

Hazardous Materials Endorsement Renewal Manual



This manual is **ONLY** for persons who have
a valid Pennsylvania CDL with a
Hazardous materials (H) endorsement
or a
Hazardous materials/Tank (X) endorsement

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HAZARDOUS MATERIALS

THIS SECTION COVERS

- Overview and Procedures
- Driver Responsibilities
- Loading and Unloading
- Bulk Tank Loading, Unloading and Marking
- The Intent of the Regulations
- Communications Rules
- Driving and Parking Rules
- Emergencies

Hazardous materials are products that pose a risk to health, safety and property during transportation. The term often is shortened to HAZMAT, which you may see on road signs, or to HM or HME in government regulations. Hazardous materials include explosives, various types of gas, solids, flammable and combustible liquid, and other materials. Because of the risks involved and the potential consequences these risks impose, the handling of hazardous materials is very heavily regulated by all levels of government.

The Hazardous Materials Regulations (HMR) are found in parts 171-180 of title 49 of the Code of Federal Regulations. The common reference for these regulations is 49 CFR 171-180.

The Department of Homeland Security Hazmat Regulations are found in part 1572. This is where it is noted that a Federal Security Threat Assessment is required for all individuals applying for a HAZMAT Endorsement on their CDL.

The Hazardous Materials Table in these regulations contains a list of these items. However, this list is not all-inclusive. Whether or not a material is considered hazardous is based on its characteristics and the shipper's decision on whether or not the material meets a definition of a hazardous material in the regulations.

The regulations require vehicles transporting certain types or quantities of hazardous materials to display diamond-shaped, square-on-point, warning signs called placards.

This publication is designed to assist you in understanding your role and responsibilities in hauling hazardous materials. Due to the constantly changing nature of government regulations, it is impossible to guarantee absolute accuracy of the materials in this section. An up-to-date copy of the complete regulations is essential for you to have. Included in these regulations is a complete glossary of terms.

You must have a commercial driver's license (CDL) with a hazardous materials endorsement before driving vehicles carrying hazardous materials which require placards. You must pass a written test about the regulations and requirements and successfully complete a Federal Security Threat Assessment to get this endorsement.

Federal regulations issued in support of the USA PATRIOT Act, require completion of a Federal Security Threat Assessment. PennDOT must receive clearance from the U.S. Department of Homeland Security, Transportation Security Administration (TSA), prior to the issuance of a Hazardous Materials Endorsement.

Everything you need to know to pass the written test is in this publication. However, this is only a beginning. Most drivers need to know much more on the job. You can learn more by reading and understanding the federal and state rules applicable to hazardous materials as well as attending hazardous materials training courses. These courses are usually offered by your employer, colleges and universities, and various associations. You can get copies of the Federal Regulations (49 CFR) through your local Government Printing Office bookstore and various industry publishers. Union or company offices often have copies of the rules for driver use. Find out where you can get your own copy to use on the job.

The regulations require training and testing for all drivers involved in transporting hazardous materials. Your employer or a designated representative is required to provide this training and testing. Hazardous materials employers are required to keep a record of that training on each employee as long as the employee is working with hazardous materials and for 90 days thereafter. The regulations require that hazardous materials employees be trained and tested at least once every three years. A dated certificate of radioactive materials training must be carried by the driver. The training must have occurred within the last two (2) years if the driver transports **route controlled** radioactive materials.

Some locations require permits to transport certain explosives or bulk hazardous wastes. States and counties also may require drivers to follow special hazardous materials routes. The Federal Government may require permits or exemptions for special hazardous materials cargo such as rocket fuel. Find out about permits, exemptions and special routes for places you drive.

OVERVIEW AND PROCEDURES

State and Federal law requires all commercial motor vehicle operators who transport Hazardous Materials (HAZMAT) and wish to retain a HAZMAT endorsement (H or X endorsement on their Commercial Driver's License) to take and pass the written English version of the HAZMAT Knowledge Test, before every renewal of their Commercial Driver's License (CDL). You must also maintain a valid Security Threat Assessment.

Commercial drivers who possess a CDL with a HAZMAT endorsement will receive a "Hazardous Material Recertification Notice" (DL-746CD) approximately seven (7) months before their CDL expiration date. This notice will act as your test authorization and should be taken with you when you go to take the recertification test. The application for Security Threat Assessment (DL-288) will be mailed 90 days prior to expiration date of your current Security Threat Assessment.

Effective May 31, 2005

Drivers must complete the following prior to having a CDL with HAZMAT Endorsement reissued:

- Pass the HAZMAT recertification knowledge test
- Appear at a Driver License Center and provide proof of U.S. Citizenship or proof of appropriate immigration status.
- Complete a Federal Security Threat Assessment application, if applicable
- Pay a Federal TSA Security Threat Assessment application fee
- Pay a fingerprint check fee
- Appear at an approved PennDOT fingerprint location to be fingerprinted for the Federal Security Threat Assessment
- PennDOT must receive clearance from the Federal Department of Homeland Security, Transportation Security Administration for you to transport hazardous materials.
- Submit a renewal application
- Pay the Pennsylvania renewal fee

Commercial Drivers who wish to retain a HAZMAT endorsement on their CDL should visit the testing location of their choice as soon as possible following receipt of the Recertification Notice. Effective 05/31/05, drivers renewing a CDL with HAZMAT endorsement also need to successfully complete a Federal Security Threat Assessment if current Security Threat Assessment is not valid.

NOTE: If an individual passes the HAZMAT re-test and the results are not credited to the driver's record before they renew their CDL, the renewed CDL **will not** display an "H" or "X" endorsement. Should this occur and a HAZMAT endorsement is needed, the driver **MUST** apply for a CDL HAZMAT Learner's Permit and complete the HAZMAT Knowledge Test to obtain the "H" or "X" endorsement. Additional information is available on our website at www.dmv.pa.gov.

QUESTIONS AND ANSWERS

- Q. How often must I take and pass the HAZMAT test?
- A. Prior to every CDL renewal, i.e., before the expiration date that is printed on your CDL.
- Q. Will I be reminded when to take the HAZMAT Recertification Test?
- A. Yes. The Pennsylvania Department of Transportation will mail HAZMAT Recertification Notices to ALL individuals who have a HAZMAT endorsement on their CDL approximately seven (7) months before the expiration date of their CDL.
- Q. What happens if I lose or misplace my HAZMAT Recertification Notice?
- A. You do not need to present the HAZMAT recertification notice when appearing at your local Driver License Center to begin your security threat assessment or take the HAZMAT knowledge test.

- Q. How many chances do I have to pass the HAZMAT Recertification test?
- A. Like any other CDL test, you will be allowed to take the test three (3) times. If you fail the recertification test the third time, you will be required to obtain a Learner's Permit and take the HAZMAT Knowledge Test.
- Q. What happens if I do not pass the HAZMAT test by the expiration date of my CDL?
- A. If you have not passed the HAZMAT test by the time your CDL expires, you will be decertified and will not be allowed to operate a vehicle which transports hazardous materials until you obtain a Learner's Permit and pass the HAZMAT Knowledge Test and successfully complete a Security Threat Assessment if current Security Threat Assessment is not valid.
- Q. Where do I go to take the written HAZMAT test?
- A. The HAZMAT test can be taken at any CDL Knowledge Test Site. A pamphlet listing test site locations should be included with your HAZMAT Recertification Notice (DL-746CD).
- Q. What does the federal security threat assessment consist of?
- A. In general, CDL drivers who apply for HAZMAT endorsement or renew their CDL with a HAZMAT endorsement will be required to:
- Provide proof of U.S. citizenship or appropriate immigration status at a PennDOT Driver License Center
 - Submit a Federal "Application for Security Threat Assessment" (Form DL-288, available on PennDOT's Driver and Vehicle Services website, www.dmv.pa.gov), if applicable
 - Pay all federal fees, as indicated on the DL-288. The federal fees will include a Federal Security Threat Assessment fee (federal criminal history background check) and a fingerprint fee.
 - Have their fingerprints taken at an approved PennDOT fingerprint location

Additional information is available on PennDOT's Driver & Vehicle Services website, www.dmv.pa.gov

- Q. How long is a Federal Security Threat Assessment valid for?
- A. A Federal Security Threat Assessment is valid for 5 years from date of issuance.
- Q. How often must CDL HAZMAT drivers apply for the Federal Security Threat Assessment and be fingerprinted?
- A. Every time a HAZMAT endorsement is initially issued or if current Federal Security Threat Assessment has expired.
- Q. Will I have to take a driving test if I already have a CDL and get a Learner's Permit for HAZMAT?
- A. No. You will only be required to take and pass the HAZMAT Written Knowledge Test.

THE INTENT OF THE REGULATIONS

CONTAIN THE MATERIAL

Transporting hazardous materials can be risky. The regulations are intended to protect you, those around you and the environment. They tell shippers how to package the materials safely and drivers how to load, transport and unload the material. These are called "containment rules."

COMMUNICATE THE RISK

To communicate the risk, shippers must warn drivers and others about the material's hazards. The regulations require shippers to put hazard warning labels on packages, provide proper shipping papers, emergency response information and placards. These items communicate the hazard to the shipper, the carrier and the driver.

ASSURE SAFE DRIVERS AND EQUIPMENT

In order to get a hazardous materials endorsement on a CDL, you must pass a written test about transporting hazardous materials. To pass the test, you must know how to:

- Identify what are hazardous materials.
- Safely load shipments.
- Properly placard your vehicle in accordance with the rules.
- Safely transport shipments.

Learn the rules and follow them. Following the rules reduces the risk of injury from hazardous materials. Taking shortcuts by breaking rules is unsafe. Rule breakers can be fined and put in jail.

Inspect your vehicle before and during each trip. Law enforcement officers may stop and inspect your vehicle. When stopped, they may check your shipping papers, vehicle placards, the hazardous materials endorsement on your driver's license and your knowledge of hazardous materials.

HAZARDOUS MATERIALS TRANSPORTATION – WHO DOES WHAT

THE SHIPPER

- Sends products from one place to another by truck, rail, vessel or airplane.
- Uses the hazardous materials regulations to determine the product's:
 - Proper Shipping name.
 - Hazard class.
 - Identification number.
 - Correct packaging.
 - Correct label and markings.
 - Correct placards.
- Must package, mark and label the materials; prepare shipping papers; provide emergency response information; and supply placards.
- Certify on the shipping paper that the shipment has been prepared according to the rules (unless you are pulling cargo tanks supplied by you or your employer.)

THE CARRIER

- Takes the shipment from the shipper to its destination.
- Prior to transportation, checks that the shipper correctly described, marked, labeled and otherwise prepared the shipment for transportation.
- Refuses improper shipments.
- Reports accidents and incidents involving hazardous materials to the proper government agency.

THE DRIVER

- Makes sure the shipper has identified, marked and labeled the hazardous materials properly.
- Refuses leaking packages and shipments.
- Placards his vehicle when loading, if required.
- Safely transports the shipment without delay.
- Follows all special rules about transporting hazardous materials.
- Keeps hazardous materials shipping papers and emergency response information in the proper place.

COMMUNICATION RULES

DEFINITIONS

Some words and phrases have special meanings when talking about hazardous materials. Some of these may differ from meanings you are used to. The words and phrases in this publication may be on your test. The meanings of other important words are in the glossary at the end of this publication.

A material's hazard class reflects the risks associated with it. There are 9 different hazard classes. Figure 1 tells the exact meaning of each hazard class. The types of material included in these 9 classes are in the table below:

Figure 1: Hazardous Materials Hazard Class/Division Table

Class	Division	Name of Class or Division	Example
1	1.1	Mass Explosives	Dynamite
	1.2	Projection Hazards	Ammunition, Incendiaries, Flares
	1.3	Mass Fire Hazards	Display Fireworks
	1.4	Minor Hazards	Ammunition
	1.5	Very Insensitive	Blasting Agents
	1.6	Extremely Insensitive	Explosive, Detonating Devices
2	2.1	Flammable Gases	Propane
	2.2	Non-Flammable Gases	Helium
	2.3	Poisonous/Toxic Gases	Fluorine, Compressed
3	—	Flammable Liquids	Gasoline
4	4.1	Flammable Solids	Ammonium Picrate, Wetted
	4.2	Spontaneously Combustible	White Phosphorous
	4.3	Dangerous When Wet	Sodium
5	5.1	Oxidizers	Ammonium Nitrate
	5.2	Organic Peroxides	Organic Peroxide Type B, Solid
6	6.1	Poison (Toxic Material)	Potassium Cyanide
	6.2	Infectious Substances	Infectious Substances Affecting Animals, Anthrax Virus
7	—	Radioactive	Uranium
8	—	Corrosives	Battery Fluid
9	—	Miscellaneous Hazardous Materials	Polychlorinated Biphenyls (PCB)
None	—	ORM-D (Other Regulated Material - Domestic)	Food Flavorings, Medicines
None	—	Combustible Liquids	Fuel Oil

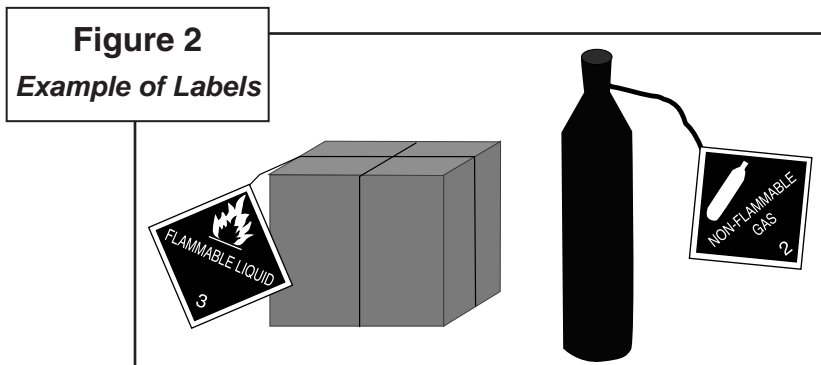
A shipping paper describes the hazardous materials being transported. Shipping orders, bills of lading and manifests are all shipping papers. Figure 6 shows an example of shipping paper.

After an accident or hazardous materials spill or leak, you may be injured and unable to communicate the hazards of the materials you are transporting. Firefighters and police can prevent or reduce the amount of damage or injury at the scene if they know what hazardous materials are being carried. Your life, and the lives of others, may depend on quickly locating the hazardous materials shipping papers. For that reason the rules:

- Require shippers to describe hazardous materials correctly and include an emergency response telephone number on shipping papers.
- Require carriers and drivers to put tabs on hazardous materials shipping papers, or keep them on top of other shipping papers and keep the required emergency response information with the shipping papers.
- Require drivers to keep hazardous materials shipping papers:
 - In a pouch on the driver's door, or
 - In clear view within immediate reach while the seat belt is fastened while driving, or
 - On the driver's seat when out of the vehicle.

PACKAGE LABELS

Shippers put diamond-shaped hazard warning labels on most hazardous materials packages. These labels inform others of the hazard. If the diamond label won't fit on the package, shippers may put the label on a tag securely attached to the package. For example, compressed gas cylinders that will not hold a label will have tags or decals. Labels look like the example in figure 2.



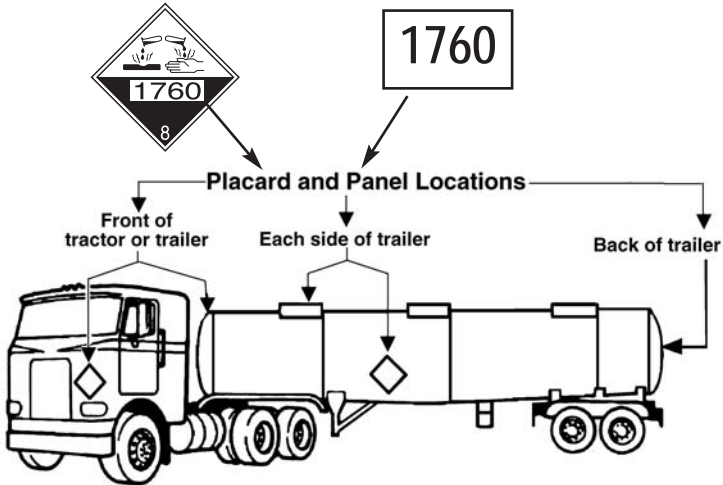
LISTS OF REGULATED PRODUCTS

Placards are used to warn others of hazardous materials. Placards are signs put on the outside of a vehicle which identify the hazard class of the cargo. A placarded vehicle must have at least 4 identical placards. They are put on the front, rear and both sides of the vehicle (see figure 3). Placards must be readable from all four directions. They are 10 3/4 inches (273 mm) square, square-on-point, in a diamond shape. Cargo tanks and other bulk packaging display the I.D. number of their contents on placards or orange panels or white square-on-point displays that are the same size as placards.

Figure 3

Placard and Panel Locations

Hazardous material identification numbers may be displayed on placards or orange panels.



There are three main lists used by shippers, carriers and drivers when trying to identify hazardous materials. Before transporting a material, look for its name on all three lists which can be found in the Hazardous Materials Regulations. Some materials are on all lists, others on only one. Always check the following lists:

- Section 172.101, the Hazardous Materials table.
- Appendix A to Section 172.101, the List of Hazardous Substances and Reportable Quantities.
- Appendix B to Section 172.101, the List of Marine Pollutants.

THE HAZARDOUS MATERIALS TABLE

Figure 4 shows part of the Hazardous Materials Table. Column 1 tells which shipping mode(s) the entry affects and other information concerning the shipping description. The next five columns show each material's shipping name, hazard class or division, ID number, packaging group and required labels.

Five (5) different symbols may appear in Column 1 of the table.

- (+) Shows the proper shipping name, hazard class and packing group to use, even if the material doesn't meet the hazard class definition.
- (A) Means the hazardous material described in Column 2 is subject to the HMR only when offered or intended for transport by air unless it is a hazardous substance or hazardous waste.
- (W) Means the hazardous material described in Column 2 is subject to the HMR only when offered or intended for transportation by water unless it is a hazardous substance, hazardous waste or marine pollutant.
- (D) Means the proper shipping name is appropriate for describing materials for domestic transportation, but may not be proper for international transportation.
- (I) Identifies a proper shipping name that is used to describe materials in international transportation. A different shipping name may be used when only domestic transportation is involved.

Column 2 lists the proper shipping names and descriptions of regulated materials. Entries are in alphabetical order so you can more quickly find the right entry. The table shows proper shipping names in regular type. The shipping paper must show proper shipping names. Names shown in italics are not proper shipping names.

Column 3 shows a material's hazard class or division, or the entry "Forbidden." Never transport a "Forbidden" material. You placard shipments based on the quantity and hazard class. You can decide which placards to use if you know these three things:

- Material's hazard class.
- Amount being shipped.
- Amount of all hazardous materials of all classes on your vehicle.

Column 4 lists the identification number for each proper shipping name. Identification numbers are preceded by the letters "UN" or "NA." The letters "NA" are associated with proper shipping names that are only used within the United States and to and from Canada. The identification number must appear on the shipping paper as part of the shipping description and also appear on the package. It also must appear on cargo tanks and other bulk packaging. Police and firefighters use this number to quickly identify the hazardous materials.

Column 5 shows the packing group assigned to a material.

Column 6 shows the hazard warning label(s) shippers must put on packages of hazardous materials. Some products require use of more than one label due to a dual hazard being present. No label is needed where the table shows the word NONE.

Column 7 lists the additional (special) provisions that apply to this material. When there is an entry in this column, you must refer to the federal regulations for specific information.

Column 8 is a three-part column showing the section numbers covering the packaging requirements for each hazardous material.

NOTE: Columns 9 and 10 do not apply to transportation by highway.

Figure 4: Part of the Hazardous Materials Table

§172.101 HAZARDOUS MATERIALS TABLE									
Symbols (1)	Hazardous Materials Descriptions and Proper Shipping Names (2)	Hazard Class or Division (3)	Identification Numbers (4)	Packing Group (5)	Label Codes (6)	Special Provisions (7)	(8) Packaging Authorizations (§ 173.***)		
							Excep-tions (8A)	Non-bulk pack-aging (8B)	Bulk pack-aging (8C)
_____	TOXIC SOLIDS SELF-HEATING, N.O.S.	6.1	UN3124	I	6.1, 4.2	A5_____	None	211	241

APPENDIX A TO §172.101 - THE LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

The DOT and the EPA want to know about spills of **hazardous substances**. They are named in the List of Hazardous Substances and Reportable Quantities (see figure 5). Column 3 of the list shows each product's reportable quantity (RQ). When these materials are being transported in a reportable quantity or greater in one package, the shipper displays the letters RQ on the shipping paper and package. The letters RQ may appear before or after the basic description. You or your employer must report any spill of these materials which occurs in **a reportable quantity**.

If the words POISON INHALATION HAZARD appear on the shipping paper or package, the rules require display of the POISON INHALATION HAZARD placards, as appropriate. These placards must be used in addition to other placards which may be required by the product's hazard class. Always display the hazard class placard and the POISON INHALATION HAZARD placard, even for small amounts.

Spills of 10 pounds or more must be reported.

Figure 5: List of Hazardous Substances

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES (continued)			
Hazardous Substance	Synonyms		Reportable Quantity (RQ Pounds (Kilograms))
Phenyl mercaptan @	Benzinethiol Thiophenol		100 (45.4)
Phenylmercuric acetate	Mercury, (acetato-0) phenyl		100 (45.4)
N-Phenylthiourea	Thiourea, phenyl		100 (45.4)
Phorate	Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methylester		10 (4.54)
Phosgene	Carbonyl chloride		10 (4.54)
Phosphine	Hydrogen Phosphide		100 (45.4)
Phosphoric acid			5000 (2270)
Phosphoric acid, diethyl 4-nitrophenyl ester	Diethyl-p nitrophenyl phosphate		100 (45.4)
Phosphoric acid, lead salt	Lead Phosphate		1 (0.454)

TEST YOUR KNOWLEDGE

1. Shippers package in order to (fill in the blank) the material.
2. Drivers placard their vehicle to (fill in the blank) the risk.
3. What three things do you need to know to decide which placards (if any) you need?
4. A hazardous materials ID number must appear on the (fill in the blank) and on the (fill in the blank). The identification number must also appear on cargo tanks and other bulk packagings, package and cylinder.
5. Where must you keep shipping papers describing hazardous materials?



These questions may be on the test.

If you can't answer them all, re-read pages 1 through 12

THE SHIPPING PAPER

The shipping paper shown in figure 6 describes a shipment. A shipping paper for hazardous materials must include:

- Page numbers if the shipping paper has more than one page. The first page must tell the total number of pages. For example, "Page 1 of 4."
- A proper shipping description for each hazardous material.
- A "**shipper's certification**," signed by the shipper, saying they prepared the shipment according to the rules.

THE ITEM DESCRIPTION

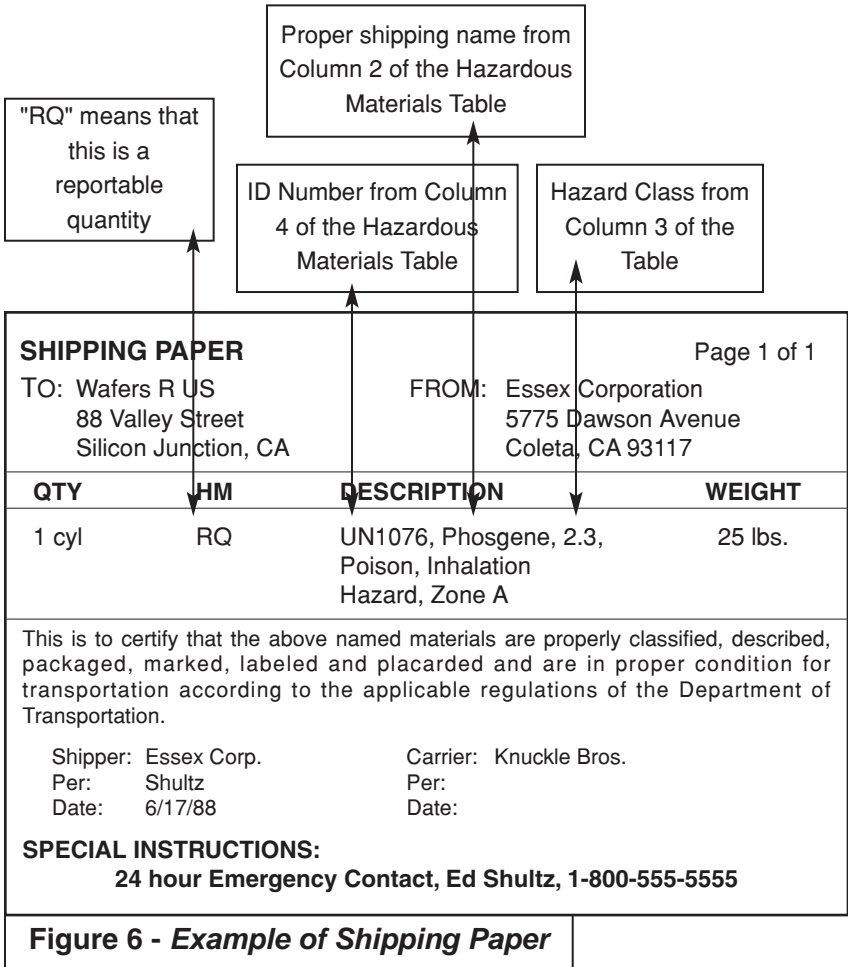
If a shipping paper describes both hazardous and non-hazardous products, the hazardous materials will be either:

- Described first, or
- Highlighted in a contrasting color, or
- Identified by an "X" placed before the shipping name in a column captioned "HM." The letters "RQ" may be used instead of "X" if a reportable quantity is present in one package.

The basic description of hazardous materials includes the identification number, proper shipping name, hazard class or division, and the packing group, if any, in that order. The packing group is displayed in Roman numerals and may be preceded by "PG."

Shipping name, hazard class, and ID number must not be abbreviated unless specifically authorized in the hazardous materials regulations. The description must also show:

- The total quantity and unit of measure, and
- The letters RQ, if a reportable quantity.
- If the letters RQ appear, the name of the hazardous substance.
- For "n.o.s." and generic descriptions, the technical name of the hazardous material.



Shipping papers also must list an emergency response telephone number. The emergency response telephone number is the responsibility of the shipper. It can be used by emergency responders to obtain information about any hazardous materials involved in a spill or fire.

Shippers also must provide emergency response information to the motor carrier for each hazardous material being shipped. The emergency response information must be able to be used away from the motor vehicle and must provide information on how to safely handle incidents involving the material. It must include information on the shipping name of the hazardous materials, risks to health, fire, explosion, and initial methods of handling spills, fires, and leaks of the materials.

Such information can be on the shipping paper or some other document that includes the basic description and technical name of the hazardous material. Or, it may be in a guidance book such as the Emergency Response Guidebook (ERG). Motor carriers may assist shippers by keeping an ERG on each vehicle carrying hazardous materials. The driver must provide the emergency response information to any federal, state, or local authority responding to a hazardous materials incident or investigating one.

Total quantity must appear before or after the basic description. The packaging type and the unit of measurement may be abbreviated. For example:

10 ctns. Paint, 3, UN1263, PG II, 500 lbs.

The shipper of hazardous wastes must put the word WASTE before the proper shipping name of the material on the shipping paper (**hazardous waste manifest**). For example:

UN1090, PG II, Waste Acetone, 3.

A non-hazardous material may **not** be described by using a hazard class or an ID number.

SHIPPERS CERTIFICATION

When the shipper packages hazardous materials, he/she certifies that the package has been prepared according to the rules. The signed shipper's certification appears on the original shipping paper. The only exceptions are when a shipper is a private carrier transporting their own product and when the package is provided by the carrier (**for example, a cargo tank**). Unless a package is clearly unsafe or does not comply with the HMR, you may accept the shipper's certification concerning proper packaging. Some carriers have additional rules about transporting hazardous materials. Follow your employer's rules when accepting shipments.

PACKAGE MARKINGS AND LABELS

Shippers print required markings directly on the package, an attached label, or tag. An important package marking is the name of the hazardous materials. It is the same name as the one on the shipping paper. When required, the shipper will put the following on the package:

- The name and address of shipper or consignee.
- The hazardous material's shipping name and ID number.
- The labels required.

If the rules require it, the shipper also will put RQ or INHALATION HAZARD on the package. Packages with liquid containers inside will also have package orientation markings with the arrows pointing in the correct upright direction. The labels used always reflect the hazard class of the product. If a package needs more than one label, the labels will be close together, near the proper shipping name.

RECOGNIZING HAZARDOUS MATERIALS

Learn to recognize shipments of hazardous materials. To find out if the shipment includes hazardous materials, look at the shipping paper. Does it have:

- An entry with a proper shipping name, hazard class, and ID number?
- A highlighted entry, or one with an X or RQ in the hazardous materials column?

Other clues suggesting hazardous materials:

- What business is the shipper in? Paint Dealer? Chemical supply? Scientific supply house? Pest control or agricultural supplier? Explosives, munitions, or fireworks dealer?
- Are there tanks with diamond labels or placards on the premises?
- What type of package is being shipped? Cylinders and drums are often used for hazardous materials shipments.
- Is a hazard class label, proper shipping name, or ID number on the package?
- Are there any handling precautions?

HAZARDOUS WASTE MANIFEST

When transporting hazardous wastes, you must sign by hand and carry a Uniform Hazardous Waste Manifest. The name and EPA registration number of the shippers, carriers, and destination must appear on the manifest. Shippers must prepare, date, and sign by hand the manifest. Treat the manifest as a shipping paper when transporting the waste. Only give the waste shipment to another registered carrier or disposal/treatment facility. Each carrier transporting the shipment must sign by hand the manifest. After you deliver the shipment, keep your copy of the manifest. Each copy must have all needed signatures and dates, including those of the person to whom you delivered the waste.

PLACARDING

Attach the appropriate placards to the vehicle before you drive it. You are only allowed to move an improperly placarded vehicle during an emergency, in order to protect life or property.

Placards must appear on both sides and ends of the vehicle. Each placard must be:

- Easily seen from the direction it faces.
- Placed so the words or numbers are level and read from left to right.
- At least 3 inches (**76.2 mm**) away from any other markings.
- Kept clear of attachments or devices such as ladders, doors, and tarpaulins.
- Kept clean and undamaged so that the color, format, and message are easily seen.

To decide which placards to use, you need to know:

- The hazard class of the materials.
- The amount of hazardous materials shipped.
- The total weight of all classes of hazardous materials in your vehicle.

Always make sure that the shipper shows the correct basic description on the shipping paper and verifies that the proper labels are shown on the packages. If you are not familiar with the material, ask the shipper to contact your office.

PLACARD TABLES

There are two placard tables, Table 1 and Table 2. Table 1 materials must be placarded whenever any amount is transported.

PLACARD TABLE 1 - ANY AMOUNT

IF YOUR VEHICLE CONTAINS ANY AMOUNT OF. . .	PLACARD AS. . .
1.1	EXPLOSIVE 1.1
1.2	EXPLOSIVE 1.2
1.3	EXPLOSIVE 1.3
2.3	POISON GAS
4.3	DANGEROUS WHEN WET
6.1 (PG I, inhalation hazard only)	POISON INHALATION HAZARD PLACARD
7 (Radioactive Yellow III label only)	RADIOACTIVE

Except for bulk packagings, the hazard classes in Table 2 need placards only if the total amount transported is 1,001 lbs. (454 kg) or more including the package. Add the amounts from all shipping papers for all the Table 2 products you have on board. You may use DANGEROUS placards instead of separate placards for each Table 2 hazard class when:

- You have 1,001 lbs. (454 kg) or more of two or more Table 2 hazard classes, requiring different placards and
- You have **not** loaded 5,000 lbs. (2,268 kg) or more of any Table 2 hazard class material at any one place. (You must use the specific placard for this material.)

If the word INHALATION HAZARD are on the shipping paper or package, you must display POISON INHALATION HAZARD placards in addition to any other placards needed by the product's hazard class.

You need not use EXPLOSIVES 1.5, OXIDIZER, and DANGEROUS placards if a vehicle contains Division 1.1 or 1.2 explosives and is placarded with EXPLOSIVES 1.1 or 1.2 placards. You need not use a Division 2.2 NON-FLAMMABLE GAS placard on a vehicle displaying a Division 2.1 FLAMMABLE GAS or for oxygen a Division 2.2 OXYGEN placard.

Placards used to identify the primary hazard class of a material must have the hazard class or division number displayed in the lower corner of the placard. No hazard class or division number is allowed on placards used to identify a secondary hazard class of a material.

Placards may be displayed for hazardous materials even if not required so long as the placard identifies the hazard of the material being transported.

PLACARD TABLE 2 - 1,001 LBS. (454 kg) OR MORE

CATEGORY OF MATERIAL <i>(Hazard class or division number and additional description, as appropriate)</i>	PLACARD NAME
1.4	EXPLOSIVES 1.4
1.5	EXPLOSIVES 1.5
1.6	EXPLOSIVES 1.6
2.1	FLAMMABLE GAS
2.2	NON-FLAMMABLE GAS
3	FLAMMABLE
Combustible liquid	COMBUSTIBLE *
4.1	FLAMMABLE SOLID

(continued)

Placard Table 2 - 1,001 lbs. (454 kg) or more (continued)

4.2	SPONTANEOUSLY COMBUSTIBLE
5.1	OXIDIZER
5.2	ORGANIC PEROXIDE
6.1 (PG I or II, other than PG I Inhalation hazard)	POISON
6.1 (PG III)	KEEP AWAY FROM FOOD
6.2	(NONE)
8	CORROSIVE
9	CLASS 9**
ORM-D	(NONE)

* FLAMMABLE placard may be used in place of COMBUSTIBLE placard on a cargo tank or portable tank.

** Class 9 placard is not required for domestic transportation.

TEST YOUR KNOWLEDGE

1. What is a shipper's certification? Where does it appear? Who signs it?
2. When may non-hazardous materials be described by hazard class words or ID numbers?
3. Name five hazard classes that require placarding in **any** amount.
4. A shipment described on the Hazardous Waste Manifest may only be delivered to another **(fill in the blank)** carrier or treatment facility, which then signs the **(fill in the blank)** giving you a copy which you must keep.
5. Your load includes 20 lbs. **(9.1 kg)** of Division 2.3 gas and 1,001 lbs. **(454 kg)** of flammable gas. What placards do you need, if any?



These questions may be on the test.

If you can't answer them all, re-read pages 13 through 19.

LOADING AND UNLOADING

GENERAL LOADING REQUIREMENTS

- Do all you can to protect containers of hazardous materials. Don't use any tools which might damage containers or other packaging during loading. Don't use hooks.
- Before loading or unloading, set the parking brake. Make sure the vehicle will not move.
- Many products become more hazardous when exposed to heat. Load hazardous materials away from heat sources.
- Watch for signs of leaking or damaged containers: LEAKS SPELL TROUBLE! Do not transport leaking packages. Depending on the material, you, your truck, and others could be in danger.

Containers of Class 1 (**explosives**), Class 3 (**flammable liquids**), Class 4 (**flammable solids**), Class 5 (**oxidizers**), Class 8 (**corrosives**), Class 2 (**gases**), and Division 6.1 (**poisons**) must be braced to prevent movement of the packages during transportation.

NO SMOKING

When loading or unloading hazardous materials, keep fire away. Don't let people smoke nearby. Never smoke around:

Class 1
EXPLOSIVES

Division 2.1
FLAMMABLE GAS

Class 4
FLAMMABLE SOLIDS

Class 5
OXIDIZERS

Class 3
FLAMMABLE LIQUIDS

SECURE AGAINST MOVEMENT

Brace containers so they will not fall, slide, or bounce around during transportation. Be very careful when loading containers that have valves or other fittings.

After loading, do not open any package during your trip. Never transfer hazardous materials from one package to another while in transit. You may empty a cargo tank, but do not empty any other package while it is on the vehicle.

CARGO HEATER RULES

There are special cargo heater rules for loading:

Class 1
EXPLOSIVES

Class 3
FLAMMABLE LIQUIDS

Division 2.1
FLAMMABLE GAS

The rules usually forbid use of cargo heaters, including automatic cargo heater/air conditioner units. Unless you have read all the related rules, don't load the above products in a cargo space that has a heater.

USE CLOSED CARGO SPACE

You cannot have overhang or tailgate loads of:

Class 1
EXPLOSIVES

Class 4
FLAMMABLE SOLIDS

Class 5
OXIDIZERS

You must load these hazardous materials into a closed cargo space unless all packages are:

- Fire and water resistant, or
- Covered with a fire and water resistant tarp.

PRECAUTIONS FOR SPECIFIC HAZARDS

EXPLOSIVES

Turn your engine off before loading or unloading any explosives. Then check the cargo space. You must:

- Disable cargo heaters. Disconnect heater power sources and drain heater fuel tanks.
- Make sure there are no sharp points that might damage cargo. Look for bolts, screws, nails, broken side panels, and broken floor boards.
- Use a floor lining with Division 1.1, 1.2, or 1.3 (**Class A or B explosives**). The floors must be tight and the liner must be either non-metallic material or non-ferrous metal.

Use extra care to protect explosives. Never use hooks or other metal tools. Never drop, throw, or roll packages. Protect explosive packages from other cargo that might cause damage.

Do not transfer a Division 1.1, 1.2, or 1.3 (**Class A or B explosive**) from one vehicle to another on a public roadway except in an emergency. If safety requires an emergency transfer, set out red warning reflectors, flags, or electric lanterns. You must warn others on the road.

Never transport damaged packages of explosives. Do not take a package that shows any dampness or oily stain.

Do not transport Division 1.1 or 1.2 (**Class A explosives**) in triples or in vehicle combinations if:

- There is a marked or placarded cargo tank in the combination, or
- The other vehicle in the combination contains:
 - Division 1.1 A (**initiating explosives**).
 - Packages of Class 7 (**radioactive**) materials labeled "Yellow III,"
 - Division 2.3 (**poisonous gas**) or Division 6.1 (**Poisonous**) materials.
 - Hazardous materials in a portable tank, on a DOT Spec 106A or 110A tank.

CLASS 8 (CORROSIVE) MATERIALS

If loading by hand, load breakable containers of corrosive liquid one by one. Keep them right side up. Do not drop or roll the containers. Load them onto an even floor surface. Stack carboys only if the lower tiers can bear the weight of the upper tiers safely.

Do not load nitric acid above any other product, or stack more than two high.

Load charged storage batteries so their liquid won't spill. Keep them right side up. Make sure other cargo won't fall against or short circuit them.

Never load corrosive liquids next to or above:

- Division 1.4 (**Explosives C**).
- Class 4.1 (**Flammable Solids**).
- Class 5.1 (**Oxidizers**).
- Division 2.3, Zone B (**Poisonous Gases**).

Never load corrosive liquids with:

- Division 1.1 or 1.2 (**Explosives A**).
- Division 2.3, Zone A (**Poisonous Gases**).
- Division 4.2 (**Spontaneously Combustible Materials**).
- Division 6.1, PGI, Zone A (**Poison Liquids**).

CLASS 2 (COMPRESSED GAS) INCLUDING CRYOGENIC LIQUIDS

If your vehicle doesn't have racks to hold cylinders, the cargo space floor must be flat. The cylinders must be:

- Held upright or braced laying down flat, or
- In racks attached to the vehicle, or
- In boxes that will keep them from turning over.

DIVISION 2.3 (POISONOUS GAS) OR DIVISION 6.1 (POISONOUS) MATERIALS

Never transport these materials in containers with interconnections. Never load a package labeled POISON or POISON GAS in the driver's cab or sleeper or with food material for human or animal consumption.

CLASS 7 (RADIOACTIVE) MATERIALS

Some packages of Class 7 (**radioactive**) materials bear a number called the "transport index." The shipper labels these packages Radioactive II or Radioactive III, and prints the package's transport index on the label. Radiation surrounds each package, passing through all nearby packages. To deal with this problem, the number of packages you can load together is controlled. Their closeness to people, animals, and unexposed film is also controlled. The transport index tells the degree of control needed during transportation. The total transport index of all packages in a single vehicle must not exceed 50.

Appendix A to this section shows rules for each transport index. It shows how close you can load Class 7 (**radioactive**) materials to people, animals, or film. For example, you can't leave a package with a transport index of 1.1 within 2 feet of people or cargo space walls.

MIXED LOADS

The rules require some products to be loaded separately. You cannot load them together in the same cargo space. Figure 7 lists some examples. The regulations (**the Segregation and Separation Chart**) name other materials you must keep apart.

Figure 7 - Prohibited Loading Combinations

DO NOT LOAD. . .	IN THE SAME VEHICLE WITH. . .
Division 6.1 or 2.3 (POISON or poison gas labeled material)	Animal or human food unless the poison package is overpacked in an approved way. Foodstuffs are anything you swallow. However, mouthwash, toothpaste, and skin creams are not foodstuff.
Division 2.3 (poisonous) gas Zone A or Division 6.1 liquids, PGI, Zone A	Division 5.1 (oxidizers), Class 3 (flammable liquid), Class 8 (corrosive liquids), Division 5.2 (organic peroxides), Division 1.1., 1.2, 1.3 (Class A or B) explosives, Division 1.5 (blasting agents), Division 2.1 (Flammable gases), Class 4 (flammable solids).
Charged storage batteries	Division 1.1 (Class A Explosives)
(continued)	

Prohibited Loading Combinations (continued)

Division 1.4 (Detonating primers)	Any other explosives unless in authorized containers or packagings.
Division 6.1 (Cyanides or cyanide mixtures)	Acids, corrosive materials, or other acidic materials which could release hydrocyanic acid from cyanides. For example: Cyanides, Inorganic, n.o.s. Silver Cyanide Sodium Cyanide
Nitric acid (Class 8)	Other materials unless the nitric acid is not loaded above any other material and not more than two tiers high.

TEST YOUR KNOWLEDGE

1. Around which hazard classes must you never smoke?
2. Which three hazard classes should not be loaded into a trailer that has a heater/air conditioner unit?
3. Should the floor liner required for Division 1.1 or 1.2 (Explosives A) be stainless steel?
4. At the shipper's dock you're given a paper for 100 cartons of battery acid. You already have 100 lbs. (45.4 kg) of dry Silver Cyanide on board. What precautions do you have to take?
5. Name a hazard class that uses transport indexes to determine the amount that can be loaded in a single vehicle.



These questions may be on the test.
If you can't answer them all, re-read pages 20-24.

BULK PACKAGING MARKING, LOADING AND UNLOADING

The glossary at the end of this section gives the meaning of the word bulk. **Cargo tanks** are bulk packagings permanently attached to a vehicle. Cargo tanks remain on the vehicle when you load and unload them. **Portable tanks** are bulk containers which are not permanently attached to a vehicle.

The product is loaded or unloaded while the portable tanks are off the vehicle. Portable tanks are then put on a vehicle for transportation. There are many types of cargo tanks in use. The most common cargo tanks are MC306 for liquids and MC331 for gases.

MARKINGS

You must display the ID number of the hazardous materials in portable tanks and cargo tanks and other bulk packagings (such as dump trucks). ID numbers are in column 4 of the Hazardous Materials Table. The rules require black 100 mm (3.9 inch) numbers on orange panels, placards, or a white, diamond-shaped background if no placard is required. Specification cargo tanks must show retest date markings.

Portable tanks must also show the lessee or owner's name. They must also display the shipping name of the contents on two (2) opposing sides. The letters of the shipping name must be at least two (2) inches tall on portable tanks with capacities of more than 1,000 (3,785L) gallons and one (1) inch tall on portable tanks with capacities of less than 1,000 gallons (3,785L). The ID number must appear on each side **and** each end of a portable tank or other bulk packaging that hold 1,000 (3,785L) gallons or more and on two opposing sides if the portable tank holds less than 1,000 (3,785L) gallons. The ID numbers must still be visible when the portable tank is on the motor vehicle. If they are not visible, you must display the ID number on both sides and ends of the motor vehicle.

TANK LOADING

The person in charge of loading and unloading a cargo tank must be sure a qualified person is always watching. This person watching the loading or unloading must:

- Be alert.
- Have a clear view of the cargo tank.
- Be within 25 feet (7.6m) of the tank.
- Know of the hazards of the materials involved.
- Know the procedures to follow in an emergency, and
- Be authorized to move the cargo tank and able to do so.

Close all manholes and valves before moving a tank of hazardous materials, no matter how small the amount in the tank or how short the distance. Manholes and valves must be closed to prevent leaks.

FLAMMABLE LIQUIDS

Turn off your engine before loading or unloading any flammable liquids. Only run the engine if needed to operate a pump. Ground a cargo tank correctly

before filling it through an open filling hole. Ground the tank before opening the filling hole, and maintain the ground until after closing the filling hole.

COMPRESSED GAS

Keep liquid discharge valves on a compressed gas tank closed except when loading and unloading. Unless your engine runs a pump for product transfer, turn it off when loading or unloading. If you use the engine, turn it off after product transfer, before you unhook the hose. Unhook all loading/unloading connections before coupling, uncoupling, or moving a chlorine cargo tank. Always chock trailers and semi-trailers to prevent motion when uncoupled from the power unit.

TEST YOUR KNOWLEDGE

1. What are cargo tanks?
2. How is a portable tank different from a cargo tank?
3. Your engine runs a pump used during delivery of compressed gas. Should you turn off the engine **before** or **after** unlocking hoses after delivery?



These questions may be on the test.
If you can't answer them all, re-read pages 24-26.

HAZARDOUS MATERIALS - DRIVING & PARKING RULES

PARKING WITH DIVISION 1.1, 1.2, OR 1.3 (CLASS A OR B) EXPLOSIVES

Never park with Division 1.1, 1.2, or 1.3 (Class A or B) explosives within 5 feet (1.5m) of the traveled part of the road. Except for short periods of time needed for vehicle operation necessities (e.g., fueling), do not park within 300 feet (91.4m) of:

- A bridge, tunnel, or building, or
- A place where people gather, or
- An open fire.

If you must park to do your job, do so only briefly.

Don't park on private property unless the owner is aware of the danger. Someone must always watch the parked vehicle. You may let someone else watch it for you only if your vehicle is:

- On the shipper's property, or
- On the carrier's property, or
- On the consignee's property.

You are allowed to leave your vehicle unattended in a safe haven. A safe haven is an approved place for parking unattended vehicles loaded with explosives. Designation of authorized safe havens are usually made by local authorities.

PARKING A PLACARDED VEHICLE NOT TRANSPORTING DIVISION 1.1, 1.2, OR 1.3 (CLASS A OR B) EXPLOSIVES

You may park a placarded vehicle (not laden with explosives) within 5 feet (1.5m) of the traveled part of the road only if your work requires it. Do so only briefly. Someone must always watch the vehicle when parked on a public roadway or shoulder. Do not uncouple a trailer and leave it with hazardous materials on a public street. Do not park within 300 feet (91.4m) of an open fire.

ATTENDING PARKED VEHICLES

The persons attending a placarded vehicle must:

- Be in the vehicle, awake, and not in the sleeper berth, or within 100 feet (30.5m) of the vehicle and have it within clear view.
- Be aware of the hazards of the materials being transported.
- Know what to do in emergencies.
- Be able to move the vehicle, if needed.

NO FLARES!

You might break down and have to use stopped vehicle signals. Use reflective triangles or red electric lights. Never use burning signals, such as flares or fuses, around a:

- Tank used for Class 3 (flammable liquids) or Division 2.1 (flammable gas) whether loaded or empty.
- Vehicle loaded with Division 1.1, 1.2, or 1.3 (Class A or B) explosives.

ROUTE RESTRICTIONS

Some states and counties require permits to transport hazardous materials or wastes. They may limit the routes you can use. Local rules about routes

and permits change often. It is your job as driver to find out if you need permits or must use special routes. Make sure you have all needed papers before starting.

If you work for a carrier, ask your dispatcher about route restrictions or permits. If you are an independent trucker and are planning a new route, check with state agencies where you plan to travel. Some localities prohibit transportation of hazardous materials through tunnels, over bridges, or other roadways. Check before you start.

Whenever placarded, avoid heavily populated areas, crowds, tunnels, narrow streets, and alleys. Take other routes, even if inconvenient, unless there is no other way. Never drive a placarded vehicle near open fires unless you can safely pass without stopping.

If transporting Division 1.1, 1.2, or 1.3 (Class A or B) explosives, you must have a written route plan and follow that plan. Carriers prepare the route plan in advance and give the driver a copy. You may plan the route yourself if you pick up the explosives at a location other than your employer's terminal. Write out the plan in advance. Keep a copy of it with you while transporting the explosives. Deliver shipments of explosives only to authorized persons or leave them in locked rooms designed for explosives storage.

A carrier must choose the safest route to transport placarded radioactive materials. After choosing the route, the carrier must tell the driver about the radioactive materials, and show the route plan.

NO SMOKING

Do not smoke within 25 feet (7.6m) of a placarded cargo tank used for Class 3 (flammable liquids) or Division 2.1 (gases). Also, do not smoke or carry a lighted cigarette, cigar, or pipe within 25 feet (7.6m) of any vehicle which contains:

Class 1
EXPLOSIVES

Class 3
FLAMMABLE LIQUIDS

Class 4
FLAMMABLE SOLIDS

Class 5
OXIDIZERS

REFUEL WITH ENGINE OFF

Turn off your engine before fueling a motor vehicle containing hazardous materials. Someone must always be at the nozzle, controlling fuel flow.

10 B:C FIRE EXTINGUISHER

The power unit of placarded vehicles must have a fire extinguisher with a UL rating of 10 B:C or more.

CHECK TIRES

Make sure your tires are properly inflated. Check placarded vehicles with dual tires at the start of each trip and each time the vehicle is parked. The only acceptable way to check tire pressure is to use a tire pressure gauge.

Do not drive with a tire that is leaking or flat except to the nearest safe place to fix it. Remove any overheated tire. Place it a safe distance from your vehicle. Don't drive until you correct the cause of the overheating. Remember to follow the rules about parking and attending placarded vehicles. They apply even when checking, repairing, or replacing tires.

WHERE TO KEEP SHIPPING PAPERS AND EMERGENCY RESPONSE INFORMATION

Do not accept a hazardous materials shipment without a properly prepared shipping paper. A shipping paper for hazardous materials must always be easily recognized. Other people must be able to find it quickly after an accident.

- Clearly distinguish hazardous materials shipping papers from others by tabbing them or keeping them on top of the stack of papers.
- When you are behind the wheel, keep shipping papers within your reach (with your seat belt on), or in a pouch on the driver's door. They must be easily seen by someone entering the cab.
- When not behind the wheel, leave shipping papers in the driver's door pouch or on the driver's seat.
- Emergency response information must be kept in the same location as the shipping paper.

PAPER FOR DIVISION 1.1, 1.2, OR 1.3 (CLASS A OR B) EXPLOSIVES

A carrier must give each driver transporting Division 1.1, 1.2, or 1.3 (Class A or B) explosives a copy of Federal Motor Carrier Safety Regulations (FMCSR), Part 397. The carrier must also give written instructions on what to do if delayed or in an accident. The written instructions must include:

- The names and telephone numbers of people to contact (including carrier agents or shippers).
- The nature of the explosives transported.
- The precautions to take in emergencies such as fires, accidents, or leaks.

Drivers must sign a receipt for these documents.

You must be familiar with, and have in your possession while driving, the:

- Shipping papers.
- Written emergency instructions.
- Written route plan.
- A copy of FMCSR, Part 397.

EQUIPMENT FOR CHLORINE

A driver transporting chlorine in cargo tanks must have an approved gas mask in the vehicle. The driver must also have an emergency kit for controlling leaks in dome cover plate fittings on the cargo tank.

STOP BEFORE RAILROAD CROSSINGS

Stop before a railroad crossing if your vehicle:

- Is placarded, or
- Carries any amount of chlorine, or
- Has cargo tanks, whether loaded or empty, used for hazardous materials.

You must stop 15 to 50 feet (4.6 to 15.2m) before the nearest rail. Proceed only when you are sure no train is coming. Don't shift gears while crossing the tracks.

HAZARDOUS MATERIALS - EMERGENCIES

THIS SECTION COVERS

- | | |
|--------------------|-----------------------------|
| • No Smoking | • Warn Others |
| • Keep People Away | • Avoid Contact or Inhaling |

EMERGENCY RESPONSE GUIDEBOOK (ERG)

The Department of Transportation has a guidebook for firefighters, police, and industry workers on how to protect themselves and the public from hazardous materials. The guide is indexed by proper shipping name and hazardous materials identification number. Emergency personnel look for these things on the shipping paper. That is why it is **vital** that the proper shipping name, ID number, label, and placards are correct.

ACCIDENTS/INCIDENTS

As a professional driver, your job at the scene of an accident is to:

- Keep people away from the scene.
- Limit the spread of material, **only if you can safely do so.**
- Communicate the danger of the hazardous materials to emergency response personnel.
- Provide emergency responders with the shipping papers and emergency response information.

Follow this checklist:

- Check to see that your driving partner is OK.
- Keep shipping papers with you.
- Keep people far away and upwind.
- Warn others of the danger.
- Send for help.
- Follow your employer's instructions.
- Prevent smoking and keep open flame away.

FIRES

You might have to control minor truck fires on the road. **However, unless you have the training and equipment to do so safely, don't fight hazardous materials fires.** Dealing with hazardous materials fires requires special training and protective gear.

When you discover a fire, send for help. You may use the fire extinguisher to keep minor truck fires from spreading to cargo before firefighters arrive. Feel trailer doors to see if they are hot before opening them. If hot, you may have a cargo fire and should not open the doors. Opening doors lets air in and may make the fire flare up. Without air, many fires only smolder until firemen arrive, doing less damage. If your cargo is already on fire, it is not safe to fight the fire. Keep the shipping papers with you to give to emergency personnel as soon as they arrive. **Warn other people of the danger and keep them away.**

If you discover a cargo leak, identify the hazardous materials leaking by using shipping papers, labels or package location. **Do not touch any leaking material—many people injure themselves by touching hazardous materials.** Do not try to identify the material or find the source of a leak by smell. Toxic gases can destroy your sense of smell and can injure or kill you even if they don't smell. If hazardous material is leaking from a container, but not from your vehicle, drive to the closest area where you can get help and call emergency personnel if they are needed. Never eat, drink or smoke around a leak or spill.

If hazardous materials are spilling from your vehicle, do not move it any more than safety requires. You may move off the road and away from places where people gather, if doing so serves safety. Only move your vehicle if you can do so without danger to yourself or others.

Never continue driving with hazardous material leaking from your vehicle in order to find a phone booth, truck stop, help or similar reason. Remember, the carrier pays for the cleanup of contaminated parking lots, roadways and drainage ditches. The costs are enormous, so don't leave a lengthy trail of contamination. If hazardous materials are spilling from your vehicle:

- Park it.
- Secure the area.
- Stay there.
- Send someone else for help.

When sending someone for help, give that person:

- A description of the emergency.
- Your exact location and direction of travel.
- Your name, the carrier's name and the name of the community or city where your terminal is located.
- The proper shipping name, hazard class and ID number of the hazardous materials, if you know them.

This is a lot for someone to remember. It is a good idea to write it all down for the person you send for help. The emergency response team must know these things to find you and to handle the emergency. They may have to travel miles to get to you. This information will help them to bring the right equipment the first time, without having to go back for it.

Never move your vehicle, if doing so will cause contamination or damage the vehicle. Keep downwind and away from roadside rests, truck stops, cafes and businesses. Never try to repack leaking containers. Unless you have the training and equipment to repair leaks safely, don't try it. Call your dispatcher or supervisor for instructions and, if needed, emergency personnel.

RESPONSES TO SPECIFIC HAZARDS

CLASS 1 (EXPLOSIVES)

If your vehicle has a breakdown or accident while carrying explosives, warn others of the danger. Keep bystanders away. Do not allow smoking or open fire near the vehicle. If there is a fire, warn everyone of the danger of explosion.

Remove all explosives before separating vehicles involved in a collision. Place the explosives at least 200 feet (61m) from the vehicles and occupied buildings. Stay a safe distance away.

CLASS 2 (COMPRESSED GASES)

If compressed gas is leaking from your vehicle, warn others of the danger. Only permit those involved in removing the hazard or wreckage to get close. You must notify the shipper if compressed gas is involved in any accident.

Unless you are fueling machinery used in road construction or maintenance, do not transfer a flammable compressed gas from one tank to another on any public roadway.

CLASS 3 (FLAMMABLE LIQUIDS)

If you are transporting a flammable liquid and have an accident or your vehicle breaks down, prevent bystanders from gathering. Warn people of the danger. Keep them from smoking.

Never transport a leaking cargo tank farther than needed to reach a safe place. Get off the roadway if you can do so safely. Don't transfer flammable liquid from one vehicle to another on a public roadway except in an emergency.

CLASS 4 (FLAMMABLE SOLIDS) AND CLASS 5 (OXIDIZING MATERIALS)

If a flammable solid or oxidizing material spills, warn others of the fire hazard. Do not open smoldering packages of flammable solids. Remove them from the vehicle if you can safely do so. Also, remove unbroken packages if it will decrease the fire hazard.

CLASS 6 (POISONOUS MATERIALS AND INFECTIOUS SUBSTANCES)

It is your job to protect yourself, other people and property from harm. Remember that many products classed as poison are also flammable. If you think a Division 2.3 (Poison Gases) or Division 6.1 (Poison Materials) might be flammable, take the added precautions needed for flammable liquids or gases. Do not allow smoking, open flame or welding. Warn others of the hazards of fire, of inhaling vapors, or coming in contact with the poison.

A vehicle involved in a leak of Division 2.3 (Poison Gases) or Division 6.1 (Poison Materials) must be checked for stray poison before being used again.

If Division 6.2 (Infectious Substances) package is damaged in handling or transportation, you should immediately contact your supervisor. Packages which appear to be damaged or show signs of leakage should not be accepted.

CLASS 7 (RADIOACTIVE MATERIALS)

If radioactive material is involved in a leak or broken package, tell your dispatcher or supervisor as soon as possible. If there is a spill or if an internal container might be damaged, do not touch or inhale the material. Do not use the vehicle until it is cleaned and checked with a survey meter.

CLASS 8 (CORROSIVE MATERIALS)

If corrosives spill or leak during transportation, be careful to avoid further damage or injury when handling the containers. Parts of the vehicle exposed to a corrosive liquid must be thoroughly washed with water. After unloading, wash out the interior as soon as possible before reloading.

If continuing to transport a leaking tank would be unsafe, get off the road. If safe to do so, try to contain any liquid leaking from the vehicle. Keep bystanders away from the liquid and its fumes. Do everything possible to prevent injury to others.

REQUIRED NOTIFICATION

The National Response Center helps coordinate emergency response to chemical hazards. It is a resource to the local police and firefighters. It maintains a 24-hour toll-free line. You or your employer must call when **any** of the following occur **as a direct result of a hazardous materials incident**:

- A person is killed.
- An injured person requires hospitalization.
- Estimated property damage exceeds \$50,000.
- The general public is evacuated for one or more hours.
- One or more major transportation arteries or facilities are closed or shut down for one hour or more.
- Fire, breakage, spillage or suspected radioactive contamination occurs.
- Fire, breakage, spillage or suspected contamination occurs involving shipment of etiologic agents (bacteria or toxins).
- A situation exists of such a nature (e.g., continuing danger to life exists at the scene of an incident) that, in the judgment of the carrier, should be reported.

NATIONAL RESPONSE CENTER (800) 424-8801

Persons telephoning the National Response Center should be ready to give:

- Their name.
- Name and address of the carrier they work for.

- Phone number where they can be reached.
- Date, time and location of incident.
- The extent of injuries, if any.
- Classification, name and quantity of hazardous materials involved, if such information is available.
- Type of incident and nature of hazardous materials involvement and whether a continuing danger to life exists at the scene.

If a reportable quantity of hazardous substance was involved, the caller should give the name of the shipper and the quantity of the hazardous substance discharged.

Be prepared to give your employer the required information as well. Carriers must make detailed written reports within 30 days of an incident.

CHEMTREC (800) 424-9300

The Chemical Transportation Emergency Center (CHEMTREC) in Washington also has a 24-hour toll-free line. CHEMTREC was created to provide emergency personnel with technical information about the physical properties of hazardous materials. The National Response Center and CHEMTREC are in close communication. If you call either one, they will tell the other about the problem when appropriate.

TEST YOUR KNOWLEDGE

1. If your placarded trailer has dual tires, how often should you check the tires?
2. What is a safe haven?
3. How close to the traveled part of the roadway can you park with Division 1.2 or 1.3 (Explosive B)?
4. How close can you park to a bridge, tunnel, or building with the same load?
5. What type of fire extinguisher must placarded vehicles carry?
6. You're hauling 100 lbs. (45.4 kg) of **Division 4.3** (Dangerous When Wet) material. Do you need to stop before railroad crossing?
7. At a rest area you discover your hazardous materials shipment is slowly leaking from the vehicle. There's no phone around. What should you do?
8. What is the Emergency Response Guide (ERG)?



These questions may be on the test.

If you can't answer them all, re-read pages 26-35.

TABLE A

RADIOACTIVE SEPARATION TABLE

(Note: You will not be tested on the numbers in this table.)

Do not leave radioactive yellow-II or yellow-III labeled packages near people, animals, or film longer than shown in this table.

TOTAL TRANSPORT INDEX	MINIMUM DISTANCE IN FEET TO NEAREST UNDEVELOPED FILM					TO PEOPLE OR CARGO COMPARTMENT PARTITIONS
	0-2 HOURS	2-4 HOURS	4-8 HOURS	8-12 HOURS	OVER 12 HOURS	
None	0	0	0	0	0	0
0.1 to 1.0	1	2	3	4	5	2
1.1 to 5.0	3	4	6	8	11	2
5.1 to 10.0	4	6	9	11	15	3
10.1 to 20.0	5	8	12	16	22	4
20.1 to 30.0	7	10	15	20	29	5
30.1 to 40.0	8	11	17	22	33	6
40.1 to 50.0	9	12	19	24	36	

TABLE B

TABLE OF HAZARD CLASS DEFINITIONS

(Note: You will not be tested on this table.)

KINDS OF HAZARDOUS MATERIALS

Hazardous materials are categorized into nine major hazard classes and additional categories for consumer commodities and combustible liquids. The classes of hazardous materials are as follows:

TABLE OF HAZARD CLASS DEFINITIONS

CLASS	CLASS NAME	EXAMPLE
1	Explosives	Ammunition, Dynamite, Fireworks
2	Gases	Propane, Oxygen, Helium
3	Flammable	Gasoline Fuel, Acetone
4	Flammable Solids	Matches, Fuses
5	Oxidizers	Ammonium Nitrate, Hydrogen Peroxide
6	Poisons	Pesticides, Arsenic
7	Radioactive	Uranium, Plutonium
8	Corrosives	Hydrochloric Acid, Battery Acid
9	Miscellaneous Hazardous Materials	Formaldehyde, Asbestos
None	ORM-D (Other regulated Material-Domestic)	Hair Spray or Charcoal
None	Combustible Liquids	Fuel Oils, Lighter Fluid

HAZARDOUS MATERIALS GLOSSARY

This glossary presents definitions of certain terms used in this section. A complete glossary of terms can be found in the Federal Hazardous Materials Rules (49 CFR 171.8). You should have an up-to-date copy of these rules for your reference.

(Note: You will not be tested on this glossary)

SECTION 171.8 DEFINITIONS AND ABBREVIATIONS

BULK PACKAGING -

means a packaging, other than a vessel, or a barge, including a transport vehicle or freight container, in which hazardous materials are loaded with no intermediate form of containment and which has:

- (1) A maximum capacity greater than 450 L (119 gallons) as a receptacle for a liquid;
- (2) A maximum net mass greater than 400 kg (882 pounds) or a maximum capacity greater than 450 L (119 gallons) as a receptacle for a solid; or
- (3) A water capacity greater than 454 kg (1,000 pounds) as a receptacle for a gas as defined in Section 173.115.

CARGO TANK -

means a bulk packaging which:

- (1) Is a tank intended primarily for the carriage of liquids or gases and includes appurtenances, reinforcements, fittings, and closures (for "tank," see 49 CFR 178.345-1(c), 178.337-1, or 178.338-1, as applicable);
- (2) Is permanently attached to or forms a part of a motor vehicle, or is not permanently attached to a motor vehicle but which, by reason of its size, construction, or attachment to a motor vehicle is loaded or unloaded without being removed from the motor vehicle; and
- (3) Is not fabricated under a specification for cylinders, portable tanks, tank cars, or multi-unit tank car tanks.

CARRIER -

means a person engaged in the transportation of passengers or property by:

- (1) Land or water as a common, contract, or private carrier; or
- (2) Civil aircraft.

CONSIGNEE -

means the business or person to whom a shipment is delivered.

DIVISION -

means a subdivision of a hazard class.

EPA -

means U.S. Environmental Protection Agency.

FMCSR -

means the Federal Motor Carrier Safety Regulations.

FREIGHT CONTAINER -

means a reusable container having a volume of 64 cubic feet (1.8 cubic meters) or more, designed and constructed to permit being lifted with its contents intact and intended primarily for containment of packages (in unit form) during transportation.

FUEL TANK -

means a tank, other than a cargo tank, used to transport flammable or combustible liquid or compressed gas for the purpose of supplying fuel for propulsion of the transport vehicle to which it is attached, or for the operation of other equipment on the transport vehicle.

GROSS WEIGHT OR GROSS MASS -

means the weight of a packaging plus the weight of its contents.

HAZARD CLASS -

means the category of hazard assigned to a hazardous material under the definitional criteria of Part 173 and the provisions of the Section 172.101 Table. A material may meet the defining criteria for more than one hazard class but is assigned to only one hazard class.

HAZARDOUS MATERIALS -

means a substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety and property when transported in commerce, and which has been so designated. The term includes hazardous substances, hazardous wastes, marine pollutants and elevated temperature materials as defined in this publication, materials designated as hazardous under the provisions of Section 172.101 and 172.102, and materials that meet the defining criteria for hazard classes and divisions in Part 173.

HAZARDOUS SUBSTANCE -

means a material, including its mixtures and solutions, that:

- (1) Is listed in Appendix A to Section 172.101;
- (2) Is in a quantity, in one package, which equals or exceeds the reportable quantity (RQ) listed in Appendix A to Section 172.101; and
- (3) When in a mixture of solution:
 - (i) For radionuclides, conforms to paragraph 6 of Appendix A to Section 172.101.
 - (ii) For other than radionuclides, is in a concentration by weight which equals or exceeds the concentration corresponding to the RQ of the material, as show in the following table:

RQ POUNDS (KILOGRAMS)	CONCENTRATION BY WEIGHT	
	PERCENT	PPM
5,000 (2270)	10	100,000
1,000 (454)	2	20,000
100 (45.4)	0.2	2,000
10 (4.54)	0.02	200
1 (0.454)	0.002	20

This definition does not apply to petroleum products that are lubricants or fuels (see 40 CFR 300.6).

HAZARDOUS WASTE -

for the purposes of this chapter, means any material that is subject to the Hazardous Waste Manifest Requirements of the U.S. Environmental Protection Agency specified in 40 CFR Part 262.

LIMITED QUANTITY -

when specified as such in a section applicable to a particular material, means the maximum amount of a hazardous material for which there may be specific labeling or packaging exception.

MARKING -

means the descriptive name, identification number, instructions, cautions, weight, specification or UN marks or combinations thereof, required by this subchapter on outer packagings of hazardous materials.

MIXTURE -

means a material composed of more than one chemical compound or element.

NAME OF CONTENTS -

means the proper shipping name as specified in Section 172.101.

NON-BULK PACKAGING -

means packaging which has:

- (1) a maximum capacity of 450 L (119 gallons) as a receptacle for a liquid;
- (2) a maximum net mass less than 400 kg (882 pounds) and a maximum capacity of 450 L (119 gallons) or less as a receptacle for a solid; or
- (3) a water capacity greater than 454 kg (1,000 pounds) or less as a receptacle for a gas as defined in Section 173.115.

N.O.S. -

means not otherwise specified.

OUTAGE OR ULLAGE -

means the amount by which a packaging falls short of being liquid full, usually expressed in percent by volume.

PORTABLE TANK -

means a bulk packaging (except a cylinder having a water capacity of 1,000 pounds (454 kg) or less) designed primarily to be loaded onto or on, or temporarily attached to a transport vehicle or ship and equipped with skids, mountings or accessories to facilitate handling of the tank by mechanical means. It does not include a cargo tank, tank car, multi-unit tank car tank or trailer carrying 3AX, 3AAX or 3T cylinders.

PROPER SHIPPING NAME -

means the name of the hazardous materials shown in Roman print (not italics) in Section 172.101.

P.S.I. OR psi -

means pounds per square inch.

P.S.I.A. OR psia -

means pounds per square inch absolute.

REPORTABLE QUANTITY (RQ) -

means the quantity specified in Column 3 of Figure 5 in Section 172.101 for any material identified in Column 1 of Figure 5.

RSPA -

means the Research and Special Programs Administration, U.S. Department of Transportation, Washington, DC 20590.

SHIPPER'S CERTIFICATION -

means a statement on a shipping paper, signed by the shipper, saying he/she prepared the shipment properly according to law.

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper conditions for transportation according to the applicable regulations of the Department of Transportation."

OR

"I hereby declare that the contents of this consignment are fully and accurately described above the proper shipping name and are classified, packed, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national government regulations."

SHIPPING PAPER -

means a shipping order, bill of lading, manifest, or other shipping document serving a similar purpose and containing the information required by Section 172.202, 172.203, and 172.204.

TECHNICAL NAME -

means a recognized chemical name or microbiological name currently used in scientific and technical handbooks, journals, and tests.

TRANSPORT VEHICLE -

means a cargo-carrying vehicle such as an automobile, van, tractor, truck, semi-trailer, tank car, or rail car used for the transportation of cargo by any mode. Each cargo-carrying body (trailer, rail car, etc.) is a separate transport vehicle.
















UN STANDARD PACKAGING -

means a specification packaging conforming to the requirements in Subpart L and M of Part 178.

UN -

means United Nations.













PLACARD SUBSTITUTION GUIDE

HAZARD CLASS/ DIVISION	NEW LABEL	NEW PLACARD	OLD PLACARD	NOTES
Division 1.1				This is a placard Substitution Guide only . For information on placarding vs weight of materials refer to: ATA'S Hazardous Materials Guide (C11046 - New); or (C1060 - Old) or to ATA'S Explosives Guide (C1036)
Division 1.2				
Division 1.3				
Division 1.4				
Division 1.5				





















* May be used for domestic shipments of
(1) Oxygen Compressed;
OR
(2) Oxygen Refrigerated Liquid.

For Explosives
Compatibility
Group will be
shown in place
of "1.3"




















PLACARD SUBSTITUTION GUIDE

HAZARD CLASS/ DIVISION	NEW LABEL	NEW PLACARD	OLD PLACARD	NOTES
Division 1.6				This is a placard Substitution Guide only . For information on placarding vs weight of materials refer to: ATA'S Hazardous Materials Guide (C11046 - New); or (C1060 - Old) or to ATA'S Explosives Guide (C1036)
Division 2.1				ATA'S Hazardous Materials Guide (C11046 - New); or (C1060 - Old) or to ATA'S Explosives Guide (C1036)
Division 2.2				ATA'S Hazardous Materials Guide (C11046 - New); or (C1060 - Old) or to ATA'S Explosives Guide (C1036)
Division 2.3				* May be used for domestic shipments of (1) Oxygen Compressed; OR (2) Oxygen Refrigerated Liquid.

PLACARD SUBSTITUTION GUIDE

HAZARD CLASS/ DIVISION	NEW LABEL	NEW PLACARD	OLD PLACARD	NOTES
Class 3				<p>Mixed Loads When the total weight of two or more Table II materials is 1,000 lbs (454 Kg) or more, a DANGEROUS placard may be used. If 5,000 lbs. (2,268 Kg) or more of any Table II materials are loaded at one location, use its class placard.</p>
	COMBUSTIBLE LIQUID			
Division 4.1				<p>TOXIC BY INHALATION Effective 10-1-97 these are required in addition to Div. 2.3 and Div. 6.1 current label and placard. Materials which have been identified as Toxic by Inhalation, and the shipping paper states "Poison-Inhalation Hazard" must be marked "Inhalation Hazard" and labeled "Poison." The vehicle must be placarded "Poison" or "Poison Gas" as appropriate in addition to the primary hazard requirements. Note: 1,000 lb exception does not apply to these materials.</p>
	SPONTANEOUSLY COMBUSTIBLE			
Division 4.2				<p>TOXIC BY INHALATION Effective 10-1-97 these are required in addition to Div. 2.3 and Div. 6.1 current label and placard. Materials which have been identified as Toxic by Inhalation, and the shipping paper states "Poison-Inhalation Hazard" must be marked "Inhalation Hazard" and labeled "Poison." The vehicle must be placarded "Poison" or "Poison Gas" as appropriate in addition to the primary hazard requirements. Note: 1,000 lb exception does not apply to these materials.</p>
	SPONTANEOUSLY COMBUSTIBLE			
Division 4.3				<p>TOXIC BY INHALATION Effective 10-1-97 these are required in addition to Div. 2.3 and Div. 6.1 current label and placard. Materials which have been identified as Toxic by Inhalation, and the shipping paper states "Poison-Inhalation Hazard" must be marked "Inhalation Hazard" and labeled "Poison." The vehicle must be placarded "Poison" or "Poison Gas" as appropriate in addition to the primary hazard requirements. Note: 1,000 lb exception does not apply to these materials.</p>
	SPONTANEOUSLY COMBUSTIBLE			
Division 5.1				<p>The U.S. Department of Transportation allows the substitution of placards as shown until October 1, 2001 for highway transportation</p>

PLACARD SUBSTITUTION GUIDE

HAZARD CLASS/ DIVISION	NEW LABEL	NEW PLACARD	OLD PLACARD	NOTES
Division 5.2				<p>Mixed Loads When the total weight of two or more Table II materials is 1,000 lbs (454 Kg) or more, a DANGEROUS placard may be used. If 5,000 lbs. (2,268 Kg) or more of any Table II materials are loaded at one location, use its class placard.</p> 
Division 6.1 (PG I & PG II)				<p>TOXIC BY INHALATION Effective 10-1-97 these are required in addition to Div. 2.3 and Div. 6.1 current label and placard. Materials which have been identified as Toxic by Inhalation, and the shipping paper states "Poison-Inhalation Hazard" must be marked "Inhalation Hazard" and labeled "Poison." The vehicle must be placarded "Poison" or "Poison Gas" as appropriate in addition to the primary hazard requirements. Note: 1,000 lb exception does not apply to these materials.</p>  
Division 6.1 (PG III)			NO PLACARD	
Class 7 (Yellow III)				
Class 8				
Class 9			NO PLACARD	

The U.S. Department of Transportation allows the substitution of placards as shown until **October 1, 2001** for highway transportation

**THIS PUBLICATION
IS NOT FOR SALE**

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

Important Words to Remember



**ORGAN
DONOR**

WHEN YOU GET YOUR LICENSE, REMEMBER THESE IMPORTANT WORDS

They're important words to thousands who await life-saving organ transplants. Words that could help others regain sight through cornea transplants, heal from burns more quickly with donated skin, or walk without pain with transplanted bone.

Individuals who choose to save a life by saying "yes" to organ and tissue donation should place the donor designation on the license and sign a donor card. The wish to donate also should be shared with family and friends so that they are aware of the important decision that has been made to help others.

SOME QUICK FACTS ABOUT ORGAN AND TISSUE DONATION

- Pennsylvania strongly supports organ and tissue donation because of its life-saving and life-enhancing opportunities.
- There is no age limit for organ donation. The general age limit for tissue and corneal donation is 70.
- Most major religions support donation.
- Donation is considered only after death is declared.
- Donation does not hinder funeral arrangements.
- There is no cost to the family of the donor.

TO GET AN ORGAN AND TISSUE DONOR CARD, CALL

In Eastern Pennsylvania:

Gift of Life Donor Program 1-888-DONORS-1
www.donors1.org

In Western Pennsylvania:

Center for Organ Recovery & Education (CORE) 1-800-DONORS-7
www.core.org

For additional Organ and Tissue Resource Information, call:

PA Department of Health 1-877-PAHEALTH

SECTION 8

TANK VEHICLES



**THIS SECTION IS FOR DRIVERS WHO WILL
DRIVE TANK VEHICLES WHICH CARRY
GASES OR LIQUID IN BULK**

SECTION 8 - TANK VEHICLES

This Section Covers

- **Inspecting Tank Vehicles**
- **Driving Tank Vehicles**
- **Safe Driving Rules**

This section has information needed to pass the CDL knowledge test for driving a tank vehicle. (You should also study Sections 2, 5, 6, and 9). A tank endorsement is required for certain vehicles that transport liquids or gases. The liquid or gas does not have to be a hazardous material. A tank endorsement is required if your vehicle needs a Class A or B CDL and you want to haul a liquid or liquid gas in a permanently mounted cargo tank rated at greater than 450 liters (119 gallons) or a portable tank rated at 1,000 gallons or more. A tank endorsement is also required for Class C vehicles when the vehicle is used to transport hazardous materials in liquid or gas form in the above described rated tanks.

Before loading, unloading, or driving a tanker, inspect the vehicle. This makes sure that the vehicle is safe to carry the liquid or gas and is safe to drive.

8.1 – INSPECTING TANK VEHICLES

Tank vehicles have special items that you need to check. Tank vehicles come in many types and sizes. You need to check the vehicle's operator manual to make sure you know how to inspect your tank vehicle.

8.1.1 – Leaks

On all tank vehicles, the most important item to check for is leaks. Check under and around the vehicle for signs of any leaking. Do not carry liquids or gases in a leaking tank. To do so is a crime. You will be cited and prevented from driving further. You may also be liable for the clean up of any spill. In general, check the following:

- Check the tank's body or shell for dents or leaks.
- Check the intake, discharge, and cut-off valves. Make sure the valves are in the correct position before loading, unloading, or moving the vehicle.
- Check pipes, connections, and hoses for leaks, especially around joints.
- Check manhole covers and vents. Make sure the covers have gaskets and they close correctly. Keep the vents clear so they work correctly. Never drive a tank vehicle with open valves or manhole covers.

8.1.2 – Check Special Purpose Equipment

If your vehicle has any of the following equipment, make sure it works:

- Vapor recovery kits.
- Grounding and bonding cables.
- Emergency shut-off systems.
- Built in fire extinguisher.

8.1.3 – Special Equipment

Check the emergency equipment required for your vehicle. Find out what equipment you are required to carry and make sure you have it (and it works).

8.2 – Driving Tank Vehicles

Hauling liquids in tanks requires special skills because of the high center of gravity and liquid movement. See Figure 8.1.

8.2.1 – High Center of Gravity

High center of gravity means that much of the load's weight is carried high up off the road. This makes the vehicle top-heavy and easy to roll over. Liquid tankers are especially easy to roll over. Tests have shown that tankers can turn over at the speed limits posted for curves. Take highway curves and on ramp/off ramp curves well below the posted speeds.

8.2.2 – Danger of Surge

Liquid surge results from movement of the liquid in partially filled tanks. This movement can have bad effects on handling. For example, when coming to a stop, the liquid will surge back and forth. When the wave hits the end of the tank, it tends to push the truck in the direction the wave is moving. If the truck is on a slippery surface such as ice, the wave can shove a stopped truck out into an intersection. The driver of a liquid tanker must be very familiar with the handling of the vehicle.

8.2.3 – Bulkheads

Some liquid tanks are divided into several smaller tanks by bulkheads. When loading and unloading the smaller tanks, the driver must pay attention to weight distribution. Fill tanks evenly and do not put too much weight on the front or rear of the vehicle.

8.2.4 – Baffled Tanks

Baffled liquid tanks have bulkheads in them with holes that let the liquid flow through. The baffles help to control the forward and backward liquid surge. There will be less front to back surge than there is for tanks without baffles. Side-to-side surge can still occur. This can cause a roll over.

8.2.5 – Un-baffled Tanks

Un-baffled liquid tankers (sometimes called "smooth bore" tanks) have nothing inside to slow down the flow of the liquid. Therefore, forward-and-back surge is very strong. Un-baffled tanks are usually those that transport food products (milk, for example). (Sanitation regulations forbid the use of baffles because of the difficulty in cleaning the inside of the tank.) Be extremely cautious (slow and careful) in driving smooth bore tanks, especially when starting and stopping.

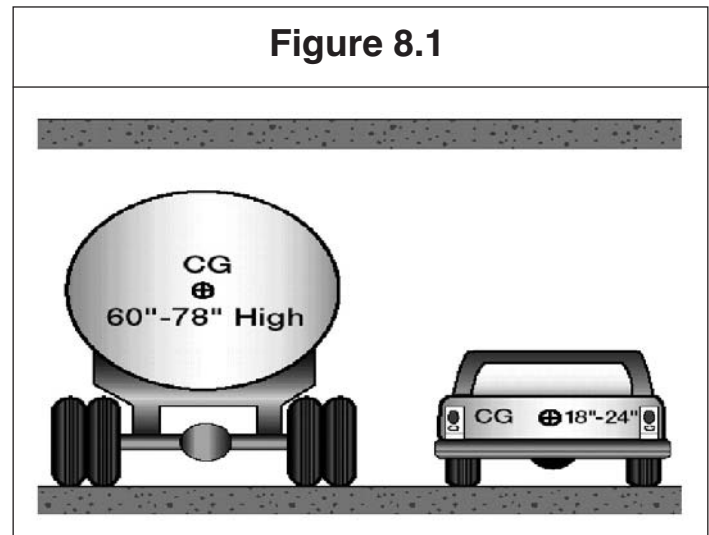
8.2.6 – Outage

Never load a cargo tank totally full. Liquids expand as they warm and you must leave room for the expanding liquid. This is called "outage." Since different liquids expand by different amounts, they require different amounts of outage. You must know the outage requirement when hauling liquids in bulk.

8.2.7 – How Much to Load?

A full tank of dense liquid (such as some acids) may exceed legal weight limits. For that reason, you may often only partially fill tanks with heavy liquids to stay within legal limits. The amount of liquid to load into a tank depends on:

- The amount the liquid will expand in transit.
- The weight of the liquid.
- Legal weight limits.



8.3 – SAFE DRIVING RULES

In order to drive tank vehicles safely, you must remember to follow all the safe driving rules. A few of these rules are listed below:

8.3.1 – Drive Smoothly

Because of the high center of gravity and the surge of the liquid, you must start, slow down, and stop very smoothly. Also, make smooth turns and lane changes.

8.3.2 – Controlling Surge (Braking)

Keep a steady pressure on the brakes. Do not release the brakes too soon when coming to a stop.

Brake far in advance of a stop and increase your following distance.

If you must make a quick stop to avoid a crash, use controlled or stab braking. If you do not remember how to stop using these methods, review subsection 2.17.2. Also, remember that if you steer quickly while braking, your vehicle may roll over.

8.3.3 – Curves

Slow down before curves, then accelerate slightly through the curve. The posted speed for a curve may be too fast for a tank vehicle.

8.3.4 – Stopping Distance

Keep in mind how much space you need to stop your vehicle. Remember that wet roads double the normal stopping distance. Empty tank vehicles may take longer to stop than full ones.

8.3.5 – Skids

Do not over steer, over accelerate, or over brake. If you do, your vehicle may skid. On tank trailers, if your drive wheels or trailer wheels begin to skid, your vehicle may jackknife. When any vehicle starts to skid, you must take action to restore traction to the wheels.

Section 8 Test Your Knowledge

1. How are bulkheads different than baffles?
2. Should a tank vehicle take curves, on ramps, or off ramps at the posted speed limits?
3. How are smooth bore tankers different to drive than those with baffles?
4. What three things determine how much liquid you can load?
5. What is outage?
6. How can you help control surge?
7. What two reasons make special care necessary when driving tank vehicles?

These questions may be on the test. If you cannot answer them all, re-read Section 8.
