

Chapter 52: [Hazardous Materials and Waste Transportation](#)

Non-commercial Hazardous Materials Transport Procedure

Product ID: [629](#) | Revision ID: 2404 | Date published: 28 May 2021 | Date effective: 28 May 2021

URL: <https://www-group.slac.stanford.edu/esh/eshmanual/references/hazmattransportProcedNonCommerce.pdf>

1 Purpose

The purpose of this procedure is to ensure the safe and efficient transport between collaborators and users at Stanford University (and other nearby universities, research facilities, and institutions) and SLAC of research materials and samples and hazardous materials that qualify for the Department of Transportation (DOT) *material of trade (MOT)* exception.

This procedure covers only non-commercial transport on public roads of DOT hazardous materials meeting MOT requirements. (The MOT exception does not apply to transport of hazardous materials by air or waterway.) Materials subject to this procedure are limited to samples (synthesized or purchased) transported by those conducting the research and to MOT materials as defined by the DOT ([49 CFR 173.6](#)), in the quantities listed in Table 1. This procedure does not cover transport of hazardous, radioactive, or mixed waste (see [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#)) or transport on-site (see [Hazardous Materials and Waste Transportation: On-site Transportation Requirements](#)).

This procedure applies to users, staff scientists, collaborators, post docs, students, and SLAC employees. It is not intended to apply to subcontractors. MOT originating from Stanford University should follow Stanford University procedures. MOT originating from SLAC should follow SLAC procedures.

2 Procedures

2.1 Prerequisites

2.1.1 Hazard Classes and Quantities

The MOT exception provided by the DOT applies only to transport, as part of a business, of hazardous materials in the hazard classes and quantities below. It does not apply to hazardous material that is self-reactive, poisonous by inhalation, or a hazardous waste. The total for any load must not exceed 200 kilograms (440 pounds).

Table 1 Material of Trade Quantity Limits

Hazard Class or Division	Packing Group	Maximum Amount of Material in Each Individual Package
2.1 Flammable compressed gases 2.2 Non-flammable, non-toxic gases	Not applicable	Each cylinder may not weigh more than 100 kg (220 lbs) gross
3 Flammable and combustible liquid 4.1 Flammable solid 5.1 Oxidizer 5.2 Organic peroxide 6.1 Poisons 8 Corrosive 9 Class 9 ORM-D	PG I	Solids: 0.5 kg (1lb) Liquids: 0.5 L (1pint)
3 Flammable and combustible liquid 4.1 Flammable solid 5.1 Oxidizer 5.2 Organic peroxide 6.1 Poisons 8 Corrosive 9 Class 9 ORM-D	PG II and III, or ORM-D	Solids: 30 kg (66 lbs) Liquids: 30 L (8 gal)
4.3 Dangerous when wet	Only PG II and III materials are allowed	30 ml (1ounce)
6.2 Infectious or biological substance (non-medical waste) excludes Category A infectious substances	Not applicable	One or more inner packaging, each no more than 0.5 kg(1.1 lb) or 0.5 L (17 ounces), totaling no more than 4 kg (8.8 lbs)or 4L (1 gal); or A single inner packaging containing not more that 16 kg (35.2 lbs) or 16 L (4.2 gal) in a single outer packaging
Diluted mixtures of Class 9 materials (not exceeding 2% concentration)	Not applicable	May be transported in a tank having a capacity of up to 1500 L (400 gal)

2.1.2 Directorate Implementation

This procedure is written to allow flexibility in meeting the different research needs of users and staff. As such, each division’s ESH coordinator will need to develop specific processes and procedures to meet the criteria below, including

- Identifying a DOT point-of-contact (POC) or gatekeeper to ensure controls are in place and used
- Ensuring persons transporting MOT are aware that they are doing so
- Ensuring work planning and control documentation and processes address MOT transport

Program audits will include asking for demonstration of the controls. Incidents will trigger a review of the process.

2.1.2.1 Incoming Materials

Incoming materials must be approved by the ESH coordinator and/or DOT program manager. Controls must be in place to ensure that an accurate chemical inventory is maintained in the receiving storage areas and that a *safety data sheet (SDS)*, if applicable, is on file. Appropriate storage for the material must be available before material is brought on-site.

2.1.2.2 Outgoing Materials

Outgoing materials must be approved by the ESH coordinator and/or DOT program manager. The material to be transported must meet the definition of MOT and transport must meet the applicable regulations ([49 CFR 173.6](#)). This includes those transporting the material having a general knowledge of MOT regulations, quantity limitations, and packaging, marking, and labeling requirements. Directorate-specific procedures should also encourage courtesy calls to receiving institutions so that they can expect and prepare for receiving hazardous materials.

2.1.2.3 Collaborations

Collaborations between Institutions within Driving Distance

Joint agreements should be encouraged between support staff of both institutions. Special attention should be given to the safe transport through local community streets.

National / International Collaborations

Since the MOT exception does not apply to transport of hazardous materials by air or waterway, directorate-specific procedures should encourage the following preferred solutions (starting with 1):

1. Encourage chemicals to be purchased at the institution at which they are used to allow their own screening and control systems to operate.
2. Encourage direct shipments by suppliers to outside institution.
3. Encourage shipment through commercial courier service.
4. Encourage having material packaged by trained DOT staff.
5. The transporting person must be knowledgeable of MOT requirements and document his or her knowledge and awareness of potential risks.

Note *Transporting non-hazardous samples packed in insulated packaging containing refrigerated liquid materials (liquid nitrogen) or solid dry ice (carbon dioxide) must follow International Air Transport Association (IATA) and carrier requirements. (See [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#).)*

2.2 Procedures

The following procedures must be followed in order to use the MOT exception.

2.2.1 Incoming

Step	Person	Action
1.	Researcher	Initiates the process by identifying materials that will need to be transported to SLAC. This can be part of the experiment review process or by contacting the SLAC POC / collaborator and documenting permission through the work planning and control (WPC) process.
2.	SLAC POC / collaborator	Requests input by directorate safety staff / ESH coordinator and/or ESH staff
3.	DOT POC	Reviews request and determines if material to be transferred qualifies as MOT. If yes, sends directorate guidance document to SLAC researcher and SLAC POC / collaborator on how to package and transport safely. ¹
4.	DOT POC	If request does not meet the MOT requirements, notifies the researcher that the material must be shipped via a registered hazmat transporter through Shipping and Receiving if the preferred non-commercial shipment solutions (Section 2.1.2.1) do not meet his or her needs
5.	Researcher	Upon arrival, checks in material with SLAC POC / collaborator for approved storage, inventory, and SDS updates
6.	SLAC POC / collaborator	Notifies ESH coordinator of arrival
7.	DOT POC	Ensures that inventory and SDS database is updated and adequate storage has been provided; notifies Radiation Protection for nuclear materials ²

2.2.2 Outgoing

Step	Person	Action
1.	Researcher	Initiates the process by identifying to the SLAC POC / collaborator materials that will need to be transported to home institution
2.	SLAC POC / collaborator	Requests review by DOT POC and/or ESH staff
3.	DOT POC	Reviews request and determines if material to be transferred qualifies as MOT. If yes, sends directorate guidance document to researcher on how to package and transport safely
4.	DOT POC	If request does not meet MOT requirements, notifies the requester that the material must be shipped via a hazmat transporter through Shipping and Receiving

1 If shipment is from another institution it is their responsibility to determine appropriate and safe shipment. SLAC is limited to giving our acceptance criteria for receipt.

2 Deuterium, deuterium-containing compounds, and lithium 6 (Li₆)

Step	Person	Action
5.	DOT POC	Ensures that inventory updated, notifies Radiation Protection for nuclear materials ³
6.	Researcher	Transports material following guidance and informs POC at destination of material transfer

2.2.3 Material of Trade Requirements

A hazardous materials shipment must meet all of the following conditions to qualify as MOT:

- Must meet the maximum quantity limits in Table 1 for packages for hazard classes and divisions.
- With the exception of tanks containing diluted mixtures of Class 9 materials, no more than a combined gross weight of 200 kilograms (440 pounds) of MOT may be transported on any one vehicle.
- Packaging must be equal or stronger than original packaging.
- Packaging must be leak-tight for liquids and gases and sift-proof for solids.
- Packages must be securely closed, secured against movement, and protected against damage.
- Packaging must be marked with a common name or proper shipping name, including the letters RQ if it contains a reportable quantity of a hazardous substance.
- Transporter must be informed of the presence of hazardous materials and have general knowledge of MOT regulations.

In addition, SLAC requires:

- For breakable containers, a rigid outer packaging (cardboard, plastic, or metal box or pail) must be used and each inner receptacle must be packaged with absorbent or cushioning material to prevent breakage and to maintain each inner receptacle in an upright condition. For liquids, there must be sufficient absorbent material to contain all liquid contained within the packaging.
- Outer packaging is not required for non-breakable receptacles such as metal or plastic cans and bottles that are secured against movement in cages, bins, boxes, or compartments.
- Each inner receptacle in a package must have a positive closure mechanism. Appropriate positive closure mechanisms include a screw-top lid or tight friction fit cap or lid designed as a closure for that specific container. Simple test tubes with a Parafilm or aluminum foil closure do not meet this requirement.
- The inner receptacle must be contained in a sealed plastic bag (zip-lock or twisted and tied/taped closed) or other closed secondary container. If materials of different chemical identity are packaged in the same outer container, the materials must be chemically compatible.
- All inner receptacles as well as the outer packaging must be marked with the common name of the material (or the DOT proper shipping name) and its primary hazard.⁴ Chemical formulas, abbreviations, or acronyms are not an acceptable form of chemical identity for this marking

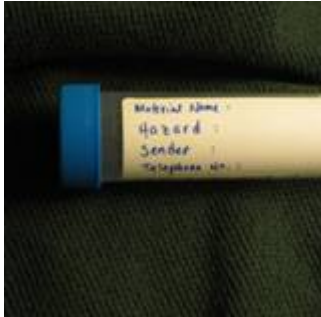
3 Deuterium, deuterium-containing compounds, and lithium 6 (Li₆)

4 Enough information must be on the package to allow the use of the [Emergency Response Guidebook \(ERG\)](#). The use of the UN/NA number is encouraged as well as the three-digit guide number that references appropriate response in the case of a spill or release.

requirement. If the material is an engineered nanomaterial, then include the following words on the label:⁵

NANOSCALE – THIS MATERIAL’S TOXICITY, REACTIVITY, AND OTHER HAZARDS MAY BE GREATER THAN ITS MACRO-SIZED FORMS

Inner Receptacle with
Positive Closure and Label



Zip-lock Bag to Contain
Leaks/Spills



Outer Packaging



Figure 1 Examples of Proper Packaging (photographs from Lawrence Berkeley National Laboratory)

- If it is necessary to transport gasoline to a field location, it must be contained in a DOT- or OSHA-approved plastic or metal safety can with a rated volume of five gallons or less. In addition, gasoline containers must be transported in the open bed of a truck. They cannot be transported in the trunk of a passenger vehicle.
- Compressed gas cylinders must be DOT-approved and tested and transported upright and secured. Cylinders cannot be transported in the same area as passengers.

Note Toxic gases (Hazard Class 2.3) cannot be transported under the MOT exception.

- It is recommended that when transporting propane cylinders, no more than 90 pounds of propane capacity (not including weight of cylinder) be carried and the cylinder have a quick disconnect or plug installed in the service valve outlet. To minimize the possibility of relief valve discharge, propane cylinders must not be left in a vehicle, especially during warm weather.
- The material must be transported directly to its final destination with no intermediate stops.

If a shipment qualifies as MOT:

- No shipping papers are required.
- No additional emergency response information is required.
- No placarding is required.
- No formal training or retention of training records is required.

Note An MOT may be transported in a motor vehicle with other hazardous materials without affecting its eligibility for the MOT exception.

⁵ Additional information can be found in the [Nanomaterial Safety Plan](#) (SLAC-I-730-0A09M-008).

If a shipment does not meet the MOT exception requirements then it must be handled as a regulated hazardous material and be prepared by trained personnel as described in [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#).

2.2.3.1 Hazard Communication

All passengers in the motor vehicle must be informed of the presence of any hazardous material within the vehicle and informed of the transportation requirements and limitations of this section.

If a substance is produced for use by another person, then a safety data sheet ([SDS](#)) must be developed and provided to the end user.

2.2.3.2 Transport Requirements

Hazardous materials must not be transported in the passenger compartment of the vehicle. They must be kept in the trunk of a passenger vehicle or the bed of a truck (this means that hatchback vehicles with no trunks must not be used for transporting hazardous materials). Transport of hazardous materials using bicycles or mopeds or on the Marguerite shuttle bus system or other modes of public transit is strictly prohibited.

3 Forms

The following forms and systems are required by this procedure:

- None; documentation should be done within existing WPC processes or directorate/user lab specified forms.

4 Recordkeeping

The following recordkeeping requirements apply for this procedure:

- None; recordkeeping should be integrated into existing processes. Records should be kept until material is delivered to its destination.

5 References

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 52, “Hazardous Materials and Waste Transportation”](#)
 - [Hazardous Materials and Waste Transportation: On-site Transportation Requirements](#) (SLAC-I-730-0A09S-037)
 - [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#) (SLAC-I-730-0A09C-007)
- [Chapter 34, “Biosafety”](#)
- [Chapter 40, “Chemical Lifecycle Management”](#)

- [Chapter 53, “Chemical Safety”](#)
- [Chapter 58, “Laboratory Safety”](#)

Other SLAC Documents

- [Chemical Management Services \(CMS\)](#)
- [Nanomaterial Safety Plan](#) (SLAC-I-730-0A09M-008)

Other Documents

- Title 49, *Code of Federal Regulations*, “Transportation”, Subtitle B, “Other Regulations Relating to Transportation”, Chapter 1, “Pipeline and Hazardous Materials Safety Administration, Department of Transportation”, Subchapter C, “Hazardous Materials Regulations”, Part 173, “Shippers: General Requirements for Shipments and Packagings”, Section 173.6, “Materials of Trade Exception” ([49 CFR 173.6](#))
- Department of Transportation. [Emergency Response Guidebook \(ERG\)](#)