Section 9
HAZARDOUS MATERIALS

This Section Covers

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

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 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, all levels of government regulate the handling of hazardous materials.

The Hazardous Materials Regulations (HMR) is found in parts 100 - 185 of title 49 of the Code of Federal Regulations. The common reference for these regulations is 49 CFR 100 - 185

The Hazardous Materials Table in the 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 section 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 license (CDL) with a hazardous materials endorsement before you drive any size vehicle that is used to transport hazardous material as defined in 49 CFR 383.5. You must pass a written test about the regulations and requirements to get this endorsement.

Everything you need to know to pass the written test is in this section. 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. Your employer, colleges and universities, and various associations usually offer these courses. 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 training for each employee as long as that 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.

All drivers must be trained in the security risks of hazardous materials transportation. This training must include how to recognize and respond to possible security threats.

The regulations also require that drivers have special training before driving a vehicle transporting certain flammable gas materials or highway route controlled quantities of radioactive materials. In addition, drivers transporting cargo tanks and portable tanks must receive specialized training. Each driver's employer or his or her designated representative must provide such training.

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 the places you drive.

9.1 – The Intent of the Regulations

9.1.1 – 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."

9.1.2 – 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 steps communicate the hazard to the shipper, the carrier, and the driver.

9.1.3 – 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. Non-compliance with regulations can result in fines and 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, and the hazardous materials endorsement on your driver license, and your knowledge of hazardous materials.

9.2 – Hazardous Materials Transportation—Who Does What

9.2.1 – 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.
Packing group.
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).

9.2.2 – 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.

9.2.3 – The Driver

Makes sure the shipper has identified, marked, and labeled the hazardous materials properly.
Refuses leaking packages and shipments.
Placards 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.

9.3 – Communication Rules

9.3.1 – 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 section may be on your test. The meanings of other important words are in the glossary at the end of Section 9.

A material's hazard class reflects the risks associated with it. There are nine different hazard classes. The types of materials included in these nine classes are in Figure 9.1.

Hazardous Materials Class			
Class	**Division**	**Name of Class or Division**	**Examples**
1	1.1 1.2 1.3 1.4 1.5 1.6	Mass Explosion Projection Hazard Fire Hazard Minor Explosion Very Insensitive Extremely Insensitive	Dynamite Flares Display Fireworks Ammunition Blasting Agents Explosive Devices
2	2.1 2.2 2.3	Flammable Gases Non-Flammable Gases Poisonous/Toxic Gases	Propane Helium Fluorine, Compressed
3	-	Flammable Liquids	Gasoline
4	4.1 4.2 4.3	Flammable Solids Spontaneously Combustible Dangerous When Wet	Ammonium Picrate, Wetted White Phosphorus Sodium
5	5.1 5.2	Oxidizers Organic Peroxides	Ammonium Nitrate Methyl Ethyl Ketone Peroxide
6	6.1 6.2	Poison (Toxic Material) Infectious Substances	Potassium Cyanide Anthrax Virus
7	-	Radioactive	Uranium
8	-	Corrosives	Battery Fluid
9	-	Miscellaneous Hazardous Materials	Polychlorinated Biphenyls (PCB)
e	-	ORM-D (Other Regulated Material-Domestic)	Food Flavorings, Medicines
	-	Combustible Liquids	Fuel Oil

Figure 9.1

A shipping paper describes the hazardous materials being transported. Shipping orders, bills of lading, and manifests are all shipping papers. Figure 9.6 shows an example shipping paper.

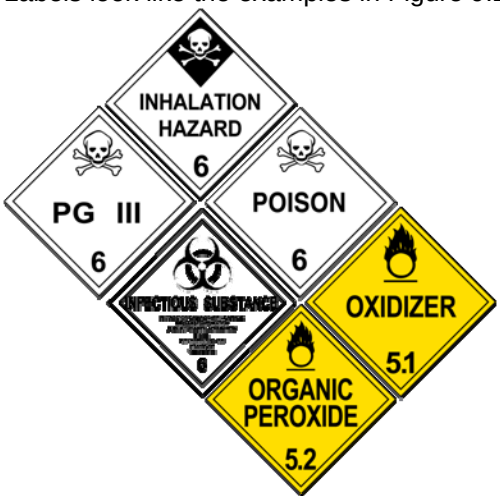
After an accident or hazardous materials spill or leak, you may be injured and unable to communicate the hazards of the materials you are transporting. Firefighters and police can prevent or reduce the amount of damage or injury at the scene if they know what hazardous materials are being carried. Your 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.
Carriers and drivers to quickly identify hazardous materials shipping papers, or keep them on top of other shipping papers and keep the required emergency response information with the shipping papers.
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.

9.3.2 – Package Labels

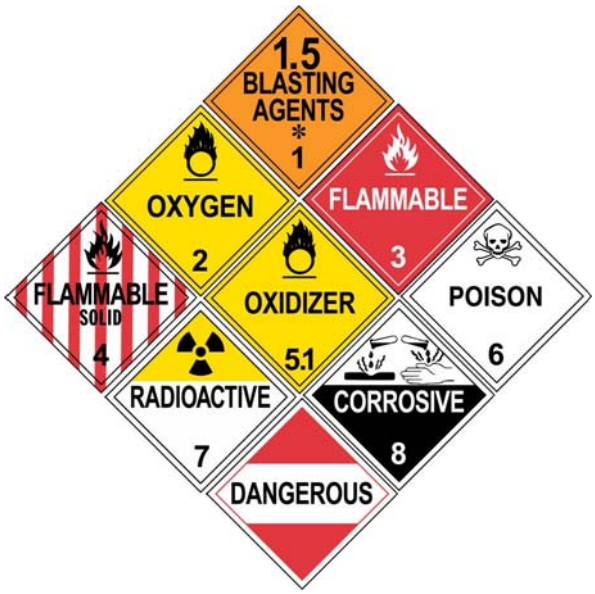
Shippers put diamond-shaped hazard warning labels on most hazardous materials packages. These labels inform others of the hazard. If the diamond label won't fit on the package, shippers may put the label on a tag securely attached to the package. For example, compressed gas cylinders that will not hold a label will have tags or decals. Labels look like the examples in Figure 9.2.



Examples of HAZMAT Labels. Figure 9.2

9.3.3 – Lists of Regulated Products

Placards. Placards are used to warn others of hazardous materials. Placards are signs put on the outside of a vehicle and on bulk packages, which identify the hazard class of the cargo. A placarded vehicle must have at least four identical placards. They are put on the front, rear, and both sides of the vehicle. See Figure 9.3. Placards must be readable from all four directions. They are at least 10 3/4 inches square, square-on-point, in a diamond shape. Cargo tanks and other bulk packaging display the identification number of their contents on placards or orange panels or white square-on-point displays that are the same size as placards.



Examples of HAZMAT Placards. Figure 9.3

Identification numbers are a four-digit code used by first responders to identify hazardous materials. An identification number may be used to identify more than one chemical. The letters "NA or "UN" will precede the identification number. The United States Department of Transportation's Emergency Response Guidebook (ERG) lists the chemicals and the identification numbers assigned to them.

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 three lists. 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 9.4 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, identification number, packaging group, and required labels.

Six 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

49 CFR 172.101 Hazardous Materials Table									
Symbols	Hazardous Materials Description & Proper Shipping Names	Hazard Class or Division	Identification Numbers	PG	Label Codes	Special Provisions (172.102)	Packaging (173. ***)		
							Exceptions	Non Bulk	Bulk
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)
A	Acetaldehyde ammonia	9	UN1841	III	9	IB8, IP6	155	204	240

Figure 9.4

Appendix A to 49 CFR 172 List of Hazardous Substances and Reportable Quantities	
Hazardous Substances	**Reportable Quantity (RQ) Pounds (Kilograms)**
Phenyl mercaptan @	100 (45.4)
Phenylmercury acetate	100 (45.4)
N-Phenylthiourea	100 (45.4)
Phorate	10 (4.54)
Phosgene	10 (4.54)
Phosphine	100 (45.4) *
Phosphoric acid	5,000 (2270)
Phosphoric acid, diethyl 4-nitrophenyl ester	100 (45.4)
Phosphoric acid, lead salt	10 (.454)
* Spills of 10 pounds or more must be reported.	

Figure 9.5

transportation. A different shipping name may be used when only domestic transportation is involved.

(G) Means this hazardous material described in Column 2 is a generic shipping name. A generic shipping name must be accompanied by a technical name on the shipping paper. A technical name is a specific chemical that makes the product hazardous.

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. Placard hazardous materials 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 (in Roman numeral) 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.

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. The numbers 1-6 in this column mean the hazardous material is a poison inhalation hazard (PIH). PIH materials have special requirements for shipping papers, marking, and placards.

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.

Appendix A to 49 CFR 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 9.5. 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 INHALATION HAZARD appear on the shipping paper or package, the rules require display of the POISON INHALATION HAZARD or POISON GAS 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.

Appendix B to 49 CFR 172.101 – List of Marine Pollutants

Appendix B is a listing of chemicals that are toxic to marine life. For highway transportation, this list is only used for chemicals in a container with a capacity of 119 gallons or more without a placard or label as specified by the HMR.

Any bulk packages of a Marine Pollutant must display the Marine Pollutant marking (white triangle with a fish and an "X" through the fish). This marking (it is not a placard) must also be displayed on the outside of the vehicle. In addition, a notation must be made on the shipping papers near the

Shipping Paper

TO:	ABC Corporation 88 Valley Street Anywhere, VA	**FROM:**	DEF Corporation 55 Mountain Street Nowhere, CO	Page 1 of 1

Quantity	HM	Description	Weight
1 cylinder	RQ ("RQ" means that this is a reportable quantity.)	Phosgene, 2.3, UN1076 Poison, Inhalation Hazard, Zone A (Phosgene is the proper shipping name from Column 2 of the Hazardous Materials Table.) (2.3 is the Hazard Class from Column 3 of the Hazardous Materials Table.) (Un1076 is the Identification Number from Column 4 of the Hazardous materials Table.)	25 lbs

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

Shipper: Per: Date:	DEF Corporation Smith October 15, 2003	Carrier: Per: Date:	Safety First

Special Instructions: 24 hour Emergency Contact, John Smith 1-800-555-5555

Figure 9.6

description of the material: "Marine Pollutant".

9.3.4 – The Shipping Paper

The shipping paper shown in Figure 9.6 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 regulations.

9.3.5 – The Item Description

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

Described first.
Highlighted in a contrasting color.
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 proper shipping name, hazard class or division, the identification number, 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 identification 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.
The letters RQ, if a reportable quantity.
If the letters RQ appear, the name of the hazardous substance.
For all materials with the letter "G" (Generic) in Column 1, 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. Some hazardous materials do not need a telephone number. You should check the regulations to determine which do need a telephone number.

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:

Waste Acetone, 3, UN1090, PG II.

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

9.3.6 – Shipper's 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.

9.3.7 – 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 material. It is the same name as the one on the shipping paper. The requirements for marking vary by package size and material being transported. 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 identification number.
- The labels required.

It is a good idea to compare the shipping paper to the markings and labels. 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.

If rules require it, the shipper will put RQ, MARINE POLLUTANT, BIOHAZARD, HOT, 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 must be close together, near the proper shipping name.

9.3.8 – 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 identification 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 identification number on the package?
- Are there any handling precautions?

9.3.9 – 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.

9.3.10 – 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 both 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 three inches 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.
- Be affixed to a background of contrasting color.
- The use of "Drive Safely" and other slogans is prohibited.
- The front placard may be on the front of the tractor or the front of the trailer.

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.

9.3.11 – Placard Tables

Placard Table 1 Any Amount	
IF YOUR VEHICLE CONTAINS ANY AMOUNT OF……	PLACARD AS…
1.1 Mass Explosives	Explosives 1.1
1.2 Project Hazards	Explosives 1.2
1.3 Mass Fire Hazards	Explosives 1.3
2.3 Poisonous/Toxic Gases	Poison Gas
4.3 Dangerous When Wet	Dangerous When Wet
5.2 (Organic Peroxide, Type B, liquid or solid, Temperature controlled)	Organic Peroxide
6.1 (Inhalation hazard zone A & B only)	Poison/toxic inhalation
7 (Radioactive Yellow III label only)	Radioactive

There are two placard tables, Table 1 and Table 2. Table 1 materials must be placarded whenever any amount is transported. See Figure 9.7.

Except for bulk packaging, the hazard classes in Table 2 need placards only if the total amount transported is 1,001 pounds or more including the package. Add the amounts from all shipping papers for all the Table 2 products you have on board. See Figure 9.8

Figure 9.7

You may use DANGEROUS placards instead of separate placards for each Table 2 hazard class when:

- You have 1,001 pounds or more of two or more Table 2 hazard classes, requiring different placards, and
- You have not loaded 2,205 pounds or more of any Table 2 hazard class material at any one place. (You must use the specific placard for this material.)
- The dangerous placard is an option, not a requirement. You can always placard for the materials.

Placards used to identify the primary or subsidiary hazard class of a material must have the hazard class or division number displayed in the lower corner of the placard. Permanently affixed subsidiary hazard placards without the hazard class number may be used as long as they stay within color specifications.

If the words INHALATION HAZARD are on the shipping paper or package, you must display POISON GAS or POISON INHALATION placards in addition to any other placards needed by the product's hazard class. The 1,000 pound exception does not apply to these materials.

Materials with a secondary hazard of dangerous when wet must display the DANGEROUS WHEN WET placard in addition to any other placards needed by the product's hazard class. The 1,000-pound exception to placarding does not apply to these materials.

Placard Table 2 1,001 Pounds Or More	
Category of Material (Hazard class or division number and additional description, as appropriate)	Placard Name
1.4 Minor Explosion	Explosives 1.4
1.5 Very Insensitive	Explosives 1.5
1.6 Extremely Insensitive	Explosives 1.6
2.1 Flammable Gases	Flammable Gas
2.2 Non- Flammable Gases	Non-Flammable Gas.
3 Flammable Liquids	Flammable
Combustible Liquid	Combustible*
4.1 Flammable Solids	Flammable Solid
4.2 Spontaneously Combustible	Spontaneously Combustible
5.1 Oxidizers	Oxidizer
5.2 (other than organic peroxide, Type B, liquid or solid, Temperature Controlled)	Organic Peroxide
6.1 (other than inhalation hazard zone A or B)	Poison
6.2 Infectious Substances	(None)
8 Corrosives	Corrosive
9 Miscellaneous Hazardous Materials	Class 9**
ORM-D	(None)
* FLAMMABLE may be used in place of a COMBUSTIBLE on a cargo tank or portable tank.	
** Class 9 Placard is not required for domestic transportation.	

Figure 9.8

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

Bulk packaging is a single container with a capacity of 119 gallons or more. A bulk package, and a vehicle transporting a bulk package, must be placarded, even if it only has the residue of a hazardous material. Certain bulk packages only have to be placarded on the two opposite sides or may display labels. All other bulk packages must be placarded on all four sides.

Subsections 9.1, 9.2, and 9.3 Test Your Knowledge

1. Shippers package in order to (fill in the blank) the material.
2. Driver 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 identification 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 packaging.
5. Where must you keep shipping papers describing hazardous materials?

These questions may be on your test. If you can't answer them all, re-read subsections 9.1, 9.2 and 9.3.

9.4 – Loading and Unloading

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.

9.4.1 – General Loading Requirements

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. It is illegal to move a vehicle with leaking hazardous materials.

Containers of hazardous materials 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 Gases)
Class 3 (Flammable Liquids)
Division 4.1 (Flammable Solids)
Division 4.2 (Spontaneously Combustible)
Class 5 (Oxidizers)

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. All hazardous materials packages must be secured during transportation.

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 2.1 (Flammable Gas)
Class 3 (Flammable Liquids)

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.
Covered with a fire and water resistant tarp.

Precautions for Specific Hazards

Class 1 (Explosives) Materials. 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 floorboards.
Use a floor lining with Division 1.1, 1.2, or 1.3. 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 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 in vehicle combinations if:
There is a marked or placarded cargo tank in the combination.
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 4 (Flammable Solids) and Class 5 (Oxidizers) Materials. Class 4 materials are solids that react (including fire and explosion) to water, heat, and air or even react spontaneously.

Class 4 and 5 materials must be completely enclosed in a vehicle or covered securely. Class 4 and 5 materials, which become unstable and dangerous when wet, must be kept dry while in transit and during loading and unloading. Materials that are subject to spontaneous combustion or heating must be in vehicles with sufficient ventilation.

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.

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).
Division 4.1 (Flammable Solids).
Division 4.3 (Dangerous When Wet).
Class 5 (Oxidizers).
Division 2.3, Zone B (Poisonous Gases).

Never load corrosive liquids with:
Division 1.1 or 1.2..
Division 1.2 or 1.3).
Division 1.5 (Blasting Agents).
Division 2.3, Zone A (Poisonous Gases).
Division 4.2 (Spontaneously Combustible Materials).
Division 6.1, PGI, Zone A (Poison Liquids).

Class 2 (Compressed Gases) 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.
In racks attached to the vehicle or in boxes that will keep them from turning over.

Cylinders may be loaded in a horizontal position (lying down) if it is designed so the relief valve is in the vapor space.

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 INHALATION HAZARD in the driver's cab or sleeper or with food material for human or animal consumption. There are special rules for loading and unloading Class 2 materials in cargo tanks. You must have special training to do this.

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.Table 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 two feet of people or cargo space walls.

Do Not Load Table	
Do Not Load	**In The Same Vehicle With**
Division 6.1 or 2.3 (POISON or poison inhalation hazard labeled material).	Animal or human food unless the poison package is over packed 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 (Poison) liquids, PGI, Zone A.	Division 1.1, 1.2, 1.3 Explosives, Division 5.1 (Oxidizers), Class 3 (Flammable Liquids), Class 8 (Corrosive Liquids), Division 5.2 (Organic Peroxides), Division 1.1, 1.2, 1.3 Explosives, Division 1.5 (Blasting Agents), Division 2.1 (Flammable Gases), Class 4 (Flammable Solids).
Charged storage batteries.	Division 1.1.
Class 1 (Detonating primers).	Any other explosives unless in authorized containers or packages.
Division 6.1 (Cyanides or cyanide mixtures).	Acids, corrosive materials, or other acidic materials which could release hydrocyanic acid . 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.

Figure 9.9

Mixed loads. The rules require some products to be loaded separately. You cannot load them together in the same cargo space. Figure 9.9 lists some examples. The regulations (the Segregation Table for Hazardous Materials) name other materials you must keep apart.

Subsection 9.4
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 materials be stainless steel?
4. At the shipper's dock you're given a paper for 100 cartons of battery acid. You already have 100 pounds 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 your test. If you can't answer them all, re-read subsection 9.4.

9.5 – 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 packaging permanently attached to a vehicle. Cargo tanks remain on the vehicle when you load and unload them. Portable tanks are bulk packaging, 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.

9.5.1 – Markings

You must display the identification number of the hazardous materials in portable tanks and cargo tanks and other bulk packaging (such as dump trucks). Identification 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 placards are required. Specification cargo tanks must show re-test 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 opposing sides. The letters of the shipping name must be at least two inches tall on portable tanks with capacities of more than 1,000 gallons and one-inch tall on portable tanks with capacities of less than 1,000 gallons. The identification number must appear on each side and each end of a portable tank or other bulk packaging that hold 1,000 gallons or more and on two opposing sides, if the portable tank holds less than 1,000 gallons. The identification numbers must still be visible when the portable tank is on the motor vehicle. If they are not visible, you must display the identification number on both sides and ends of the motor vehicle.

Intermediate bulk containers (IBCs) are bulk packages, but are not required to have the owner's name or shipping name.

9.5.2 – 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 of the tank.
- Know of the hazards of the materials involved.
- Know the procedures to follow in an emergency.
- Be authorized to move the cargo tank and able to do so.

There are special attendance rules for cargo tanks transporting propane and anhydrous ammonia.

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. It is illegal to move a cargo tank with open valves or covers unless it is empty according to 49 CFR 173.29.

9.5.3 – 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.

9.5.4 – 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 cargo tank. Always chock trailers and semi-trailers to prevent motion when uncoupled from the power unit.

Subsection 9.5
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 unhooking hoses after delivery?

These questions may be on your test. If you can't answer them all, re-read subsection 9.5.

9.6 – Hazardous Materials -- Driving and Parking Rules

9.6.1 – Parking with Division 1.1, 1.2, or 1.3 Explosives

Never park with Division 1.1, 1.2, or 1.3 explosives within five feet 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 of:

- A bridge, tunnel, or building.
- A place where people gather.
- 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.
- On the carrier's property.
- 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 is usually made by local authorities.

9.6.2 – Parking a Placarded Vehicle Not Transporting Division 1.1, 1.2, or 1.3) Explosives

You may park a placarded vehicle (not laden with explosives) within five feet 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 of an open fire.

9.6.3 – Attending Parked Vehicles

The person attending a placarded vehicle must:

Be in the vehicle, awake, and not in the sleeper berth, or within 100 feet 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.

9.6.4 – 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 Explosives.

9.6.5 – 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. Always 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 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.

9.6.6 – No Smoking

Do not smoke within 25 feet 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 of any vehicle, which contains:

Class 1 (Explosives)
Division 2.1 (Flammable Gases)
Class 3 (Flammable Liquids)
Division 4.1 (Flammable Solids)
Division 4.2 (Spontaneously Combustible)
Class 5 (Oxidizers)

9.6.7 – 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.

9.6.8 – 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.

9.6.9 – Check Tires

Make sure your tires are properly inflated. Check placarded vehicles with dual tires at the start of each trip and when you park. You must check the tires each time you stop. 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.

9.6.10 – 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 a crash.

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.
Papers for Division 1.1, 1.2 or, 1.3 Explosives.

A carrier must give each driver transporting Division 1.1, 1.2, or 1.3 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.

9.6.11 – 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.

9.6.12 – Stop Before Railroad Crossings

Stop before a railroad crossing if your vehicle:

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

You must stop 15 to 50 feet before the nearest rail. Proceed only when you are sure no train is coming and you can clear the tracks without stopping. Don't shift gears while crossing the tracks.

9.7 – Hazardous Materials - Emergencies

9.7.1 – 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, identification number, label, and placards are correct.

9.7.2 – Crashes/Incidents

As a professional driver, your job at the scene of a crash or an incident 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.
Call for help.
Follow your employer's instructions.

9.7.3 – 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, call 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. 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 materials 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 identification 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 upwind 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.

9.7.4 – 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 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 (Poisons) must be checked for stray poison before being used again.

If a Division 6.2 (Infectious Substances) package is damaged in handling or transportation, you should immediately contact your supervisor. Packages that 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, contain any liquid leaking from the vehicle. Keep bystanders away from the liquid and its fumes. Do everything possible to prevent injury to yourself and to others.

9.7.5 – Required Notification

The National Response Center helps coordinate emergency response to chemical hazards. It is a resource to the police and firefighters. It maintains a 24-hour toll-free line listed below. You or your employer must phone 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 more than one hour.
- One or more major transportation arteries or facilities are closed for one hour or more.
- Fire, breakage, spillage, or suspected radioactive contamination occurs.
- Fire, breakage, spillage or suspected contamination occur 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) 424-8802

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.

Radioactive Separation Table A						
TOTAL TRANSPORT INDEX	MINIMUM DISTANCE IN FEET TO NEAREST UNDEVELOPED FILM					TO PEOPLE OR CARGO COMPARTMENT PARTITIONS
	0-2 Hrs.	2-4 Hrs.	4-8 Hrs.	8-12 Hrs.	Over 12 Hrs.	
None	0	0	0	0	0	0
0.1 to 1.0	1	2	3	4	5	1
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	

Figure 9.10

Do not leave radioactive yellow - II or yellow - III labeled packages near people, animals, or film longer than shown in Figure 9.10

Classes 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 listed in Figure 9.12.

Hazard Class Definitions Table B		
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

Figure 9.11

Subsections 9.6 and 9.7 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 materials?
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 pounds of Division 4.3 (dangerous when wet) materials. Do you need to stop before a railroad-highway crossing?

7. At a rest area you discover your hazardous materials shipments slowly leaking from the vehicle. There is no phone around. What should you do?
8. What is the Emergency Response Guide (ERG)?

These questions may be on your test. If you can't answer them all, re-read subsections 9.6 and 9.7.

9.8 – 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.)

Sec. 171.8 Definitions and abbreviations.

Bulk packaging – 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 (1000 pounds) as a receptacle for a gas as defined in Sec. 173.115.

Cargo tank - 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 – 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 – The business or person to whom a shipment is delivered.

Division – A subdivision of a hazard class.

EPA – U.S. Environmental Protection Agency.

FMCSR – The Federal Motor Carrier Safety Regulations.

Freight container – a reusable container having a volume of 64 cubic feet 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 – 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 – The weight of the packaging plus the weight of its contents.

Hazard class – The category of hazard assigned to a hazardous material under the definitional criteria of Part 173 and the provisions of the Sec. 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 – 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, elevated temperature materials and materials designated as hazardous in the hazardous materials table of §172.101, and materials that meet the defining criteria for hazard classes and divisions in §173, subchapter c of this chapter.

Hazardous substance - A material, including its mixtures and solutions, that:

1. Is listed in Appendix A to Sec. 172.101;

2. Is in a quantity, in one package, which equals or exceeds the reportable quantity (RQ) listed in Appendix A to Sec. 172.101; and
3. When in a mixture or solution -
   (i) For radionuclides, conforms to paragraph 7 of Appendix A to Sec. 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 shown in Figure 9.12.

Hazardous Substance Concentrations		
RQ Pounds (Kilograms	Concentration by Weight	
	Percent	PPM
5,000 (2,270)	10	100,000
1,000 (454)	2	20,000
100 (45.4)	.2	2,000
10 (4.54)	.02	200
1 (0.454)	.002	20

Figure 9.12

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.

Intermediate bulk container (IBC) – A rigid or flexible portable packaging, other than a cylinder or portable tank, which is designed for mechanical handling. Standards for IBCs manufactured in the United States are set forth in subparts N and O §178.

Limited quantity – The maximum amount of a hazardous material for which there may be specific labeling or packaging exception.

Marking – The descriptive name, identification number, instructions, cautions, weight, specification, or UN marks or combinations thereof, required by this subchapter on outer packaging of hazardous materials.

Mixture – A material composed of more than one chemical compound or element.

Name of contents – The proper shipping name as specified in Sec. 172.101.

Non-bulk packaging - A 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 Sec. 173.115.

N.O.S. - Not otherwise specified.

Outage or ullage – The amount by which a packaging falls short of being liquid full, usually expressed in percent by volume.

Portable tank – Bulk packaging (except a cylinder having a water capacity of 1,000 pounds 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 – The name of the hazardous materials shown in Roman print (not italics) in Sec. 172.101.

P.s.i. or psi – Pounds per square inch.

P.s.i.a. or psia – Pounds per square inch absolute.

Reportable quantity (RQ) - The quantity specified in Column 2 of the Appendix to Sec. 172.101 for any material identified in Column 1 of the Appendix.

RSPA – now PHMSA – The Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington, DC 20590.

Shipper's certification – A statement on a shipping paper, signed by the shipper, saying he/she prepared the shipment properly according to law. For example:

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

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

* words may be inserted here to indicate mode of transportation (rail, aircraft, motor vehicle, vessel)

Shipping paper – A shipping order, bill of lading, manifest, or other shipping document serving a similar purpose and containing the information required by Sec. 172.202, 172.203, and 172.204.

Technical name – A recognized chemical name or microbiological name currently used in scientific and technical handbooks, journals, and texts.

Transport vehicle – 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 – A specification packaging conforming to the standards in the UN recommendations.

UN – United Nations.