

M E R R T T

Hazard Recognition



INTRODUCTION

Very strict regulations control the shipment of radioactive material. The regulations require that shipments of radioactive material be marked, labeled, or placarded. This information provides important details about the nature of the material being transported and may help you during an accident.

PURPOSE

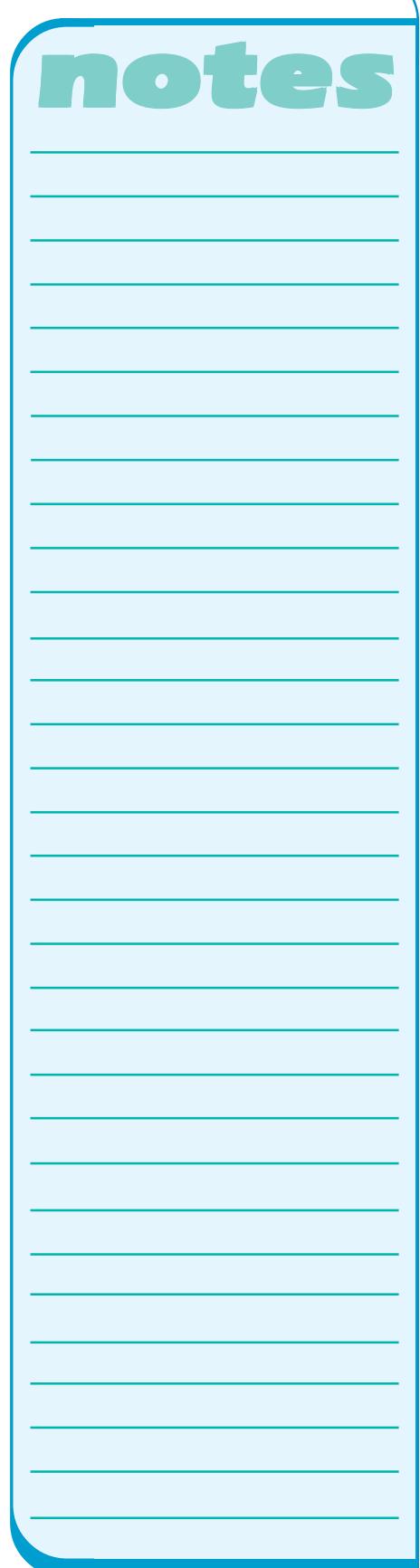
The purpose of this module is to increase your understanding of package markings, warning labels, and placards used for packaging and shipping radioactive material.

As an emergency responder, you need to be aware of radioactive material present at an accident scene. Understanding radioactive material marking, labeling, and placarding requirements will help you properly assess accident scenes and respond appropriately.

MODULE OBJECTIVES

Upon completion of this module, you will be able to:

1. Identify markings on packages used to transport radioactive material.
 2. Identify labels on packages used to indicate the presence of radioactive material.
 3. Identify placards used on radioactive material shipments.





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RADIOACTIVE MATERIAL: Shipping and Packaging Concerns

Safe Packaging

Prior to transport, regulations require that radioactive material be properly packaged, sealed, surveyed for external radiation, and then checked for external contamination. The package is then marked and labeled (as required) to communicate specific information about its contents.

Package Markings

Package markings are designed to inform transportation workers and emergency response personnel about the package's radioactive contents. Package markings will be clearly marked on the outside of the package. Some of the markings you may see on a radioactive material package include the following:

- Proper Shipping Name and UN identification number (e.g., Radioactive material, Type A package, UN 2915)
 - “Radioactive LSA” or “Radioactive SCO”¹ (if applicable)
 - “Type IP-1, IP-2, IP-3, or Type A” or “Type B”² (if applicable)
 - Gross weight, if package weighs more than 110 lbs.
 - “USA”
 - Orientation arrows. This is a good indication that the package contains liquids (see figure below)
 - “RQ” if the package contains a reportable quantity of material



¹ Radioactive Low Specific Activity (LSA) and Surface Contaminated Objects (SCO) shipments, when transported exclusively on a conveyance may be excepted (exempt) from the other marking and labeling requirements discussed here. When excepted from these marking and labeling requirements, vehicle placarding is required. More information on LSA and SCO material is given in Module 8, Radiological Terminology and Units.

² Type IP-1, IP-2, IP-3, Type A, and Type B refer to specific types of radioactive material packaging. Package types are discussed in more detail in the Radioactive Material Shipping Packages module.

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Radiation-warning Labels

Radioactive material packages may require special labels in addition to any marking required. The radioactive labels alert persons, particularly handlers, that the package contains radioactive material and that the package may require special handling and storage controls. Some radioactive material packages do not require labels. Bulk packages containing large volumes of low-level radioactive material may not require labels although vehicle placards may be required.

When required, labels must be applied to opposite sides of the package. Labels contain specific information about the quantity and type of radioactive material being shipped. The type of label used depends on the external radiation level or in some cases the package contents. The shipper must measure the radiation levels to determine which label is required.



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The following labels may be used on packages used to transport radioactive material:

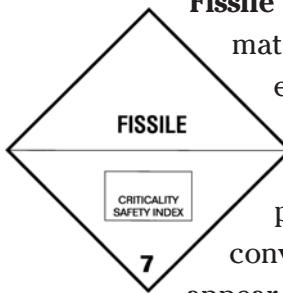


Radioactive White-I: minimal radiation levels detectable outside the package.



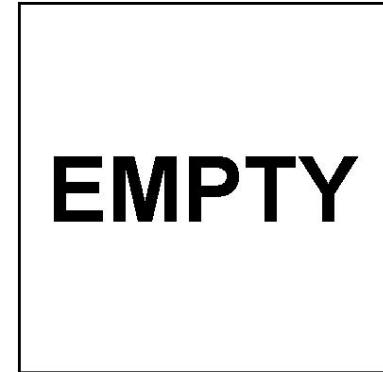
Radioactive Yellow-II: medium-level radiation levels detectable outside the package.

Radioactive Yellow-III: highest radiation levels detectable outside the package.



Fissile Label: applied to packages that contain fissile materials³. The Criticality Safety Index (CSI) for each package will be noted on the label. The CSI is displayed on the label to assist the shipper in controlling how many fissile packages can be grouped together on a conveyance. When applicable, the fissile label will appear adjacent to the radioactive material label.

EMPTY: applied to packages that have been emptied of their contents as far as practical but may still contain regulated amounts of internal contamination and minimal radiation levels detectable outside the package.



³ Fissile materials are composed of atoms that can be split by neutrons in a self-sustaining chain-reaction (criticality) to release enormous amounts of energy. Special controls are placed on fissile materials during transportation to ensure nuclear criticality safety.

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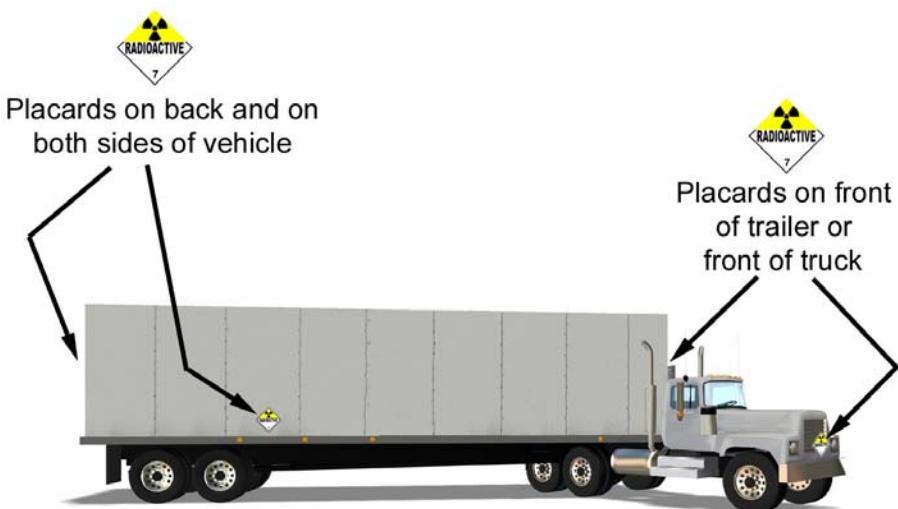
In a response situation, if you encounter a package that has a radiation-warning label on it, carefully note the specific label. Also note any other information or markings on the package. Write all the information down and be certain of its accuracy. As with all hazardous material, you need to have as much information as possible in a response situation.

Placarding Requirements

Not all shipments of radioactive material require that the transport vehicle be placarded. Rail or highway shipments containing excepted quantities and packages with the EMPTY, Radioactive White-I, and Radioactive Yellow-II labels do not require vehicle placarding. Placarding is required for the following:

- Packages with the Yellow-III label
 - Exclusive Use⁴ LSA/SCO shipments in excepted packages
 - Highway Route Controlled Quantities of material

When required, placards must be in plain view and displayed on all four sides of the transport vehicle as show below.



⁴ “Exclusive use” means a single shipper transports the material and all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the shipper or receiver.



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The standard placard for radioactive material is square-on-point and is yellow on top and white on the bottom, with black lettering and a black radiation symbol in the yellow portion. Standard size is approximately 11 x 11 inches. In the bottom corner, the DOT hazard class number "7" denotes radioactive material.



There is one other type of radioactive placard that you may encounter on highway shipments. It looks like the standard placard, except that it has a white square background and a black border. This placard represents a “Highway Route Controlled Quantity” (HRCQ) shipment. HRCQ shipments contain higher quantities of radioactive material and require special controls during transport. Special controls include operating highway vehicles over “preferred routes.”



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A preferred route is the Interstate Highway system or a state-designated alternate route selected by a state agency. The driver of a HRCQ vehicle must be provided with a written route plan, must have received DOT mandated training within two years prior to the shipment, and must have a certificate of such training in his possession during the shipment.

United Nations Identification Number

In addition to the radioactive placard, the vehicle may also have a United Nations Identification Number (UN ID) located close to the placard. The UN ID number will appear on either an orange panel or on a plain white square-on-point configuration similar to a placard. The orange panel is orange with black lettering and has a four-digit identification number that identifies the radioactive material. This four-digit number is the UN identification number of the material being transported. The orange panel and white square-on-point configuration is used because UN identification numbers may not be displayed on a Class 7 placard. The UN identification number can be used to locate the name of the material and the response guide in the Emergency Response Guidebook (ERG).

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Secondary Hazards

Responders should always be alert for the presence of secondary hazards at an incident site. These secondary hazards can come from other possible sources such as other hazardous material carried on the vehicle or external factors such as downed power lines, spilled fuel, etc. If you observe a radioactive placard, do not let this distract you from looking for additional placards on the vehicle. Be aware that some radioactive material may have other hazardous properties. For instance, they may be contained in a compressed gas or contain corrosive chemicals.

Remember that radioactive placards may not indicate the only hazard(s) on the vehicle. Don't get "tunnel vision" about radiation; it is important to look for spilled fuel, downed power lines, etc., since these may pose a more immediate hazard than the radioactive material.



Check Your Understanding



1. Package _____ and labels are designed to inform transportation workers and emergency response personnel about a package's radioactive contents.
2. Orientation arrows on the outside of a package are a good indication that the package contains _____.
3. All packages of radioactive material require radiation-warning labels. True/False.
4. Which of the following is true regarding the use of radiation-warning labels?
 - a) Radiation-warning labels are only used on medical shipments
 - b) When required, they will appear on opposite sides of the package
 - c) All shipments of radioactive material require radiation-warning labels
 - d) Radiation-warning labels are placed on vehicles transporting radioactive material
5. The _____ label is applied to packages that, after being emptied of their contents, may still contain a regulated amount of internal contamination.
6. Placarding is required on all shipments of radioactive material. True/False.
7. The standard placard for radioactive material is _____ on top and _____ on the bottom, with black lettering and a black radiation symbol. In the bottom corner, the DOT hazard class number _____ denotes radioactive material.

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ANSWERS

1. markings
2. liquids
3. False
4. b
5. empty
6. False
7. yellow
7. white
7. True