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Module 6.0a: Carrier Requirements – Highway

Introduction

This module presents requirements for the transportation of hazardous materials by private, common, and contract motor carriers. These requirements are found in Part 177 of the Hazardous Materials Regulations, (HMR 49 CFR Parts 100 – 185) and the Federal Motor Carrier Safety Regulations (FMCSR Parts 300 – 399).

Objectives

1. Identify requirements affecting the transportation of hazardous materials on public highways by private, common, and contract motor carriers including vehicles not in motion.
2. Describe information found in the Federal Motor Carrier Safety Regulations (FMCSR) as well as understand the differences among the FMCSR, the Hazardous Materials Regulations (HMR), and state regulations.
3. Identify shipping paper description and shipper certification requirements.
4. Identify methods for handling damaged or leaking packages and tanks.
5. Identify loading and unloading requirements for vehicles containing hazardous materials.
6. Determine segregation requirements using the segregation table in section 177.848.
7. Apply the incident reporting requirements of section 171.15, section 171.16, and related sections of the HMR.

Carriage by Highway

This module addresses the HMR requirements for the acceptance and transportation of hazardous materials by private, common and/or contract “for-hire” motor carriers in 49 CFR Part 177, “Carriage by Public Highway.”

Motor carriers and others subject to Part 177 must also comply with those FMCSR found in 49 CFR Parts 383 and 390 – 397.

The requirements of Part 177, “Carriage by Highway,” are in addition to those requirements contained in Parts 171, 172, 173, 178 and 180 of the HMR. Additionally, this module addresses applicable requirements of the Federal Motor Carrier Safety Administration (FMCSA) in 49 CFR Parts 390 – 397.

Federal Motor Carrier Safety Regulations

The FMCSR covered in this module address driver qualifications, hours of service, equipment standards, driving and parking rules for transportation of hazardous materials, alcohol and controlled substances, financial responsibility, and operational requirements.
Although the FMCSR are found in other sections as well, the regulations in 49 CFR Parts 382, 383, 385, and 390 – 397 (excluding sections 397.3 and 397.7) refer to:

- Driver qualifications
- Hours of service
- Equipment standards
- Alcohol and controlled substances
- Financial responsibilities
- Operational requirements

**Motor Carrier/Shipper Responsibilities**

You may not offer or accept a hazardous material for transportation in commerce unless:

- You are registered (if required)
- You have properly classed, described, packaged, marked, and labeled the hazardous material
- The hazardous material is in proper condition for shipment in accordance with the HMR. PHMSA registration requirements are in addition to any other Federal, state, or local registration requirements.

Motor Carrier and offeror/shipper responsibilities frequently overlap. When a carrier performs a shipper function, the carrier is responsible for performing that function in accordance with 49 CFR.

**Training Requirements**

Both carriers and shippers are responsible for ensuring their employees are properly trained as required by the HMR.

**Definition of Hazmat Employee**

A “hazmat employee” is anyone employed by a hazmat employer who, during the course of employment, directly affects hazardous materials transportation safety including self-employed and owner-operators of motor vehicles that transport hazardous materials in commerce.

- Loads, unloads, or handles hazardous materials
- Manufactures, tests, reconditions, repairs, modifies, marks, or otherwise represents packages as qualified for transportation of hazardous materials
- Prepares hazardous materials for transportation
- Is responsible for the safety of transporting hazardous materials
- Operates a vehicle used to transport hazardous materials
- Performs any function subject to the HMR or performs a function directly affecting hazardous materials transportation safety

Except as provided in section 172.704(c)(1), before any hazmat employee performs a function subject to the HMR, that person must be provided initial training in the performance of that function. Each hazardous materials employee must be periodically retrained at least every three years.

**Driver Training Requirements**

The driver training regulations in Part 177 illustrate how the FMCSR can be closely linked to related rules in the HMR. Section 177.816 mandates training in the requirements found in the FMCSR Parts 390-397.
Section 177.816(a)(2) requires training in areas such as vehicle controls and equipment, including emergency equipment. The exact equipment required is found in FMCSR Part 393.

Additional Motor Carrier Requirements
Section 177.816 requires additional training for operators of cargo tanks or vehicles with portable tanks, as well as other training that may be satisfied by the appropriate state commercial driver’s license, known as a CDL, required in Part 383.

Section 177.816 requires driver training that includes pre-trip safety inspection; use of vehicle controls and equipment, operation of vehicle, procedures for maneuvering in tunnels, bridges, and railroad crossings, requirements pertaining to the attendance of vehicles, parking, smoking, routing, and incident reporting and loading and unloading of materials.

Recurrent hazardous materials transportation training is required every three years, regardless of the length of time your CDL is valid.

HMR vs. Federal Motor Carrier Safety Regulations

Introduction
The HMR differ from the Federal Motor Carrier Safety Regulations (FMCSR), in that the HMR are specifically intended to cover transportation of hazardous materials, whether within a state or between states. The FMCSR regulate general safety requirements for motor vehicles, including hazardous materials safety. Covered within the FMCSR are:

- Part 382 apply to drug and alcohol use
- Part 383 apply to CDL requirements and penalties
- Part 387 apply to insurance
- Parts 390 – 399 apply to interstate transportation only
- Parts 382, 383 and 387 apply to both interstate and intrastate transport

The other regulations from the FMCSR cover both interstate and intrastate transportation, as does the HMR.

Determining FMCSR Applicability
When determining which FMCSR regulations apply, it is also important to verify state regulations.

The differences in regulations are important. The FMCSR on drug and alcohol testing and CDL cover both interstate and intrastate transport, and FMCSR insurance regulations in some cases apply to intrastate as well as interstate transport.

State, not Federal, regulations cover hours of service and qualification of drivers, except as noted above, in strictly intrastate transport.
**USDOT Inspections**
USDOT representatives are authorized to conduct unannounced inspections of all motor carrier records, equipment, packaging, and containers that may affect the safe transportation of hazardous materials. Unlike state and local police, USDOT representatives have the right of entry without probable cause or prior notification.

**State and Municipal Laws**
Many state statutes and municipal ordinances prohibit carriers from transporting hazardous materials on restricted highways and through public tunnels. Motor carriers have to obey those laws as well as Federal regulations, unless a special permit has been authorized. The HMR do not nullify or supersede these state statutes and municipal ordinances, regardless of the kind or quantity of hazardous materials.

Section 177.810, within the HMR, requires compliance with local ordinances regarding public tunnels, and section 397.3, within the FMCSR, requires compliance with state and local laws unless they are in disagreement with specific Federal requirements.

**Driving and Parking Rules**
Part 397 of the FMCSR covers driving and parking rules, including attendance and surveillance of parked vehicles and routing regulations for both radioactive and non-radioactive hazardous materials.

The requirements for routing nonradioactive hazardous material shipments by motor vehicle are in Part 397, Subpart C, within the FMCSR. Routing requirements for radioactive hazardous materials are found in Subpart D.

**Leaking Containers**
**Carriage by Public Highway**
Marking and placarding requirements are found in Subparts D and F of Part 172 of the 49 CFR.

Except in an emergency, a transport vehicle containing a hazardous material may not be moved unless it displays all required markings and placards. An improperly placarded or marked transport vehicle may be moved in an emergency, only if:

- Escorted by a state or local government representative
- The motor carrier has permission from the USDOT
- Movement of the transport vehicle is necessary to protect life or property

**General Requirements**
Hazardous materials must be loaded, blocked, braced, and unloaded in accordance with the prescribed safeguards found in section 177.834(a-o). Special handling, loading and unloading, and attendance requirements for explosives in Divisions 1.1, 1.2 and 1.3 are found in 49 CFR 177.835 and 397.5.
Disabled Motor Vehicle in Transit
Broken or leaking containers in transit must be handled by the safest practice available. If safe to do so, these packages may be repaired. Broken or leaking packages may also be placed in a salvage drum in accordance with section 173.3(c) and transport it to its destination, or return it to the shipper. Complete requirements for handling disabled vehicles and broken or leaking packages are found in section 177.854 in the HMR.

Leaking Cargo Tanks
When a leak in a cargo tank makes further transportation unsafe:

- Remove the cargo tank from the traveled portion of the highway
- Use every means to safely dispose of the leaking material by preventing its spread over a wide area, and preventing the contamination of streams and sewers
- All sources of ignition are forbidden

Movement of Leaking Cargo Tanks
Leaking cargo tanks may be moved only to the nearest place where the contents can be disposed of safely. All available means must be used to prevent leakage or spillage on the highway. You may move leaking cargo tanks only to the nearest place where the contents can be disposed of safely.

Shipping Papers

Introduction
Unless excepted, you must have a shipping paper that is prepared in accordance with sections 172.200, 172.201, 172.202, and 172.203 for each hazardous material shipment. The carrier must retain shipping papers for one (1) year for hazardous materials, and three (3) years for hazardous wastes according to section 177.817. General requirements for shipping papers are discussed in Module 2.

Shipper’s Certification - Initial Motor Carrier
An initial motor carrier may not accept a hazardous material unless the shipping paper includes a properly completed shipper’s certification. However, you do not need a shipper’s certification for:

- Shipments transported entirely by the shipper as a private motor carrier, unless reshipped from one carrier to another
- Bulk shipments transported in a cargo tank supplied by the motor carrier (since the carrier, not the shipper, provides the packaging)
- Return of an empty tank car previously containing a hazardous material that has not been cleaned or purged

Shipping Paper - When Offered to Rail Carrier
When you offer a freight container or transport vehicle to a rail carrier, the shipping paper must contain the description of the freight container or transport vehicle, and the kind of placard affixed to the freight container or transport vehicle.
Accessibility of Shipping Papers

It is the responsibility of every motor carrier and driver to make sure that the shipping papers are readily available and accessible in case of an accident or inspection. In order to do this, shipping papers for hazardous materials must be clearly distinguished from all other shipping papers. This can be accomplished by tabbing the hazmat shipping papers, placing them on top of the stack of papers, or keeping them separate but still readily accessible.

Driver at Vehicle Controls

When you are at the motor vehicle’s controls, the shipping paper must be within your immediate reach, even while you are restrained by a lap belt. The shipping papers must be readily visible to a person entering the driver’s compartment, or in a holder mounted on the inside of the driver’s door.

Driver Not at Vehicle Controls

When you are not at the motor vehicle’s controls, the shipping paper must either be placed in the holder mounted to the inside of the driver’s door, or placed on the driver’s seat.

Loading & Unloading

Special Loading and Unloading Requirements

Special requirements for the loading and unloading of motor vehicles are contained in 49 CFR 177.835 – 177.842. There are specific loading and unloading requirements for materials in hazard classes 1 – 8. Additional attendance requirements are found in 49 CFR 397.5.

Explosive Materials

Specific requirements for Class 1 – Explosive Materials include:

- You must turn off the vehicle engine during loading and unloading
- The cargo area interior must be free of projections (such as bolts, screws or nails) that could damage a package or container.
- The tailgate must be closed.
- The cargo must remain within the body of the vehicle.
- The trailer must have a tight floor and the inside surfaces in contact with the load must be lined with nonmetallic or nonferrous materials.
- Pyrotechnics are one of the most transported materials. They are also among the most cited materials in transport violations.
**Flammable Liquid Materials**
Part 177 includes special requirements for cargo tank motor vehicles that transport Class 3 – (flammable liquid) materials.

- You must bond and ground a cargo tank if the cargo tank is loaded through an open filling hole.
- You do not have to ground and bond the cargo tank if it is loaded or unloaded through a vapor tight connection into a stationary tank, provided the metallic connection is in contact with the filling hole.

**Storage Batteries - Nitric Acid**
Section 177.839 provides special requirements for storage batteries containing electrolyte if loaded with other cargo.

- You must load such a storage battery so other cargo does not fall onto or against it.
- You must adequately protect and insulate battery terminals against short circuits.

Section 177.839 also regulates the loading of nitric acid. You must not load any packaging of nitric acid of 50 percent or greater concentration above any packaging containing any other kind of material.

**Gases**
A cylinder containing compressed gas must be protected from movement or ejection from the motor vehicle. You must:

- Securely restrain it in an upright or horizontal position
- Load it into a rack attached to the motor vehicle
- Pack it in a box or crate

See 49 CFR 177.840(a) for the special requirements associated with compressed gas.

**Poisons - Poison Inhalation Hazard**
Part 177 provides special requirements for packages labeled “TOXIC” or “POISON.” You may not transport packages labeled:

- “TOXIC,”
- “POISON,” or
- “POISON INHALATION HAZARD”

In the same motor vehicle with foodstuffs, feed or edible material unless the package is overpacked in a metal drum as provided in section 173.25(c) of the HMR, or loaded in a closed unit load device and the foodstuffs, feed, or edible material is loaded in another closed unit load device.

**Materials Prohibited in Driver's Compartment**
You may not transport a package labeled “TOXIC,” “POISON,” “TOXIC GAS,” “POISON GAS,” or “POISON INHALATION HAZARD” in the driver’s compartment or the sleeper berth of a motor vehicle.
**Selected Class 4 and Class 5 Materials**

When loading Class 4 (flammable solid) or Class 5 (oxidizing) materials in a motor vehicle, make certain they are contained in the body of the vehicle, and covered either by the body of the vehicle, by a tarpaulin, or by other means. If the vehicle has a tailboard or tailgate, ensure it is closed and secure.

If the material is likely to become hazardous to transport when wet, take precautions to keep it dry, both during loading and during transport.

If there is a spontaneous heating/combustion hazard associated with the material, make sure the lading is sufficiently ventilated to provide reasonable assurance against fire.

When loading nitrates, make sure the vehicle is swept clean and is free of projections that might injure the bag. Do not load ammonium nitrate with organic coating in an all-metal vehicle of a closed type unless the metal is aluminum or aluminum alloy.

Do not load more than 100 pounds net mass smokeless powder for small arms, Division 4.1, in a single vehicle.

For division 4.2 (pyrophoric liquid) cylinders, load with all valves and safety relief devices in the vapor space, and secure the cylinders against shifting in transit.

See section 177.838 for the full text of these provisions.

**Radioactive Materials**

The number of radioactive material packages in a storage location or transported in a motor vehicle is limited by the total Transport Index, known as TI, which is derived from the radiation reading one meter from the package containing radioactive material.

The number of radioactive material packages in a storage location or transported in a motor vehicle is limited so that the total TI number does not exceed 50. The TI is placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The total TI is the sum of the TI on the labels of individual packages and over packs.

The TI is used to determine the minimum separation distance in meters or feet to the nearest undeveloped film, passengers, employees and animals, in continuously occupied areas in various stages of transportation.

The limitation that the total TI number may not exceed 50, does not apply to exclusive use shipments, meaning motor vehicles used only to transport that material or commodity by a single shipper. “Exclusive use” and “transport index” are defined in section 173.403 of the HMR.


Separation Distances
In a motor vehicle, you must keep packages bearing “RADIOACTIVE YELLOW-II” or “RADIOACTIVE YELLOW-III” labels away from areas used by humans or animals, or used to transport undeveloped film, in accordance with the minimum separation distances prescribed in the table in section 177.842(b).

Separation Distances for Groups of Packages
No group of “RADIOACTIVE YELLOW-II” or “RADIOACTIVE YELLOW-III” labeled packages may have a total TI of more than 50 in any single storage location. Each group of packages must be handled and stowed no closer than 6 meters (20 feet) to any other such group, measured edge to edge.

Exclusive Use vs. Sole Use
Each motor vehicle used to transport radioactive materials under exclusive use conditions must be checked for radiation contamination after each use. Exclusive use means this shipment includes only radioactive materials. Requirements for this type of materials include:

- Check for contamination after each use with radiation detection instruments
- Do not return to service until radiation dose meets acceptable levels
- Sole use means the vehicle never transports anything but radioactive materials. Requirements for this type of vehicle include:
- Exclusive use requirements do not apply to any vehicle used solely for transporting Class 7 (radioactive) material

The examination must be performed with radiation detection instruments. A motor vehicle may not be returned to service until the radiation dose rate meets acceptably low levels. The requirements applicable to radioactive surface contamination of a motor vehicle under exclusive use do not apply to any vehicle used solely for transporting Class 7 (radioactive) materials under the conditions and limitations specified in section 177.843(b).

Marking Requirements
Vehicles used solely for transporting Class 7 (radioactive) materials must be stenciled with the words “For Radioactive Materials Use Only.”

The stencil lettering must be at least three (3) inches high in a conspicuous place on both sides of the vehicle exterior. These vehicles must be kept closed “at all times” except when being loaded or unloaded.
Activity: Think It Through

Look at the two packages below labeled “RADIOACTIVE.” Determine the minimum distance that these packages must be separated from the dividing partition of the cargo compartment of the shipping vehicle.

Step 1:
Package one has a TI of 1.0. The second package has a TI of 1.5. The total TI is 2.5.

Step 2:
Using the information in the section 177.842 table, find the minimum distance from the dividing partition of the cargo compartment(s).

<table>
<thead>
<tr>
<th>Total transport index</th>
<th>Minimum separation distance in meters (feet) to nearest undeveloped film in various times of transit</th>
<th>Minimum distance in meters (feet) to area of persons, or minimum distance in meters (feet) from dividing partition of cargo compartments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 2 hours</td>
<td>Over 12 hours</td>
</tr>
<tr>
<td>None</td>
<td>0.0 (0)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>0.1 to 1.0</td>
<td>0.3 (1)</td>
<td>0.6 (2)</td>
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<tr>
<td>1.1 to 5.0</td>
<td>0.9 (3)</td>
<td>1.2 (4)</td>
</tr>
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<td>6.1 to 10.0</td>
<td>1.2 (4)</td>
<td>1.8 (6)</td>
</tr>
<tr>
<td>10.1 to 20.0</td>
<td>1.5 (5)</td>
<td>2.4 (8)</td>
</tr>
<tr>
<td>20.1 to 30.0</td>
<td>2.1 (7)</td>
<td>3.0 (10)</td>
</tr>
<tr>
<td>30.1 to 40.0</td>
<td>2.4 (8)</td>
<td>3.4 (11)</td>
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<tr>
<td>40.1 to 50.0</td>
<td>2.7 (9)</td>
<td>3.7 (12)</td>
</tr>
</tbody>
</table>

NOTE: The distance in this table must be measured from the nearest point on the nearest packages of Class 7 (radioactive) material

Answer:
For a TI of 2.5, the minimum distance is 0.6 meters (2 feet) from the dividing partition of the cargo compartment(s).
**Segregation**

**Segregation Table**

Certain hazardous materials must be separated in a manner that, in the event of leakage from packages, commingling would not occur. The segregation and separation chart of hazardous materials applies to materials in one or more hazard class in packages that require labels in a compartment within a multi-compartmented cargo tank, or in a portable tank loaded in a transport vehicle or freight container. The “Segregation Table for Hazardous Materials” found in section 177.848 shows the segregation requirements for hazard classes and divisions.

A hazard class or division that is not shown is not restricted. For example, hazard Class 9 is not restricted. A blank space in the table also indicates that no restrictions apply. Additional instructions for using the table are found in section 177.848(e).

![Segregation Table for Hazardous Materials](image)

<table>
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<tr>
<th>Class or division</th>
<th>Notes</th>
<th>1.1</th>
<th>1.2</th>
<th>1.3</th>
<th>1.4</th>
<th>1.5</th>
<th>1.6</th>
<th>2.1</th>
<th>2.2</th>
<th>2.3 gas zone A</th>
<th>2.3 gas zone B</th>
<th>3</th>
<th>4.1</th>
<th>4.2</th>
<th>4.3</th>
<th>5.1</th>
<th>5.2</th>
<th>5.1 liquids PG 1 zone A</th>
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<th>8 liquids only</th>
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<td></td>
<td>A</td>
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<td>Table Legend</td>
<td>The table in section 177.848 contains a series of X’s and O’s. An “X” in the box where a row and a column intersect means that you may not load, transport, or store the two materials together in the same transport vehicle or storage facility. When an “O” appears, you may load, transport, and/or store the materials together, provided certain conditions are met to preclude the commingling of hazardous materials. An “A” in the second column of the table indicates that, notwithstanding the requirements of the letter “X,” you may load or store ammonium nitrate and ammonium nitrate fertilizers with Division 1.1 or Division 1.5 materials. The asterisks (*) in the table indicate that the compatibility table in section 177.848(f) governs segregation among different Class 1 materials.</td>
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<tr>
<td>“X” Entry</td>
<td>Take your ruler or paper marker and place it across the table under the row “Poisonous gas (Division 2.3), Zone A.” Keep your ruler in place and find the Class 3 (flammable liquid) column. Follow that column down the page to its intersection with Division 2.3, Zone A. There is an “X” in the block where Div. 2.3, Zone A row and Class 3 column intersect. Do not load, transport, or store these materials together.</td>
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<td>Blank Entry</td>
<td>Using the same procedure take your ruler or paper marker and place it across the table under the row “Flammable liquids (Class 3).” Keep your ruler in place and find the Division 2.2 column. Follow that column down the page to its intersection with Flammable liquids (Class 3). The area where these intersect is blank, which means that you may load, transport, or store two materials together.</td>
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<td>“O” Entry</td>
<td>The row for Division 5.1 (Oxidizers) and the column for Class 3 (flammable liquid). There is an “O” where these intersect. The instructions for using the Table indicate that you may not load, transport, or store these materials together – unless a separation is maintained to prevent commingling of the hazardous material.</td>
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<td>“*” (Asterisk) Entry</td>
<td>The asterisk (*) in Columns 1.1 through 1.6 for explosives in section 177.848. The asterisk indicates that segregation among different Class 1 (explosive) materials is governed by the Compatibility Table shown in the visual. Compatibility Table for Class 1 materials can be reviewed in section 177.848(f) of the HMR.</td>
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Reportable Incidents

Despite all safety efforts, incidents do occur. When hazardous materials are involved in a transportation incident, a report may be required. Reporting requirements are the responsibility of the carrier.

For certain incidents, you must notify the National Response Center (NRC) as soon as practical but not later than 12 hours after the incident occurs. For any such incident, you must also follow up with a written Hazardous Materials Incident Report, DOT Form F 5800.1 within 30 days.

A written Hazardous Materials Incident Report, DOT Form F 5800.1 must also be submitted within 30 days of discovering any unintentional release of hazardous materials or unintentional discharge of hazardous waste, as well as under certain other conditions (see Section 171.16).

Radioactive/Infectious Substances

Notification to the NRC as soon as practical, and not later than 12 hours after the discovery of the incident, in the event of fire, breakage, spillage, or suspected radioactive contamination from a radioactive material.

Notification to the CDC as soon as practical, and not later than 12 hours after the discovery of the incident, in the event of fire, breakage, spillage, or suspected contamination involving an infectious substance other than a regulated medical waste.

Marine Pollutants

Even though you are a motor carrier, you still need to report by phone to the NRC as soon as practical, and no later than 12 hours after discovery of the event, a large release of a marine pollutant.

This requirement applies to a release of over 400 kilograms of a solid, and to the release of over 450 liters of a liquid.

Compatibility Table for Class 1 (Explosive) Materials

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Hazardous Materials Regulations
6.0a Carrier Requirements – Highway
Student Workbook
**Other Incidents**

Hazmat incidents that result in any of the following require notification as soon as practical, and not later than 12 hours after the discovery of the event, to the National Response Center when due to the hazardous materials there is:

- Death or injury requiring hospitalization
- Change in the operational flight pattern or routine of an aircraft
- The shutdown of a major facility or transportation artery for one hour or more
- An evacuation of the general public that lasts one hour or more
- A situation that, in your judgment, requires notification, even if none of the above conditions are met – for example, a continuing danger to life, although no death has yet occurred

**Summary**

You have completed all of the material for module 6.0a. You should be able to:

- Identify requirements affecting the transportation of hazardous materials on public highways by private, common, and contract motor carriers including vehicles not in motion.
- Describe information found in the Federal Motor Carrier Safety Regulations (FMCSR) as well as understand the differences among the FMCSR, the HMR, and state regulations.
- Identify shipping paper description and shipper certification requirements.
- Identify methods for handling damaged or leaking packages and tanks.
- Identify loading and unloading requirements for vehicles containing hazardous materials.
- Determine segregation requirements using the segregation table in section 177.848.
- Apply the incident reporting requirements of sections 171.15 and 171.16, and related sections of the HMR.

**References**