3.0 MARKING AND LABELING
STUDENT WORKBOOK
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Module 3: Marking and Labeling

Introduction

Marking and Labeling are part of the Department of Transportation's overall communications requirements.

The information in this module cannot serve as a resource for the design or manufacture of DOT-specified marks and labels. You may, however, refer to the Hazardous Materials Regulations (HMR) for detailed specifications and the DOT Chart 15 for visual representation of markings, labeling, or placarding hazardous materials.

Please see 49 CFR Section 172.300-450 for detailed specifications if you originate any marking or part of a marking (such as an ID number) or label. The individual offering hazardous materials must use these marks and labels to communicate the hazards of that shipment to the people who may be exposed to the hazard, such as truck drivers and emergency responders.

The information contained in this module provides an overview of the marking and labeling information contained within the Hazardous Materials Regulations. It identifies and describes for you the appropriate use, and the visual identification of, marks and labels required in the HMR.

Remember, attention to detail during this lesson may help save another person's life during a hazardous materials incident.

Objectives

After completing this module on Marking and Labeling, you should be able to:

1. Apply the requirements for marking hazardous materials packages, freight containers, and/or transport vehicles and any exceptions to these requirements.
2. Apply the requirements for labeling hazardous materials packages, overpacks, and freight containers, and any exceptions to these requirements.
3. Identify special types of labeling that might be required for international shipments, water shipments, and air shipments.
4. Identify unauthorized non-bulk package markings and labels.
5. Identify the specific and general regulatory reference for a violation of 49 CFR, Part 172, Subpart D and Subpart E.

Marking Applicability

When you offer a hazardous material for transportation, or transport a hazardous material, you must mark each package, freight container, and transport vehicle containing the hazardous material in the manner required by the HMR.
The term “marking” as used in the HMR refers to placing the required information on the outer package containing the hazardous materials. This includes a proper shipping name, identification number with the appropriate prefix, specifications or UN markings, plus any other required information, instructions and/or cautions.

This module assumes that the manufacturer has assigned the proper shipping name, ID number, hazard class or division number, and packing group number, and the student is able to correctly use the Hazardous Materials Table.

## Non-Bulk Packaging

### Marking Requirements for Non-Bulk Packaging

Each person who offers a hazardous material for transportation in a non-bulk packaging must mark the package with the required information for the material as shown in the Hazardous Materials Table.

### Proper Shipping Name

You must mark hazardous material offered for transportation in a non-bulk packaging with the proper shipping name and identification number, unless excepted. The proper shipping name for a hazardous waste is not required to include the word “waste” if the package bears the EPA marking prescribed by 40 CFR 262.32.

### Marking

<table>
<thead>
<tr>
<th>Marking</th>
<th>Explanation of Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification Number</td>
<td>You must mark each package with the identification number, preceded by &quot;UN&quot; or &quot;NA&quot;, as appropriate, for the material as shown in the HMT. Identification numbers are not required on packagings that contain only ORM–D materials or limited quantities transported by highway, rail or vessel. A transport vehicle or freight container containing only a single hazardous material in non-bulk packages must be marked, on each side and each end with the identification number specified for the hazardous material in the HMT when all five criteria under section 172.301(a)(3)(i)-(v) are met.</td>
</tr>
<tr>
<td>Technical Name(s)</td>
<td>You must mark each non-bulk packaging containing hazardous materials with the technical name in parentheses in association with the proper shipping name in accordance with the requirements and exceptions specified for display of technical descriptions on shipping papers in section 172.203(k).</td>
</tr>
<tr>
<td>Special Permit Information</td>
<td>You must plainly and durably mark the outside of each package authorized by special permit with &quot;DOT–SP&quot;, followed by the special permit number assigned.</td>
</tr>
<tr>
<td>Consignee’s or Consigner’s Name and Address</td>
<td>You must mark a non-bulk packaging containing a hazardous material offered for transportation, with the name and address of the consignor or consignee, except when that package is transported by highway only and will not be transferred from one motor carrier to another; or the package is part of a carload lot, truckload lot or freight container load, and the entire contents of the rail car, truck or freight container are shipped from one consignor to one consignee.</td>
</tr>
</tbody>
</table>
Activity: Matching

Using the marking requirements listed below, match the requirements to the appropriate location illustrated in the image provided. Use the red boxes to record your answers.

Marking Requirements:
A. Identification Number
B. Technical Name(s)
C. Consignee’s or Cosigner’s Name and Address
D. Special Permit Information
**Liquid Hazardous Materials in Non-Bulk Packagings**

You must pack each non-bulk combination package having inner packagings containing liquid hazardous materials with closures upward. It must have legible package orientation markings on two opposite vertical sides, with the arrows pointing in the correct upright direction. Depicting a rectangular border around the arrows is optional.

You may not display arrows for purposes other than indicating proper package orientation on a package containing a liquid hazardous material.

The requirement for packaging orientation arrows do not apply to the following seven instances:

- A non-bulk package with inner packaging, which are cylinders
- Packages containing flammable liquids in inner packagings of 1L or less when not transported by aircraft
- Packages containing flammable liquids in inner packagings of 120 ml or less when packed with sufficient absorption material and not transported by aircraft
- Liquids contained in manufactured articles (e.g., alcohol or mercury in thermometers), which are leak-tight in all containers
- A non-bulk package with hermetically-sealed inner packagings not exceeding 400 mL each
- Packages containing liquid infectious substances not exceeding 50 ml
- Class 7 radioactive material in Type A, IP-2, Type B(U) or Type B(M) packages

**Limited Quantities Materials**

The new limited quantity marking designates hazardous material packages for air transport (Y) and packages not prepared for air transport (all other modes).

Except for transportation by aircraft or as otherwise provided in this subchapter, a package containing a limited quantity of hazardous materials is not required to be marked with the proper shipping name provided it is marked with the identification (ID) number, preceded by the letters “UN” or “NA,” as applicable, for the entry as show in the section 172.101 Table, and placed within a square-on-point border.

Except for transportation by aircraft or as otherwise provided in this subchapter, a package prepared in accordance with the applicable limited quantity requirements in Part 173 must display the limited quantity marking.

A package displaying this mark is not subject to the marking requirements of section 172.301 unless the limited quantity package also contains a hazardous substance or a hazardous waste.

As an alternative, a packaging may display the limited quantity “Y” mark shown in section 172.315(b) if the package conforms to authorized substance and article provisions and the inner and outer package conforms to authorized substance and article provisions and the inner and outer package conform to the provisions of section 173.27(f).
**ORM-D Materials**

Except for transportation by aircraft, and until December 31, 2020, a packaging marked in accordance with section 172.316 is not required to be marked with the limited quantity marking required by section 172.316(a). The “Consumer Commodity, ORM-D” marking is authorized until December 31, 2020, for domestic highway, rail, and vessel transportation.

**Marine Pollutant Markings for Non-Bulk Packaging**

You must mark any non-bulk packaging that contains a marine pollutant with the "Marine Pollutant" marking when transporting by vessel.

Also, mark the name of the marine pollutant on the package in parentheses in association with the marked proper shipping name.

Place the MARINE POLLUTANT mark in association with the hazard warning labels required by the HMR, or in the absence of any labels, with the marked proper shipping name.

Except when all or part of the transportation is by vessel, you do not have to mark non-bulk packagings containing marine pollutants with the Marine Pollutant mark if transported by motor vehicle, rail car, or aircraft as set forth in section 171.4(c).

**Marine Pollutant Marking for Non-Bulk Packaging (Not Required)**

The MARINE POLLUTANT mark is not required:

- On single packagings or combination packagings where each single package or each inner packaging of combination packagings has: (i) A net quantity of 5 L (1.3 gallons) or less for liquids; or (ii) A net mass of 5 kg (11 pounds) or less for solids.
- On a combination packaging containing a marine pollutant, other than a severe marine pollutant, in inner packagings each of which contains: (i) 5 L (1.3 gallons) or less net capacity for liquids; or (ii) 5 kg (11 pounds) or less net capacity for solids.
- Except for transportation by vessel, on a bulk packaging, freight container or transport vehicle that bears a label or placard specified in subparts E or F of this part.

**Hazardous Substances in Non-Bulk Packagings**

You must mark each non-bulk package containing a hazardous substance with the name of the hazardous substance, in parentheses, in association with the proper shipping name, if the proper shipping name does not identify the hazardous substance by name.

If the material contains two or more hazardous substances, identify at least two hazardous substances, including the two with the lowest reportable quantities (RQs). Mark "RQ" on the package in association with the proper shipping name. Packages of radioactive material labeled under section 172.403 are excepted from this requirement. For a hazardous waste, the waste code (e.g., D001), if appropriate, may be used to identify the hazardous substance.
**Bulk Packaging Requirements**

**General Marking Requirements for Bulk Packagings**
The general marking requirements for bulk packagings include:

- Identification Numbers
- Size of Markings
- Empty Packagings
- Fumigant Markings

**Identification Numbers**
The ID number markings are required on each side and each end of the packaging, with a capacity of 3,785 L (1,000 gallons) or more, and for cylinders permanently installed on a tube trailer motor vehicle.

ID number markings are required on only two opposing sides for:

- Portable tanks having a capacity of less than 3,785L
- A DOT 106 or 110 multi-unit tank car
- A bulk packaging other than a portable tank, cargo tank, or tank car with a volumetric capacity of less than 18 cubic meters (640 cubic feet). For example, a bulk bag or box.
- An IBC, if labeled in accordance with Subpart E of Part 172 instead of placarded, may display the proper shipping name and UN identification number in accordance with the size requirements of section 172.302(b)(2) in place of a UN number on an orange panel or placard
- A Large Packaging as defined in section 171.8

**Size of Markings**
Markings on bulk packaging must have a:

- Width of at least 6.0 mm (0.24 inch) and a height of at least 100 mm (3.9 inches) for rail cars.
- Width of at least 4.0 mm (0.16 inch) and a height of at least 25 mm (one inch) for portable tanks with a capacity of less than 3,785 L (1,000 gallons) and IBCs.
- Width of at least 6.0 mm (0.24 in) and a height of at least 50 mm (2.0 inches) for cargo tanks and other bulk packagings.

**Empty Packagings**
Each bulk packaging marked with a proper shipping name or identification number must remain marked when it is emptied unless it is sufficiently cleaned of residue and purged of vapors to remove any potential hazard or refilled with a material requiring different markings or no marking at all.

**Fumigant Markings**
A rail freight container, truck body, or trailer in which the lading has been fumigated with any hazardous material, or is undergoing fumigation, must be marked as specified 173.9 with a FUMIGANT marking.
**Prohibited Markings**

No person may offer for transportation or transport a package that is marked with the proper shipping name or identification number of a hazardous material unless that package actually contains the identified hazardous material or its residue. This applies to both bulk and non-bulk packages. Exceptions to this requirement exist when:

- The package is not visible during transportation and is loaded by the shipper and unloaded by the shipper or consignee.
- The markings on the package are securely covered in transportation.
- The marking of a shipping name on the package describes a material not regulated under the HMR.

**General Marking Requirements**

The HMR states that markings on bulk and non-bulk packagings must be:

- Durable, in English, and printed or affixed to the surface of a package or on a label, tag, or sign.
- Displayed on a background of sharply contrasting color.
- Unobscured by labels or attachments.
- Located away from any other marking, such as advertising, that could substantially reduce the hazardous materials marking's effectiveness.

**Authorized Abbreviations**

You may not use abbreviations in a proper shipping name marking on a bulk or non-bulk packaging except as provided for in section 172.308. You may use the abbreviation "ORM" or "ORM-D" in place of the words "Other Regulated Material." You may also use abbreviations that appear as authorized descriptions in column 2 of the HMT. Examples are listed in the table below.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Proper Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEI</td>
<td>Explosive, Extremely Insensitive</td>
</tr>
<tr>
<td>HMX</td>
<td>Cyclotetramethylene trinitramine</td>
</tr>
<tr>
<td>n.o.s</td>
<td>not otherwise specified</td>
</tr>
<tr>
<td>ORM</td>
<td>Other Regulated Materials</td>
</tr>
<tr>
<td>PCB</td>
<td>Polychlorinated biphenyls</td>
</tr>
<tr>
<td>PCB</td>
<td>Polychlorinated biphenyls</td>
</tr>
<tr>
<td>PETN</td>
<td>Pentaerythritol tetranitrate</td>
</tr>
<tr>
<td>SA</td>
<td>Small arms</td>
</tr>
<tr>
<td>TNT</td>
<td>Trinitrotoluene</td>
</tr>
</tbody>
</table>

§172.308 **Authorized abbreviations.**

(a) Abbreviations may not be used in a proper shipping name marking except as authorized in this section.

(b) The abbreviation “ORM” may be used in place of the words “Other Regulated Material.”

(c) Abbreviations which appear as authorized descriptions in column 2 of the §172.101 table (e.g., “TNT” and “PCB”) are authorized.
Class 7 – Radioactive Materials Marking Requirements

In addition to any other markings required by the HMR, you must mark each bulk and non-bulk packaging containing a Class 7 – Radioactive materials in the following manner:

- Mark the package's gross mass including the unit of measurement, which may be abbreviated, on the outside of the package, if its gross mass is greater than 50 kg or 110 pounds.
- Legibly and durably mark the outside of each industrial, Type A, Type B(U), or Type B(M) package, in letters at least 13 mm (0.5 in) high, with the words "TYPE IP–1," "TYPE IP–2," "TYPE IP–3," "TYPE A," "TYPE B(U)" or "TYPE B(M)," as appropriate. A package which does not conform to these standards may not be so marked.
- Legibly and durably mark the outside of each package which conforms to an IP–1, IP–2, IP–3 or a Type A package design, with the international vehicle registration code of the country of origin of the design. The international vehicle registration code for packages designed by a United States company or agency is the symbol "USA".
- Plainly mark a radiation symbol on the fire-and-water resistant outermost receptacle of each package which conforms to a Type B(U) or Type B(M) package.

This mark must be embossed, stamped or applied by other means resistant to the effects of fire and water. Mark "USA" in conjunction with the specification marking, or other package certificate identification on each Type B(U), Type B(M), or fissile material package destined for export.

Marking Requirements for Bulk and Non-Bulk Packagings of Poisonous Materials

You must mark a material poisonous by inhalation "Inhalation Hazard," in association with the required labels or placards, and the shipping name.

You must mark a transport vehicle or freight container containing a material poisonous by inhalation in non-bulk packages, if it is loaded at one facility with 1,000 kg or more aggregate weight.

- If the aggregate gross weight comprises two or more such materials, use the ID number of the material with the greatest aggregate gross weight
- For different materials in both Hazard Zones A and B, use the mark with the ID number of the Hazard Zone A material

For a packaging containing a Division 6.1 PG III material, "PG III" may be marked adjacent to the POISON label.
**Required Markings for Explosive Hazardous Materials in Bulk or Non-Bulk Packagings**

You must mark each package containing a Class 1, explosive material with the EX-number for that substance, article or device.

Except for fireworks approved IAW 173.64, a package of Class 1 materials may be marked with a national stock number issued by the Department of Defense or identifying information, such as a product code, in lieu of the EX-number, if the national stock number or identifying information can be specifically associated with the EX-number assigned.

When more than five different Class 1 explosive materials are packed in the same package, you may mark it with only five of the EX-numbers, national stock numbers, or product codes, or with a combination of each of these.

This requirement does not apply if the EX-number, product code or national stock number of each explosive item described under a proper shipping description is shown in association with the shipping description required by the HMR. Product codes and national stock numbers must be traceable to the specific EX-number assigned by the Associate Administrator.

Certain exceptions to these restrictions apply for materials being shipped to testing agencies, or being used for developmental testing, or covered by a national security classification.

**Marine Pollutant Markings for Bulk Packaging**

You must mark a transport vehicle or freight container that contains a package subject to these marking requirements with the MARINE POLLUTANT mark on each side and each end. This requirement may be met by the marking displayed on a freight container or portable tank loaded on a motor vehicle or rail car. You do not have to mark non-bulk packaging containing marine pollutants with the Marine Pollutant mark unless they are transported by vessel.

You must mark a bulk packaging that contains a marine pollutant with the MARINE POLLUTANT mark on at least two opposing sides or two ends other than the bottom, if the packaging has a capacity of less than 3,785 L.

The mark must appear on each end and each side if the packaging has a capacity of 3,785 L or more.

You must mark a transport vehicle or freight container that contains a package subject to these marking requirements with the MARINE POLLUTANT mark on each side and each end.

This requirement may be met by the marking displayed on a freight container or portable tank loaded on a motor vehicle or rail car.

You do not have to mark non-bulk packagings containing marine pollutants with the Marine Pollutant mark unless they are transported by vessel.
### Marine Pollutant Markings for Bulk Packaging Exceptions

#### The Marine Pollutant mark is not required:

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>On single packagings or combination packagings where each single package or each inner packaging of combination packagings has:</td>
</tr>
<tr>
<td>• A net quantity of 5 L (1.3 gallons) or less for liquids</td>
</tr>
<tr>
<td>• A net mass of 5 kg (11 pounds) or less for solids</td>
</tr>
<tr>
<td>On a combination packaging containing a marine pollutant, other than a severe marine pollutant, in inner packagings each of which contains:</td>
</tr>
<tr>
<td>• 5 L (1.3 gallons) or less net capacity for liquids</td>
</tr>
<tr>
<td>• 5 kg (11 pounds) or less net capacity for solids</td>
</tr>
<tr>
<td>On a bulk packaging, freight container, or transport vehicle that bears a label or placard specified in subparts E or F of Part 172.</td>
</tr>
<tr>
<td>On a package of limited quantity material marked in accordance with section 172.315.</td>
</tr>
</tbody>
</table>

#### Infectious Substances

You must mark bulk and non-bulk packagings containing a regulated medical waste with a BIOHAZARD marking on two opposing sides or two ends other than the bottom, if the packaging has a capacity of less than 3,785 L.

![BIOHAZARD](image)

You must mark it on each end and each side if it has a capacity of 3,785 L or more.

You must mark a transport vehicle or freight container bearing such packagings if the BIOHAZARD marking on the bulk packaging is not visible on each side and each end.

The BIOHAZARD marking must be displayed on a background of contrasting color. It may be displayed on a plain white square-on-point configuration having the same outside dimensions as a placard. The BIOHAZARD marking must be visible from the direction it faces.

#### Elevated Temperature Materials

You must mark a bulk packaging containing an elevated temperature material on two opposing sides with the word "HOT," in black or white Gothic lettering, on a contrasting background.

The marking must be displayed on the packaging itself or in black lettering on a plain white square-on-point configuration having the same outside dimensions as a placard.

You must mark bulk packagings containing molten aluminum or molten sulfur "MOLTEN ALUMINUM" or "MOLTEN SULFUR," respectively. If the identification number is displayed on a white-square-on-point display configuration, the word "HOT" may appear in the upper corner.
**Bulk Packaging Types**
In addition to the general marking requirements previously addressed and the marking requirements for content-specific materials, it is important that you are familiar with the marking requirements for these bulk packaging types.

**Portable Tanks**
In addition to the general and content-specific marking requirements, these markings are required when portable tanks are used.

- **Shipping name:** You must legibly mark the proper shipping name on a portable tank containing a hazardous material.
- **Owner's name:** You must mark the owner's or the lessee's name on a portable tank that contains a hazardous material.
- **Identification numbers:** If the identification number for the hazardous material contained in the portable tank is not visible from outside the transport vehicle, you must display it on each side and each end of the transport vehicle or freight container using placards, orange panels, or the white square-on-point configuration as appropriate.

**Cargo Tanks**
In addition to the general and content-specific marking requirements, these markings are required when cargo tanks are used.

**Proper Shipping Name**
Except for certain nurse tanks that must be marked as specified in section 173.315(m), you must mark each cargo tank transporting a Class 2 material subject to the HMR on each side and each end with either the proper shipping name of the gas or an appropriate common name for the material (e.g., "Refrigerant Gas").

**Identification Numbers**
Unless a cargo tank is already marked with the required identification number(s), the offeror must provide the number(s) to the carrier or affix the number(s).

If you offer a hazardous material or a cargo tank containing a hazardous material to a motor carrier for transportation, you must provide the motor carrier with the identification number(s) on placards or affix orange panels containing the required identification number(s) prior to or at the time the material is offered for transportation.

For a cargo tank transported on or in a transport vehicle or a freight container, if the identification number marking on the cargo tank would not normally be visible during transportation, the vehicle or container must be marked on each side and each end with the appropriate identification number.

**QT/NQT Markings**
You must mark each MC 330 and MC 331 cargo tank, near the specification plate, with either "QT" (for cargo tanks made of quenched and tempered steel) or "NQT" (for cargo tanks not made of quenched and tempered steel.)
Emergency Shutoff
Each on-vehicle manually-activated remote shutoff device for closure of the internal self-closing stop valve, must be identified by the marking "Emergency Shutoff," in letters at least 0.75 inches in height, in a color that contrasts with its background, in an area immediately adjacent to the means of closure.

Tank Cars and Multi-Unit Tank Car Tanks
If you offer for transportation or transport a hazardous material in a tank car or multi-unit tank car tank, you must mark each side and each end with the material's identification number.

Similarly, a motor vehicle or rail car used to transport a multi-unit tank car tank containing a hazardous material must be marked on each side and each end with the material's identification number.

In addition, a tank car containing certain ingredients must be marked on each side with the key words of the ingredient’s proper shipping name as specified in the HMT, or a common name authorized elsewhere in the HMR (e.g., "refrigerant gas").

Other Types of Bulk Packagings
If you offer a hazardous material to a motor carrier for transportation in a bulk packaging, you must provide the motor carrier with the required identification numbers on placards or plain white square-on-point display configurations, or affix orange panels containing the numbers to the packaging.

You must do this prior to or at the time the material is offered for transportation, unless the packaging is already marked with the identification number.

For a bulk packaging contained in or on a transport vehicle or freight container, if the identification number marking on the bulk packaging is not visible, you must mark the transport vehicle or freight container on each side and each end with the material's identification number.
Other Types of Bulk Packagings Exceptions

The following packagings may be placarded on only two opposite sides or, alternatively, may be labeled instead of placarded:

- A portable tank having a capacity of less than 3,785 L (1000 gallons)
- A DOT 106 or 110 multi-unit tank car tank
- A bulk packaging other than a portable tank, cargo tank or tank car with a volumetric capacity of less than 18 cubic meters (640 cubic feet). For example, a bulk bag or box.
- An IBC, if labeled in accordance with Subpart E of Part 172 instead of placarded, may display the proper shipping name and UN identification number in accordance with the size requirements of section 172.302(b)(2) in place of a UN number on an orange panel or placard
- A Large Packaging as defined in section 171.8

Identification Number Markings

You must display identification number markings on orange panels, placards, or white square-on-point configurations. For design specifications of each marking, see section 172.332.

Prohibited Display of Identification Numbers

- You may not display an identification number on a placard, orange panel, or white square-on-point display configuration unless the identification number is the one specified for the material in the HMT; and the package, freight container, or transport vehicle on which the number is displayed contains the hazardous material associated with that identification number.
- An identification number may not be displayed on an orange panel on a cargo tank unless it is affixed to the cargo tank by the person offering the hazardous material for transportation in the cargo tank.
- If a placard is required by the placarding tables, you may only display an identification number on an orange panel if it is displayed in proximity to that placard.
- You may not display an identification number on any Dangerous, Explosives, Radioactive, or Subsidiary Hazard placards.
Special Provisions for Identification Numbers

**Identification numbers are not required:**

On the ends of a portable tank, cargo tank or tank car having more than one compartment if hazardous materials having different identification numbers are being transported. In such a situation, the identification numbers on the sides of the tank shall be displayed in the same sequence as the compartments containing the materials they identify.

On a cargo tank containing only gasoline if the cargo tank is marked "Gasoline" on each side and rear in letters no less than 50 mm (2 inches) high, or is placarded in accordance with section 172.542(c).

On a cargo tank containing only fuel oil, if the cargo tank is marked "Fuel Oil" on each side and rear in letters no less than 50 mm (2 inches) high, or is placarded in accordance with section 172.544(c).

For each of the different liquid petroleum distillate fuels, including gasoline and gasohol in a compartmented cargo tank or tank car, if the identification number is displayed for the distillate fuel having the lowest flash point. After October 1, 2010, if a compartmented cargo tank or tank car contains such fuels together with gasoline and alcohol fuel blend containing more than ten percent ethanol, the identification number “3475” or “1987” must also be displayed in addition to the identification number for the liquid petroleum distillate fuel having the lowest flashpoint.

**Replacement of Missing Identification Numbers**

If more than one of the required identification number markings on placards, orange panels, or white square-on-point display configurations are damaged or destroyed during transportation, you must replace all the missing or damaged identification numbers as soon as practicable.

In certain cases, however, you may legibly enter the correct identification numbers by hand, using an indelible marking material. When entered by hand, the identification numbers must be located in the white display area of the placard, orange panel or white square-on-point display.
Labeling

General Labeling Requirements
You must label hazardous material if it meets one or more hazard class definitions, in accordance with column 6 of the HMT and the table found in section 172.400(b). If you offer for transportation or transport a hazardous material in commerce, in any of the following packages or containment devices, you must label them. These packages and containment devices include:

- A non-bulk package
- A bulk packaging, other than a cargo tank, portable tank, or tank car, with a volumetric capacity of less than 18 cubic meters (640 cubic feet)
- A portable tank of less than 3,785 liters (1,000 gallons) capacity
- A DOT Specification 106 or 110 multi-unit tank car tank
- An overpack, freight container or unit load device, of less than 18 cubic meters containing a package for which labels are required

Labeling Exceptions
There are exceptions to the labeling provisions specified in section 172.400.

General exceptions, such as:

- A cylinder, or a Dewar flask containing Division 2.1, Division 2.2, Division 2.3 gas that is not poisonous, carried by a private or contract motor carrier, not over packed, and durably and legibly marked
- A package or unit of DOD military explosives or ammunition
- A package containing a DOD hazardous material other than ammunition
- A compressed gas cylinder permanently mounted in or on a transport vehicle
- A freight container, aircraft unit load device or portable tank that is placarded in accordance with subpart F of the HMR or conforms to section 172.512 (a)(3) or (b)(3)
- An Overpack or unit load device
- A package of low specific activity RAM and surface contaminated objects

Certain exceptions to labeling requirements are provided for small quantities transported by highway or rail in section 173.4 and excepted quantities in section 173.4a.

A subsidiary hazard label is not required on a package containing a Class 8 (corrosive) material that has a subsidiary hazard of Division 6.1 (poisonous) if the toxicity of the material is based solely on the corrosive destruction of tissue rather than systemic poisoning.

A package containing a poisonous-by-inhalation material in a closed transport vehicle or freight container may be excepted from the POISON INHALATION HAZARD or POISON GAS label or placard, under the conditions set forth in sections 171.12 and 171.12a.
Labeling Prohibitions
You may not display:

- A hazard label on a packaging not containing a hazardous material
- A hazard label communicating a hazard not presented by the packaging
- Any label which, by its color, design, or shape, could be confused with a label prescribed in the HMR

The previous restrictions do not apply to packages labeled in conformance with the Globally Harmonized System of Classification and Labeling Chemicals (GHS); the United Nations (UN) Recommendations; the International Maritime Dangerous Goods (IMDG) Code; the International Civil Aviation Organization (ICAO) Technical Instructions; or the Canadian Dangerous Goods (TDG) Regulations.

The provisions of this section do not apply to a packaging that is unused or cleaned and purged of all residue, transported in a transport vehicle or freight container in such a manner that the packaging is not visible during transportation, and transported on a vehicle that is loaded by the shipper and unloaded by the shipper or consignee.

Primary and Subsidiary Hazard Labels
You must label each package containing a hazardous material with the primary and, if applicable, the subsidiary hazard label(s) specified in column 6 of the HMT. If more than one label code is listed in column 6, the first code listed indicates the primary hazard, and the others are subsidiary hazards.

For those packages containing a hazardous material not in Class 1 or Class 2, the packaging must be labeled with a subsidiary hazard label in accordance with the Subsidiary Hazard Labels table shown here.

Display of Hazard Class on Labels
You must display the appropriate hazard class or division number in the lower corner of both the primary and subsidiary hazard label.

Labeling Class 7 – Radioactive Materials
The proper label to affix to a package of Class 7 radioactive material is based on the transport index, or "TI," and the maximum radiation level at any point on the external surface of the package.

If the radiation level and TI suggest different hazard warning labels, choose the label indicating the greater hazard level.

- RADIOACTIVE WHITE–I indicates the least severe hazard level,
- RADIOACTIVE YELLOW–III indicates the most severe
- Any package containing a highway route-controlled quantity must always be labeled RADIOACTIVE YELLOW–III
Activity: Think It Through

Using the following table from the HMR, determine the proper label to affix to a package of Class 7 radioactive materials.

Question:
A package with a transport index of 0.8 and a maximum surface radiation level of 60 millirems per hours would require which label?

Table:

<table>
<thead>
<tr>
<th>Transport index</th>
<th>Maximum radiation level at any point on the external surface</th>
<th>Label category&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>0&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Less than or equal to 0.006 mSv/h (0.5 mrem/h)</td>
<td>WHITE-I</td>
</tr>
<tr>
<td>More than 0 but not more than 1</td>
<td>Greater than 0.005 mSv/h (0.5 mrem/h) but less than or equal to 0.5 mSv/h (50 mrem/h)</td>
<td>YELLOW-II</td>
</tr>
<tr>
<td>More than 1 but not more than 10</td>
<td>Greater than 0.5 mSv/h (50 mrem/h) but less than or equal to 2 mSv/h (200 mrem/h)</td>
<td>YELLOW-III</td>
</tr>
<tr>
<td>More than 10</td>
<td>Greater than 2 mSv/h (200 mrem/h) but less than or equal to 10 mSv/h (1,000 mrem/h)</td>
<td>YELLOW-III (Must be shipped under exclusive use provisions; see 173.441(b) of this subchapter).</td>
</tr>
</tbody>
</table>

Reference: 49 CFR Section 172.403 Class 7 (radioactive) material.

Answer:
Circle the proper label to affix to the package of Class 7 radioactive materials.

Labels for Mixed and Consolidated Packaging

When two or more compatible hazardous materials are packed in the same packaging, or within the same outside container or overpack, you must label the outside of the packaging, outside container, or overpack for each class of hazardous material contained within.

- **Mixed Packaging**: When hazardous materials having different classes are packed within the same packaging, or within the same outside container, you must label the packaging outside container or the overpack for each class of hazardous material contained within.

- **Consolidated Packaging**: When two or more packages containing compatible hazardous material are placed within the same outside container or overpack, you must label the outside container or overpack for each class of hazardous material contained within.
**Authorized Label Modifications**

For Classes 1, 2, 3, 4, 5, 6, and 8, the text indicating a hazard, such as Flammable Liquid or Oxidizer, is not required on a primary or subsidiary label. Displayed here are both versions of the hazard class labels, with and without the hazard text.

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**Label Placement**

In most cases, you must affix each label required by the HMR to a surface of the package or containment device containing the hazardous material, or print the label directly on the package surface.

You must locate the label on the same surface the proper shipping name appears on, and in close proximity to it.

If the surface of the package is too small, too irregular, or a cylinder for compressed gases, the label may be displayed on a tag attached to the package. You may not use a tag for a Class 7 radioactive material.

To learn more about the specifications for label design, see section 172.406.

**Exceptions**

A label may be printed on or placed on a securely fixed tag, or may be affixed by other means, to a package that contains no radioactive material and that has dimensions less than the required label, cylinder, or package that has such an irregular surface that it precludes satisfactorily affixing a label to that surface.

**Placement of Multiple Labels**

When primary and subsidiary hazard labels are required, they must be displayed next to each other within 150 mm (6 inches) of one another.

**Contrast with Background**

Each label must be printed on or affixed to a background of contrasting color, or must have a dotted or solid line outer border.
Duplicate Labeling
Duplicate labels must be displayed on at least two sides or two ends for:

- Each packaging having a volume of 1.8 cubic meters (64 cubic feet) or more
- Each non-bulk package containing a radioactive material
- Each DOT 106 or 110 multi-unit tank car tank
- Each portable tank of less than 3,785 L (1000 gallons) capacity
- Each freight container or aircraft unit load device having a volume between 1.8 cubic meters and 18 cubic meters

Visibility
A label must be clearly visible and may not be obscured by markings or other attachments.

Labeling Requirements
Labeling requirements for hazardous materials are further explained under each of these categories:

Durability
Each label, whether printed on or affixed to a package, must be durable and weather resistant.

A label on a package must be able to withstand deterioration or a substantial change in color over a 30-day exposure to conditions similar to those that might reasonably be expected to be encountered by the labeling incident to transportation.

Form Identification
A label may contain form identification information, including the name of its maker, providing that the information is printed outside the solid inner border in type no larger than 10 point.

Exceptions
Except for a hazardous material, poisonous by inhalation, labels conforming to the specifications provided for in the UN Recommendations, may be used in place of a corresponding label that conforms to the requirements of the HMR.

Design
Except for size and color, the printing, inner border, and symbol on each label must be shown as in the HMR. The dotted line border shown on each label is not part of the label specification, except when used as an alternative for the solid line outer border.
**Label Gallery: “Standard” Labels**

Below is a label gallery of the “standard” labels.

<table>
<thead>
<tr>
<th>General Hazardous Material Class</th>
<th>Example of “Standard” Label</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class 1: Explosives</strong></td>
<td>![Explosives Label]</td>
</tr>
<tr>
<td><strong>Class 2: Gases</strong></td>
<td>![Oxygen Label]</td>
</tr>
<tr>
<td><strong>Class 3: Flammable Liquid</strong></td>
<td>![Flammable Liquid Label]</td>
</tr>
<tr>
<td><strong>Class 4: Flammable Solids, Spontaneously Combustible, and Dangerous When Wet</strong></td>
<td>![Dangerous When Wet Label]</td>
</tr>
<tr>
<td>Class 5: Oxidizer and Organic Peroxide</td>
<td>![Organic Peroxide]</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Class 6: Poison/Toxic, Poison Inhalation Hazard, and Infectious Substances</td>
<td>![Poison]</td>
</tr>
<tr>
<td>Class 7: Radioactive</td>
<td>![Radioactive]</td>
</tr>
<tr>
<td>Class 8: Corrosive</td>
<td>![Corrosive]</td>
</tr>
<tr>
<td>Class 9: Miscellaneous Hazardous Material</td>
<td>![Miscellaneous]</td>
</tr>
</tbody>
</table>
Summary

You have completed all of the material for Module 3. You should be able to:

- Apply the requirements for marking hazardous materials packages, freight containers, and/or transport vehicles and any exceptions to these requirements.
- Apply the requirements for labeling hazardous materials packages, overpacks, and freight containers, and any exceptions to these requirements.
- Identify special types of labeling that might be required for international shipments, water shipments, and air shipments.
- Identify unauthorized non-bulk package markings and labels.
- Identify the specific and general regulatory reference for a violation of 49 CFR, Part 172, Subpart D and Subpart E.

References