

DRI Procedure for Moving/Transporting Chemicals¹

I. Introduction

A state agency or local jurisdiction that transports chemicals for its own use, using its own personnel and state-owned vehicles, is exempt from the Department of Transportation (DOT) regulations as long as the material is not transported for commercial purposes². This procedure provides guidance for moving chemicals within DRI buildings, between DRI buildings and for driving or transporting chemicals by DRI employees only for *Non-Commercial Purposes* (i.e., between DRI campuses or to field research locations).

DRI must comply with the DOT regulations if it offers chemicals to a non-governmental carrier (by motor vehicle, aircraft, rail, or vessel) or transports these materials in "furtherance of a commercial enterprise." (For information regarding shipping chemicals through a carrier such as FedEx, refer to the DRI Shipping Information, <http://safety.dri.edu/Forms/DRIShipping.html>). Questions regarding shipment or transportation issues may be addressed to Environmental Health and Safety (EH&S), 775-673-7329.

II. Scope

This procedure provides guidance to DRI personnel for the transport of hazardous chemicals within a building, between adjacent buildings on campus and via vehicle between DRI buildings, campuses, and to and from DRI field research sites. The procedure does not address the requirements for the transport of biohazardous or radioactive materials. Contact EH&S for additional information on the latter.

III. Movement within a building or between adjacent buildings

The handling and movement of hazardous materials and waste within a building between rooms or between adjacent buildings on private roads, sidewalks or walkways is governed by 29 CFR Part 1910.1200, Hazard Communication; 29 CFR Part 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories; and 40 CFR Part 262, Standards Applicable to Generators of Hazardous Waste. These regulations have specific training requirements that must be met to ensure employees are thoroughly familiar with proper handling and emergency procedures. Lab Safety and Hazardous Waste training classes provided by EH&S discuss these requirements.

A. General Requirements:

1. Wear appropriate personal protective equipment (PPE). Minimum PPE includes safety glasses, lab coat or other appropriate lab attire, and closed-toed shoes.
2. Individuals transporting chemicals must ensure containers are labeled and properly protected from breakage and that they know the material's hazards (Material Safety Data Sheets, MSDSs, are a good source for this information) and what to do in case of a spill.
3. Hazardous chemicals/substances must be attended at all times during the transportation process.

¹ **Note:** These procedures are only for chemicals. If the samples contain biological materials, contact DRI EH&S, 775-673-7329, or if the samples are radioactive, contact the UNR Radiation Safety Office, 775-784-4540, for help.

² Numerous letters of interpretation posted on the DOT web site, <http://hazmat.dot.gov/regs/rules.htm>.

DRI Procedure for Moving/Transporting Chemicals

4. All containers must have secure, tight-fitting lids.
5. All moves within/between building should be conducted during normal business hours (M-F, 8:00 - 5:00).
6. Use freight elevators for moving chemicals between floors. If they are not available, use unoccupied passenger elevators. Stairs should only be used if an elevator is not available and only for small containers that can be easily carried by hand.
7. Plan movement between buildings using sidewalks or paved surfaces. Use a cart or hand truck if moving more than one box of chemicals at a time.
8. At no time should transport of chemicals take place through office spaces. Transport over carpeted corridors should be avoided if possible.
9. Incompatible chemicals should not be packed together (see table below for examples).

Incompatible Chemicals, not all inclusive
Read individual MSDSs if there are questions regarding compatibilities
Cyanides and Acids
Sulfides and Acids
Oxidizers and Organics or Flammables
Strong Acids and Bases
Hydrazine and Oxidizers
Strong Acids or Bases and Flammables
Acids and Chlorine Compounds
Water or Air Reactives with almost anything

B. Specific Requirements

1. **Hazardous materials in gaseous or liquefied gas form** should be transported in corridors only on a special safety cart that is designed to prevent toppling (except for lecture-size bottles, which should be carefully hand-carried one at a time). Cylinder caps must be kept in place at all times during transportation.
2. **Odiferous chemicals** (for example mercaptans) require special packaging and care. Using a hood, ensure the containers are sealed, wipe³ down to remove any residue and use double containment (such as two zip lock bags) to help prevent spreading odors along the way.
3. **Highly toxic chemicals** (for example, sodium cyanide) require special packaging. Using a hood, remove any evidence of residue³ from the container. Package in double containment.
4. **Transportation of chemicals through corridors** must comply with fire codes.

The following is taken directly from the International Fire Code⁴:

³ Wipes, unless grossly contaminated, are handled as non-RCRA lab trash; while grossly contaminated wipes are handled as hazardous waste. (Both are shipped by our waste vendor for incineration.)

⁴ 2006 International Fire Code, Chapter 27, Section 2703.10

DRI Procedure for Moving/Transporting Chemicals

- a. **Valve Protection (27. 10.1)**--Hazardous materials in gas containers, cylinders and tanks in transit shall have their protective caps in place. Containers, cylinders and tanks of highly toxic or toxic compressed gases shall have their valve outlets capped or plugged with an approved closure device in accordance with Chapter 30.
- b. **Carts and Trucks Required (27.10.2)**--Liquids in containers exceeding 5 gallons (19L) in a corridor or exit enclosure shall be transported on a cart or truck. Containers of hazardous materials having a hazard ranking of 3 or 4 in accordance with NFPA 704 and transported within corridors or exit enclosures, shall be on a cart or truck. Where carts or trucks are required for transporting hazardous materials, they shall be in accordance with Section 2701.10.3.

Exceptions (to 27.10.2):

- Two hazardous material liquid containers, which are hand carried in acceptable safety carriers.
 - Not more than four drums not exceeding 55 gallons (208 L) each, which are transported by suitable drum trucks.
 - Containers and cylinders of compressed gases, which are transported by approved hand trucks, and containers and cylinders not exceeding 25 pounds (23 kg), which are hand carried.
 - Solid hazardous materials not exceeding 100 pounds (45 kg), which are transported by approved hand trucks, and a single container not exceeding 50 pounds (23 kg), which is hand carried.
- c. **Carts and trucks (27.10.3)**--Carts and trucks required by Section 2703.10.2 to be used to transport hazardous materials shall:
 - Be designed to provide a stable base for the commodities being transported and have a means of restraining containers to prevent accidental dislodgment. Gas cylinders placed on carts and trucks shall be individually restrained.^{5, 6}
 - Be provided with a device which will enable the operator to safely control the movement by providing stops or speed reduction devices.
 - Be constructed of materials compatible with those being transported.
 - Be of substantial construction, and for the transport of liquids, have adequate secondary containment to contain the content of the largest container to be transported.

In addition

- Carts and trucks used to transport materials shall not obstruct or be left unattended within any part of a means of egress, and
- Incompatible materials shall not be transported on the same cart or truck.

⁵ The authority having jurisdiction may allow a single chain on carts designed for two cylinders as long as both bottles are tightly restrained to prevent inadvertent slippage.

⁶ Cylinder hand trucks constructed to move two bottles simultaneously shall not be used for single bottle transport.

DRI Procedure for Moving/Transporting Chemicals

IV. Movement via vehicle between DRI buildings, DRI campuses and into the field for research purposes

A DRI employee transporting hazardous materials in a state vehicle (NSHE/DRI owned or leased or from the Nevada state motor pool) during the course of his/her work is performing non-commercial business. Transportation of hazardous materials for non-commercial business is not subject to Department of Transportation (DOT) Hazardous Material Regulations found in 49 CFR Parts 171-180. Therefore, the movement of hazardous materials⁷ between buildings, between campuses, or into the field for research in DRI/NSHE/state vehicles by DRI personnel for non-commercial purposes is not subject to the DOT Hazardous Material Regulations. However, personnel conducting these activities must have a valid driver's license, be authorized to use a DRI/NSHE/state vehicle, use the proper containment and packaging materials while en-route and have completed one or more of the following training programs:

- Hazard Communication, 29 CFR Part 1910.1200,
- Lab Safety (Chemical Hygiene Plan, 29 CFR 1910.1450),
- Hazardous Waste Generator training (40 CFR Part 262 including emergency procedures to be used in the event of an accident).

Procedure

A. Determine if the material you plan to transport is a DOT Hazardous Material.

1. The material is likely to be considered hazardous for transportation purposes if it meets one or more of the following:
 - a. It was shipped to you as a DOT hazardous material, which will be noted on the shipping paper, or if the original package is DOT labeled or marked,
 - b. It is listed in the DOT Hazardous Materials Table, 49 CFR 172.101,
 - c. It has a "UN" number, which refers to the DOT Hazardous Materials Table,
 - d. It exhibits one or more of the following characteristics of a hazardous material:

Explosive	Flammable solid, spontaneously combustible, dangerous when wet	Radioactive
Compressed or liquefied gas or cryogenic fluid	Oxidizer, organic peroxide	Corrosive
Flammable liquid	Poison (toxic), infectious	Miscellaneous hazard, such as dry ice

2. Materials with Hazardous Material Information System (HMIS) or National Fire Protection Association (NFPA) ratings higher than '1' are likely to be classified by DOT as hazardous.
3. Check the MSDS or contact DRI EH&S to determine if your materials are regulated by DOT.

⁷ Under no circumstances are DRI personnel to transport any amount of explosives (DOT Class 1) or inhalation zone A or B (typically poison gases, class 2.3 and some toxics, class 6.1) materials. Large scale chemical moves should be packaged and shipped via commercial carrier to limit the chance of transportation incidents.

DRI Procedure for Moving/Transporting Chemicals

B. General Requirements for any chemicals self-transported by vehicle:

This procedure states the minimum requirements for the packaging and transport of chemicals in a manner that will minimize the threat of release from container breakage during transport.

1. Place your chemicals in secondary containers. (A secondary container must be capable of containing the materials if the primary container breaks or leaks.) Absorbent materials must be included in the secondary container to absorb any liquids. This will also cushion the materials and help prevent container breakage.
2. For multiple compatible materials transported in the same outer box, include packing material, such as Styrofoam peanuts between containers.
3. Include on the outer packaging a listing of the materials being transported and an emergency phone number. The driver should also have a copy of this information in easy reach of the driver's seat.
4. It is best if the materials can be transported within the trunk or bed of a pick up truck. It is also recommended, though not required, for non-DOT regulated materials that a DRI vehicle be used for the transportation. NOTE: A DRI/NSHE/state owned vehicle shall be used for transport of any material meeting the DOT definition of hazardous material (see section IV.C below for additional requirements).
5. For security and safety purposes minimize stops along the route.
6. Carry a cell or satellite phone in case of any problems or emergencies along the way. If there is a problem during transport, contact the EH&S at 775-742-6330.

C. If the material is considered hazardous per DOT:

Chemicals which are considered hazardous cannot be transported in privately owned/personal vehicles. All transport must be in a DRI/NSHE/State vehicle by a DRI employee. Chemicals can only be transported for the purposes of conducting research, field investigations, educational purposes and other official Institute business. In addition to the procedures described in Section IV.B, the following apply to transport of DOT hazardous materials:

1. If possible, have the vendor direct ship to the field location or ship the chemical yourself via FedEx⁸. You will also need to make provisions for shipping the material back to DRI once the field work is done. Remember you cannot ship hazardous waste, so any used chemicals must be labeled 'Used'.
2. If shipping via a commercial carrier is not an option, take only the amount necessary to conduct the work. If transferring chemicals from the original (manufacturer's) container into smaller containers, ensure that labeling meets the requirements of the OSHA Hazard Communication Standard (full chemical name, hazards and target organs effects identified on the label).
3. Never carry hazardous materials onto a plane in your carry on or checked luggage. If you need to fly to your research site, you will need to ship your hazardous materials via commercial carrier (i.e., FedEx).

⁸ This will require you to first take an on-line training class and to provide a 24 hour emergency number for the shipping papers. See <http://safety.dri.edu/Forms/DRIShipping.html> for details.

DRI Procedure for Moving/Transporting Chemicals

4. If more than one chemical will be transported, they shall be packed separately (by hazard class) and segregated within the vehicle by hazard class.
5. In addition to the outer packaging requirements listed in IV.B.3, a chemical list, copies of the Material Safety Data Sheets and the emergency number shall be readily accessible to the driver.
6. Do not place hazardous materials within the passenger compartment of the vehicle. Use the trunk or cargo bed. Ensure they are properly packaged and firmly secured. Never leave chemicals stored in a vehicle. Large quantities of hazardous materials must be transported in a truck. Contact EH&S for guidance.
7. Cryogenics must be transported only in approved storage vessels (for example Dewar flasks with pressure relief devices). Cryogenics should never be transported where off gassing can enter the passenger area of the vehicle.
8. Gas cylinders should not be transported in the trunk of a car. Use a truck, van, etc. and secure them from rolling/moving around. If possible, the cylinders should be orientated in an upright position. As with transportation within buildings, the protective caps must be on cylinders and for toxic gases, valve outlets must be capped or plugged with an approved closure device.
9. To transport materials on dry ice, contact EH&S for specific packaging requirements. See <http://safety.dri.edu/Forms/shippingnonhaz.pdf>.
10. Project PIs should keep records for all hazardous materials transported. Documentation should include what materials were transported and where the materials were transported to, the date of the transportation and the quantity of each material. These records should be kept for a minimum of two years.