
Transporting Hazardous Material Safely

Guidance from the University of North Carolina at Chapel Hill EHS Department

Be careful when transporting hazardous material. Your safety is at stake – not only when you receive or send a package, but when you pass a truck on the highway or board a plane. Accidents happen, and they are more likely to be severe when a hazardous material is involved.

To protect you and others, the US Department of Transportation (DOT) and other agencies strictly regulate the transport of hazardous material. Failure to comply with these laws risks public health, the environment, and the safety of people who drive, fly, or transport hazardous material. Non-compliance is also subject to fines (up to \$37,500 per violation) and in egregious cases, imprisonment.

Transportation Compliance at UNC-Chapel Hill

Laws governing the transport of hazardous material are many and complex. At UNC-Chapel Hill each department or division that receives or ships hazardous material should designate a staff member to be their Hazardous Material Transportation Coordinator. This person should have a basic awareness of hazardous material shipping regulations, recognize hazardous materials, and guide others to resources for further advice. Training on how to properly handle hazardous material shipments is provided through EHS.

This brochure pertains to chemicals and chemical products and is intended for awareness and information only. Reading this brochure does not certify you to ship a hazardous material. EHS provides training on how to ship, receive, or handle hazardous material packages. For shipping information for hazardous items not covered in this brochure such as infectious substances or radioactive materials contact EHS for more information.

In addition to this brochure, review the following supplementary information provided by the US Department of Transportation:

Hazardous Materials Marking, Labeling & Placarding Guide, U.S. Department of Transportation, Research and Special Programs.

<http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Hazmat/Training/Chart%2014.pdf>

Do You Know if You're Shipping Hazardous Materials?, U.S. Department of Transportation, Research and Special Programs.

http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/do_you_know_shipping_brochure.pdf

Do You Need Training?

DOT requires training and certification as a *hazmat employee* if you perform any of the following jobs:

- Load, unload, or handle shipments of hazardous material.
- Prepare hazardous material for transport
- Operate a vehicle used to transport hazardous material.

You need to attend training and be certified if you work in a receiving area or loading dock, or if you handle hazardous material shipments. Training is required even if you arrange the shipment of a package that has been prepared by another person, or if you follow the packaging instructions of a shipper (this includes returns to a manufacturer). New employees who may handle or ship hazardous material must attend training and be certified prior to performing any of these duties. As explained above, UNC-Chapel Hill Hazardous Material Transportation Coordinators must attend training.

Training must be repeated every two years. It covers:

- General Awareness/familiarization with the law and hazardous material.
- Safety, including emergency response, personal protection and procedures for avoiding accidents. People who load hazardous material into vehicles need to understand the rules for chemical compatibility and segregation.
- Function –specific training – specific requirements for the hazardous material you handle or intend to ship, the mode of transportation you intend to use, and your job function.

DOT does not require training if you only sign for, open or unpack packages of hazardous material. Training is not required if you simply use hazardous material (ex: for cleaning or in a lab setting) or if you only move material within a building. However we recommend basic training for everyone who handles hazardous material. You'll learn useful information and be ready in case you need to send hazardous material.

EHS Provides Basic Training

EHS offers basic hazardous material transportation training at no cost to you. The basic training covers the job functions listed in the table below.

After attending the basic training and passing the exam you will be legally certified to:

- Unload and handle packages of hazardous material.
- Sign for, open and unpack shipments of hazardous material.

You may obtain hazardous material transportation training from a source other than EHS. If you have received training from another source please let us know so we can maintain our database of trained personnel.

Job Function Related to the Transport of Hazardous Material	Elements Included in the EHS Basic Hazardous Material Training		
	Awareness & Familiarization	Safety	Function Specific
<ul style="list-style-type: none"> • Unload or handles packages of hazardous material • Sign for, open or unpack shipments that include hazardous material* 	Included in Basic Training	Included in Basic Training	Included in Basic Training
<ul style="list-style-type: none"> • Prepare hazardous material for transport • Offer hazardous material for transport • Arranging shipments of hazardous material that have been prepared by others. 	Included in Basic Training	Included in Basic Training	NOT included. Additional training required.
Load or operate a vehicle used to transport hazardous material	NOT included. Additional training required.	NOT included. Additional training required.	NOT included. Additional training required.

*Training is recommended (not required) if you sign for, open or unpack packages of hazardous material.

As shown on the table above, EHS basic training is not complete for all job functions. You need to attend a separate function-specific or vehicle training in order to:

- Prepare or offer hazardous material for transport
- Load or operate a vehicle transporting hazardous material in commerce.

Shipping Requires Function Specific Training

If you occasionally prepare or offer hazardous material for transport or arrange shipments of hazardous material that have been prepared by others, you must obtain function-specific training that covers proper packaging, labeling, marking and completion of shipping papers.

Function-specific training focuses on the detailed requirements for the specific material that you wish to ship, the mode of transport you plan to use, and your role in the shipment. You may obtain this training through a one-on-one session with EHS staff. If you are involved with a variety or large number of shipments you should attend a comprehensive course to receive function-specific training. Contact EHS to discuss your needs and schedule a comprehensive training.

Transporting Hazardous Materials

In North Carolina, anyone who operates a vehicle containing hazardous materials for which a placard is required must obtain a Commercial Drivers License (CDL) with a hazardous material endorsement (H)

from the DOT. These operators must also participate in a drug testing program. An operator is not required to have the H endorsement if the vehicle is not required to be placarded. Placarding requirements are specific to the hazardous material's classification and the amount of material being transported. Contact EHS for placarding requirements for specific materials.

If you load shipments of hazardous material onto a vehicle you must receive function specific training on chemical compatibilities and loading procedures. This training covers the proper way to load hazardous materials and how to safely segregate hazardous cargo.

These requirements are summarized in the table below.

Transporting Hazardous Materials Outside of Commerce

In general the rules for transporting hazardous materials apply only to transportation "in commerce". This means transportation on public highways or through areas with open access by the public. A government employee (including state government), operating a government owned vehicle and for the sole purpose of transporting material from one government controlled location to another is not considered "in commerce" and therefore is exempt from most DOT hazardous material requirements. However if the classification or amount of hazardous material requires the vehicle to be placarded, the driver must have a CDL with the H endorsement.

Be aware that shipments from the UNC Material Distribution System use this exemption and may arrive at your building without all of the labels, markings or other identification usually required by the DOT.

Although non-commercial transport is exempt from labeling, marking and packaging requirements, you should take all reasonable precautions to prevent accidents or spills during transport. The intent of DOT hazardous material regulations is to minimize the risk of exposure and damage during transport so it is important to keep these practices in mind even when a shipment is exempt from the rules. All hazardous material should be well labeled and contained. Secondary containment is recommended (ex: double bag the container or place it in a plastic tray). Do not transport hazardous material in the passenger compartment of a vehicle. You should contact EHS for advice prior to transporting a hazardous material as a non-commercial shipment in an unplacarded vehicle.

REQUIREMENTS FOR PEOPLE WHO LOAD OR OPERATE VEHICLES TRANSPORTING HAZARDOUS MATERIALS IN NORTH CAROLINA.

	Placard Required	No Placard Required
Transportation in Commerce	<ul style="list-style-type: none"> • Obtain a CDL from DOT with H endorsement • Drug testing • Function specific training every 3 years 	<ul style="list-style-type: none"> • Function specific training • Function specific training every 3 years
Transportation Not in Commerce	<ul style="list-style-type: none"> • Obtain a CDL from DOT with H endorsement • Drug testing • Recommended function specific training every 3 years 	<ul style="list-style-type: none"> • No requirements • Recommended function specific training

Recognize Hazardous Material

When you receive or ship material or equipment, it is important that you determine if the contents is a hazardous material or is regulated as such. There are many ways in which you can recognize incoming or outgoing shipments of hazardous material.

IDENTIFY HAZMAT IN INCOMING SHIPMENTS

You may recognize an incoming shipment containing hazardous material in a several ways:

- The shipment may arrive in a vehicle bearing a DOT placard on its side. A *placard* is an 11-by-11 inch diamond-shaped sign placed on the four sides of a vehicle that carries hazardous material. There are over 25 different placards used to ship hazardous material including a placard for each hazard class and division (see list below). See the *DOT Chart 11: Hazardous Materials Marking, Labeling & Placarding Guide* for examples of placards and labels. A placard is only required for large quantities, so not all vehicles carrying hazardous material will be placarded.
- The container is in a DOT-approved *package*. DOT specifies performance standards for cardboard boxes, metal cans and other containers. DOT-approved packages usually have a “DOT” or “UN” notation marked on its exterior.
- The package bears a hazardous material label. A *label* is a 4-by-4 inch diamond-shaped sticker placed on the package. There are over 35 different labels used to ship hazardous material. The package might not be a labeled if the is marked “Limited Quantity” or “DOT-E” followed by a number.
- Adjacent to the label, the package is marked according to DOT specifications. This *marking* is specified in DOT regulations, and includes the material’s shipping name and UN number, and sometimes notations to specify certain hazards or package handling considerations. “DRY ICE (1.8 KG) UN 1845” and “ACETONE UN 1090” are examples of DOT markings.

- Hazardous material must be noted on the *shipping paper* or bill of lading with highlighting, by being listed first or by being marked with an “X” in the “HM” column.

Not all hazardous material is shipped this way. The regulations exempt small amounts, exempt containers, or certain products. For example, although liquid nitrogen is classed as miscellaneous hazardous material, certain shipments are exempt.

Notify the shipper if the package or shipping paper does not match its contents. Ask that future shipments be properly identified. Follow UNC purchasing procedures for resolving billing problems.

DOT Hazard Class	Hazardous Material Example
Class 1: Explosive	Dynamite
Class 2: Division 2.1: Flammable Gas Division 2.2: Non-flammable Gas Division 2.3: Poison/Toxic Gas	Hydrogen, propane Nitrogen Fluorine
Class 3: Flammable liquid	Gasoline, xylene, ethanol
Class 4: Division 4.1: Flammable solid Division 4.2: Spontaneously combustible Division 4.3: Dangerous when wet	Ammonium picrate White phosphorus Sodium metal
Class 5 Division 5.1: Oxidizer Division 5.2: Organic peroxide	Ammonium nitrate Methyl ethyl ketone peroxide

Class 6 Division 6.1: Poison Division 6.2: Infectious substance	Potassium cyanide Anthrax
Class 7: Radioactive	Radiolabeled chemicals
Class 8: Corrosive	Formaldehyde
Class 9: Miscellaneous	Dry ice, lithium batteries

You can view the labels and placards associated with these classes here:

<http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Hazmat/Training/Chart%2014.pdf>

Identify Hazmat in Outgoing Shipments

If you prepare or offer hazardous material for shipment, you are responsible for properly completing the shipping paper, placarding the vehicle, and packaging, labeling and marking the shipment. If you send a package of hazardous material, you are legally responsible for the shipment's compliance even if the transporter or recipient advises or assists you with the shipment. This includes following written instructions and using packing materials provided by the supplier to return an item to the supplier. Because you are liable, you must receive training to become thoroughly knowledgeable with requirements for transporting hazardous material. If you have any questions, seek the assistance of the resources listed below.

Because special transportation requirements pertain to hazardous material, it is essential that you review all shipments leaving your work unit to identify those materials that are hazardous. There are two ways to tell:

- Check if your material is listed on the DOT Hazardous Materials Table

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- Determine if your material meets the characteristic of a hazardous materials class

Other clues as to whether the material is hazardous can be found by reading the labels, markings and papers of the shipment in which you received the material. Assuming your supplier followed DOT rules, you can use the same procedure for shipping the material from campus. This does not apply to shipments received from the UNC Material Distribution System because their shipments are exempt from DOT rules. See above.

Be aware that some equipment contains batteries, capacitors, transformers or other components that contain hazardous material. As a result, such equipment must be shipped as a hazardous material.

Using the DOT Hazardous Materials Table

The DOT Hazardous Material Table is published in 49 CFR part 172.101. The table is long and references other chapters of the 49 CFR for packing and labeling instructions. For help navigating this table and the associated chapters contact EHS for assistance.

An online version of the table can be found here: <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=0b8eea63f4bd418a649b33b6ec98f146&rgn=div8&view=text&node=49:2.1.1.3.8.2.25.1&idno=49>

If you use this table to determine if your material is hazardous be sure to check chemical, generic and trade names, as well as synonyms.

There are nine classes of DOT hazardous material (see table above). If your material exhibits the characteristics of any of these classes it must be shipped according to the rules for that class. Some materials are not listed specifically by name on the Hazardous Material Table. There is a general listing for these types of materials such as “Flammable liquid, N.O.S.” (Not Otherwise Specified). Check the MSDS for any chemical to determine the hazards associated with it or contact EHS for assistance in determining any hazards present.

Some materials in the Miscellaneous Class (Class 9) are listed in the Hazardous Materials Table as “Other Regulated Material” (ORM) and must bear an ORM marking on their package.

Prevent Exposures and Accidents

The DOT Hazardous Material regulations are designed to prevent exposure and damage from hazardous materials in transit. Following the packing and labeling guidelines will ensure any package you prepare will safely contain the hazardous material inside.

When accepting a delivery of hazardous do not sign for the package if it appears damaged. The sender is responsible for the package until the receiver signs for it. This will save you the trouble of having to return the damaged package later.

If a hazardous material package has been delivered and accepted by someone else, make sure to closely inspect the package for damage before opening and handling it.

- Examine the exterior of the package.
- Don't touch a container that is open, leaking, weeping, broken, or not containing the hazardous material properly.
- Do not open a hazardous material package unless you know the contents and have been trained to handle the material.

Call EHS if a hazardous material has spilled on UNC property. Contact the University Employee Occupational Health Clinic if you have been exposed to a hazardous material.

Call UNC Police and Security at 911 in case of injury, fire, explosion, or a high hazard spill.

Prepare for Spills

In spite of everyone's best efforts, spills happen—so it is wise to prepare for hazardous material spills. Keep spill response and cleanup supplies at hand, and review the procedures for responding to spills. To prepare for and clean up a spill, you will need at a minimum:

- **North American Emergency Response Guidebook** (the yellow book). DOT requires this guidebook (or equivalent emergency response information) at every loading dock and in every vehicle where hazardous material is handled. It cross-references shipping names, UN numbers and DOT labels with emergency response procedures. It is available from the U.S. Department of Transportation, Research and Special Programs Administration.
- The **Material Safety Data Sheets** (MSDS) of the materials you handle. For specific hazard and cleanup information, consult the MSDS. If the MSDS is not included in the shipment, call the supplier or EHS for a copy. MSDS may not be available for infectious substances and some laboratory samples.
- **Absorbent material**, such as floor-dry.
- **Personal protective equipment**, such as safety goggles and appropriate gloves.

SPILL CLEANUP PROCEDURES

Some basic procedures apply to all spills of hazardous material. In case of a spill:

- Immediately inform your supervisor, coworkers and others in the area.
- Control access to the area to prevent others from being exposed or coming into contact with the spilled material. Close doors, run tape across a hallway or put up a sign.
- If hazardous vapors or gases are present, tell others to evacuate the area. If you can do so safely, open windows and fume hoods. Close doors to the area and go to a remote location to call 911.
- If hazardous vapors or gases are spreading to other areas, pull the fire alarm and evacuate the building. **WHEN IN DOUBT, GET OUT.** The Chapel Hill Fire Department's Hazardous Incident Team will respond.

- For simple spills, follow the procedures below. Call EHS if you need cleanup advice or assistance.

No two spills are alike. Spills can be simple—ones that you can clean yourself—or ones that present a high degree of hazard. Resources and responders are available to help you in case of a high hazard spill. When in doubt, get out and call for help.

Simple Spills That you can clean up yourself	High Hazard Spills Call EHS or 911 for help.
<ul style="list-style-type: none"> • Does not spread rapidly • Does not endanger people or property except by direct contact • Does not endanger the environment outside the building 	<ul style="list-style-type: none"> • Any spill of an infectious substance • Any spill of an unknown substance • If hazardous vapors or gases are spreading to other areas • Other spills that are not simple

Spills should be cleaned by people who are knowledgeable about the hazardous material, such as the package's recipient or sender, or a person who uses the material.

Call EHS for training in spill response. A spill kit and training can prevent injuries and minimize disruption of your work when a spill occurs.

Chemical or Chemical Products Spills

For spills or leaks of chemicals or chemical products, cleanup procedures are in the UNC Chapel Hill Lab Safety Manual: http://ehs.unc.edu/manuals/docs/lab_safety_manual.pdf

You may also call EHS for spill cleanup advice and assistance.

Radioactive Material Spills

For spills or leaks of radioactive material, contact EHS. After hours, call UNC Public Safety and ask them to contact a radiation safety health physicist. Spill cleanup procedures can be found in chapter 7 of the Radiation Safety Manual: <http://ehs.unc.edu/manuals/radiation/radman2009.pdf>

Infectious Substance or Biological Material Spills

For spills or leaks of infectious substances, etiological agents or biological material, contact EHS Biological Safety or consult your laboratory's approved protocol. General protocols for spill cleanup are also available from EHS Biological Safety.

Preparing Hazardous Material Shipments

Please be sure that trained personnel supervise all shipments from your unit. This handout is a summary of what you should be aware of if you ship hazardous material from campus. It is not meant to be complete or a substitute for additional function-specific training. This handout will guide you to

resources that can help you transport hazardous material safely and legally. For functions specific training certifying you to ship a hazardous material from campus contact EHS.

Prior to offering a shipment from campus, first determine if your shipment contains hazardous material by reviewing the MSDS and the lists and characteristics of hazardous material discussed above. Compare the lists with the contents of your shipment, including any part or article it may contain. If your shipment contains hazardous material, DOT rules require:

- That you have been trained and certified to ship the hazardous material
- The package meets DOT standards.
- The package bears the appropriate DOT label.
- The package is marked according to DOT regulations. Even exempt packages must have specified markings.
- A shipping paper completed according to DOT regulations. Special notations and formatting are required for hazardous material.
- For larger quantities, the vehicle must bear placards. If the driver doesn't have a placard, you must provide it.

In addition to DOT rules, air shipments must abide by the *Dangerous Goods Regulations* of the International Air Transport Association (IATA) and the *Technical Instructions* of the International Civil Aviation Organization (ICAO). Shipping companies often have their own, additional rules.

As explained above, you are legally liable for complying with DOT rules for any hazardous material that you offer for shipment. Nevertheless, shippers can be very helpful in preparing a package for transport. If you work with a shipper:

- Tell them fully and accurately what you wish to ship, including if your package contains dry ice or liquid nitrogen.
- Follow their packaging, labeling and marking instructions precisely.
- On the shipping paper, describe the contents fully and accurately. Follow the shipper's instructions for describing the hazard material and class.

Additional Requirements for Radioactive Material

Radioactive material must be shipped by EHS Radiation Safety personnel. Please contact the EHS well in advance of your shipment so that arrangements can be made.

Additional Requirements for Biological Material

The shipment and receipt of infectious substances is increasingly regulated. The shipment of certain select agents requires a permit. A shipment of biological material may be regulated by other authorities, such as the U.S. Department of Agriculture, the Centers for Disease Control and Prevention and the U.S. Department of Commerce.

Biological Samples in Liquid Nitrogen “Vapor Shippers”

A special “vapor shipper” container is available for transporting biological samples in liquid nitrogen. If the sample itself does not need to comply with additional requirements, the shipment and packaging is exempt from DOT requirements.

When using a vapor shipper, charge the package according to the manufacturer's instructions, and then pour off excess liquid nitrogen. If package and the sample are exempt, the package must be marked “DOT Exempt.” Tell the shipper that the package contains liquid nitrogen, but the packaging is exempt.

Contact the Biological Safety Office for advice in shipping biological material, infectious substances or etiological agents.

Shipping Supplies

The following vendors can provide labels and approved packaging. Although you are required by law to provide placards when they are needed, check with your carrier to see if they will provide them for you—they usually do.

In mark, Inc.: www.inmarkinc.com

Saf-T-Pack: www.saftpak.com

Cargopak Corp.: www.cargopak.com

LabelMaster: www.labelmaster.com

Fisher Scientific: www.fishersci.com

If you are interested in using a liquid nitrogen vapor shipper contact EHS for vendors and unit rental options.

Shipping Papers and Documentation

For individual shipments, the EHS can help you prepare a shipping paper. Shipping papers must accurately describe the hazardous material, its hazard class, and include other legally required notations.

If you will frequently send hazardous material packages that require shipping papers the function specific training provided by EHS will cover how to properly complete all hazardous material paperwork.

Emergency Phone Number Required on Shipping Paper

DOT requires all shipping papers for hazardous materials to contain a 24 hour emergency number. To satisfy this requirement, UNC has a contract with ChemTrec. ChemTrec is a service that provides worldwide emergency response in case of an emergency involving your shipment. The service contract with ChemTrec requires that the shipper:

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1. Provide ChemTrec with an MSDS or other safety information for the hazardous material in your shipment:
 - Contact ChemTrec at 1-800-262-8200 or chemtrec@chemtrec.com to determine if they have an MSDS on file under UNC-Chapel Hill for the material you are shipping. If they do skip to part II.
 - If they do not have the MSDS on file and you have 5 days or more before you are shipping email a copy of the MSDS to: msds@chemtrec.com. ChemTrec will keep this MSDS on file so you only have to do this once.
 - If you are shipping in less than 5 days email your MSDS to: ecenter@chemtrec.com. To keep your MSDS on file you will also need to email it to: msds@chemtrec.com.
 2. Clearly display ChemTrec's emergency contact information on your shipping paper along with UNC-Chapel Hill's customer number (to identify us to ChemTrec):

Emergency Contact: CHEMTREC: 1.800.424.9300 (US) or 703-527-3887 (International) Customer # CCN23370

It is important to list UNC-Chapel Hill in the Sender information on all shipping papers as ChemTrec will only recognize shipments under this name. You should also include our customer number CCN23370.

The use of Chemtrec's emergency number is strictly intended for UNC Chapel Hill. Do not provide this emergency information or our customer number to another institution to list on a shipping paper for a material being sent to you (even if you are paying for it). Unauthorized use of ChemTrec's services by an outside party not covered in our service contract could cause our contract to be cancelled. Contact EHS if you have any questions about the terms of our ChemTrec service contract.

Additional Requirements for International Shipments

The U.S. Environmental Protection Agency (EPA)'s Toxic Substance Control Act (TSCA) and the U.S. Customs and Border Patrol (CBP) requires all imported and exported chemicals to follow specific reporting guidelines. More information on TSCA regulations for chemical shipments can be found here: http://ehs.unc.edu/ih/lab/docs/tsca_instructions.pdf

For More Information

EHS can help you safely and legally receive, handle, and ship hazardous materials. We offer advice and training and can direct you to other resources that can help. Please contact us if you have any questions.

Chemicals, Chemical Products, Chemical Samples		
Dan Vick	962-5712	shipping@ehs.unc.edu
Infectious Substances, Etiological Agents, Biological Material		
Dan Vick	962-5712	shipping@ehs.unc.edu
Radioactive Material		
Jonathan Moore	962-5713	Radiation_safety_office@ehs.unc.edu

DOT Regulations and Guidance

U.S. Department of Transportation Office of Hazardous Materials

Safety: <http://hazmat.dot.gov/>

Parts 130, 171-180 and 397 of Title 49, *Code of Federal Regulations* (49 CFR), U.S. Government Printing Office. Available online at: www.gpoaccess.gov/cfr/index.html

U.S. Department of Transportation, Information Center: 1-800-467-4922

Other Regulations

Additional requirements for facilities transferring or receiving select agents:

www.selectagents.gov

Dangerous Goods Regulations, International Air Transport Association (IATA), Montreal (published annually): www.iata.org

2008 North American Emergency Response Guidebook, (the yellow book), U.S. Department of Transportation, Research and Special Programs Administration (published every three years)