



Environmental Releases – Recognition, Health Effects, and Reporting

Participant Guide

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Midwest Consortium for Hazardous Waste Worker Training

Acknowledgments

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See <https://mwc.umn.edu> for a listing of contacts at each member institution and additional information about our organization and other available training. We encourage you to comment on these materials. Please give your suggestions to those leading the program in which you are now enrolled or click on 'contact us' at <https://mwc.umn.edu>.

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Disclaimer

Note: The training program covers basic hazard recognition, identification, reporting, and self-protection for individuals who may observe the preliminary stages of an event. It does not provide the necessary hazard recognition and protective skills required to approach a drum or other container which may be hazardous. Emergency responders receive substantial training in order to protect themselves when approaching hazardous material or stopping releases. For further information about this matter, consult the training facilitator and the Local Emergency Planning Committee for your city or county.

This material was updated 10/17/2022 and web links are active as of that date. If you find an error, please inform the facilitator so that it can be updated

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Introduction

You are here because you are a concerned individual in the community who may be the first person to discover a hazardous material in your neighborhood. (The term *Hazardous Material* will be defined during the program.) As the first to be concerned, your job is to observe and report conditions to appropriate personnel. The personnel trained in dealing with unknown or hazardous materials will then take control.

When you complete this program, you will better be able to:

- Identify physical, biological, and chemical hazards
- Recognize how to safely observe a potential hazard
- Describe important observations
- Identify to whom you should report the observations
- Describe how the body can react to hazardous substances

We want you to participate in the program. Please ask questions about anything that you do not understand and/or anything you would like to have discussed in more detail.

Hazardous waste can be found in neighborhoods. In 2016, a Madison Heights (Detroit) company, Electro-Plate Service, Inc., was closed by officials as it presented a serious risk to the community. The facility held nearly 5,000 containers of hazardous substances, including dangerous chemicals such as cyanide and hydrochloric acid. Many were improperly stored, unlabeled, open, or in poor condition. There were a number of chemical spills. The company was located in a high-density area, within a mile of nine facilities including daycares, schools and senior living; the nearest homes were just 500 feet away.

Hazardous waste violations can result in penalties. In 2004, the Wabash Environmental Technologies facility in Indiana was found to contain thousands of gallons of waste that could overflow during heavy rain. In addition, numerous leaky 55-gallon drums were found on the property. The owner was sentenced to 5 years in prison and a \$237,680 fine.

Unsolved Mysteries

This section will give you an opportunity to think about some abandoned waste incidents which have happened and might happen again. What is a hazardous material will also be discussed.

Objectives

When you have completed this section, you will be better able to:

- Recognize potential hazardous materials
- Recognize the need for accurate information-gathering
- Define hazardous material

Unsolved Mysteries Exercise

Directions

- During this exercise, you will work in groups of two to six participants.
- In your group, have someone take notes and report back to the class.
- One person should read each “mystery” to your group.
- Your trainer will tell you which mysteries you should discuss. Spend three to five minutes on each mystery, answering all the questions. The trainer will announce the time every five minutes so you will know when to move on to the next one.
- After the groups have completed all of their mysteries, the trainer will ask for group reports and lead a discussion with the whole class.
- Note: Please stay within the facts given in each “mystery.” Don’t make up anything.

Mystery A

It's 2:05 p.m. on a hot Friday in July. You live next door to a facility which has recently gone out of business. Until April, sludge from degreasing tanks was treated there. You notice that something is leaking from under a pile of old transformers stored on the plant property. The liquid is slowly moving under the chain-link fence that surrounds the plant and into your driveway.

Answer the following questions in your group:

What should you do?

What can you observe that should be reported?

What could happen if you take no action?

What other information do you want?

Mystery B

While taking your daily early morning run, you notice a lot of debris by the roadway. Cardboard boxes and two drums are in the culvert. The lid of one of the drums has popped off, and purple stuff is leaking out.

Answer the following questions in your group:

What should you do?

What can you observe that should be reported?

What could happen if you take no action?

What other information do you want?

Mystery C

One May evening, firefighters responded to a structural fire at a garden nursery warehouse in your neighborhood. When they arrived, the warehouse was totally engulfed in flames. Three employees of the nursery were trying to fight the fire with ordinary garden hoses. The firefighters immediately began fighting the fire.

About 30 minutes later, additional firefighters arrived. Soon after that, the crews were told that several chemicals were kept in the burning building and that self-contained breathing apparatus (SCBA) should be used.

A little while later, the firefighters, you, and your neighbor began experiencing chest tightness; shortness of breath; abdominal cramps; nausea; and burning eyes, nose, and throat. You go to the local emergency room for treatment.

Answer the following questions in your group:

Why might you have symptoms?

What “clues” were given that a hazard, other than fire, existed?

How could the hazardous exposures be avoided?

Mystery D

You are out on a Saturday morning taking the dog for a walk when you see a picnic cooler tossed off by the side of the road, but instead of soda cans and hotdogs, you see glass dishes, plastic tubing, and stained coffee filters. There's a bucket of cat litter nearby, too, that smells strongly of ammonia.

Answer the following questions in your group:

What could explain this odd assortment of discarded items?

What information should you gather?

What should you do?

Examples from Your Experience

Have you seen abandoned drums, packages, or trucks? Or industry usage of a river or stream? Or smelled something near an industrial facility and wondered what it was?

What observations would be important for you to communicate to others?

Did you communicate what you observed?

How did you know who to report your observations to?

What Is a Hazardous Material?

Hazardous material is a legal term. The definitions of hazardous material can be found in several environmental laws. According to these laws, a material may be defined as hazardous because it is included on a list of substances considered to be hazardous materials.

A hazardous material can be defined as any substance capable of producing unwanted effects on health, safety, or the environment. Sometimes non-hazardous materials will be considered hazardous when mixed with other materials. Community members who notice something unusual will generally not know the name of chemicals. For those individuals, the following definition of a hazardous material can be used:

You should consider any unknown material as a hazardous material.

It is difficult (if not impossible) to detect some hazardous materials. If you do not know for sure what a material is, treat it as a hazardous material!

Summary — Unsolved Mysteries

- Recognize potential hazardous materials
- Recognize the need for accurate information-gathering
- All unknown materials should be considered hazardous until proven otherwise.

Hazard Recognition

This section describes some clues you should look for both to help you avoid hazards and to prepare the emergency responders for hazards they may face at the scene you've discovered.

Objectives

When you finish this section, you will be better able to:

- Identify physical, biological, and chemical hazards
- Describe important characteristics of the scene
- Recognize how to safely observe a potential hazard
- Recognize labels, placards, and types of containers

Hazard Recognition Introduction

In order to know “what’s going on,” you need two kinds of information. The first kind of information concerns the type of health and safety hazards present at the scene. The second type of information concerns characteristics of the scene other than the health and safety hazards.

Health and safety hazards can be grouped into three main types:

1. Physical
2. Biological
3. Chemical

Examples of each type of hazard are listed below:

Physical hazards

- Radiation from waste
- Steam clouds
- Confined spaces
- Unstable soils

Biological hazards

- Infectious hospital wastes
- Research materials (animals, tissue, for example)
- Blood-borne pathogens
- Poisonous plants and animals

Chemical hazards

- Flammable liquids
- Reactive materials
- Oxidizing agents
- Corrosives
- Poisons (including carcinogens, or cancer-causing)

This section will provide you with some “clues” to help you recognize some physical, biological, and chemical hazards. Besides identifying potential hazards at the scene you observe, there is other information that would be helpful to note.

Characteristics of the scene include information about:

- Exact location
- Type of release? airborne, water, on roadway or land
- Evidence of smoke or fire
- Dead animals or vegetation
- Nearby buildings
- People in the area or nearby
- Nature of the terrain
- Access routes

Characteristics of the scene can increase the hazards.

What's Going On = Hazards Present + Characteristics of the Scene

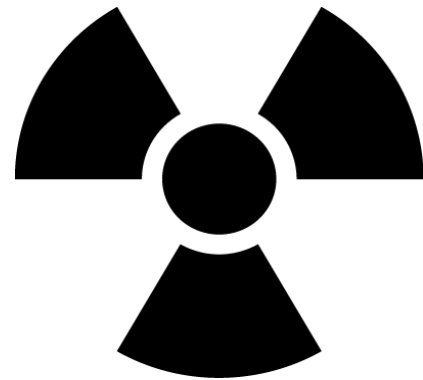
Note that you may be more likely to observe hazards after natural or man-made disasters such as tornados, flooding, or vehicle accidents.

Physical Hazards

It is important to recognize the physical hazards — not only to protect yourself, but also to report this information accurately.

Radiation

Radioactive sources are used in industry and medicine, and radioactive wastes result from energy and weapons production. The best indication that a radiation source is present is the symbol shown on the right. It is usually magenta or purple-colored on a yellow background. Where radiation hazards exist, the company must include Standard Operating Procedures (SOPs) in the safety and health plan. Everyone should keep as far away as possible from any containers with this marking unless they have had specific training and know that they are adequately protected.



Radiation Symbol

Steam Clouds

Steam from ruptured lines can cause severe burns. Maintain a safe distance. The steam, or the heat from it, may also react with other materials to compound the problem at a hazardous materials incident scene. Steam will be carried by the wind. If you are outside, stay upwind to reduce the possibility of contact with the steam. If there is steam at the scene, include that information in your report.

It is possible that what appears to be steam may not actually be steam. Some chemicals may give off toxic clouds which may appear steam-like. Also, gases escaping from a pressurized container may look like steam.

Do not approach anything that looks like a cloud.

Confined Spaces

Confined spaces are areas like ditches, stream beds, trailers, tanks, railcars, basements, and storage closets. Stay out of confined spaces. Entry into confined spaces may block your view of what else is happening around you. In addition, accumulations of chemical vapors can happen quickly in confined spaces and could prove deadly to you either through direct exposure or the increased risk of explosion.

Physical Hazards Checklist

What do I look for?

- Radiation sources and symbols
- Steam or clouds near the ground
- Confined spaces

How Do I Observe Them?

- From a distance
- From upwind, if outdoors
- From a higher elevation, if possible
- Take notes if possible, but do not risk your safety

Biological Hazards

The most common type of packaged biological waste is probably infectious waste from a hospital or other healthcare facility. This type of waste should be in boxes, plastic containers, or red plastic bags marked on all sides with the fluorescent orange infectious materials symbol shown here. Examples of infectious materials include used needles and syringes, soiled bandages, test tubes, and disposable vials. Be alert to used needles, which may have been improperly disposed of in neighborhoods.



Infectious Materials Symbol

As with any other hazardous waste, disposal containers may break open during transportation or manual handling. If you notice anything that looks like hospital waste lying around on an accident site, move away from the area. Do not pick up or touch the material.

Less frequently encountered biological hazards would include biological research materials such as genetic materials and viral or bacterial cultures. If the research materials include biological agents, the containers should be clearly marked. If you notice broken vials, flasks, or culture dishes, stay clear and tell the emergency responders.

Biological Hazards Checklist

What do I look for?

- Red plastic bag
- Infectious materials symbol on packaging
- Used needles, syringes, test tubes, and vials

How Do I Observe Them?

- From a distance
- From upwind, if outdoors
- From a higher elevation, if possible
- Take notes if possible, but do not risk your safety

Chemical Hazards

Chemical hazards depend on the properties of the material. Some properties are described below.

- A **flammable material** gives off enough vapor to burn if there is a source of ignition.
- A **reactive material** has the tendency to react with another component (including water).
- An **oxidizing material** supports or accelerates burning by providing a source of oxygen.
- A **corrosive material** is a liquid or solid that eats away or dissolves a material when it touches it.
- A **poisonous material** can cause injury, illness, or death through exposure.

Your senses can assist in identifying some common chemical hazards. For example, chemicals in drinking water can be sensed by unusual smells or taste and natural gas leaks have a unique odor. However, your nose will not detect many substances. Even substances that have a smell may be missed if you have a cold or allergy or become “used to” the odor. Many substances have no odor.

Never breathe hazardous materials on purpose.

There can be a number of “clues” about the possible dangers from chemical hazards. This section describes some of the clues that you should look for to determine whether chemical hazards are present.

Clues to look for include:

- Written information/warnings – placards and labels
- characteristics of the containers that are present
- things you notice about the area, such as dead animals or affected vegetation

It is important to remember that the absence of clues does not guarantee that there are no hazards present.

Placards and labels and information resources are described below; accurate report of what you see or learn from resources will allow responders to prepare better to approach any suspicious materials.

Placards and Labels

One of your best clues to report about potential chemical hazards comes from placards and labels that may be visible from your observation area.

Placards are attached to transportation vehicles, large storage vessels, and portable tanks carried on or in transport vehicles.

Labels are on shipping boxes, drums, bags or other small containers.

There are several different types of placards and labels used depending on if the chemical is a moving vehicle, a container, or at a facility. Different agencies oversee compliance, depending on the location.

Transportation vehicles and shipped containers– The Department of Transportation (DOT) regulations are followed; these are summarized in the Emergency Response Guidebook (ERG).

Containers at or from a workplace – Hazard Communication Standard (HCS 2012, enforced by the Occupational Safety and Health Administration [OSHA]); 2 alternatives may still be used to comply with HCS2012, National Fire Protection Association (NFPA) and HMIS (Hazardous Material Information System)

The following pages describe the most commonly used.

As an observer, your two tasks are:

1. Gather information that you can see
2. Stay away from any exposure

Department of Transportation Placards and Labels

The DOT system is used in the transportation of hazardous materials and applies to rail cars, road trailers, and shipped containers.

Below is an example of a DOT signage or label that might be seen on a truck, train or cardboard shipping box.



Notice the... Shape: diamond

Color: red

Symbol: a flame

4-digit number: 1075

1-digit number: 2

All DOT placards are the same shape, but differ in the other 'clues' that are shown.

The red color of this placard indicates that the contents are flammable. A full listing of the hazard for each color is shown below:

Color	Hazard
Orange	Explosive
Red	Flammable or combustible gas or liquid
Green	Non-flammable gas
Yellow	Reactive
White with skull & crossbones	Toxic
White and red vertical stripes	Flammable solid
White top with black bottom	Corrosive
White top with red bottom	Spontaneously combustible
Blue	Water-reactive
Yellow top with white bottom	Radioactive
Black and white stripes on top, white bottom	Low to moderate hazard

NOTE: physical (radioactive) and chemical hazards are included.

The flame symbol of this placard also indicates that the chemical is flammable. Other symbols are shown in the table below:

Symbol	Hazard
Bursting ball	Explosive
Flame	Flammable/combustible/dangerous when wet/organic peroxide
Skull and crossbones	Poisonous
Circle and flame	Oxidizing material
Gas cylinder	Non-flammable gas
Propeller/Trefoil	Radioactive
Test tube/hand/metal	Corrosive
Special symbol	Infectious

The 4-digit number is an identification number used in the DOT Emergency Response Guidebook (ERG). This number will provide responders with information on potential hazards, public safety and emergency response procedures. Sometimes placards with the 4-digit number in the center are referred to as a “number placard.”

The 1-digit number provides information on the type of hazard that might result from release. For example, 2 indicates that the contents is a gas. The meaning of each of the nine hazard classes is shown below:

#	UN Hazard Class
1	Explosives
2	Gases (compressed, liquefied, or dissolved under pressure)
3	Flammable liquids
4	Flammable solids or substances
5	Oxidizing substances
6	Poisonous and infectious substances
7	Radioactive substances
8	Corrosives
9	Miscellaneous dangerous substances

For a report, the shape will guide a responder to the DOT ERG. Assuming you cannot read the numbers, a report of the color and symbol would provide a responder with

information that the material is flammable. If you report color, symbol, 4-digit and 1-digit numbers, a responder would know that the contents are a flammable gas (color, flame, 2), the 4-digit number would be used to identify the chemical as butane, butylene, isobutene, isobutylene in the ERG.

Look at the placard to the right, and identify the shape, color, symbol, 4-digit number and 1-digit number for a report!



Some placards do not have a 4-digit number. One example is shown here:

For this placard, the report would include shape, color, symbol and 1-digit number and the word 'radioactive'. Examples of other words used include:

- Flammable Gas
- Combustible
- Fuel Oil
- Non-Flammable Gas
- Flammable Solid
- Oxidizer
- Infectious Substance
- Corrosive
- Organic Peroxide
- UNXXXX
- Dangerous when wet
- Spontaneously Combustible

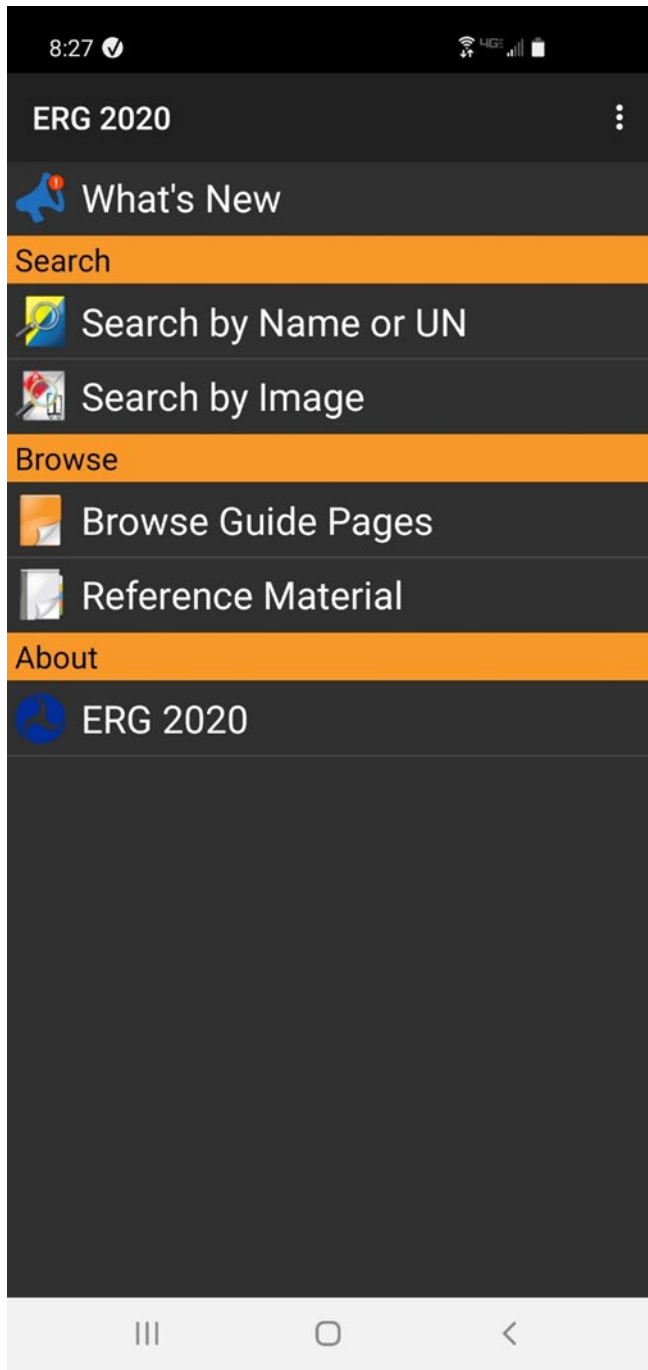


The 1-digit number space may include a number like 2.2, providing more information to the responder. Hazard classes 1, 2, 4, 5 and 6 have been divided into subclasses. For example, 2.2 indicates that the contents are a non-flammable, non-toxic/non-poisonous gas.

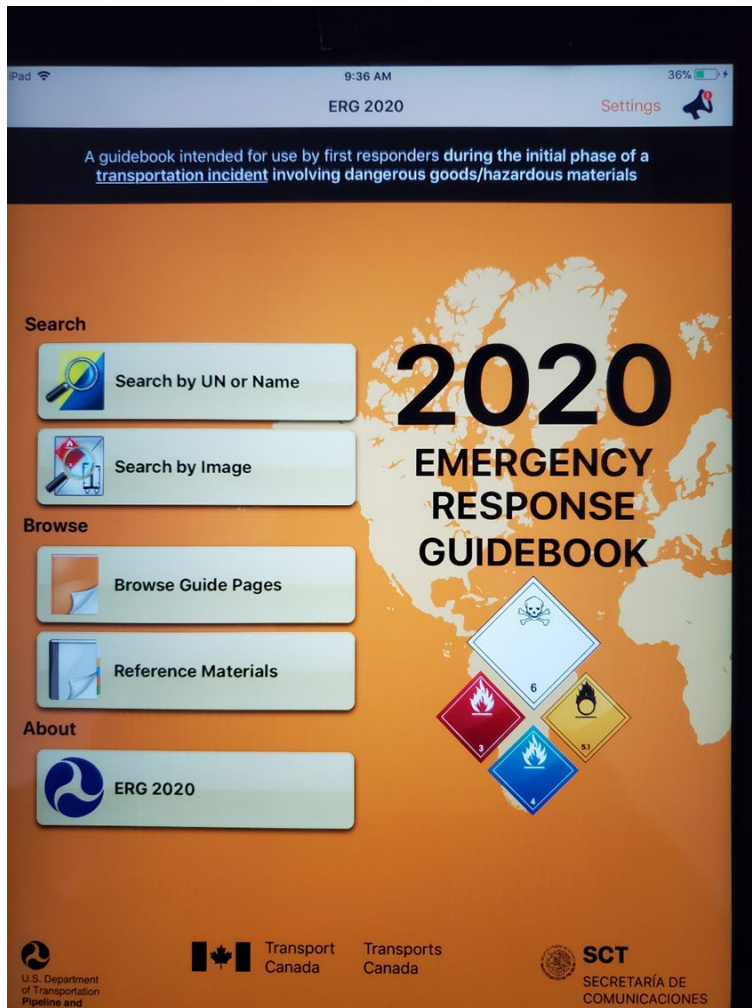
Using the Emergency Response Guide (ERG) to recognize DOT placards and labels, access additional information

The ERG is available as a book or an app.

When using the app, the home page will look slightly different depending on the device you are using but will basically work the same way. Below is what the home pages will look like:



Home page for Smartphone (Android or iPhone)



Home page for iPad

ERG is divided into sections, each with its own color. The typical starting point is looking up a substance by name (blue pages), ID (UN) number (yellow pages) or image (placard, rail car, trailer).

YELLOW: The yellow pages list chemicals in numerical order based on their assigned ID number (UN number). If you are reading a placard or label which has a four-digit number in the center, you can look up the chemical name in the yellow pages, which will tell you the name of the chemical and the Guide number. When using the app, you simply type the number into the Search by Name or UN field.

BLUE: The blue pages list chemicals alphabetically by their name. From this listing you can determine each chemical's ID number and the Guide number. When using the app, you simply enter the chemical name into the Search by Name or UN field.

ORANGE: The orange pages are called the Guides. These pages are of use in determining the potential hazards of the chemical in question, with the greatest concern listed first. Additionally, the Guides give a brief description of the emergency action that should be taken by appropriate emergency response personnel. When using the book, you must first find the appropriate Guide Number by looking in the yellow or blue pages or referring to the Table of Placards. When using the app, you are immediately taken to the appropriate Guide Number when you select the chemical name, ID number, or placard (Note: with some chemicals you may receive guidance based on if a fire is involved before proceeding to the Guides).

GREEN: Some chemicals are also included in the green pages. The green pages indicate the Table of Initial Isolation and Protective Action Distances. This section of the ERG describes the distances necessary for initial isolation around a chemical incident as well as the distance downwind that persons must be protected.

Book: Chemicals that are highlighted green in the blue and yellow pages will be found in Table 1 (green pages). If the name of the material in Table 1 is followed by "(when spilled in water)", consult Table 2 for toxic gases produced. If there is an asterisk next to the ID number in Table 1, also consult Table 3.

Smartphone: If a chemical has green page, this will be indicated during your search and, in the orange pages, you will see at the top of the screen the words Initial Isolation and Protective Distances. You can access the green pages by swiping left.

iPad: The green pages information will automatically appear on the right side of the screen.

Windows: The green pages information will automatically appear at the bottom of the Guide.

In addition to the Protective Distance information found in Table 1 (green pages) some chemicals have information about toxic gases produced "when spilled in water" (Table 2). When using the app, this information is listed at the bottom of the green section, "TIH Gas(es) Produced when spilled in water".

Six common TIH gases have additional information provided by type of container (Table 3). When using the app, this Table 3 information will be available at the same location as the other Protective Distance information.

PLACARD: The app also allows you to Search by Image of Placard, Rail Car, or Road Trailer by selecting this option on the home screen or navigator bar at the top. With your smartphone or iPad, select Search by Image and then scroll down and select the placard of interest, taking you to the appropriate page in the Guide (orange pages). You can navigate to the Rail Car and Road Trailer sections by swiping left (smartphone) or buttons at top (iPad).

PROTECTIVE DISTANCE MAPPING: Digital formats will display protective action distances in real time using your devices GPS location. From the Guide or green page, select the distance cone icon or 'Map' at the top of the page. You will be asked about the spill location, wind direction and speed, size of spill, container type, and time of day. You will then be able to view the protective distance area on the actual map of the spill area.

Other notes when using digital format:

- You can review the orange pages by selecting Browse Guide Pages on the home screen.
- You can look at the white and green reference pages and 'How to use this app' by selecting Reference Material on the home screen.
- When using a smartphone or iPad, selecting the picture of a book at the top of the screen will open the 'User Guide'
- When using a smartphone, select the 3 dots at the top to return to the home screen or open Reference Help.
- When using an iPad, use the back arrow (<) at the top right to navigate menus.
- When using Windows, use the symbols at the top or 'Search by' to navigate.

If you want additional help, a How to Use the ERG video can be found here:

<https://www.phmsa.dot.gov/hazmat/erg/emergency-response-guidebook-erg>

Hazard Communication Standard (HCS 2012)

HCS 2012 covers labelling of hazardous chemicals used in industry (excluding wastes) to describe physical hazards (such as flammability and corrosivity), health hazards (including both immediate and long-term health effects) and environmental hazards. These labels include pictograms that may be visible from a distance.

The eight health and safety pictograms and one (non-mandatory) environmental pictogram are shown on the following page.

Note the... Shape: red diamond
 Symbol: black on white background.

HCS Pictograms and Hazards

<p style="text-align: center;">Health Hazard</p>  <ul style="list-style-type: none"> • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity 	<p style="text-align: center;">Flame</p>  <ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides 	<p style="text-align: center;">Exclamation Mark</p>  <ul style="list-style-type: none"> • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
<p style="text-align: center;">Gas Cylinder</p>  <ul style="list-style-type: none"> • Gases Under Pressure 	<p style="text-align: center;">Corrosion</p>  <ul style="list-style-type: none"> • Skin Corrosion/Burns • Eye Damage • Corrosive to Metals 	<p style="text-align: center;">Exploding Bomb</p>  <ul style="list-style-type: none"> • Explosives • Self-Reactives • Organic Peroxides
<p style="text-align: center;">Flame Over Circle</p>  <ul style="list-style-type: none"> • Oxidizers 	<p style="text-align: center;">Environment (Non-Mandatory)</p>  <ul style="list-style-type: none"> • Aquatic Toxicity 	<p style="text-align: center;">Skull and Crossbones</p>  <ul style="list-style-type: none"> • Acute Toxicity (fatal or toxic)

The words above each pictogram are descriptions of the symbol; the words below the pictogram are the HCS 2102 Hazard Classes covered by the symbol. NOTE: Only the red diamond and symbol are shown on a label. In addition to the pictogram, a label will show other information such a signal word (Danger or Warning), hazard and precautionary statements, the product identifier, and supplier identification, but these require that you be closer to the container to read.

Do not approach a container to read words

Alternative signage may still be in use

Employers continue to use signage such as National Fire Protection Association (NFPA) diamonds or HMIS (Hazardous Material Information System) requirements for workplace labels, as long as they are consistent with the requirements of the HCS. Workers must be trained to recognize any alternative signage. **These are described below.**

National Fire Protection Association (NFPA) — 704 System

The NFPA system is used for storage vessels and stationary containers at an industrial facility.

Below is an example of the NFPA 704 System.



Notice the ...

Shape: diamond

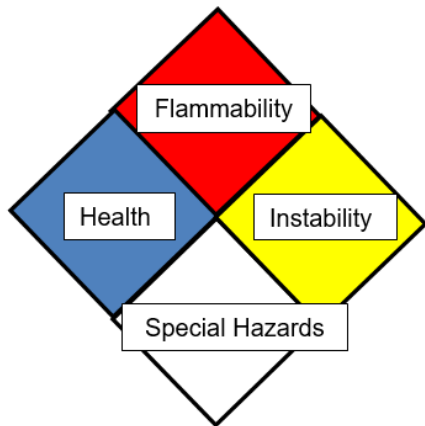
Colors: Red, Blue, Yellow, White

Numbers: 4, 2, 3

Symbol: W

All NFPA placards and labels are the same shape and have the same colors. What differs are the numbers and symbol.

The color of each of the four small diamonds indicates the type of hazard as shown below.



Color	Hazard
Red	Flammability
Blue	Health
Yellow	Instability
White	Special hazards

The number in the red, blue, and yellow diamonds is a relative rank of the potential flammability, health, and instability hazard, respectively, ranging from 0 or blank (low) to 4 (high hazard).

The Special Hazards (white) section of the NFPA-704 label may contain symbols (examples shown below) that give more information about the chemical. The following are symbols and their meanings that might be found in the Special Hazards (white) section of the NFPA-704 label.

NFPA Standard Symbols:

W

Reacts with water

OX

Oxidizer

SA

Simple Asphyxiant

Non-Standard Symbols:

- **COR:** Corrosives.
- **ACID** and **ALK** (Alkali) to be more specific.
- **BIO:** Biological Hazard.
- **POI:** Poisonous Material (e.g. strychnine)
- **CYL** or **CRYO:** Cryogenic Material (e.g. liquid nitrogen)
- **Radioactive trefoil:** Radioactive materials. (e.g. plutonium, uranium)
- The field may also be left blank if no special hazards are present.
- When multiple special hazards exist, white panels are added below the placard to show the additional special hazards.

The HMIS (Hazardous Material Information System)

The HMIS is used for storage vessels and containers

Below is an example of an HMIS label

Propane	
Health	* 1
Flammability	4
Physical Hazard	2
Personal Protection	□

Notice the

Shape: Rectangular

Chemical Name: Propane

Colors: Blue, Red, Orange, White

Boxes: Contain numbers or letters

All HMIS labels have the same shape and colors. For hazard recognition and reporting, it is important to note numbers in the blue, red and oranges boxes and any letter in the white section.

The numbers rank the potential health, flammability, and physical hazard and range from 0 (low) to 4 (high).

The Personal Protection section may contain a letter which tells you what personal protective equipment you should use to protect yourself when working with the material. Capital letters range from A (safety glasses) to K (full protective suit with gloves, boots, a hood or mask, and an air-line or Self-Contained Breathing Apparatus). If personal protection is coded X, specialized handling procedures are needed. Lower-case letters n through u, w, y and z are codes for specific protective equipment. For example, q represents boots and u represents an organic vapor respirator. A chart outlining each letter code will be accessible to responders.

Labels and Placards Checklist

What do I look for?

- Shape
- Color
- Words (but only from a distance)
- Numbers
- Symbols, Pictograms

Note: Much of this information is available on the internet, so a search with your phone or other device may prove helpful.

How Do I Observe Them?

- From a distance
- From upwind, if outdoors
- From a higher elevation, if possible
- Take notes (or photos) if possible, but do not risk your safety

Placards and Labels Exercise

You will again work in your small group. Several placards and labels will be distributed by your trainer. Answer the following questions and be ready to report back as a group.

What important features of the labels and placards should you note?

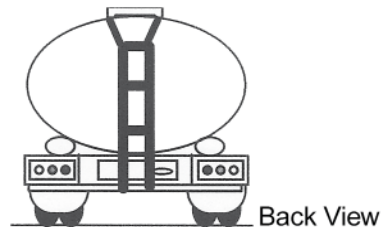
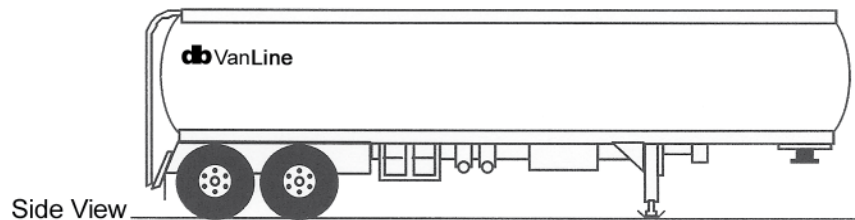
What are the hazards displayed on each of the placards and labels given to your group?

Containers

Another clue to the identity of chemical hazards may be the type or shape of the container in which the chemical substance was transported or stored. The container can usually be seen from a distance and may be the only information about chemicals that you can gather. This section will show you some “clues” to look for to identify hazardous materials at different locations in your community. Some of the types of containers which give “clues” to their contents are identified in this section. There are many other types of containers (such as glass, paper bags, boxes, barrels, and hoppers) that may not give any “clues” to their contents. Report any suspect container to the appropriate personnel, regardless of type.

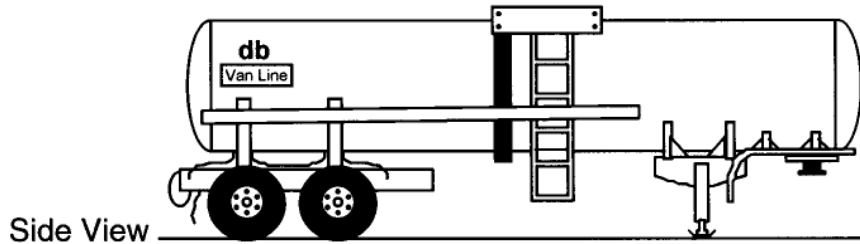
Atmospheric Pressure Tank Truck

Trailers shaped like this—an oval cylinder—generally carry flammable and combustible liquids, usually liquids lighter than water (especially petroleum products).

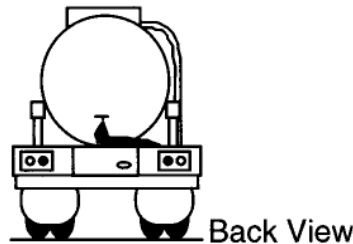


Low-Pressure Chemical Carrier

The trailer shown here — a round cylinder often insulated with a double shell — probably carries poisons, mild corrosives, or mild oxidizing solutions. (Compare with the Corrosive Liquid Carrier below.)



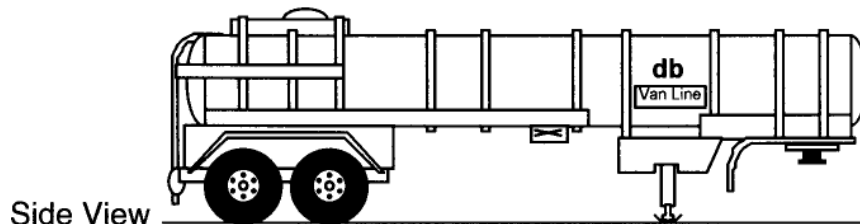
Side View



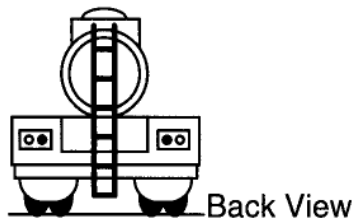
Back View

Corrosive Liquid Carrier

These tanks can be identified by their small circular diameter with reinforcing exterior stiffening rings.



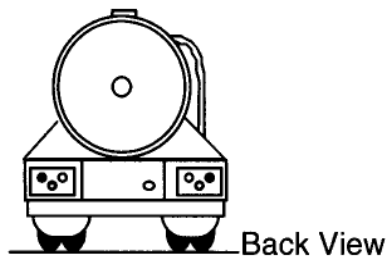
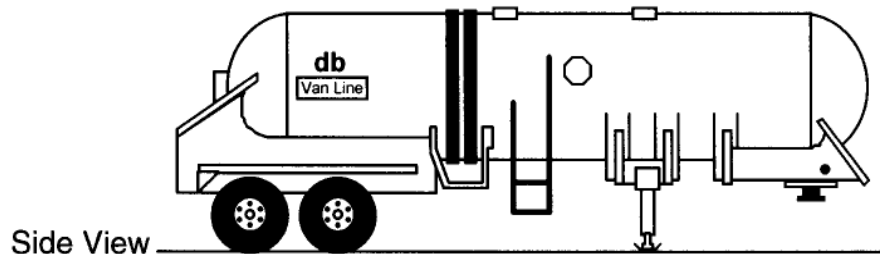
Side View



Back View

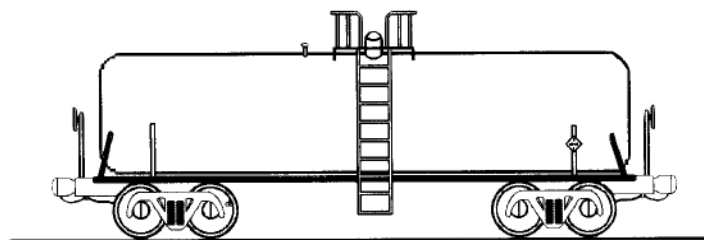
High-Pressure Liquefied Gas Tanker

These tanks are circular with rounded ends. They may carry propane, butane, or anhydrous ammonia under pressure.



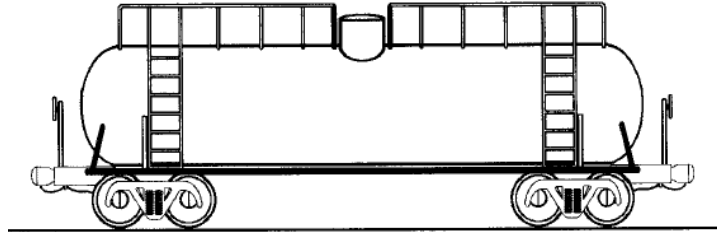
Non-Pressurized Rail Tank Cars

These rail tank cars are identified by the horizontal tank with flat convex ends and visible fittings or an expansion dome. These tank cars carry flammable and combustible liquids, flammable solids, oxidizers, organic peroxides, poisons, and corrosives.



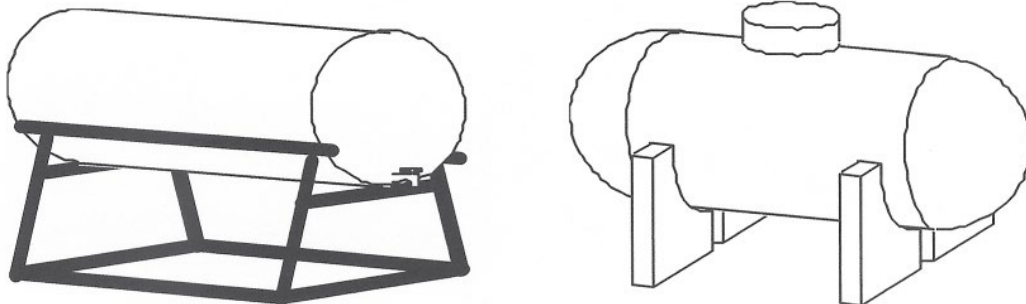
Pressurized Rail Tank Cars

These tank cars also have horizontal tanks but with rounded ends, unless they are double-shelled and have a bonnet (dome cover). These tank cars usually carry flammable and non-flammable gases and poisons.



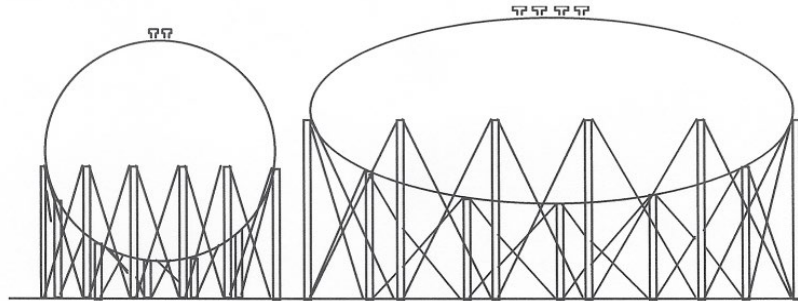
Horizontal Tanks

Horizontal tanks are cylinders which sit on the ground or on legs. These tanks usually store flammable liquids, corrosives, and poisons but may contain most anything.



Sphere Tanks

These tanks are round or elliptical and have large relief devices at the very top. Sphere tanks store pressurized materials such as methane, propane, LPG, ethane, and other light gases.



Drums

The “clues” to the contents of drums come from the material from which they are made as well as whether they are closed-top or open-top. Closed-top drums are sealed and have small openings in the top of the drum through which liquids can be poured. Open-top drums have removable lids and do not have the small openings characteristic of the closed-top drum.

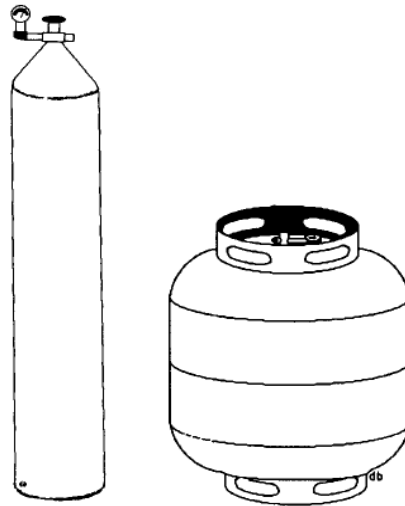


Some types of drums and what they contain are listed below.

- Closed-top metal drums normally contain non-corrosive products in liquid form
- Closed-top plastic or composite (plastic inside metal or cardboard) drums usually contain corrosive liquids
- Open-top metal drums usually contain non-corrosive solids or sludge
- Open-top plastic drums usually contain corrosive solids or sludge
- Other types of drums such as stainless steel, nickel, and MONEL™ are used for chemicals that because of their specific properties require special containers. These containers usually can be recognized by their metallic color.

Cylinders

Cylinders usually contain pressurized flammable or non-flammable gases. Cylinders may be involved in transportation and storage incidents. Pressurized cylinders should be considered dangerous because of their explosive capability, particularly in fire situations. Ruptures of the cylinders may cause them to become projectiles.



Other Containers

Other types of containers may also contain hazardous materials. Liquid hazardous materials may be stored in glass containers. Dry materials may be stored in boxes, bags, or wooden barrels. Hazardous materials stored in these types of containers may be transported by any means or may be stored at any site. Just because a material is contained in one of these types of containers does not mean that it is safe. Although all containers should be labeled, they may not be, or you may not be able to see the label.

It is important that you be able to describe the type and shape of all containers, labeled or not.

Chemical Container Checklist

What do I look for?

Location

- Road
- Rail
- Fixed

Shape

- Round
- Oval
- Flat or round ends
- Cone-shaped
- Spheres

Material

- Plastic
- Metal
- Composite
- Wood
- Glass
- Paper

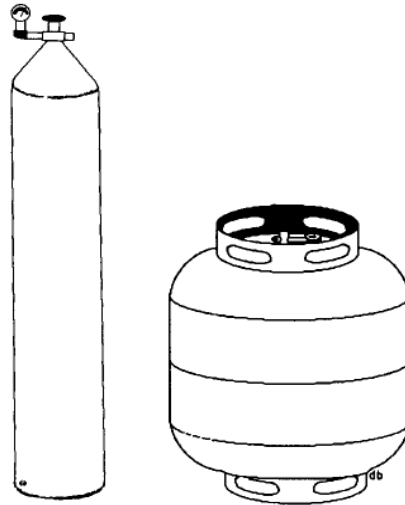
How Do I Observe Them?

- From a distance
- From upwind, if outdoors
- From a higher elevation, if possible
- Take notes or pictures if possible, but do not risk your safety

Container Shapes Exercise

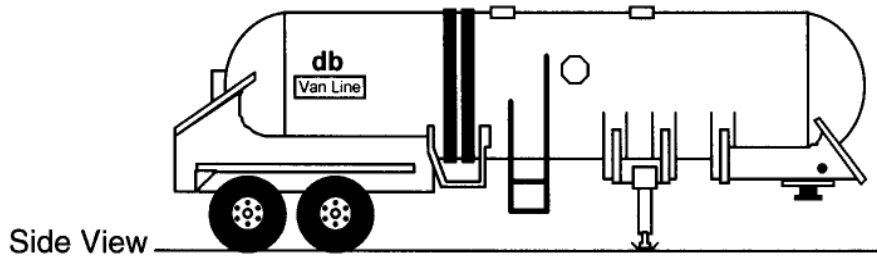
Working with your group, describe the containers shown on the following pages as you would if reporting an incident involving them.

Container Shape I

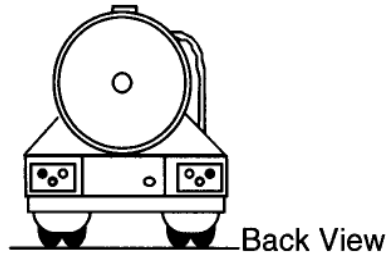


Description:

Container Shape II



Side View



Back View

Description:

Container Shape III



Description:

Reporting What You See

Objectives

When you complete this section, you will be better able to:

- Describe important observations
- Identify to whom you should report the observations

Accurate reports to local authorities are very important if they are to evaluate the risk to you, your neighbors, or property. Please remember to never risk your safety in order to gather information.

Who to Call: Some cities have a division in the police department which deals with reports of unusual releases or observations; this is often called the Environmental Crimes Unit. In rural counties, the sheriff will be the contact person. A call to the fire department, the police department, or county government should get you started toward speaking with the correct officials. Be patient; more than one call will likely be needed.

On the next page is a model form you could use to collect information before you make the report. Use this form to organize information for the exercise What's Going on Here?

Your Name

Your contact information

Location of potential hazard

Description of container and labels/placards

Rail

Roadway

Tank

- Is anything leaking? Liquid Solid Cloud
- Is the release... airborne? in water? on road or land?

Other details

smoke/fire?

nearby people? if yes, approximate number

nearby buildings? if yes, use of each

the terrain

access routes

other

Record of calls

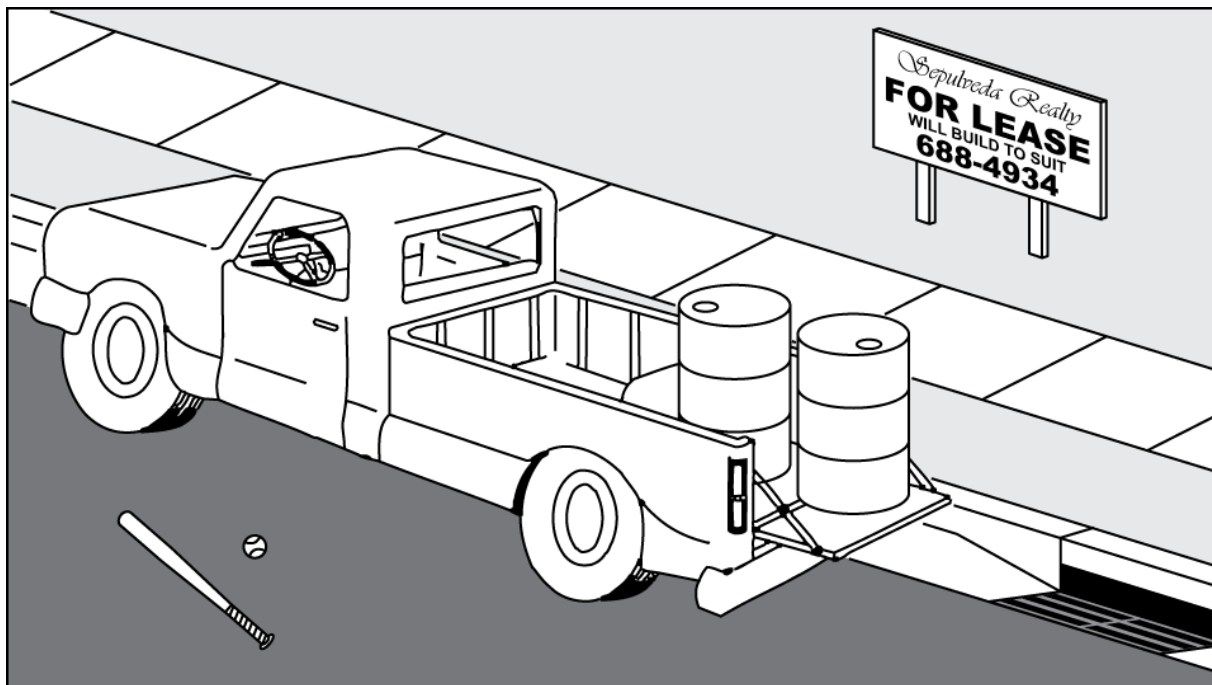
To whom

Date/Time

Comments

Exercise — What’s Going on Here?

On your way to the post office, you pass a vacant lot. (At least the last time it was vacant.) Today you observe the scene shown below:



It looks as though neighborhood children have been playing on the truck. What do you see? Write the information that you would report on the form (previous page) and be ready to discuss your answers with the class.

Health Effects

In this section you will learn the basic terms about health effects. Recognizing the potential for a health effect is the first step in avoiding it.

Objectives

When you finish this section, you will better be able to:

- Describe how the body can react to hazardous substances
- Identify what to do if you think you have been exposed

Health Effects: How, When, and Where?

How Do Chemicals Enter Your Body?

Chemicals can enter your body through skin contact, ingestion, inhalation, or injection.

- **Skin/Eye Contact:** If you come into physical contact with some types of chemicals, they may just irritate your skin or eyes and/or they may be absorbed into your body.
- **Ingestion:** If you smoke or eat after being exposed, chemicals on your hands may enter your body through ingestion.
- **Inhalation:** Chemicals that are gases or vapors coming from liquid chemicals can enter your body through inhalation. Some chemicals can mix with steam that you might inhale. Dusts and liquid droplets may also be inhaled.
- **Injection:** Chemicals can enter your body through other means, also. Chemicals can enter through cuts or other skin abrasions. If you receive any type of puncture wound at the scene, it is possible that whatever caused the puncture wound could be contaminated.

When Will Effects Appear?

A chemical's effect may be considered acute and/or chronic.

- **Acute:** Develops quickly, usually after exposure to high concentrations of a hazardous substance.
- Example: Contact with concentrated nitric acid can cause an acid burn on the skin.
- **Chronic:** Takes a long time to develop or requires long exposures, usually at low concentrations.
- Example: Breathing asbestos can result in lung diseases many years after exposure.

Where Will Effects Appear?

Reactions to chemical exposure may be local or systemic.

- **Local:** The reaction develops where the substance enters the body or comes into direct contact with parts of the body.

- Example: Breathing hydrochloric acid can immediately result in a coughing spell and cause bronchitis.
- **Systemic:** The reaction develops at some place other than the point of contact.
- Example: Benzene can be absorbed through the skin and cause leukemia and other blood disorders.

As you observe...

Your body may be able to help you pick up clues that will help describe the scene to the emergency responders. Although many substances leave no clues that can be detected by your senses, you should report anything that your senses pick up. Do not move closer to the scene to see if you can “sense” something.

Clues Your Senses Can Provide

- **Eyes** can spot hazards, read signs and placards, and/or display symptoms that can be caused by hazardous materials.
- **Skin** can tingle or burn.
- **Ears** can hear unusual sounds such as hissing from pressure release.
- **Nose** can smell bad or unusual odors.
- **WARNING** — Your nose will not detect many substances. Even substances that have a smell may be missed if you have a cold or allergy or become “used to” the odor. Many substances have no odor. Never breathe hazardous materials on purpose.
- Stay a safe distance away as you observe to avoid possible exposure. If you are outdoors, stay upwind.
- Use your eyes; if your eyes or other senses are affected, MOVE AWAY.

Health Effects while you are observing

In the event that you are having a physical response while observing, move further away and immediately make your report, including your symptoms. Also, report if your skin or clothing contacted any of the chemical. Make every effort to not contaminate any other surface, such as getting into your car, unless directed to do so. Follow all instructions you are given, including seeking medical evaluation.

Health Effects After Your Observation

Be aware of any symptoms that you may be having. If you are having any symptoms after making your observations, you should:

- **Keep a diary** of any symptoms you experience. The specific date and time of potential exposure is part of the report record; if you did not make a report, remember the date and time in a diary. For any symptoms, write date, time and symptoms in the diary.
- **Notify the agency** (fire department, State EPA, or other agency) in charge of responding to the incident. Others who were at the scene may be experiencing similar symptoms.
- **Get information** about the chemicals involved in the incident.
- **See a doctor.** You may need to see an occupational physician who is trained to recognize signs and symptoms of chemical exposures. Your family doctor may not have the right training or experience.

Summary — Health Effects

- Chemicals can enter your body through skin/eye contact, ingestion, inhalation, or injection.
- Health effects may show up either immediately or after exposure.
- Exposures affect different parts of the body.
- Your senses may help you spot clues, but they are not reliable for evaluating whether a hazard exists.
- If you have any symptoms or know you have come into contact with a substance, back off and make a call-in; follow advice regarding medical follow up.
- If you have any symptoms after the observation, see an occupational physician.
- Avoid exposure. Stay at a safe distance. If outdoors, stay upwind.

Resources

Objectives

When you are finished with this section, you will better be able to:

- Describe what each agency does
- Identify resources that are available

This section contains a brief description of the responsibilities of some of the Federal, State, and Local agencies, the scope of legislation, and some available internet resources.

Agencies

Environmental Protection Agency (EPA)

The EPA is concerned with the quality of the environment, including the air, land, and water (except for navigable waterways). The EPA published regulations to define hazardous waste. It created identification and reporting systems so that the government can track the quantities and types of hazardous waste being generated and confirm that they are being properly handled. Regulations set by the EPA are published in Section 40 of the *Code of Federal Regulations*, beginning with Part 200.

The federal EPA has delegated the enforcement of its regulations to state EPA agencies. Some states don't call their agency EPA. Some states have regulated other wastes in addition to EPA hazardous wastes, and they are called "special wastes." Examples of special wastes that come under state-by-state rules are waste oils, asbestos abatement waste, and petroleum-contaminated soil.

In states where federal personnel enforce OSHA, health and safety at hazardous waste sites is overseen by EPA; if a State Plan is in place to cover government workers, the state OSHA personnel can enforce HAZWOPER sites.

Department of Transportation (DOT)

The DOT is concerned with the transport of hazardous materials through interstate commerce. The DOT publishes a manual, the Emergency Response Guidebook (ERG), that is useful in interpreting labels it requires on containers. Regulations set by the DOT are published in Section 49 of the *Code of Federal Regulations*, Parts 100–200.

United States Coast Guard (USCG)

The USCG is responsible for monitoring the transportation of hazardous materials across navigable waterways and preserving our bodies of water. The USCG is involved in clean-up actions following oil spills.

Nuclear Regulatory Commission (NRC)

The NRC is responsible for community and worker protection from radiation hazards.

State and Local health departments

Your health department can be a valuable resource as related to releases in your neighborhood.

Legislation

Hazardous Materials Transportation Uniform Safety Act (HMTUSA)

The Hazardous Materials Transportation Act (1975) gave the Department of Transportation authority to regulate the transportation of hazardous materials. In 1990 this act was reauthorized, becoming the Hazardous Materials Transportation Uniform Safety Act (HMTUSA). HMTUSA covers any person who transports hazardous materials. It also covers any person or company that manufactures, fabricates, marks, maintains, reconditions, repairs, or tests a package.

Toxic Substance Control Act (TSCA)

The TSCA (1976); updated 2016 as the Frank R. Lautenberg Chemical Safety for the 21st Century Act) requires evaluation of chemicals before they are sold. This act requires EPA to create a list of reviewed harmful substances that need precautions and safe work practices by the community as well as industry. This act gives the manufacturers, importers, and distributors of these goods the responsibility to report on and keep records related to those substances. Some substances have additional restrictions, while others are excluded from the requirement due to the nature of their use.

Resource Conservation and Recovery Act (RCRA)

RCRA (1976) was established to regulate the management and disposal of hazardous materials and wastes. RCRA started the manifest system of tracking a hazardous waste from generation through transportation, storage, and disposal. It is sometimes referred to as the “cradle-to-grave” liability tracking system. It also encourages hazardous waste recycling and minimization. The RCRA gave the EPA the jurisdiction and responsibility to create and enforce the regulations regarding the proper handling, labeling, storing, treating, and disposing of hazardous waste.

RCRA Amendments of 1984 strengthened the program to include underground storage tanks (USTs), to redefine small-quantity generator (SQG) to include more generators, and to restrict liquid and hazardous wastes from landfills.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

CERCLA (1980), also known as **Superfund**, authorized government money for clean-up of abandoned hazardous waste sites, clean-up of and emergency response to transportation incidents involving chemical releases, payment to injured or diseased citizens, etc. It was amended in 1986.

Superfund Amendment and Re-Authorization Act (SARA)

SARA (1986) was passed to better safeguard the safety and health of workers and the community at large. It reauthorized money for continued abandoned site clean-up and continued site characterizations to determine which locations belong on the National Priorities List (NPL). It mandated that OSHA establish worker safety and health standards for hazardous waste operations and emergency response. It provided for training of management and workers about safety and health concerns at waste sites, TSD facilities, and emergency response situations. It includes three sections, or “Titles” relevant to hazardous waste issues. In brief, the relevant Titles require the following:

Title I

- Training of emergency response personnel and workers at hazardous waste operation sites (HAZWOPER).
- Preparation of a written emergency response plan for companies where hazardous materials may be spilled or released.
- Proper procedures for handling emergency response operations.

Title II

- Continues “Superfund” to pay for hazardous waste clean-up through a tax on industry.

Title III (Emergency Planning and Community Right-to-Know, or EPCRA)

- Development of comprehensive community emergency plans by Local Emergency Planning Committees (LEPCs).
- Immediate reporting by facilities of accidental releases of Extremely Hazardous Substances (EHSs) in quantities greater than the Reportable Quantity (RQ).
- Reporting by facilities of certain chemical inventory and release information to fire departments, LEPCs, and the State Emergency Response Commission (SERC).

- Annual completion and submission of a Toxic Chemical Release Inventory Form by facilities utilizing each of over 650 Toxic Release Inventory (TRI) chemicals. This information is available to the public on the internet. The following exercise utilizes the TRI to find information on toxic releases in your area or any area of the US.

Internet Web Pages

- EPA: <https://www3.epa.gov/>
- DOT: <https://www.transportation.gov/>
- USCG: <https://www.uscg.mil/>
- NRC: <https://www.nrc.gov/>
- Federal Emergency Management Agency (FEMA): <http://www.fema.gov>
- Department of Homeland Security: <https://www.ready.gov/>
- Emergency Response Guidebook (ERG):
<http://www.phmsa.dot.gov/hazmat/outreach-training/erg>

Exercise

The facilitator will provide you with an exercise or exercises to complete at this time.

Summary and Closing

Thank you for participating in this program that was designed for concerned individuals in the community who may be the first person to discover a hazardous material. On the evaluation form, please provide feedback on your ability after the session to:

- Identify physical, biological, and chemical hazards
- Recognize how to safely observe a potential hazard
- Describe important observations
- Identify to whom you should report the observations
- Describe how the body can react to hazardous substances

Please ask any remaining questions.