number, and hazard class warning label.
- Packaging containing reportable quantities (Appendix A of 40 CFR § 172.101) must be marked with “RQ”.

Fire codes limit the amount of hazardous materials that can be used and stored in the workplace.

Provisions are detailed and vary with location and material; consult with EHS on details.

Minimizing the quantity of hazardous material in use and storage is a prudent practice.

When in storage or use, hazardous materials containers require secondary containment as follows:

- Storage Areas
 - To protect single liquids containers >55 gallons in size (or >1000 gal aggregate).
 - To protect single solids containers >248 kg in size (or > 4524 kg aggregate).
- Use Areas
 - To protect individual vessels or systems > 5L in volume.
 - To protect multiple vessels or systems aggregating >20L in volume.
- Storage and Use
 - All hazardous waste containers.
 - To segregate incompatible materials (e.g. acids from bases, flammables from oxidizers).

References

Guidelines for Laboratory Close-Out – General guidelines on handling hazardous materials, equipment, samples/specimens, and non-hazardous materials during the close-out of a laboratory.

Transporting Hazardous Materials Quick Facts – General guideline on transporting hazardous materials.

PI Orientation & Laboratory Setup – General guideline to setting up a safe laboratory work environment.

Appendix D – Intent to Ship Hazardous Materials

Submit this form to EHS if you plan to ship something that may be classified as a hazardous material. EHS will determine if your shipment is regulated and will assist you in properly preparing your material for shipment. For biological materials or dry ice, refer to UO Shipment of Biological Materials and Dry Ice guidance.

1. Material Name:
2. Form of Material (i.e. liquid, solid, etc):
3. Quantity of Material:
4. CAS number (if any):
5. Manufacturer (if any):
6. Product Number (if any):
7. Shipping Destination:
8. Special Shipping Requirements (i.e. cold packs, dry ice):
9. What is your preferred shipping method (i.e. US Mail, FedEx, UPS)?
10. Do you plan to transport this material in a non-commercial vehicle?

Print name:		Date:	
Signature:		Phone #:	
Department, Building, Room:			
Email this form to ehsinfo@uoregon.edu, Attn. HazMat Shipping Assistance			

Appendix E – Shipment of Dangerous Goods using Small Quantity Exemptions

I. Introduction

Regulation acknowledges that the paperwork burden associated with compliance may outweigh the actual hazard present when shipping very small quantities of materials. Exceptions do exist. This document describes the applicability of de minimus and small quantities exceptions, and requirements that must still be addressed under each provision. It does not substitute for required training or the full text of the applicable Regulation.

For domestic ground transportation, 49 CFR §173.4 excludes small quantities of certain hazardous materials from many of the requirements of the U.S. DOT Hazardous Materials Regulations. For domestic and international air transportation the International Air Transport Association (IATA) Dangerous Goods Regulations (DGR) excludes small quantities of certain hazardous materials from certain requirements through either De Minimus or Excepted Quantities provisions.

Hazardous materials within the context of shipping, also known as 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 the the list of dangerous goods in Dangerous Goods Regulation or which are classified according to Dangerous Goods Regulation”. This definition may vary from other definitions of hazardous materials in other regulatory context.

II. Training

Anyone offering Dangerous Goods for transport must first receive training. Those wishing to ship hazardous materials according to the exceptions in 49 CFR §173.4, or IATA, must receive personal training from EHS. Call EHS at 346-3192 to schedule a shipping training.

III. Applicability

A. Domestic Ground Shipments

1. Shipping companies

The small quantity exceptions in 49 CFR 173.4 may be utilized when shipping materials with UPS, FedEx Ground, or overland freight carriers. The small quantity exceptions do not apply to materials sent through U.S. mail. The U.S. Postal Service will only ship hazardous materials packaged for retail sale.

2. Materials with small quantity exceptions

The materials covered include:

- Nonflammable, nontoxic gas (Division 2.2);
- Aerosols without a subsidiary hazard (Class 2);
- Flammable liquids (Class 3);
- Flammable solids (Division 4.1);
- Spontaneously combustible materials (Division 4.2, Packing Group II and III);
- Dangerous when wet materials (Division 4.3, Packing Group II and III);
- Oxidizers (Division 5.1 and 5.2);
- Toxic substances (Division 6.1);
- Radioactive materials (Class 7);
- Corrosives (Class 8); and
- Certain miscellaneous hazardous materials (Class 9).

3. Materials with no exceptions

Materials for which there are no exceptions to DOT regulations include:

- Explosives (Class 1);
- Flammable and Toxic gases (Division 2.1 and 2.3);
- Spontaneously combustible materials (Division 4.2, Packing Group I);
- Dangerous when wet materials (Division 4.3, Packing Group I);
- Infectious substances (Division 6.2); and
- Lithium batteries and cells (Class 9).

Shipment of the following materials requires assistance from EHS:

- Organic Peroxides (Division 5.2);
- Materials poisonous by inhalation (Division 6.1);
- Lithium batteries and cells (Class 9);
- Chemical waste; and
- Radioactive materials (Class 7).

B. Air Shipments (Domestic or International)

1. Shipping companies

IATA exemptions may be utilized with any air operator. Some foreign states and operators have specific requirements that may impact the applicability of any exemption. These are described within the state and operator variations, section 2.8 IATA DGR.

2. Materials with exceptions

The materials that may be shipped as IATA De Minimus or Excepted Quantities include:

- Non-flammable, non-toxic gases (Division 2.2) without subsidiary risks;
- Flammable liquids (Class 3);
- Flammable solids (Class 4) Packing Groups II and III;
- Oxidizing substances (Division 5.1) Packing Groups II and III;
- Organic peroxides (Division 5.2) only when a kit component;
- Toxic substance (Division 6.1);
- Corrosive substances (Class 8);
- Miscellaneous dangerous goods (Class 9) and all articles.

Materials are assigned to Excepted Quantity Codes (E0, E1, E2, E3, E4 and E5). The complete listing of codes is found at IATA DGR 2.6.2.2, and related to materials by the IATA DGR 4.2 List of Dangerous Goods.

3. Materials with no exceptions

Materials for which there are no exceptions to IATA regulations include:

- Explosives (Class 1);
- Flammable and Toxic Gases (Division 2.1 and 2.2);
- Infectious substances (Division 6.2);
- Primary lithium (non-rechargeable batteries, Class 9) UN 3090 and UN 3091;
- Non-flammable, non-toxic gases (Division 2.2) of UN 1950, UN 2037, UN 2073, UN 2857 and UN 3164;
- Flammable liquids (Class 3) of Packing Group I with subsidiary risk, and UN 1204, UN 2059 and UN 3473;
- Flammable solids (Class 4) of Packing Group I, self-reactive nature, and UN 2555, UN 2556, UN 2557, UN 2907, UN 3292 and UN 3476;
- Oxidizing substances (Division 5.1) of Packing Group I;
- Toxic substance (Division 6.1) of Packing Group I with inhalation toxicity;
- Corrosive substance (Class 8) of Packing Group I, and UN 1774, UN 2794, UN 2795, UN 2800, UN 2803, UN 2809, UN 3028, UN 3477 and UN 3506; and

- Miscellaneous dangerous substances (Class 9) carbon dioxide (solid), genetically modified organisms, genetically modified microorganisms, and lithium ion and lithium metal batteries.

Shipment of these, and the following, materials requires assistance from EHS:

- Organic Peroxides;
- Materials poisonous by inhalation;
- Lithium batteries (within equipment, and spares);
- Chemical waste; and
- Radioactive materials.

IV. Summary Requirements

A. 49 CFR §173.4 Small Quantities (domestic ground transportation)

Materials covered by the small quantity exceptions are exempt from all other requirements of 49 CFR when they are shipped according to ten requirements outlined in paragraph (a) of the provision.

Briefly, these requirements are:

- Inner receptacle contains not more than:

Material	Net quantity per inner receptacle
Authorized liquids	30 mL
Authorized solids	30 g
Division 6.1, PG I, Hazard Zone A or B materials	1 g
Class 7 radioactive materials	Activity requirements of §173.421-426
Division 2.2 gases	30 mL water capacity

- Inner receptacle is at least 0.2 mm thick and is not liquid full at 55 °C;
- Closure of inner receptacle is positively secured;
- Chemically compatible absorbent and/or cushioning;
- Inner receptacle is secured in outer packaging;
- Packaging must pass a drop test and compressive load test;
- Package must not contain forbidden materials (49 CFR 172.101);
- Package does not exceed 29 kg;
- Package is not opened or altered during transportation;
- Package is marked with the statement, “**This package conforms to 49 CFR 173.4 for domestic highway or rail transport only.**”; and
- Lithium batteries and cells must be shipped as fully regulated Dangerous Goods.

Drop test: The package must sustain free drops made from a height of 1.8 m (5.9 feet) directly onto a solid unyielding surface without breakage or leakage of internal containers and without reduction in the effectiveness of the package from replicating success in this test. Drops include flat onto package top, bottom, sides, as well as a corner junction.

Compressive load test: Applicable when shipping multiple identical packages concurrently; contact EHS for assistance.

B. IATA DGR De Minimus Quantities (air transportation)

Dangerous goods assigned codes E1, E2, E4, or E5 are not subject to IATA regulation when carried as cargo provided:

- Maximum net quantity of material per inner packaging is limited to 1 mL for liquids and gases, and 1 g for solids;
- Each inner packaging must be leak proof and securely packed in an outer packaging with cushioning and absorbent material so that in normal conditions of transport, they cannot break, be punctured, or leak their contents out of the outer packaging;

- Each outer packaging must be documented to survive a drop test from 1.8 m (5.9 feet), and a 24 hour compressive load equivalent to the total mass of equivalent packages stacked to a height of 3 m (9.8 feet); and
- The maximum net quantity of dangerous goods per outer packaging does not exceed 100 mL for liquids and gases, and 100 g for solids.

C. IATA DGR Excepted Quantities (air transportation)

Small quantities of dangerous goods assigned codes E1, E2, E3, E4, or E5 are only subject to the following provisions within IATA Regulation: training requirements, dangerous goods in air mail requirements, classification and packing group criteria, packaging requirements, loading restrictions, accident and incident reporting, and radioactive materials shipping requirements. For full text of these requirements, see IATA DGR 2.6. A summary of these requirements follows.

1. Classification Requirement

Dangerous goods must be classified according to class and division according to Regulation guidelines. Classification must be based on listing within the Regulation. If a material is not listed by name then a generic or n.o.s. (not otherwise specified) proper shipping name must be selected from IATA DGR Table 4.1.A that most accurately describes the substance. Classification results in quantity limitations as follows:

EQ Code	Maximum net quantity per inner packaging	Maximum net quantity per outer packaging
E0	Not permitted as Excepted Quantity	
E1	30 g/30 mL	1 kg/1 L
E2	30 g/30 mL	500 g/500 mL
E3	30 g/30 mL	300 g/300 mL
E4	1 g/1 mL	500 g/500 mL
E5	1 g/1 mL	300 g/300 mL

2. Packaging Requirements

- Inner packages must strong, leak-proof, and have secured closures;
- Each inner package must be within a leak-proof intermediate package complete with cushioning and absorbent material;
- Intermediate packaging must be securely packed in a strong outer packaging (wood, fibreboard, or equivalent).
- The complete package must be documented to survive a drop test from 1.8 m (5.9 feet), and a 24 hour compressive load equivalent to the total mass of equivalent packages stacked to a height of 3 m (9.8 feet);
- The package must be of adequate size to apply all necessary markings on a package face;
- Overpacks may be used and may contain packages with or without other dangerous goods; and
- An Excepted Quantities package must not contain any dangerous goods that require a Shipper's Declaration.
 - Dry Ice is allowed within Excepted Quantities packages when the requirements of Packing Instruction 954 are met.

3. Marking Requirements

A 100 mm x 100 mm Excepted Quantity packaging mark is required. The mark must indicate the primary hazard class, and division when assigned, of each dangerous goods contained in the package. When the name of the shipper is not legibly shown elsewhere on the package, this information must also be included within the marking. An example for a flammable liquid (Class 3) is provided for review.

An overpack must display all required markings, and the word “overpack”, unless the markings on internal packages are clearly visible.

4. Documentation

Accompanying bills of lading, or air waybills, must include the statement “Dangerous Goods in Excepted Quantities”. A Shipper’s Declaration of Dangerous Goods is not required.

5. Handling

Transport operator requirements include loading restrictions, and reporting of dangerous goods accidents, incidents and other occurrences.

V. Resources

UO Environmental Health and Safety, <http://ehs.uoregon.edu/HazMatShipping>

49 CFR 173.4, <http://www.ecfr.gov>

IATA Dangerous Goods Regulations, <http://www.iata.org/publications/dgr/Pages/index.aspx>

Package Markings: www.shippinglabels.com; www.labelmaster.com

