

Hazardous Materials

A hazardous material is a material that, in any quantity, poses a threat to life, health or property. More than four billion tons of materials classified as hazardous are shipped throughout the United States each year.

Hazardous materials commonly shipped in the United States include:

- explosives (materials that combust or detonate)
- compressed gases (pressurized flammable or nonflammable gas)
- flammable liquids (those with a flash point of less than 100 degrees Fahrenheit)
- combustible liquids (those with a flash point greater than 100 degrees Fahrenheit)
- flammable solids (nonexplosive solid material that burns vigorously and can be ignited readily)
- oxidizers (substances that give off oxygen or act like oxygen and stimulate combustion)
- poisonous gases, corrosives, (materials that destroy skin)
- radioactive materials

Exposure to nonradioactive hazardous materials is much more likely than exposure to radioactive ones.

An incident involving hazardous materials is a true emergency and you should call 9-1-1 immediately.

Resources for Handling Hazardous Materials

Several resources can assist you in the proper handling of hazardous material emergencies:

CHEMTREC (Chemical Transportation Emergency Center) is a public service based in Washington, D.C., as a division of the Chemical Manufacturer's Association. You can reach officials at CHEMTREC 24 hours a day, seven days a week by dialing 1-800-424-9300. Officials there can answer any questions and advise you on how to handle emergencies involving hazardous materials.

CHEMTREC even will locate the shipper of the hazardous materials for appropriate follow-up. To obtain help from CHEMTREC, you will need to provide the following information:

1. The identification number or the name of the product.
2. The nature of the problem
3. Your name and the number where you can be reached.
4. Your location
5. The Department of Transportation Response guide number you are using.
6. The shipper or manufacturer of the product.

7. The type of container
8. The rail car or truck number
9. The carrier's name
10. Local conditions (weather, terrain, etc.)

It is critical that you make every effort to keep a phone line open so that the shipper can reach you with guidance and assistance.

One good reference is a guidebook published by the Department of Transportation called *Hazardous Materials: Emergency Response Guidebook*. The book lists more than 1,000 hazardous materials with their identification numbers; it is cross-referenced so that you can quickly locate complete instructions for emergency procedures. Many hazardous materials are listed both by identification number and in alphabetical order.

State and local agencies such as the Department of Environmental Quality or the Department of Transportation can help you identify hazardous materials and provide assistance in case of disaster.

Identification

There are several ways to identify a hazardous material:

The **placard**, a four-sided, diamond-shaped sign, will be displayed on the trucks, railroad cars and large containers that are carrying hazardous materials. Many placards are red or orange, while a few are white or green. The placard will contain a four-digit identification number as well as a class or division number that indicates whether the material is flammable, radioactive, explosive or poisonous.

Shipping papers will have the name of the substance, the classification (such as flammable or explosive), and the four-digit identification number. With very few exceptions, the shipping papers identifying hazardous materials are required to be in the cab of a motor vehicle within the reach of the driver, in the possession of a train crew member in the engine or the caboose, in a holder on the bridge of a vessel or in the aircraft pilot's possession.

Labels can be found on containers and packages containing hazardous materials, which name the substance, the classification and the four-digit identification number.

General Procedures - Emergencies

The general rule in working with hazardous materials is to act quickly and to isolate and deny entry (access). Time is critical, but do not act so quickly that you endanger yourself and others at the scene. Call 9-1-1 immediately. Secure the scene and limit exposure to anyone. Do not try any rescue efforts. Wait for the fire department to arrive on the scene before doing anything.

Radiation Emergencies

Largely due to ignorance about radiation and to inexperience in dealing with radiation-related incidents, much fear has surrounded radiation, leading to a lack of widespread training. Radiation emergencies may be clean (meaning that the patient was exposed but not contaminated) or dirty (meaning that the patient was contaminated).

The Nature of Radiation

None of your five senses can detect radiation. We always are exposed to minute amounts of radiation. Cosmic rays that constantly bombard the earth contain radioactive rays. Some minerals that contain radiation have occurred naturally in the earth from the beginning. But exposure to large amounts of radiation is a relatively new danger as people are exposed to x-rays or to unintentional contamination from nuclear power plants, from radioactive transport vehicle crashes and construction incidents.

Radiation is a general term that describes energy transmission. Radiation takes several different forms, including sound, light and heat. These forms can burn the eyes, sound can harm the ears and heat can burn. However, ionizing radiation is the most harmful and cannot be detected without special equipment. Ionizing radiation has the unique property of being able to disrupt atoms and, therefore, to damage the cells of the body.

The three kinds of ionizing radiation are:

Alpha Particles

They do little damage if exposure is only external. They can be shielded off by material as weak as clothing or a sheet of paper. Positively charged and consisting of two protons and two neutrons, they are considered to be the least dangerous of ionizing radiation as long as they remain outside the body.

Beta Particles

The negatively charged electrons are more dangerous and are 7,000 times smaller than alpha particles, but even they can be absorbed by heavy clothing.

Gamma Rays

These are extremely dangerous. High-energy light similar to x-rays, they may be absorbed by several inches of lead but can pass completely through the body as they inflict damage to the cells. Many radioactive substances emit gamma rays spontaneously; the rays contain large amounts of energy and are capable of inflicting damage.

How Radiation Affects the Body

Because the body depends upon billions of individual cells for its well being, exposure to ionizing radiation can disrupt the function of those body cells or destroy them completely. This results in radiation sickness. In massive doses it can cause death. The degree of radiation sickness depends on what kind of radiation was delivered, the

duration of exposure, how much of the body and what parts were exposed, and the total dose of radiation delivered.

Depending on dosage, radiation can have the following effects on the body:

- reddening and swelling of the skin
- itching, flaking, weeping, blistering and ulceration of the skin
- temporary or permanent sterility
- suppression of menstruation
- reduction in sperm count
- swelling and inflammation of the lungs
- obstruction of the airways
- damage to the blood vessels and air sacs of the lungs
- damage to the blood vessels throughout the body
- cataracts
- cancer
- genetic damage

Immediate effects can include nausea, vomiting, lowered plasma content, shock, dehydration, tremors, convulsions, drowsiness, listlessness, and, with high concentrations, death.

Cell damage to the body can occur with all kinds and amounts of radiation exposure. During the first two days following exposure, a sharp increase in the number of white blood cells occurs. The number of white blood cells then decreases, reaching a level below normal. As the number of white blood cells decrease, the body becomes extremely susceptible to infection. At the same time that the white blood cell number is diminishing, the amount of platelet (the cells responsible for clotting in the blood) is also decreasing, introducing the possibility of uncontrolled bleeding. Simultaneously, the number of red blood cells drops, leading to anemia. Long-range exposure to radiation or to large doses can result in leukemia.

Victims exposed to radiation may develop what is called acute radiation syndrome, a progressive illness with predictable stages but with a wide variety of symptoms that may or may not occur. The severity of acute radiation syndrome depends on the dosage of radiation received, the length or duration of exposure, and the way in which the radiation is distributed in the body. Those who survive radiation exposure may require months, or sometimes years, to recover completely. In many cases, lingering effects such as chromosomal damage or reproductive injury may never disappear.

Motorists at Scene of a Hazardous Materials Incident

If a motorist is the first on the scene of an incident involving a vehicle carrying hazardous materials, 9-1-1 should be called immediately. **REMEMBER - STAY UPWIND AND ON A HIGHER TERRAIN THAN THE INCIDENT SITE, AND PREVENT OTHERS FROM ENTERING THE HAZARDOUS AREA WHEN POSSIBLE.**

It is very important that motorists, their passengers and all bystanders avoid converging on the scene. Evacuation of the area is critical because of the potential occurrences of fires, explosions and exposures. In many instances, crowds gathering around the scene of an incident interfere with emergency vehicle rescue operations. Sometimes bystanders are killed in explosions or fires or later find that they were contaminated.