Hazardous Materials Transportation Training Modules

# VERSION 5.1

## INSTRUCTOR

Carrier Requirements (Rail)

U.S. Department of Transportation

**Pipeline and Hazardous Materials Safety Administration**

## MODULE 6C

# Script

## Visual

## Narrative

### 1

This module is based on Part 174 and presents the DOT requirements for transporting hazardous materials by rail. The discussion will center on general operating requirements, handling and loading requirements, segregation of hazardous materials, and the positioning of placarded cars in the train.

### 2

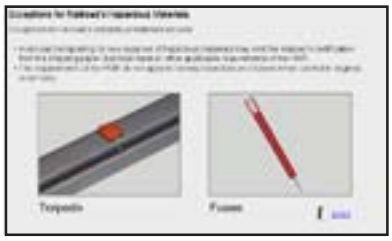
After completing Module 6C on the Carrier Requirements for Rail lesson, you should be able to:

- Compare the general operating requirements for DOT and the general railroad industry along with the exceptions for the transportation of hazardous materials by rail.
- Describe the information found in the Segregation Table for Hazardous Materials for rail transport.
- Identify the documentation needed for rail cars within a train containing hazardous materials,
- Illustrate the proper positioning of placarded cars in a train using the Placard Group Table,
- Discuss rail industry restrictions as they relate to the transportation of hazardous materials, to include speeds, routes, and inspections.
- Identify incident/accident reporting requirements.

## 3

You may not accept hazardous materials for transportation unless they are properly classed, described on a shipping paper, packaged, marked, and labeled according to the requirements of the HMR. Hazardous materials shipments by rail must comply with the requirements of Part 174 as well as those contained in Parts 171, 172, 173 and 179 of the HMR. Without the required shipping papers, you must not accept a car containing hazardous materials for transportation by rail.

## 4




A railroad transporting its own supplies of hazardous materials must meet all other requirements of the HMR, although a shipper's certification is not required on the shipping paper when a railroad is transporting its own supplies. The requirements of the HMR do not apply to railway torpedoes and fusees when carried in engines or rail cars. Torpedoes must be in a closed, metal box when not in use.

## 5

A rail carrier must inspect each rail car containing hazardous materials, at ground level, for required markings, labels, placards, securement of closures, and leakage, at each location where a hazardous material is accepted or placed in a train.

## 6

A carrier must forward shipments of hazardous materials promptly and within 48 hours after acceptance (not counting Saturdays, Sundays, and holidays). Carriers that provide only weekly or biweekly service must forward hazardous materials shipments on the first available train. Division 2.1 (flammable gas), Division 2.3 (poisonous gas), or Class 3 (flammable liquid) loaded in a tank car may not be received and held at any point, subject to the forwarding orders.

## 7

A rail carrier may impose additional restrictions on a hazmat shipment when local conditions make acceptance, transportation, or delivery unusually hazardous. The carrier must report additional local restrictions to the Bureau of Explosives for publication.

## 8

You may transport a bulk packaging containing a hazardous material inside a fully closed transport vehicle or freight container, if it is properly secured so it will not change position, slide into other packages or contact the walls of the transport vehicle or freight container during normal transportation conditions. Bulk packaging not in conformance with and subject to these requirements, may be transported in container-on-flat-car or trailer-on-flat-car service subject to the conditions in 174.63(c)(1-6). Review 174.63(c)(1-6) to become more familiar with these bulk- packaging requirements.

## 9

You may not transport a cargo tank or multi-unit tank car tank containing a hazardous material in trailer-on-flat-car or container-on-flat-car service, unless this service is approved by the Associate Administrator for Safety, Federal Railroad Administration. In the event of an incident resulting in an emergency, you do not need prior approval to move the cargo tank to mitigate the incident's consequences. Such movement must be limited to transportation necessary under emergency conditions.

## 10

**Professor Fed's Knowledge Check 1**

Instructions: Click and drag the response to the blank line that correctly answers the question asked. You will have two chances to answer this exercise correctly. Select the Done button when you are finished to receive feedback.

| | | |
|---|---|---|
| certification | validation | 24 hours |
| portable | cargo | 48 hours |

1. A shipper's _____ is not required on a shipping paper when a railroad transports its own hazardous materials and supplies.

2. Generally speaking, hazardous materials shipments must be forwarded within 48 hours of acceptance and the consignee must remove the shipments within _____.

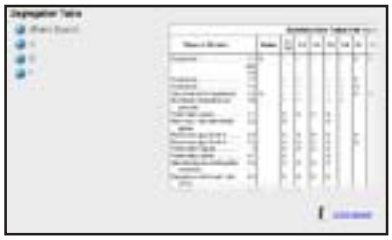
3. In an emergency, a _____tank containing hazardous material may be moved without prior approval.

**The correct answers are: 1) certification, 2) 48 hours, 3) cargo**

## 11

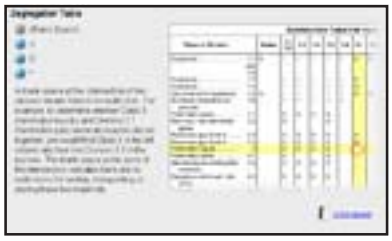
You must segregate hazardous materials in loading, transportation and storage according to the Segregation Table for Hazardous Materials in 174.81(d). To use the table, match the hazard classes in the left hand column with hazard classes across the top row. Click on the buttons to learn more.

## 12

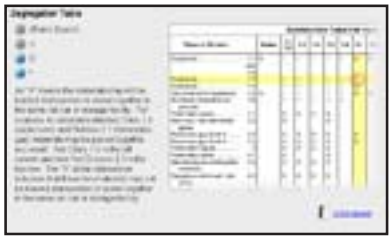


This table uses three different symbols – the letter X, the letter O, and an asterisk – to represent information. A blank space also provides information. Click on each button to learn more about what the symbols and blank space represent.

## 12a



## 12b



## 12c

## 12d

## 13

As we have learned, some materials have primary and subsidiary hazards. In segregating hazardous materials, you must apply the segregation appropriate to the subsidiary hazard when it is more restrictive than the segregation for the primary hazard. But hazardous materials in the same hazard class may be stowed together, without regard to segregation required by the subsidiary hazard, if the materials cannot react dangerously with each other.

## 14

**Professor Fed's Knowledge Check 2**

Instructions: Select the best answer from the four choices provided.

A(n) _____ indicates the materials may not be loaded, transported, or stored together.

A. X
B. O
C. *
D. blank space

**Correct answer is A**

## 15

When carrier personnel unload a tank car, unloading must be performed by a reliable person who has been trained and is responsible for unloading safely. The brakes must be set and at least one wheel blocked on at least one car being unloaded. If multiple cars are being unloaded, the hand brakes must be set and at least one wheel should be blocked from both directions. Caution signs, to warn approaching people must be placed on the track or on the car. Pressure must be relieved before opening manhole covers or outlet valve caps, and safety procedures must be followed when breaking seals, opening manhole covers and performing unloading operations. Unloading connections for tank cars must be securely attached to unloading pipes. After unloading is completed, a tank car may not be allowed to stand with unloading connections attached. A tank car must be attended or monitored by the unloader during the period of unloading and while the tank car is connected to the unloading device.

## 16

If you load packages in a freight container or transport vehicle, you must load each package containing a hazardous material so that it cannot fall or slide. You must also protect hazardous materials packages so that other freight cannot fall onto or slide into them. If other freight can’t protect the packages, blocking and bracing must be used. For blocking and bracing examples, see the Bureau of Explosives pamphlets Numbers 6 and 6c. If a hazardous materials package bears orientation markings you must load it so that the markings are pointing in an upright position. You must not use the doors of a freight container or transport vehicle to secure a load containing a hazardous materials package, unless the doors meet the design strength specifications for freight containers and trailers. The specifications are M-930 for freight containers and M-931 for trailers in the Association of American Railroads (AAR) Manual of Standards and Recommended Practices.

## 17

All hazardous materials that have leaked from a package in a rail car or on other railroad property must be carefully cleaned up and removed.

## 18

You must load Class 1 (Explosive) materials for rail transportation according to detailed requirements in Subpart E of Part 174, as applicable. The requirements address procedures for properly loading and securing Class 1 explosives in order to ensure safe rail transportation.

## 19

Requirements for carrying shipping papers and other hazmat-related documents depend on when car movement takes place in a "train." The HMR defines a train as "one or more engines coupled with one or more rail cars, except during switching operations or where the operation is that of classifying and assembling rail cars within a railroad yard for the purpose of making or breaking up trains." The Federal Railroad Administration (FRA) has clarified this definition, saying a "train" exists when federal air brake rules apply to train movement or when picking up or setting out cars at interchanges or industry.

## 20

In addition to shipping papers, a train crew must also carry a document showing the current position of each rail car containing hazardous materials in the train. This document is called a train consist. A train crewmember must update the train consist to show changes in the position of cars within a train containing hazardous materials.

## 21

**Professor Fed's Knowledge Check 3**

Instructions: Select the best answer from the four choices provided.

The HMR defines a train as _____ or more engines coupled with one or more rail cars, except during switching operations or where the operation is that of classifying and assembling rail cars within a railroad yard for the purpose of making or breaking up trains.

A. four
B. three
C. two
D. one

**Correct Answer is D**

## 22

You may not use a rail car to transport hazardous materials unless it displays the required markings and placards. Placards and car certificates lost in transit must be replaced at the next inspection point. Those not required must be removed at the next terminal where the train is classified.

If the carrier is not aware of a placarding irregularity until the time of inspection, the "next inspection point" means the inspection point at which the placarding irregularity is noticed. That is, the carrier does not have the option of waiting until the inspection point after the one where the irregularity becomes known.

## 23

Switching placarded railcars requires certain considerations when the use of hand brakes is necessary. Hand brakes must be tested to make sure they're working properly before cutting off cars during switching operations. Cars with switching restrictions must clear the ladder track before other cars can be cut off in motion.

## 24

Strict handling restrictions apply to any rail car that is placarded:

- Division 1.1 Explosives
- Division 1.2 Explosives
- Division 2.3, Zone A, Poisonous Gases
- DOT 113 tank cars placarded Division 2.1 Flammable Gas

These placards must be displayed on a white square background.

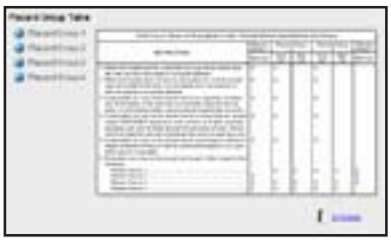
## 25

No rail car moving under its own momentum may strike any placarded flatcar or any flatcar carrying a placarded transport vehicle, freight container, or bulk packaging. A placarded flatcar or a flatcar carrying a transport vehicle, freight container, or bulk packaging may not be coupled into with more force than is necessary to complete the coupling. Most carrier operating rules specify a coupling speed of no more than 4 mph; but this is not a Federal regulatory requirement.

## 26

In a train, placarded cars have to be positioned according to strict rules of separation. These rules are listed in a table found in 174.85(d).

## 27



The table organizes placards into groups based on hazard classification. Placard groups 1 and 4 apply to rail cars only. Placard groups 2 and 3 are subdivided into rail cars and tank cars, because both types of cars may be used to carry the hazardous materials in these groups. Click each button to learn more about each Placard Group.

## 28

Placard Group 1 applies to rail cars only and includes Division 1.1 and 1.2 (Explosives). Cars placarded Division 1.1 or 1.2 explosives face additional restrictions while being handled in a terminal, yard or siding. They must be separated from the engine by at least one non-placarded car, and they must be placed in a location that is safe from danger of fire. The cars may not be placed under a bridge or overhead crossing or near a passenger shed or station except during transfer operations.

## 29

Placard Group 2 is subdivided into rail cars and tank cars, because both types of cars may be used to carry the hazardous materials in these groups, and includes Division 1.3, 1.4, 1.5; Class 2 (not including Division 2.3, PG I, Zone A); Class 3; Class 4; Class 5; Class 6 (not Division 6.1, PG I, Zone A); and Class 8.

## 30

Placard Group 3 is subdivided into rail cars and tank cars, because both types of cars may be used to carry the hazardous materials in these groups, and includes Division 2.3 (PG I, Zone A; poisonous gas) and Division 6.1 (PG I, Zone A; poisonous liquid).

## 31

Placard Group 4 applies to rail cars only carrying Class 7 (Radioactive) materials.

## 32

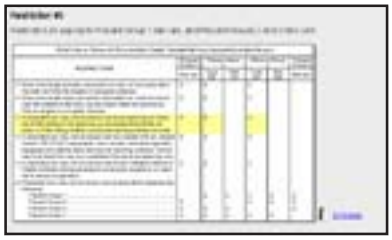
Reading down the left side of the table, there are six placement restrictions. The four placard groups read left to right across the top of the table. The table is arranged to show an X under the type of placarded car where each restriction applies. Click on the restriction numbered buttons to learn about each of these restrictions.

## 33

Restriction #1 reads, “When train length permits, placarded car may not be nearer than the sixth car from the engine or occupied caboose.”

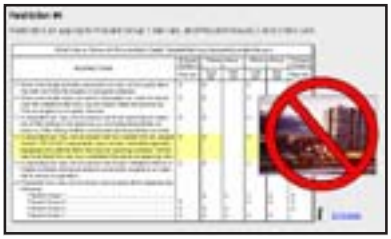
Restriction #2 reads, “When train length does <u>not</u> permit, placarded car must be placed near the middle of the train, but not nearer than the second car from an engine or occupied caboose.”

## 34



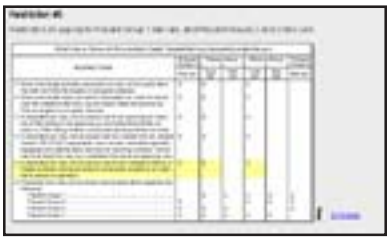
Restriction #3 says that a placarded car may not be placed next to an open-top car when any of the lading in the open top car protrudes beyond the car ends or would protrude if the lading shifted.

## 35



Restriction #4 says that a placarded car may not be placed next to a loaded flatcar that does not have permanent bulkheads. This restriction does not apply if the flatcar is loaded with closed container on flatcar or trailer on flatcar equipment, or if the flatcar is an auto carrier or has other equipment with tie-down devices for securing vehicles.

## 36



Restriction # 5 states that a placarded car may not be placed next to any transport vehicle or freight container having an internal combustion engine or an open flame device in operation.

## 37

Restriction #6 explains which placarded cars may not go next to each other. The table shows that for each Placard Group the restriction applies to every other Placard Group. In other words, cars from the same placard group may be placed next to each other and cars from different placard groups may not.

## 38

There are additional placement restrictions not covered in the Table. A car placarded RADIOACTIVE must be separated by at least one non-placarded car from a locomotive, an occupied caboose, or a carload of undeveloped film.

## 39

Tank cars containing the residue of hazardous materials <u>must</u> be separated by at least one non-placarded car from a locomotive or occupied caboose.

## 40

Escorted cars must be placed next to or ahead of the car occupied by the guards or technical escorts if they are placarded: Division 1.1 or 1.2 (explosives); Division 2.3 (Hazard Zone A, poison gas); and Division 6.1 (PG I, Hazard Zone A, poisonous liquid). If a car occupied by guards or technical escorts has an operating heater or air conditioning equipment, it must be the fourth car behind a car requiring Division 1.1 or 1.2 placards.

## 41

The maximum speed of cars carrying molten metal or molten glass may not exceed 15 miles per hour if the packaging does not meet the requirements in 173.247.

## 42

**Professor Fed's Knowledge Check 4**

Instructions: Click and drag each of the terms shown here to fill in the blanks below. Click on the DONE button when you are finished.

| | | | |
|---|---|---|---|
| one | two | three | four |
| five | six | placarded | escorted |

1. Rail cars placarded Division 1.1 or Division 1.2 must be separated from the engine by at least _____ non-placarded car.

2. There must be at least _____ rail cars between a Placard Group 1 rail car and the engine or an occupied caboose, if train length permits.

3. A(n) _____ rail car must be next to, or ahead of, the car that is carrying the guards or technical escorts.

**The correct answers are: 1) one, 2) five, 3) escorted**

## 43

The railroad industry can and does recommend stricter operating rules than those required by DOT. Click on each button to learn more.

## 44

Additional restrictions apply to “key trains” which are:

- Trains with five tank car loads of Poisonous by Inhalation materials; or
- Trains with 20 or more loaded cars, trailers, containers and intermodal tanks carrying a <u>combination of</u>:
  - Division 2.3 and 6.1 Zone A or B Poisonous by Inhalation materials;
  - Division 1.1 and 1.2 Explosives;
  - Division 2.1 Flammable Gases; and
  - Certain environmentally sensitive chemicals

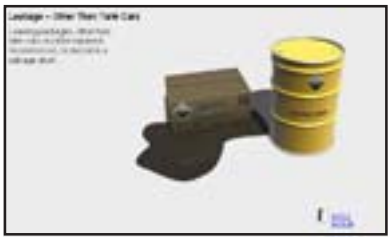
## 45

Key trains are limited to a maximum speed of 50 miles per hour. When practical, they will hold main track at meeting or passing points. A full train inspection is required at any emergency stop. At hot box detector stops, if an alarm sounds, the train must be inspected. If no defect is found, the train must travel no faster than 30 miles per hour to the next detector — or another 30 miles — for another inspection.

## 46

The Association of American Railroads (AAR) recommends that railroads designate certain routes as “key routes.” Key routes carry at least 10,000 loads of hazardous materials a year or 4,000 loads of the special materials that make up key trains. It is important to note that key train and key route criteria are not Federal requirements.

## 47



Leaking packages, other than tank cars, may not be forwarded as is. They must be repaired, reconditioned, or placed in a salvage drum according to the requirements in 173.3.

## 48

A leaking tank car may be moved without making repairs if necessary to safeguard human health or the environment. Movement must be kept to a minimum and any leaking liquid must be prevented from spreading.

## 49

A tank car that no longer conforms to the requirements of the HMR may not be forwarded unless repaired or approved for movement by the Associate Administrator for Safety, Federal Railroad Administration.

## 50

A car that's resting unevenly or bulging at the doors or walls, may have been damaged inside from a lading shift or mishandling. If the car appears in good condition, the crew can check the placards and markings to make sure they are properly applied. This should be done before pulling it from the shipper's spot or placing it in a train. The placards must match each other and the information on the shipping papers. Crews can verify placard accuracy by checking the shipping paper for Hazard Class and UN or NA Identification Number.

## 51

You may not fill a tank car that is overdue for periodic inspection with a hazardous material and then offer it for transportation. Test dates must be current for both tanks and safety valves. If the car passes the hazmat checks, it can be switched to the local classification yard. There it is given a detailed mechanical inspection of running gear and safety appliances. Then it's placed into a train. Shipping papers and related documents are given to the train crew.

## 52

Incidents or accidents involving hazardous materials may require notification to the National Response Center (NRC), or, for an etiologic agent, the Centers for Disease Control (CDC). The NRC or CDC must be notified by telephone within 12 hours when, as a direct result of hazardous materials:

- A person is killed, or requires hospitalization for injury;
- An evacuation lasting more than one hour occurs;
- One or more major transportation routes is closed for more than one hour; or
- Aircraft flight patterns are altered.

Immediate notification is also required for incidents involving:

- Radioactive contamination;
- Etiologic (disease-causing) contamination; or
- More than 450 liters of liquid marine pollutants or 400 kilograms of solid marine pollutants are released.

The NRC telephone number is 1-800-424-8802.

The CDC telephone number is 1-800-232-0124.

A written report is also required within 30 days when any of the above criteria are met, or when any of the criteria of Section 171.16 are met.

For Class 7 (radioactive) incidents, you must notify the offeror of the shipment at the earliest practicable moment.

## 53

**Professor Fed's Knowledge Check 5**

Instructions: Select the best answer from the four choices provided.

A _____ tank car may be moved without making repairs if necessary to protect human health and the environment.

A. full
B.. empty
C. damaged
D. leaking

**Correct answer is D**

## 54

**Professor Fed's Knowledge Check 6**

Instructions: Select the best answer from the four choices provided.

Test dates on tank cars must be current _____.

A. prior to filling with hazardous materials and offering for transportation
B. by the time the tank cars reach their destination
C. prior to departing
D. none of the above

**Correct answer is A**

## 59

This concludes the instruction and Knowledge Checks for Module 6C – Carrier Requirements for Rail. You should now be able to:

- Compare the general operating requirements for DOT and the general railroad industry along with the exceptions for the transportation of hazardous materials by rail,
- Use the Segregation Table for Hazardous Materials for rail transport,
- Identify the documentation needed for rail cars within a train containing hazardous materials,
- Illustrate the proper positioning of placarded cars in a train using the Placard Group Table,
- Discuss rail industry restrictions as they relate to the transportation of hazardous materials, to include speeds, routes, and inspections, and
- Identify incident/accident reporting requirements.

It is now time to assess how well you understand the information presented in this module. When you are ready, select Test on the Express Lane, to begin the end of module test for Module 6C. This will be an open reference test. Good luck.

# End of Module Test

Now that you have completed reviewing the topic on Carrier Requirements for Rail, let's evaluate how well you have mastered this material. This end of module test contains nine multiple-choice questions to determine your mastery of the six learning objectives covering Carrier Requirements for Rail. This is an open reference book test and you may use any of the references that you have to assist you in successfully completing this test.

**Instructions: Select the best answer from the four choices provided.**

## Question #1

Which one of the following items cannot be transported in the same rail car as Oxidizers?

A. Class 8, corrosive materials
B. Div 1.1, explosive materials
C. Class 4, flammable solid materials
D. Class 3, flammable liquid materials

**Correct answer is B**

## Question #2

A carrier may transport a cargo tank containing a hazardous material in TOFC/COFC service without the approval of FRA's Associate Administrator for Safety under which of the following circumstances?

A. There is an emergency need for the cargo tank to be moved in order to mitigate the consequences of an incident/accident
B. The shipment will be seriously behind schedule if not transported immediately
C. A and B
D. None of the above

**Correct answer is A**

## Question #3

When train length permits, a placarded car may not be nearer than the _____car from the engine or occupied caboose.

A. third
B. seventh
C. sixth
D. ninth

**Correct answer is C**

## Question #4

A rail car in _____ may not be placed next to any transport vehicle or freight container having an internal combustion engine.

A. Placard Group 4
B. Placard Group 3
C. Placard Group 2
D. Placard Group 1

**Correct answer is D**

## Question #5

A car placarded "RADIOACTIVE" must be separated from a locomotive or occupied caboose by at least _____.

A. four non-placarded cars
B. two non-placarded cars
C. one non-placarded car
D. five non-placarded cars

**Correct answer is C**

## Question #6

Generally, a carrier must forward hazardous material shipments promptly and within how many hours after acceptance?

A. 8
B. 16
C. 24
D. 48

**Correct answer is D**

## Question #7

A tank car containing residue of hazardous materials must be separated from the engine or an occupied caboose by at least _____ rail car other than a placarded tank car.

A. one
B. two
C. three
D. four

**Correct answer is A**

## Question #8

The doors of freight containers and transport vehicles may be used to secure loads of hazmat packages if _____.

A. the doors meet the design strength requirements in the AAR's Manual of Standards and Recommended Practices
B. the load is within the limits of the design strength requirements of the doors
C. both a and b
D. neither a or b

**Correct answer is C**

## Question #9

In addition to notifying the NRC or the CDC by phone and following up with a written report, in the event of certain hazardous materials incidents you must also notify the shipper (offeror) of the material in the case of:

A. Infectious substances
B. Radioactive materials
C. Death or injury requiring hospitalization
D. It is never necessary to notify the shipper (offeror)

**Correct answer is B**