Hazardous Materials

Hazardous materials or Hazmat, are solids, gases, and liquids that can hard people, animals, property, and the environment. Throughout the U.S., hazardous materials are moved by marine vessels, air, rail, and truck. Hazmat chemicals that give freight transportation providers the most cause for concern are the toxic inhalation hazard (TIH) materials.

In the U.S., hazmat transportation is regulated by the Federal Government, and agencies including: U.S. Department of Transportation (USDOT), Pipeline and Hazardous Materials Safety Administration, Federal Railroad Administration (FRA), Federal Aviation Administration (FAA), Federal Motor Carrier Safety Administration (FMCSA) U.S. Coast Guard. as well as by state governments, and local jurisdictions.

Title 49 Code of Federal Regulations (CFR) Sections 105 through 180 governs the movement of hazardous materials by the various freight modes (air, rail, truck, and vessel).

The main and primary safety and security concern related to the transportation of hazardous materials by freight modes, is the prevention of a lethal spill or release occurring in proximity to populated areas, or venues or events with large numbers of people in attendance, iconic buildings, landmarks, and environmentally sensitive areas.

Federal agencies have issued regulations that require how certain hazardous materials are moved, stored, loaded, and trans-loaded. Drivers of hazardous materials are also required to undergo background checks and obtain a hazardous materials endorsement background check by the Transportation Security Agency (TSA). States and cities have also designated specific highway routes that hazardous material can be transported along. This includes restricting the types and combinations (especially in bulk) of hazardous materials through tunnels. The National Hazardous Materials Designated, Preferred and Restricted Routes current list was last updated in 2008.

Freight Mode Hazmat Information

The U.S. Department of Transportation requires hazard marking labels, known as placards, to be placed on the transportation vehicle, tanks, tank cars, portable tanks, and bulk packaging, along with a four digit number coding that identifies the specific type of material for emergencies. A 4" x 4" colored diamond label with warning words and graphics must also be affixed to the outside of the shipping container. These can be seen in Figure 1.

Railroads are required under the "Common Carrier Rule" to ship hazardous material. However, the make-up, general handling, and loading of trains carrying hazmat are strictly regulated. The distances between specific hazardous material placarded cars and tanks along the trains' length are regulated by FRA rules. This is especially the case for loading of class 1 explosive materials, class 2 gases materials, and poisonous and radioactive materials. Rules also proscribe certain train configurations, and how the units are moved around in the rail yards to make up the trains. Some hazardous materials are not allowed to be transported together under any circumstances within the same train compilation.

The FRA has also issued regulations requiring railroads to perform comprehensive safety and security risk analysis to determine and select routes that pose the least overall risk. The analysis must include 27 risk factors and include input provided by state and local governments. Regular

safety audits are conducted by the FRA to ensure compliance by the railroads. More information regarding hazmat transportation by rail can be found on the Association of American Railroads site.

Trucks also carry a large portion of hazardous material throughout the U.S. The USDOT and FMCSA, and Pipeline and Hazardous Materials Safety Administration govern regulations regarding trucking of hazardous materials. One of the main elements required by for trucking is the verification of truck drivers TSA, as part of implementation of the Patriot Act also requires drivers who transport hazardous materials to have a hazardous materials endorsement (HME) background check. This requires drivers who are seeking to gain a HME to undergo a fingerprint based check. Port facilities also produce rules that regulate the transport of hazardous materials on their facilities. The Port Authority of New and New Jersey, for example, updated its 'Redbook' in 2009 regarding the transportation of hazardous materials by truckers in tunnel and bridge facilities that it operates. More information regarding hazmat transportation by trucks can also be found the on the American Trucking Association's website.

33 CFR Part 126 governs handling dangerous cargo at waterfront facilities.

The U.S. Coast guard is the primary government agency responsible for the transportation of hazardous materials by water. The Maritime Transportation Security Act 2003 laid down new rules for international ship and port facility security, including implementation of the Transportation Working Identification Credential (TWIC) program. This issues a tamper-resistant biometric credential to workers who require unescorted access to secure areas of ports, vessels, and the outer continental shelf facilities. Under 33 CFR 12.19 the Captain of the Port is authorized to issue permits for *each* transportation of handing, loading, discharging or transporting dangerous cargo at the waterfront facility. The permit specifies the limits, quantity and isolation and remoteness required to handle these materials.

The Coast Guard is harmonizing its regulations with the International Maritime Organization International Convention for the Safety of Life at Sea 1974 regarding maritime bulk solid hazardous materials. This will expand the list of solid hazardous materials authorized for bulk transportation by vessel, and will create special handling procedures for these hazmat cargos. More information regarding hazmat transportation by marine vessels can be found at the American Association of Port Authorities website.

Air cargo hazmat transportation restrictions apply not just to freight cargo but also to items that passengers and cabin crew can bring onto aircraft. TSA is responsible for screening of passengers, and air cargo. International treaties also govern the movement of hazardous materials by air.

FIGURE 1 HAZMAT CLASSES

There are 9 classes of hazardous materials which are further subdivided into divisions.

CLASS NUMBER	CLASS NAME	DIVISIONS	PLACARD
1	Explosives	1.1 Mass explosion hazard 1.2 Blast/projection hazard 1.3 Minor blast hazard 1.4 Major fire hazard 1.5 Blasting agents 1.6 Extremely insensitive explosive	
2	Gases	2.1flammable gas 2.2 nonflammable Gas 2.3 poisonous Gas 2.2 Oxygen 2.3 Inhalation Hazard	
3	Flammable Liquids	3.1 Flammable 3.2 Combustive 3.3 Gasoline Fuel Oil	
4	Flammable Solids	4.1 Flammable Solid 4.2 Spontaneously combustible 4.3 Dangerous when wet	
5	Oxidizers & Organic Peroxides	5.1 Oxidizer 5.2 Organic Peroxide	
6	Poisons & Infectious Substances	6.1 Inhalation hazard 6.2 Poison 6.3 Toxic	
7	Radioactive Materials	Any material, or combination, that emits ionizing radiation > 0.002 microcuries per gram.	
8	Corrosives	8.1 Acids 8.2 Alkali (Materials, .liquid or solid that can dissolve skin, tissue, or corridor certain metals)	
9	Miscellaneous	Substances that do not fall into other categories	

More information on hazardous materials can be found on the Occupational Safety & Health Administration Website.