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COMMUNITY EMERGENCY RESPONSE TEAM

Participant Handbook

Federal Emergency Management Agency
Emergency Management Institute
National Fire Academy

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The Community Emergency Response Team (CERT) concept was developed and implemented by the City of Los Angeles Fire Department (LAFD) in 1985. They recognized that citizens would very likely be on their own during the early stages of a catastrophic disaster. Accordingly, LAFD decided that some basic training in disaster survival and rescue skills would improve the ability of citizens to survive until responders or other assistance could arrive. The Whittier Narrows earthquake in 1987 underscored the area-wide threat of a major disaster in California. Further, it confirmed the need for training civilians to meet immediate emergency needs. As a result, the LAFD created the Disaster Preparedness Division with the purpose of training citizens in the CERT concept. As of 1993, more than 8,000 people and 225 teams had been trained.

The training program LAFD initiated proved to be so beneficial that the Federal Emergency Management Agency (FEMA) felt the concept and the program should be made available to communities nationwide. The Emergency Management Institute (EMI), in cooperation with the LAFD, has expanded the CERT materials to make them applicable to all hazards. The goal of the training continues to be preparing people to help people. Seeing the value of CERT, FEMA is committed to supporting the training of local CERT teams across the nation. These teams too can assist with saving lives and protecting property in the event of a major disaster.

Those who benefit from the training should thank the LAFD for their vision and initiative in developing CERT, and for their willingness to support FEMA's effort to share this program with communities across the nation.

Further appreciation is given to the City of Oakland Fire Department, the City of San Francisco Fire Department, and the City of Colorado Springs Fire Department for their assistance in preparing the training materials. Technical review performed by Jim O'Brien, Certified Emergency Manager, Clark County Fire Department, Las Vegas, Nevada, and Battalion Chief Chris Hunter, Fairfax County Fire and Rescue Department, Fairfax County, Virginia.

About Community Emergency Response Team (CERT) Training

If available, emergency services personnel are the best trained and equipped to handle emergencies and you should use them. However, following a catastrophic disaster, you and the community may be on your own for a period of time because of the size of the area affected, lost communications, and unpassable roads.

CERT training is designed to prepare you to help yourself, your family, and your neighbors in the event of a catastrophic disaster. Because emergency services personnel will not be able to help everyone immediately, you can make a difference by using the training in this manual to save lives and protect property.

This training covers basic skills that are important to know in a disaster when emergency services are not available. You will want to help. With training and practice and by working as a team, you will be able to do the greatest good for the greatest number after a disaster, while protecting yourself from becoming a victim.

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Introduction

When Disaster Strikes

The damage caused by natural disasters such as earthquakes, hurricanes, tornadoes, and flooding affects all elements of society and government. Catastrophic events:

- Severely restrict and overwhelm our response resources, communications, transportation, and utilities.
- Leave many individuals and neighborhoods cut off from outside support.

It takes time for emergency response agencies to set up and prepare for an organized effort, and damaged roads and disrupted communications systems may restrict their access into critically affected areas. Thus, for the initial period immediately following a disaster—often up to 72 hours or longer—individuals, households, and neighborhoods may need to rely on their own resources for:

- Food
- Water
- First aid
- Shelter

Individual preparedness, planning, and survival skills and mutual aid within neighborhoods and worksites during this initial period are essential measures in coping in the aftermath of a disaster.

Community Preparedness

Community-based preparedness planning allows us to prepare for and respond to the anticipated disruptions and potential hazards following a disaster. As individuals we can prepare our homes and families to cope during that critical period. Through pre-event planning, neighborhoods and worksites can also work together to help reduce injuries, loss of lives, and property damage. Neighborhood preparedness will enhance the ability of individuals and neighborhoods to reduce their emergency needs and to manage their existing resources until organized assistance becomes available.

Studies of behavior following disasters have shown that groups working together in the disaster period perform more effectively if there has been prior planning for disaster response. These studies show that organized grassroots efforts may be more successful if they are woven into the social and political fabric of the community—neighborhood associations, schools, workplaces, places of worship, and other existing organizations.

Effective response therefore requires comprehensive planning and coordination of all who will be involved—government, volunteer groups, private businesses, schools, and community organizations. With training and information, individuals and community groups can be prepared to serve as a crucial resource capable of performing many of the emergency functions needed in the immediate post-disaster period. The Community Emergency Response Team (CERT) program is designed to help communities prepare for effective disaster response through training and preplanning.

How CERT Teams Operate

As each CERT team is formed, its members select a team leader and an alternate and identify an emergency meeting location, or *staging area*, to be used in the event of an emergency. Teams are encouraged to go into action even during relatively moderate emergencies—regardless of actual need—in order to gain practice mobilizing and assessing damage.

The staging area is where the fire department and other services will interact with CERTs. Having a centralized contact point makes it possible to communicate damage assessments and allocate volunteer resources more effectively.

Damage from disasters may vary considerably from one location to another. In an actual disaster, CERTs are deployed progressively and as needs dictate. Members are taught to first assess their own needs and those in their immediate environment.

How CERT Teams Operate (Continued)

CERT members who encounter no need in their immediate area then report to their staging area, where they take on assigned roles based on overall area needs. Members who find themselves in a heavily affected location send runners to staging areas to get help from available resources. Ham and CB radio links also may be used to increase communication capabilities and coordination.

The CERT program can provide an effective first-response capability. Acting as individuals first, then later as members of teams, trained CERT volunteers can fan out within their particular area, extinguishing small fires, turning off natural gas inlets to damaged homes, performing light search and rescue, and rendering basic first aid. Trained volunteers also offer an important potential work- force to service organizations in nonhazardous functions such as shelter support, crowd control, and evacuation.

The CERT Training Program

In the next 7 sessions, you will be trained in such basic self-help and mutual-aid emergency functions as:

- Emergency preparedness
- Fire suppression
- Utility control
- Disaster medical operations
- Light search and rescue
- Team organization

Classes are taught by trained emergency personnel, including firefighters and emergency medical services personnel. The program consists of 17 hours of training and emphasizes hands-on practice.

The CERT Training Program (Continued)

CERT training is divided into 7 sessions covering the following topics:

SESSION	*TOPICS COVERED*
1. Disaster Preparedness	☞ Introduction to disasters ☞ Impact on infrastructure ☞ Building structures and nonstructural items ☞ Role of CERTs in disaster response
2. Disaster Fire Suppression	☞ Identifying and reducing potential fire hazards ☞ Basic fire suppression strategy ☞ Firefighting resources ☞ Firefighting techniques
3. Disaster Medical Operations Part 1	☞ Treatment strategies for life-threatening conditions, including: - Airway obstruction - Bleeding - Shock ☞ Principles of triage
4. Disaster Medical Operations Part 2	☞ Medical operations conducted within treatment areas to which victims are sent from triage, including: - Head-to-toe patient assessment - Treatments for various injuries - Public health considerations
5. Light Search And Rescue Operations	☞ Search and rescue priorities and resources ☞ Techniques for situation size-up and search ☞ Lifting, cribbing, and victim removal ☞ Rescuer safety, including recognizing: - Rescuer limitations - Construction-related hazards
6. Disaster Psychology And Team Organization	☞ The post-disaster emotional environment ☞ CERT organization ☞ CERT decision making and documentation
7. Course Review And Disaster Simulation	*Exercise:* Disaster Simulation

The CERT Training Program (Continued)

Upon completion of the course, you will receive a certificate and identification that will identify you as an emergency response team member during disaster response. You should purchase additional safety equipment, such as goggles, gloves, and basic first aid supplies and have them available for use during emergencies. (If you are a member of a business or industry training group, your employer may supply these items for you.)

Training in disaster response should not be a one-time event. Awareness, commitment, and skills must be reinforced through followup training and repeated practice in order to maintain the edge necessary for effective response in the face of an emergency. In order to maintain your skill level and continually improve performance, you and your team members should participate in continuing supplemental training when offered in your area. Working through practice disaster scenarios with other teams will provide opportunities not only for extended practice but for valuable networking with teams in the local area.

Chapter I
Disaster Preparedness

In this chapter you will learn about:

- **Disasters and disaster workers:** What defines a disaster, and who makes up the disaster workforce.
- **Disaster threats:** Characteristics of various types of disasters and the potential for occurrence in your area.
- **Impact on the infrastructure:** The potential effect of disasters on transportation, electrical service, telephone communication, fuel and water supplies, and emergency services.
- **Structural and nonstructural hazards:** Potentially hazardous conditions in various types of structures and their contents during a disaster.
- **Safety precautions during a disaster:** What to do if you are inside, outside, or driving a vehicle.
- **Individual and worksite preparedness:** How you can prepare in advance to reduce structural and nonstructural hazards and survive the initial period after a disaster.
- **Community preparedness:** How a community can prepare in advance to respond in a disaster situation.

Disasters And Disaster Workers

What Is A Disaster?

According to Webster's Dictionary, a disaster is

> *Any event that overwhelms existing resources to deal with the event.*

Disasters may be natural or caused by human actions, may occur in any season of the year, and may cover a limited or a wide-ranging geographic area. The following are some examples of the wide range of events that may reach disaster proportions:

- Earthquake
- Hurricane
- Tornado
- Blizzard
- Flood
- Act of terrorism (e.g., bombing)
- Civil disturbance (e.g., riot)
- Hazardous materials incident

What Is A Disaster? (Continued)

Whatever the cause, disasters have several key elements in common:

- The event is *relatively unexpected*, with little or no prior warning or opportunity to prepare.
- Available personnel and emergency services may not be available during the initial stages of a disaster because of demands for their services.
- Lives, health, and the environment are *endangered*.

Who Are "Disaster Workers"?

A variety of services, agencies, and programs work together to provide emergency services and disaster assistance to local residents after a disaster event. However, these service providers cannot be everywhere at once, and initial needs may be greater than they can handle immediately with available resources. During these initial hours after a disaster, when damage is heavy or widespread and emergency services are stretched thin, many people are called upon to provide assistance to those around them.

Individuals and families help themselves. Neighbors help neighbors. Coworkers help each other. Able-bodied people turn out to offer their services to the emergency services workers. Volunteers play an extremely important role in reducing the death, injury, and damage in the period immediately after a disaster. They bring a wide variety of skills and experience to the task, and through teamwork can help build a vital network that links all parts of the disaster area. (See Figure I-1 on page I-5.)

Who Are "Disaster Workers"? *(Continued)*

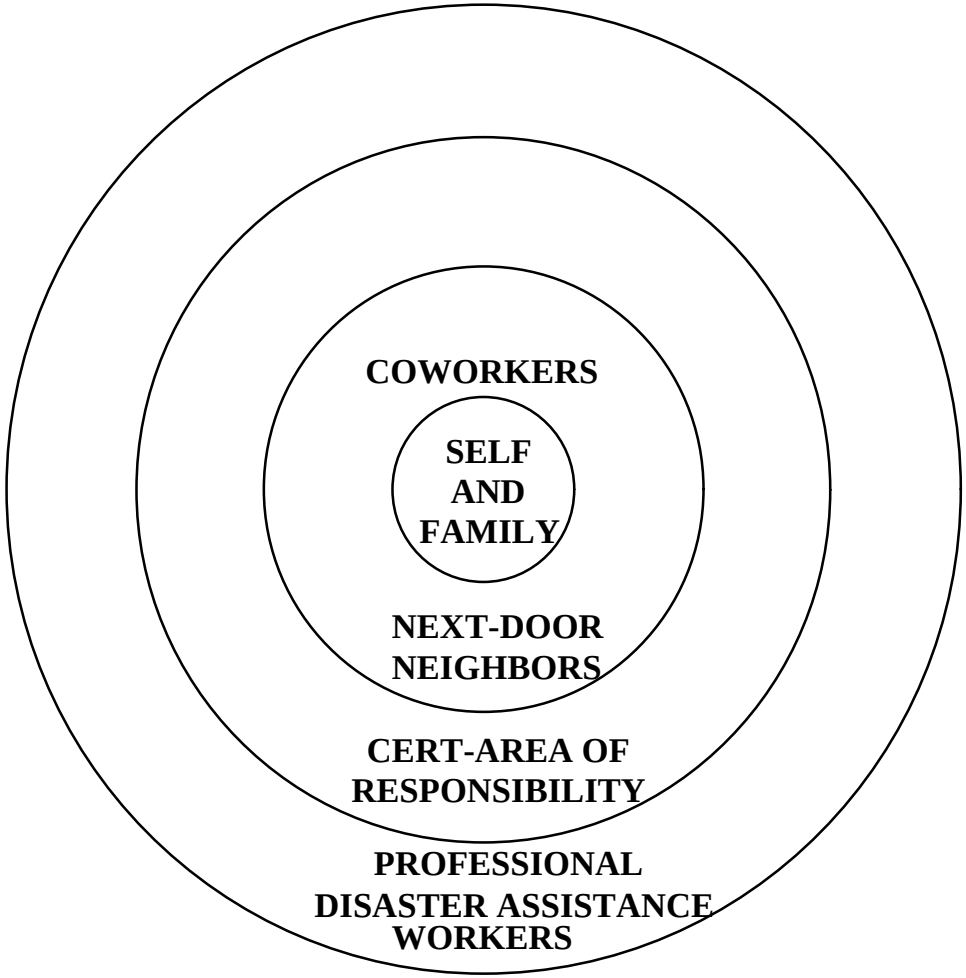


Figure I-1. Disaster Workers

Disaster Threats

The potential threat of different types of disasters varies across the United States. This section provides overviews of the following types of disasters:

- Earthquakes
- Hurricanes And Coastal Storms
- Tornadoes
- Floods
- Hazardous Materials Accidents

You may wish to highlight key parts that relate especially to your area, as outlined by your instructor.

Earthquakes

Introduction

Earthquakes are a shaking or trembling of the earth, caused by underground volcanic forces or by breaking and shifting of rock beneath the surface. Although the area of greatest earthquake risk is the west coast, where tectonic activity occurs along the San Andreas fault, other areas of the United States are also at risk of earthquakes. For example, Memphis, Tennessee and St. Louis, Missouri are located along major faults. The map in Figure I-2 on page I-9 shows locations of moderate or greater earthquakes throughout the U.S.

Earthquake Classifications

Earthquakes are classified as *small*, *moderate*, *major*, or *great* based on the Richter scale (a measure of energy released during the quake). The Richter scale has a logarithmic base, so each increment on the scale is multiplied by a factor that is 10 times larger than the previous factor. (For example, an earthquake of magnitude 8.6 would not be twice as violent as one of 4.3, but rather would be 10,000 times worse.) Although there are other methods of determining earthquake intensity and magnitude, the Richter scale is the most widely used method today. Earthquake classifications based on Richter scale magnitudes are shown in the table below.

Classifications	*Richter Scale Magnitudes*
Small	5.0–5.9
Moderate	6.0–6.9
Major	7.0–7.9
Great	8.0–8.9

Table I-1. Earthquake Classifications

Earthquake Prediction

Although it is still impossible to predict earthquakes accurately, scientists have been able to derive some probabilities about future earthquakes in the United States, including:

- Areas along the west coast are at risk for earthquakes every day.
- Major earthquakes appear to occur in cycles of between 50 and 275 years.
- It is likely that a major earthquake will hit California and perhaps other parts of the U.S. in the next decade or two.

Earthquake Prediction *(Continued)*

Figure I-2. Sites Of Moderate Or Greater Earthquakes

Hurricanes And Coastal Storms

Introduction

Hurricanes are violent areas of low pressure forming in the tropical Atlantic Ocean from June to November. (Similar Western Pacific Ocean storms are called typhoons.) Hurricanes have winds of 75 miles per hour or more and are accompanied by torrential rains and along coastal regions a storm surge. Although coastal storms may have hurricane-force winds and may cause similar kinds and amounts of damage, they are not classified as hurricanes because they do not originate in the tropics. Together, hurricanes and coastal storms cause billions of dollars in damage annually in the United States.

Hurricane Classifications

Hurricane strength is classified using the Saffir-Simpson Hurricane Damage Potential Scale. This scale correlates hurricane strength to barometric pressure, windspeed, and storm surge as shown in the table below.

Category	*Barometric Pressure (Inches)*	*Windspeed (Miles Per Hour)*	*Storm Surge (Feet)*
I - Minimal	Above 28.94	74-95	4-5
II - Moderate	28.50-28.91	96-110	6-8
III - Extensive	27.91-28.47	111-130	9-12
IV - Extreme	27.17-27.88	131-155	13-18
V - Catastrophic	Less Than 27.17	More Than 155	More than 18

Table I-2. Hurricane Classifications

Hurricane Prediction

On average, the coasts along the Gulf of Mexico and the Southeastern seaboard are struck by more than five hurricanes each year. Although meteorologists now have many ways in which to predict hurricanes, tracking storm movement and landfall remains an inexact science. The National Hurricane Center, located in Miami, Florida, has predicted that 1992 was the first year of a 10-year cycle of severe hurricane activity. The map in Figure I-3 on page I-12 shows areas of high hurricane and coastal storm activity.

Hurricane Prediction *(Continued)*

Figure I-3. Areas Of High Hurricane And Coastal Storm Activity

Tornadoes

Introduction

Tornadoes are powerful, circular windstorms that may be accompanied by winds of 200 or more miles per hour. Tornadoes may range in width from several hundred yards to more than one mile across. Although tornadoes may occur throughout most of the United States, areas in the Midwest and South are particularly susceptible to tornado activity. Parts of Texas, Oklahoma, Kansas, Missouri, Nebraska, Mississippi, Alabama, Georgia, and Florida are at highest risk of tornado strike. (See the map in Figure I-4 on page I-15 showing tornado incidence.)

Tornado Classifications

Tornadoes are classified using the Fujita Wind Damage Scale. This scale correlates damage with windspeed, as shown in the table below.

Category	*Windspeed (Miles Per Hour)*	*Damage*
F0	Up to 72	Light
F1	73-112	Moderate
F2	113-157	Considerable
F3	158-206	Severe
F4	207-260	Devastating
F5	More than 260	Incredible

Table I-3. Tornado Classifications

Tornado Prediction

With the help of sophisticated radar and other measures, meteorologists are now able to predict when favorable conditions for tornado formation exist and are better able to warn the public. However, even given an average of 700 confirmed reports of tornadoes each year in the United States, many remain unreported.

Tornado Prediction *(Continued)*

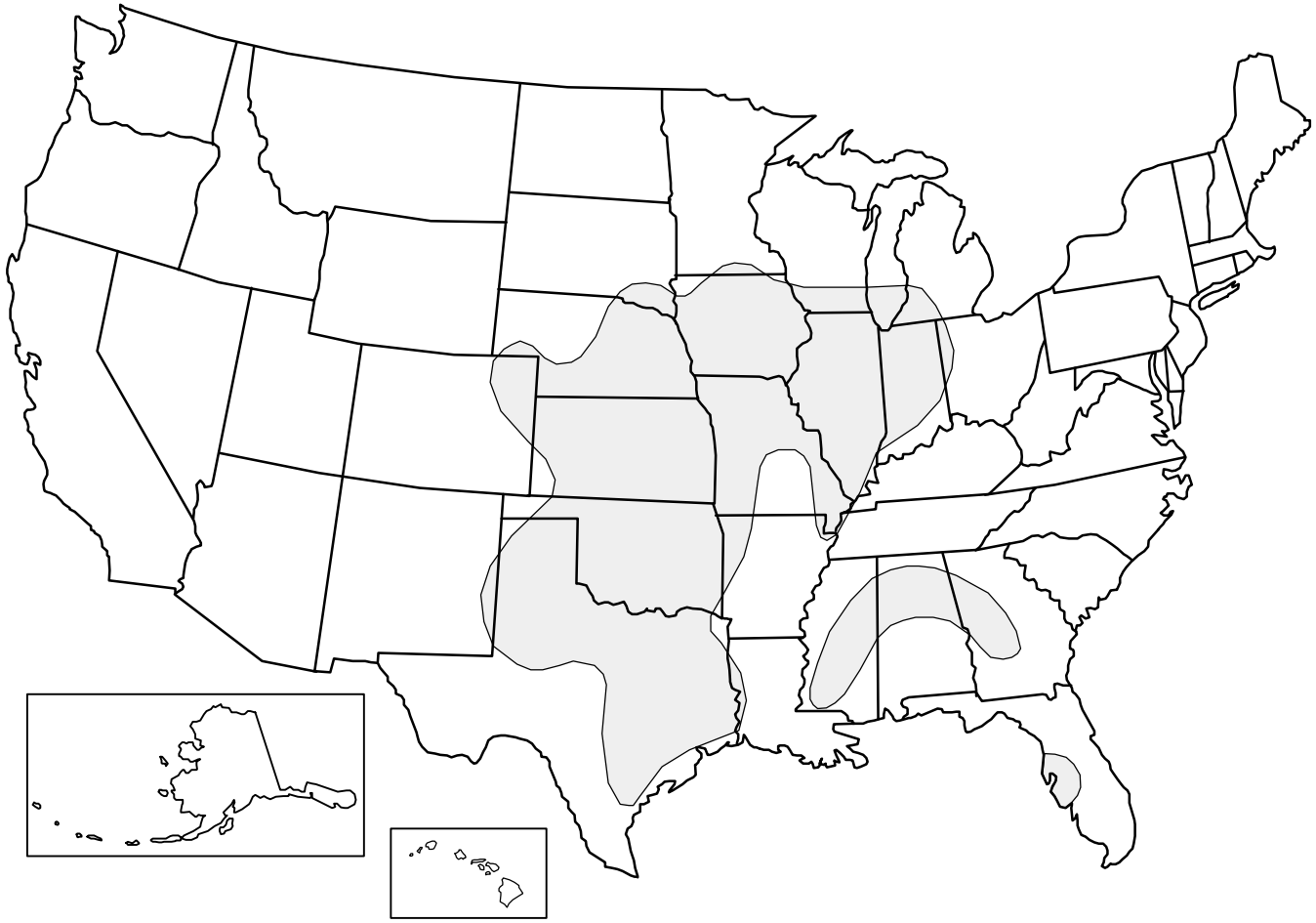


Figure I-4. Areas Of High Tornado Incidence

Floods

Introduction

A flood occurs any time a body of water rises to cover what is usually dry land. Floods have many causes, including heavy rain, spring snowmelt, hurricanes and coastal storms, and dam or levee failure. When flooding occurs, affected areas may sustain damage to structures and personal property, as well as severe damage to the environment in the form of soil erosion and deforestation, and damage to utilities and transportation systems. Flash floods, for which there is little or no warning, cause great risk to humans and animals. Land along rivers and streams, lakeshores, and coastlines are particularly susceptible to flooding. Under some conditions, however, even inland areas that are not normally threatened by flooding may be immersed.

Flood Classifications

Floods are measured according to the heights the waters reach. Their magnitude is based on the chances that water flow will equal or exceed a certain level on a recurring basis.

Flood Prediction

Satellite technology combined with river forecast centers and hydrologic service areas enable meteorologists to predict flood occurrence and severity with reasonable accuracy and provide warnings to those in high-risk areas. On average, rivers overflow their normal boundaries once every 2 years. Severe coastal flooding, however, can result in conjunction with any hurricane or coastal storm, the track of which cannot be predicted with complete accuracy. Clearly, the risk of damage or injury resulting from floods cannot be downplayed.

Blizzards

Introduction

The National Weather Service defines a blizzard as considerable falling or blowing snow accompanied by winds of 35 miles per hour or more. Blizzards are also accompanied by frigid temperatures and extremely limited visibility. Blizzards in the United States occur most frequently in the northern Midwestern States but may occur inland of Atlantic coastal storms and at high altitudes in the Western States. When blizzards occur, much of the infrastructure in the affected area may be disrupted for several days.

Blizzard Classification

Blizzards are classified by their windspeed and concurrent visibility. Blizzard classifications are shown in the table below.

Type	*Windspeed*	*Visibility*
Blizzard	35 - 44 miles per hour	Less than 500 feet
Severe Blizzard	45 miles per hour or greater	Approaching zero

Table I-4. Blizzard Classifications

Blizzard Prediction

With the help of satellites and other methods, meteorologists can predict when conditions are favorable for blizzard conditions to develop, which allows them to issue blizzard watches and warnings to the public. It remains impossible, however, to predict blizzards with complete accuracy or to predict the exact track that a storm will follow.

Hazardous Materials Accidents

Introduction

According to the Resource Conservation and Recovery Act of 1976, a hazardous material is any product that corrodes other materials, explodes or is easily ignited, reacts strongly with water, is unstable when exposed to heat or shock, or is otherwise toxic to humans, animals, or the environment. While the United States has a body of law governing the safe handling, transport, and disposal of hazardous materials, accidents can and do occur throughout the country on a regular basis. Additionally, while the risk of exposure to radioactive materials in nuclear power facilities, mining operations, and storage facilities is strictly regulated, it remains possible for a radioactive materials incident to occur.

Hazardous Materials Classifications

Hazardous materials are not classified in the same way as natural hazards. Also, hazardous materials are classified differently depending on whether they are being stored or transported. Both classification systems are discussed more fully in Chapter II: Disaster Fire Suppression.

Hazardous Materials Accident Prediction

While there is no way to predict hazardous materials accidents, certain areas are at some degree of risk, including those located near interstate highways; manufacturing, storage, or disposal facilities; and nuclear power facilities. Prevention of accidents, rather than prediction, is central to avoiding potential damage, loss, or other contamination from hazardous materials.

Impact On The Infrastructure

Introduction

When a disaster occurs, it has a cascading effect because of its impact on the infrastructure: transportation, utilities, communications systems, fuel supplies, and water supplies—the services and delivery systems on which we depend. When one of these important elements in our support system breaks down, it has a domino effect, causing other elements to falter. When multiple elements break down, the effect can be crippling. Some of the ways in which the infrastructure can be affected in a disaster or emergency are shown in the table below.

Service	*Effect*
Transportation	☙ Inability to get emergency service personnel into the affected area. ☙ Inability to transport victims away from the area.
Electrical	☙ Increased risk of fire and electrical shock. ☙ Possible disruption to transportation system if downed lines are across roads.
Telephone	☙ Lost contact between victims, service providers, and family members. ☙ System overload due to calls from or to friends or relatives.
Water	☙ Disruption of service to homes, businesses, and medical providers. ☙ Inadequate water supply for firefighting. ☙ Increased risk to public health if there is extensive damage to the water supply or if it becomes contaminated.
Fuel Supplies	☙ Increased risk of fire or explosion from ruptured fuel lines. ☙ Risk of asphyxiation from natural gas leaks in confined areas.

Table I-5. Possible Effects Of Damage To The Infrastructure

Emergency Services

Each instance of damage to the infrastructure may severely restrict the abilities of police, fire, and paramedic services to provide service following a disaster. Some types of damage and their effects on emergency services are shown in the table below.

Type Of Damage	*Effect On Emergency Services*
Road	☙ Inability to assess damage accurately. ☙ Ambulances prevented from reaching victims and/or victims prevented from reaching emergency medical services. ☙ Police prevented from reaching areas of civil unrest. ☙ Fire departments prevented from getting to fires. ☙ Flow of needed supplies is interrupted.
Structural	☙ Damaged hospitals unable to receive patients. ☙ Increased risk of damage from falling debris.
Disrupted Communication	☙ Victims unable to call for help. ☙ Coordination of services is hampered.
Fuel Line Damage	☙ Fire and paramedic services overburdened.
Disrupted Water Service	☙ Firefighting capabilities restricted. ☙ Medical facilities hampered.

Table I-6. Possible Effects Of Damage On Emergency Service Providers

Service Priorities

Because emergency services are likely to have inadequate resources to meet the needs in a disaster situation, those resources must be applied according to highest priority need:

Police:	Establish order and safe ingress/egress to and from the disaster area.
Fire:	Suppression of *major* fires.
Paramedic:	*Life-threatening* injuries.

Lower priority needs may have to be met in other ways.

Structural And Nonstructural Hazards

Introduction

During and following a disaster, damage to building structures presents one of the greatest hazards. Damage will vary according to the type of disaster, the type and age of the structure, and location in relation to the disaster center. The following is an overview of disaster hazards related to building structures and their contents.

Hazards Related To Structure Type

High-Rise And Apartment Buildings

Engineered buildings, such as most high-rise structures, have performed well in earthquakes and other disasters. Older high-rise buildings with steel and concrete construction are more susceptible to damage than the newer ones which use curtain construction and prefabricated panels. Primary hazards in and around high-rise buildings include:

- Broken glass.
- Falling panels.

Hazards in and around apartment buildings depend largely on the age and condition of the structure. Hazards may include:

- Collapsing walkways and stairways.
- Crumbling cornices and other trim.
- Broken glass.

Detached Homes

Age, type of construction, and type of disaster are major factors in potential damage to detached homes and garages. Homes built before 1940 generally were not bolted to the foundation, making them subject to being shaken, blown, or floated off their foundations. Older homes constructed of unreinforced brick are less stable than newer construction. Porches without support beams may collapse. Damage to single homes from tornadoes and hurricanes can range from little damage to total destruction. Following a disaster event, there is the potential for further collapse and fire due to ruptured gas lines.

Mobile Homes

When mobile homes are displaced in a disaster (whether earthquake, storm, flood, or other), utility connections are easily damaged, and broken gas lines may cause fires.

Other Public Places

Malls, sports arenas, airports, places of worship, and other places where people may gather may pose hazards in some types of disasters. For example, in an earthquake, overhead structures may collapse. Widespread panic in large crowds can result in casualties.

Nonstructural Hazards

Fixtures and items within a home, garage, or office can pose hazards during or after a disaster event. The following are examples of some of the nonstructural hazards that may be encountered:

- Gas line ruptures from water heaters or ranges displaced by shock or water.
- Damage from falling books, dishes, or other cabinet contents.
- Risk of injury or electric shock from displaced appliances and office equipment.
- Hazardous products within reach of children.

Disaster Hazard Mitigation

Introduction

Regardless of the event or the amount of warning offered, there are safety precautions that one can take to reduce or prevent injury. These measures include:

- Personal safety.
- Home and worksite preparation.
- Community preparation.

Personal Safety

The personal safety measures that you should take vary depending on the circumstance. Precautions for natural hazards are shown in the table on pages I-25 through I-30.

Personal Safety (Continued)

Event	*Time*	*Take The Following Action*
Earthquake	Before	☙ Have a home earthquake plan, and know what to do after the earthquake occurs. ☙ Have a plan for reuniting all family members after an earthquake occurs. ☙ Have an out-of-state family phone contact. ☙ Have supplies on hand including water, a flashlight, a portable radio, food, a fire extinguisher, and tools. ☙ Bolt bookshelves and water heaters into wall studs, and latch cabinets. ☙ Move beds away from windows. ☙ Move pictures and other hanging objects away from beds. ☙ Keep a pair of shoes next to your bed.
	During	☙ Drop, cover, and hold. ☙ Get under a heavy table or desk and hold on, or sit or stand against an inside wall. ☙ Keep away from windows. ☙ If indoors, stay there. ☙ If outdoors, stay outdoors away from falling debris, trees, and power lines. ☙ If in your car, drive to a clear spot and stay in the car. Avoid stopping on or under overpasses. ☙ Do not use elevators.
	After	☙ Expect aftershocks. They are just as serious as the main earthquake. ☙ Put on shoes to protect from broken glass. ☙ Check for injuries and fires. ☙ Use a flashlight to inspect your residence for damage including gas, water, and electrical lines and appliances. ☙ If you smell gas of if there is a fire, turn off the main gas valve. Switch off individual circuit breakers (or unscrew individual fuses), then switch off the main circuit breaker (or unscrew the main fuse). ☙ Do not go into damaged areas. ☙ Do not use telephones except in emergencies. ☙ Do not use vehicles except in emergencies. ☙ Use a portable radio for information. ☙ If your home is unsafe, get everyone out.

Table I-7. Personal Precautions Against Natural Hazards

Personal Safety *(Continued)*

Event	*Time*	*Take The Following Action*
Hurricane Or Coastal Storm	Before	☙ Know the risks of the area, the evacuation routes, and the location of shelters. ☙ Have a home hurricane plan of action. ☙ Know what a hurricane "watch" and "warning" mean. [Note: A hurricane watch means a hurricane may hit your area. A hurricane warning means such a hurricane is headed for your area.] ☙ Have a portable radio and flashlight, as well as other supplies. ☙ Ensure that enough nonperishable food and water supplies are on hand to last for at least 2 weeks. ☙ Floodproof your home. ☙ Tie down mobile homes. ☙ Keep trees and shrubbery trimmed. ☙ Review your insurance policy to ensure that it provides adequate coverage.
	During	**Watch Phase (24-48 hours before landfall)**: ☙ Board up all windows. ☙ Fill your car's gas tank and prepare to evacuate. ☙ Check mobile home tie-downs. ☙ Check batteries and stock up on canned food, medical supplies, and drinking water. ☙ Bring in outside objects (e.g., garbage cans, lawn furniture, bicycles). ☙ Listen to the advice of local officials, and evacuate if told to do so. **Warning Phase (24 hours or less before landfall)**: ☙ Listen to the advice of local officials, and evacuate if told to do so. ☙ If you are not advised to evacuate, stay indoors and away from windows. ☙ Stay away from flood waters; never drive through them. ☙ Be aware of the calm "eye"; the storm is not over. ☙ Be alert for tornadoes.

Table I-7. Personal Precautions Against Natural Hazards
(Continued)

Personal Safety *(Continued)*

Event	*Time*	*Take The Following Action*
Hurricane Or Coastal Storm (Continued)	After	☙ Wait until an area is declared safe before entering. ☙ Use a flashlight to inspect for damage including gas, water, and electrical lines and appliances. ☙ Stay away from downed power lines. ☙ If you smell gas of if there is a fire, turn off the main gas valve. Switch off individual circuit breakers (or unscrew individual fuses), then switch off the main circuit breaker (or unscrew the main fuse). ☙ Do not use telephones except in emergencies. ☙ Use a portable radio for information.
Tornado	Before During	☙ Know the tornado risks of the area. ☙ Prepare a home tornado plan, and know the safest places to go during a tornado. ☙ Know what a tornado "watch" and "warning" mean. [Note: A tornado watch means a tornado may hit your area. A tornado warning means such a storm has been spotted and is about to strike. Go to safety immediately.] ☙ Have a portable radio and flashlight and other emergency supplies. **Watch Phase (up to 6 hours before)**: ☙ When you hear a "watch," keep your eye out for the approaching storm or listen to the radio or TV. ☙ Consider an immediate plan of action. **Warning Phase (0-1 hour before)**: ☙ Get away from all windows. ☙ Use telephones only for life-threatening emergencies. ☙ Go to the basement, and get under sturdy furniture or stairs. ☙ If you do not have a basement, go to an inside closet, a bathroom, or a hallway on the lowest level of the building. ☙ If you are in a car, get out and go inside a sturdy house or building. Do not try to outrun a tornado with your car. ☙ If you are caught outside, get into a ditch or low-lying area.

Table I-7. Personal Precautions Against Natural Hazards
(Continued)

Personal Safety *(Continued)*

Event	*Time*	*Take The Following Action*
Tornado (Continued)	During (Continued)	☙ Keep away from buildings with widespan roofs like cafeterias, auditoriums, and shopping malls. ☙ If you are in a mobile home, go to a storm shelter or, if one is not available, get out and lie in a ditch and cover your head.
	After	☙ Listen to a portable radio for information. ☙ Use a flashlight to check for damage including gas, water, electrical lines, and appliances. ☙ If you smell gas or if there is a fire, turn off the main gas valve. Switch off individual circuit breakers (or unscrew individual fuses), then switch off the main circuit breaker (or unscrew the main fuse). ☙ Stay out of the disaster area. ☙ Do not use telephones except in emergencies. ☙ Do not use vehicles except in emergencies.
Flood	Before	☙ Know the flood risk and the elevation of the area. ☙ Prepare a home flood evacuation or escape plan. ☙ Get flood insurance, if available. ☙ Keep insurance papers, important documents, and other valuables in a safe-deposit box. ☙ Know what a flood and a flash flood "watch" and "warning" mean. [Note: A flood watch means a slow-rising flood is possible for your area. A flood warning means flooding is already occurring or will occur soon in your area. A flash flood watch means there is a chance that flash flooding could occur anytime within the next few hours. A flash flood warning means you may only have seconds to evacuate to higher ground.] ☙ Have a family plan, and choose a safe area in advance. ☙ Have a portable radio, flashlight, and emergency supplies.
	During	**Watch Phase (2-3 days for flood; 2-12 hours for flash flood)**: ☙ Sandbag windows and doors. ☙ Move furniture and other items to higher levels. ☙ Fill your car's gas tank. ☙ Listen to radio or TV for up-to-the-minute information.

Table I-7. Personal Precautions Against Natural Hazards
(Continued)

Personal Safety (Continued)

Event	*Time*	*Take The Following Action*
Flood (Continued)	During (Continued)	**Warning Phase (24-48 hours for flood; 0-1 hour for flash flood)**: ✍ Use telephones only for life-threatening emergencies. ✍ Evacuate, if necessary, and follow instructions. ✍ Do not walk or drive through flood waters. ✍ Stay off bridges where water is covering them. ✍ Heed barricades blocking roads. ✍ Keep away from waterways during heavy rain. If you are in a canyon area and hear a warning, get out of your car and get to high ground immediately. ✍ Keep out of storm drains and irrigation ditches.
	After	✍ Listen to a portable radio for information. ✍ Boil drinking water before using (rolling boil for 10 minutes). Wells should be pumped out and the water tested for purity before drinking. ✍ Use a flashlight to check for damage including gas, water, and electrical lines and appliances. ✍ If you smell gas or if there is a fire, turn off the main gas valve. Switch off individual circuit breakers (or unscrew individual fuses), then switch off the main circuit breaker (or unscrew the main fuse). ✍ Stay out of the disaster area. ✍ Do not use telephones except in emergencies. ✍ Do not use vehicles except in emergencies.
Event	***If You Are . . .***	***Take The Following Action***
Blizzard	Outside	✍ Find shelter and try to stay dry. ✍ Cover all exposed parts of the body. ✍ If there is no shelter, you should: - Prepare a lean-to, wind-break, or snow cave for protection from the wind. - Build a fire for heat and to attract attention. - Place rocks around the fire to absorb and reflect heat.

Table I-7. Personal Precautions Against Natural Hazards
(Continued)

Personal Safety *(Continued)*

Event	*If You Are . . .*	*Take The Following Action*
Blizzard (Continued)	Outside (Continued)	☞ Mark your location for rescuers. ☞ Do not drink alcoholic beverages. Avoid falling asleep. ☞ Avoid eating snow. It will lower your body temperature. Melt it first.
	In a car or truck	☞ Stay in the vehicle. Disorientation occurs quickly in snow and cold. ☞ Run the motor about 10 minutes each hour for heat. ☞ Open the window a little for fresh air to avoid carbon monoxide poisoning. Make sure the exhaust pipe is not blocked. ☞ Make yourself visible to rescuers. - Turn on the dome light at night when running the engine. - Tie a colored cloth (preferably red) to your antenna or door. - Raise the hood indicating trouble after snow stops falling. ☞ Exercise from time to time to keep blood circulating and to keep warm.
	At home or in a building	☞ Stay inside. ☞ Use telephones only for life-threatening emergencies. ☞ Use fire safeguards for heat and properly ventilate. ☞ If there is no heat, close off unneeded rooms and stuff towels or rags in cracks under doors. Cover windows at night. ☞ Eat and drink plenty. ☞ Wear layers of loose-fitting, lightweight, warm clothing. Remove layers to avoid overheating, perspiration, and chill. Wear a hat.

Table I-7. Personal Precautions Against Natural Hazards
(Continued)

Personal Safety *(Continued)*

Prevention of injury from hazardous materials in the home lies in proper storage and handling. The acronym for safe storage procedures is *L.I.E.S.*:

- *Limit* the amount of hazardous materials in storage.
- *Isolate* products in approved containers, store them inside closed cabinets, and protect them from sources of ignition. Keep containers tightly covered.
- *Eliminate* products that are no longer necessary by disposing of them properly.
- *Separate* incompatible materials (e.g., chlorine products and ammonia).

When handling hazardous materials, be sure to:

- Read the warnings on product labels.
- Use the safety precautions (e.g., gloves, goggles, or breathing mask) recommended by the manufacturer.
- Limit contact to the degree possible.

If you are not sure of the product with which you are dealing or if the product produces a noxious odor, smoke, or steam leave the area immediately. Call the local emergency service operator (usually 911) and observe the material from uphill, upwind, and at a distance until qualified personnel arrive. If necessary, enlist the help of neighbors to warn others of the danger. If evacuation is required, evacuate to an upwind location. Moving uphill and upwind will prevent reintroduction to the hazard via the wind.

Home And Worksite Preparations

Preparedness is the key to survival in a disaster or emergency. Individuals, families, and worksites can take steps that will help minimize structural and nonstructural hazards during a disaster, facilitate escape, and promote survival in the period immediately following the event.

Reducing Structural And Nonstructural Hazards

Many injuries from structural and nonstructural hazards are easily preventable. Some steps that you can take to reducing structural and nonstructural hazards are shown in the table below.

Type Of Hazard	***Precautions***
Structural	✍ Bolt older houses to the foundation. ✍ Board or place protective tape on windows and glass doors to minimize flying glass. ✍ Strap mobile homes to their concrete pads.
Nonstructural	✍ Anchor such furniture as bookshelves, hutches, and grandfather clocks to the wall. ✍ Secure appliances and office equipment in place with industrial-strength Velcro®. ✍ Secure cabinet doors with childproof fasteners. ✍ Locate and label gas, electricity, and water shut-offs before disasters occur. After a disaster, shut off the utilities as needed to prevent fires and other risks. (See page I-33.) Store a shut-off wrench where it will be immediately available. ✍ Secure water heaters to the wall to safeguard against a ruptured gas line or loose electrical wires. (See page I-34.)

Table I-8. Precautions Against Structural And Nonstructural Hazards

Reducing Structural And Nonstructural Hazards (Continued)

Illustrations of utility shut-offs are shown below.

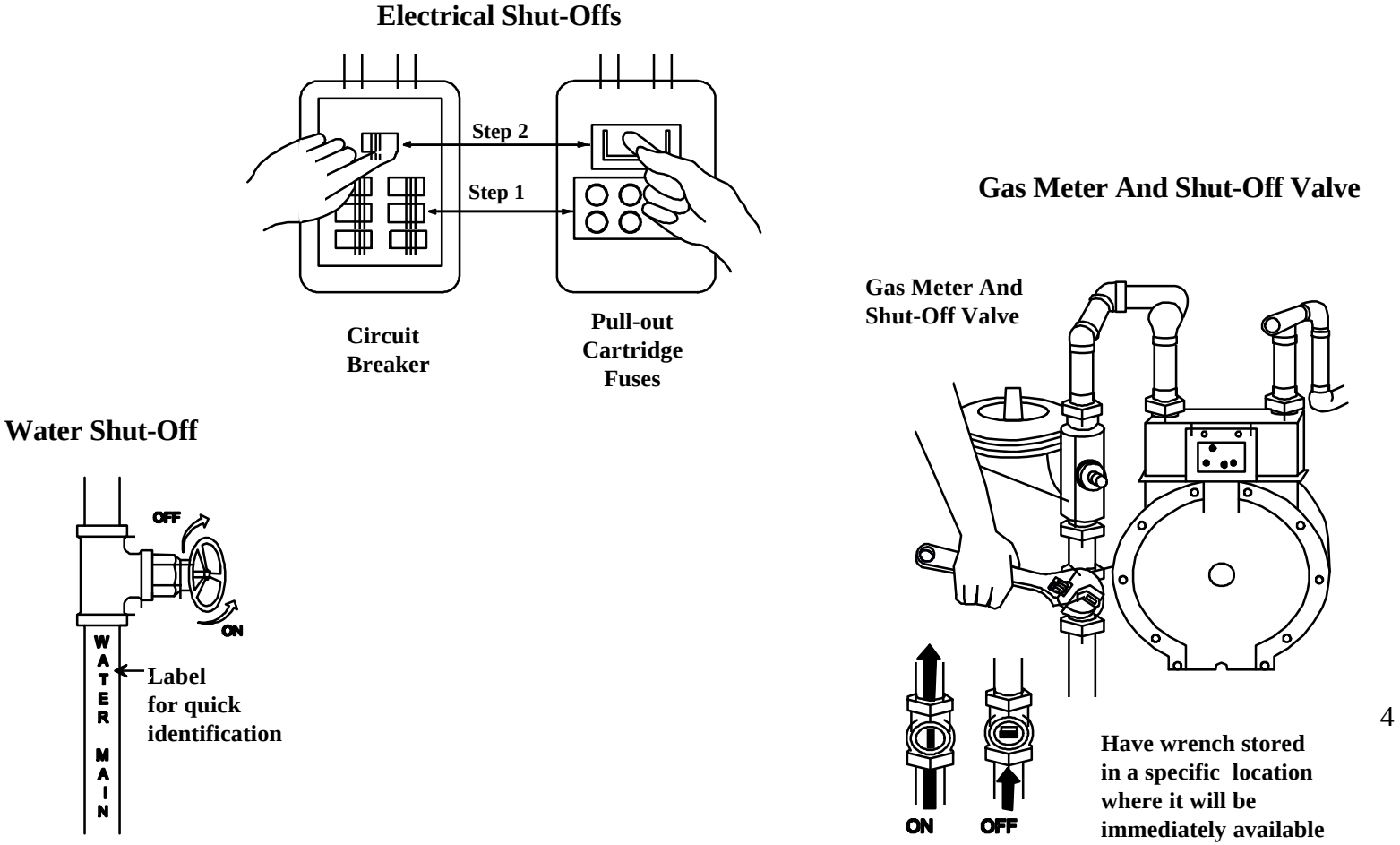


Figure I-5. Utility Shut-Offs

Reducing Structural And Nonstructural Hazards (Continued)

The figure below shows how to brace a residential-use water heater.

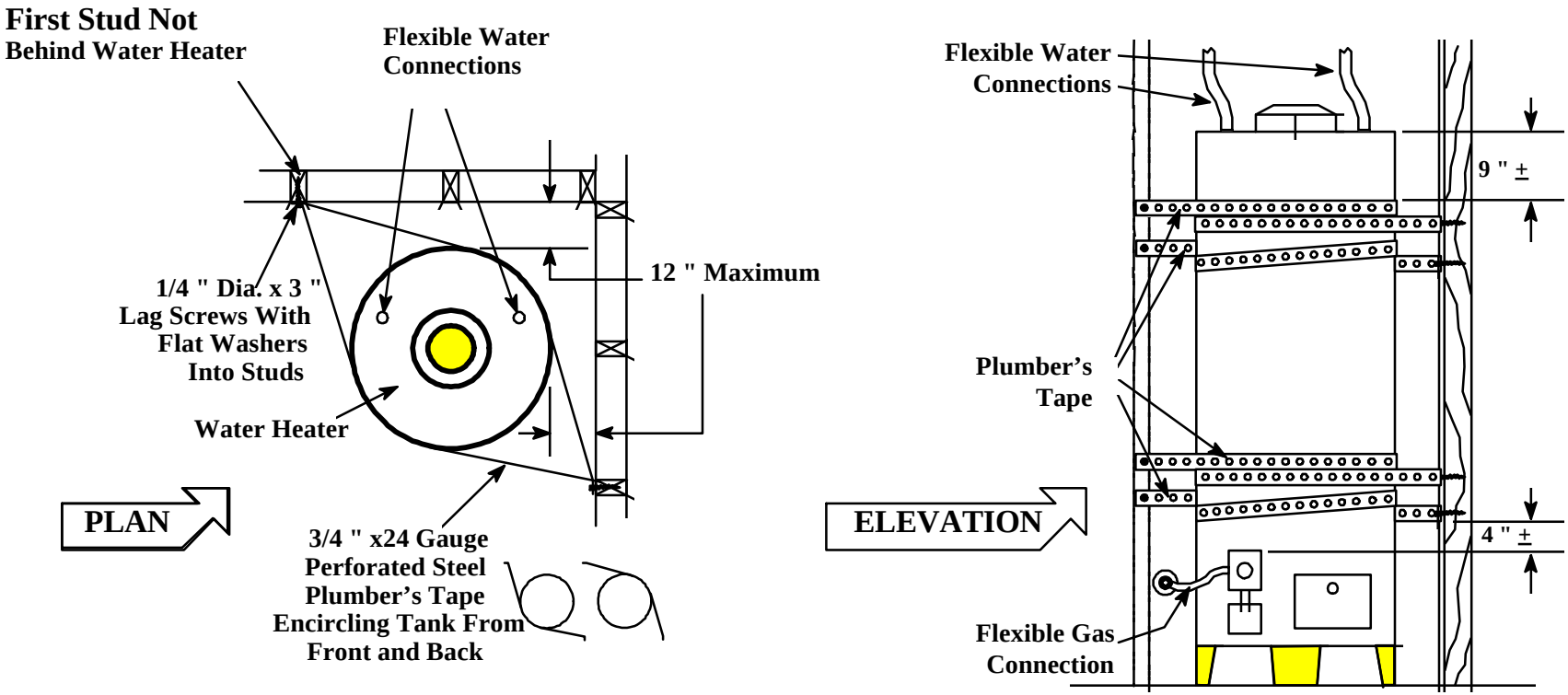


Figure I-6. Water Heater Bracing

Assembling And Storing Survival Supplies

You can cope best by preparing for disaster before it strikes. One way to prepare is by assembling a Disaster Supplies Kit. Once disaster hits, you won't have time to shop or search for supplies. But if you've gathered supplies in advance, you and your family can endure an evacuation or home confinement.

To Prepare Your Kit

1. Review the checklist on the next few pages (from FEMA L-189, ARC 4463, Your Family Disaster Supplies Kit).

2. Gather the supplies that are listed.

3. Place the supplies you're apt to need for an evacuation in an easy-to-carry container. These supplies are listed with an asterisk (*).

Water

Store water in plastic containers such as soft drink bottles. Avoid using containers that will decompose or break, such as milk cartons or glass bottles. A normally active person needs to drink at least 2 quarts of water each day. Hot environments and intense physical activity can double that amount. Children, nursing mothers, and ill people will need more.

- Store 1 gallon of water per person per day (2 quarts for drinking, 2 quarts for food preparation/ sanitation.)*
- Keep at least a 3-day supply of water for each person in your household.

To Prepare Your Kit (Continued)

Water
(Continued)

If you have questions about the quality of the water, purify it before drinking. You can heat water to a rolling boil for 10 minutes or use commercial purification tablets to purify the water. You can also use household liquid chlorine bleach if it is pure, unscented 5.25% sodium hypochlorite. To purify water, use the following table as a guide:

WATER QUANTITY	***BLEACH ADDED***
1 Quart	4 Drops
1 Gallon	16 Drops
5 Gallons	1 Teaspoon

Table I-9. Ratios For Purifying Water With Bleach

After adding bleach, shake or stir the water container and let it stand thirty minutes before drinking.

~

To Prepare Your Kit (Continued)

Food

Store at least a 3-day supply of nonperishable food. Select foods that require no refrigeration, preparation, or cooking and little or no water. If you must heat food, pack a can of Sterno. Select food items that are compact and lightweight. *Include a selection of the following foods in your Disaster Supplies Kit:

- Ready-to-eat canned meats, fruits, and vegetables
- Canned juices, milk, soup (if powdered, store extra water)
- Staples—sugar, salt, pepper
- High-energy foods—peanut butter, jelly, crackers, granola bars, trail mix
- Vitamins
- Foods for infants, elderly persons or persons on special diets
- Comfort/stress foods—cookies, hard candy, sweetened cereals, lollipops, instant coffee, tea bags

~

First Aid Kit

Assemble a first aid kit for your home and one for each car. A first aid kit* should include:

- Sterile adhesive bandages in assorted sizes
- 2-inch sterile gauze pads (4-6)
- 4-inch sterile gauze pads (4-6)
- Hypoallergenic adhesive tape
- Triangular bandages (3)
- 2-inch sterile roller bandages (3 rolls)
- 3-inch sterile roller bandages (3 rolls)
- Scissors
- Tweezers

To Prepare Your Kit (Continued)

First Aid Kit
(Continued)

- Needle
- Moistened towelettes
- Antiseptic
- Thermometer
- Tongue blades (2)
- Tube of petroleum jelly or other lubricant
- Assorted sizes of safety pins
- Cleaning agent/soap
- Latex gloves (2 pair)
- Sunscreen

Nonprescription Drugs

- Aspirin or nonaspirin pain reliever
- Anti-diarrhea medication
- Antacid (for stomach upset)
- Syrup of Ipecac (used to induce vomiting if advised by the Poison Control Center)
- Laxative
- Activated charcoal (used if advised by the Poison Control Center)

~

Tools And Supplies

- Mess kits, or paper cups, plates and plastic utensils*
- Emergency preparedness manual*
- Battery-operated radio and extra batteries*
- Flashlight and extra batteries*
- Cash or traveler's checks, change*
- Nonelectric can opener, utility knife*
- Fire extinguisher: small canister, ABC type
- Tube tent
- Pliers
- Tape

To Prepare Your Kit (Continued)

Tools And Supplies
(Continued)

- Compass
- Matches in a waterproof container
- Aluminum foil
- Plastic storage containers
- Signal flare
- Paper, pencil
- Needles, thread
- Medicine dropper
- Shut-off wrench, to turn off household gas and water
- Whistle
- Plastic sheeting
- Map of the area (for locating shelters)

Sanitation

- Toilet paper, towelettes*
- Soap, liquid detergent*
- Feminine supplies*
- Personal hygiene items*
- Plastic garbage bags, ties (for personal sanitation uses)
- Plastic bucket with tight lid
- Disinfectant
- Household chlorine bleach

~

Clothing And Bedding

*Include at least one complete change of clothing and footwear per person.

- Sturdy shoes or work boots*
- Rain gear*
- Blankets or sleeping bags*
- Hat and gloves
- Thermal underwear
- Sunglasses

~

To Prepare Your Kit (Continued)

Special Items

Remember family members with special needs, such as infants and elderly or disabled persons.

*For Baby**

- Formula
- Diapers
- Bottles
- Powdered milk
- Medications

*For Adults**

- Heart and high blood pressure medication
- Insulin
- Prescription drugs
- Denture needs
- Contact lenses and supplies
- Extra eye glasses

- *Entertainment*—games and books

- *Important Family Documents*—Keep these records in a waterproof, portable container.
- Will, insurance policies, contracts, deeds, stocks and bonds
- Passports, social security cards, immunization records
- Bank account numbers
- Credit card account numbers and companies
- Inventory of valuable household goods, important telephone numbers
- Family records (birth, marriage, death certificates)

Creating A Family Disaster Plan

Exit Drills In The Home

To get started . . .

- Contact your local emergency management office and your local American Red Cross chapter.
  - Find out which disasters are most likely to happen in your community.
  - Ask how you would be warned.
  - Find out how to prepare for each type of disaster.
- Meet with your family.
  - Discuss the types of disasters that could occur.
  - Explain how to prepare and respond.
  - Discuss what to do if advised to evacuate.
  - Practice what you have discussed.
- Plan how your family will stay in contact if separated by disaster.
  - Pick two meeting places:
    - A location a safe distance from your home in case of fire.
    - A place outside your neighborhood in case you can't return home.

Exit Drills In The Home (Continued)

- Choose an out-of-state friend as a "check-in contact" for everyone to call.

- Complete the following steps.
  - Post emergency telephone numbers by every phone.
  - Show responsible family members how and when to shut off water, gas, and electricity at main switches.
  - Install a smoke detector on each level of your home, especially near bedrooms; test them monthly and change the batteries two times each year. (Change batteries when you change your clocks in the spring and fall.)
  - Contact your local fire department to learn about home fire hazards.
  - Learn first aid and CPR. Contact your local American Red Cross chapter for information and training.

- Meet with your neighbors.
  - Plan how the neighborhood could work together after a disaster. Know your neighbors' skills (medical, technical).
  - Consider how you could help neighbors who have special needs, such as elderly or disabled persons.
  - Make plans for child care in case parents can't get home.

Evacuation Planning

Develop an escape plan that provides for escape from every room. As part of your escape plan:

- Consider the needs of children and physically challenged individuals.
- Inform all family members or office coworkers of the plan.
- Run practice escape drills.

An example of an escape plan is shown in the figure below.

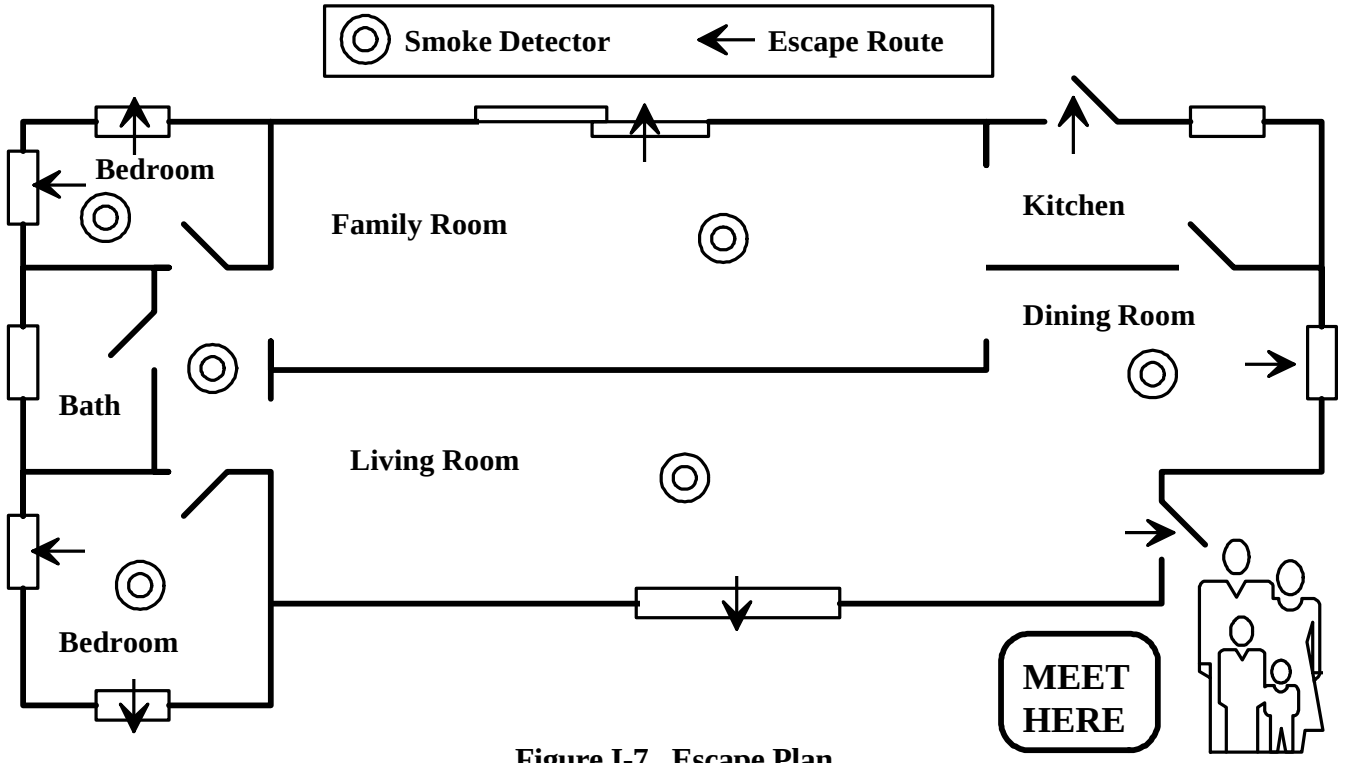


Figure I-7. Escape Plan

Community Preparations

The community can also prepare by establishing Community Emergency Response Teams to respond in the period immediately after a disaster. CERTs assist existing response teams and assume the same functions as response personnel. The CERT organizational structure is shown in Figure I-8.

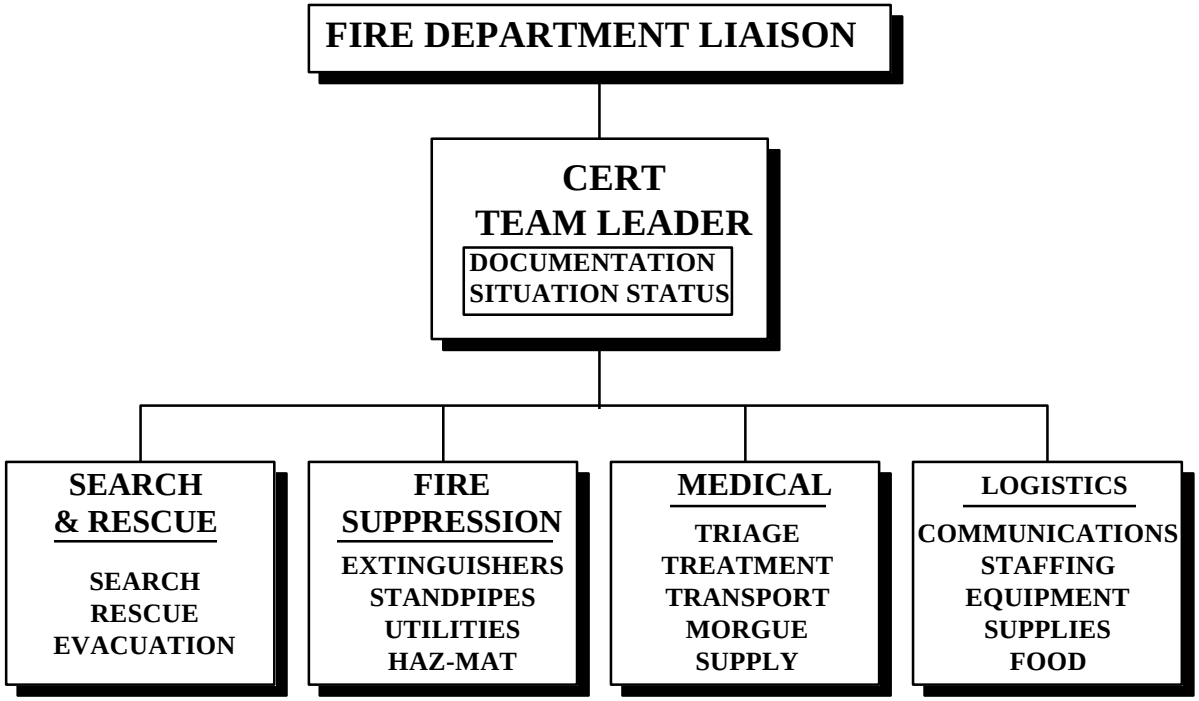


Figure I-8. CERT Organization

There are checklists (starting on page I-51) following this chapter that will help you plan and organize your CERT, and assemble the equipment and supplies your team will need.

Protection For Disaster Workers

People who volunteer their services during a disaster are generally protected by Federal, State, and/or local laws. Most states have "Good Samaritan" laws that protect people who provide emergency care *in a prudent and reasonable manner* to ill or injured persons. Other city, county, or State laws may also apply. Your instructor will provide information about laws that apply in your area. Record the key points below for future reference.

Applicable Laws	Key Points

Summary

CERTs are among a variety of agencies and personnel that cooperate to provide assistance in the aftermath of an emergency or disaster. The keys to a CERT's effectiveness are in:

- Familiarity with the type of event and the types of damage that are most likely to result.
- Adequate preparation for the event and its aftermath.
- Proper training in the functional areas to which CERTs are assigned, including:
  - Fire suppression.
  - Light search and rescue.
  - Disaster medical operations.
  - Logistics.

Given these three keys, CERTs can be an invaluable asset to immediate response efforts.

Assignment

Before the next session:

1. Read and familiarize yourself with Chapter II: Disaster Fire Suppression.
2. Bring a pair of leather gloves and a pair of safety goggles.
3. Begin food and water storage for at least 72 hours for yourself and your family.
4. Establish an out-of-state emergency contact. This is the person you will contact in the event of a disaster in your area, to report your status. Others can then contact that person to check on your status. Be sure to let family and friends know who your contact person is.

Assignment (Continued)

5. Locate the utility shut-offs in your home.

6. Wear appropriate clothes (no shorts, no open-toed shoes), because you will practice putting out a small fire with an extinguisher.

Additional Reading

The references below are available if you would like to know more about the information in this chapter.

Emergency Food and Water Supplies. Federal Emergency Management Agency, Washington, DC: 1993.

Filderman, Lynne D., Natural Hazards Risk Profile: Hurricanes, Floods, Tornadoes, Lightning, Earthquakes. American National Red Cross, Washington, DC: 1991.

Flood. Federal Emergency Management Agency, National Oceanic and Atmospheric Administration, and American Red Cross, Washington, DC: 1992.

Ludlum, David M. The Audubon Society Field Guide to North American Weather. A. A. Knopf, New York, NY: 1992.

Natural Hazards Risk Profile. American Red Cross, Washington, DC: 1991.

Reader's Digest Action Guide: What To Do in an Emergency. Reader's Digest Association, Pleasantville, NY: 1988.

Talking Points for Disaster Education Presentations. American Red Cross, Washington, DC: 1991.

Williams, Jack. The Weather Book: An Easy-To-Understand Guide to the USA's Weather. Vintage Books, New York, NY: 1992.

Additional Reading (Continued)

In addition, the following pamphlets are available through the Federal Emergency Management Agency (L code), the American Red Cross (ARC code), and the National Weather Service (PA code).

Emergency Preparedness Catalog (L-164)

Emergency Preparedness Checklist (L-154)

Your Family Disaster Supplies Kit (L-189/ARC 4463)

Your Family Disaster Plan (L-191/ARC 4466)

* Are You Ready for a Hurricane? (ARC 4454)
* Are You Ready for an Earthquake? (ARC 4455)
* Are You Ready for a Fire? (ARC 4456)
* Are You Ready for a Tornado? (ARC 4457)
* Are You Ready for a Flood? (ARC 4458)
* Are You Ready for a Winter Storm? (ARC 4464)
* Are You Ready for a Thunderstorm? (ARC 5009)

Winter Storms: The Deceptive Killer (PA 91002/ARC 4467)

Flash Floods and Floods: The Awesome Power (PA 92050/ARC 4493)

Tornadoes: Nature's Most Violent Storm (PA 92052/ARC 5002)

* Available in English and Spanish

Additional Materials
Chapter I

Community Emergency Response Team Checklist

INSTRUCTIONS: Use the list below when planning and organizing a CERT. Keep this page in the front of the CERT plan of operation.

Personal Preparedness	*Completed*	*Date Checked*
Food	☝	
Water	☝	
Out-of-State Phone Contact	☝	
Mitigation Measures:		
Water heater	☝	
Utilities	☝	
Cabinets, etc.	☝	
Other: _____	☝	

Community Emergency Response Team Checklist (Continued)

Team Organization	*Completed*	*Date Checked*
Leadership		
Team leader	☝	
Group leaders	☝	
Membership		
Roster	☝	
Phone list	☝	
Skills inventory	☝	
Communications		
Telephone tree	☝	
Newsletter	☝	
Amateur radio	☝	
Runners	☝	

Community Emergency Response Team Checklist (Continued)

***Team Organization** (Continued)*	*Completed*	*Date Checked*
Resources And Locations		
Personnel	☝	
Equipment	☝	
Supplies	☝	
Response kits	☝	
Area Surveys		
Evacuation plans	☝	
Staging area	☝	
Casualty collection points	☝	
Specific hazard areas	☝	
Area maps	☝	
Response Plan		
Response criteria	☝	
Communications/notifications	☝	
Staging area/command post	☝	

Community Emergency Response Team Checklist (Continued)

Team Organization *(Continued)*	*Completed*	*Date Checked*
Teamwork		
Meetings	☐	
Drills and exercises	☐	
Training:		
- First aid	☐	
- CPR	☐	
- Other: _____	☐	

Recommended CERT Equipment And Supplies

The following equipment and supplies are recommended as a minimum supply cache for all CERT teams. The equipment and supplies should be maintained at or near the team staging area.

Equipment/Supply	*Date Obtained*	*Quantity*	*Date Checked*
➢ Nylon/canvas bag with shoulder strap			
➢ Water (two canteens/bottles per Search and Rescue team)			
➢ Dehydrated foods			
➢ Water purification tablets			
➢ Work gloves (leather)			
➢ Goggles			
➢ Dust masks			
➢ Flashlight or miner's lamp			
➢ Batteries and extra bulbs			
➢ Secondary flashlight or light sticks			

Recommended CERT Equipment And Supplies *(Continued)*

Equipment/Supply	*Date Obtained*	*Quantity*	*Date Checked*

- Utility knife
- Note pads
- Markers:
  - Thin-point
  - Thick-point
- Pens
- Duct tape
- Masking tape (2-inch)
- Scissors
- Crescent wrench
- First aid pouch containing:
  - 4 ″ 4 gauze dressings (6)
  - Abdominal pads (4)
  - Triangular bandages (4)
  - Band-Aids
  - Roller bandage

Chapter II
Disaster Fire Suppression

In this chapter you will learn about:

- **Fire chemistry:** How fire occurs, classes of fire, and choosing the correct means to extinguish each type of fire.
- **Hazardous materials:** How to identify potentially dangerous materials in storage or in transit.
- **Fire hazards:** Potential fire hazards in the home and worksite, and fire prevention strategies.
- **Fire suppression strategy:** How to evaluate fires, assess firefighting resources, and determine a course of action.
- **Portable fire extinguishers:** Types of portable fire extinguishers and how to operate them.
- **Safe fire suppression:** How to decide if you should attempt to extinguish a fire; how to approach and extinguish a fire safely.
- **Teamwork:** The importance of working with a buddy.

Introduction

During and immediately after a disaster, the first priorities of professional fire services are life safety and extinguishing *major* fires. They may be hampered by impassable roads, inadequate water supply, weather conditions, burning material, and inadequate resources to deal with the number of existing major fires. At this time, CERT fire suppression groups play a very important role in firefighting and fire prevention by:

- Putting out small fires before they become major fires.
- Preventing additional fires by removing fuel sources.
- Assisting with evacuations where necessary.

Portable fire extinguishers are an invaluable firefighting tool. They can be used to eliminate small fires that might otherwise grow into larger, more destructive fires and to prevent the loss of life and property.

Potential fuel sources include natural gas and electrical utilities as well as hazardous materials. Understanding hazardous materials and other fire hazards in the home and workplace will help you determine the appropriate course of action to take.

Work with a buddy.

Fire Chemistry

Fires require three elements to exist:

- *Heat.* The temperature at which a material produces a vapor, and the temperature at which vapors will burn. (Vapors will self-ignite if the temperature is hot enough.)

- *Fuel.* The fuel for a fire may be a solid, liquid, or gas. The type and quantity of the fuel will determine which method should be used to extinguish the fire.

- *Oxygen.* Fires will burn vigorously in any atmosphere of at least 20 percent oxygen. Without oxygen, fuel could be heated until entirely vaporized, and it would not burn.

Together, these three elements are called the *fire triangle,* which is illustrated in the figure below.

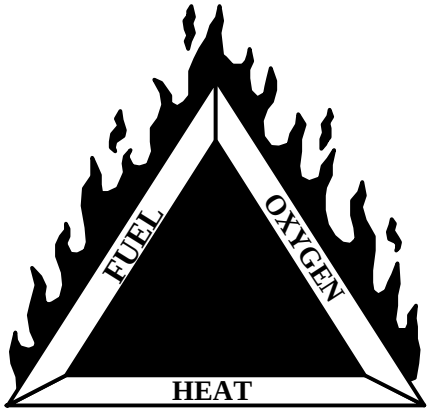


Figure II-1. Fire Triangle

Fire Chemistry
(Continued)

The three elements in the proper proportions will produce fire. Extinguishment is possible when one of the three elements is missing as shown in the following figure.

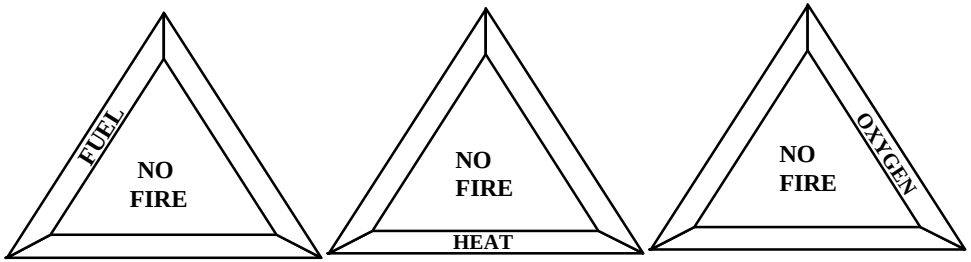


Figure II-2. Effect Of Removing Elements Of The Fire Triangle

Classes of fire are based on the type of fuel that is burning. There are four major classes of fire:

- *Class A.* Ordinary combustibles such as paper, cloth, wood, rubber, and many plastics.
- *Class B.* Flammable liquids (e.g., oils, gasoline, kitchen grease, paints, and solvents) and combustible liquids (e.g., charcoal lighter, kerosene, and diesel fuel). These fuels burn only at the surface because oxygen cannot penetrate the depth of the fluid. If ignited, it is the vapor that burns.
- *Class C.* Electrical equipment (wiring, fuse boxes, motors, power tools, appliances).
- *Class D.* Combustible metals such as aluminum, magnesium, and titanium.

Fire Chemistry
(Continued)

It is extremely important to identify the type of fuel so that the correct method and agent can be used to extinguish the fire.

The remainder of this chapter will deal with:

- CERT size-up.
- Firefighting resources.
- Safe fire suppression.

In class, your instructor may present additional information that is not included in this Participant Handbook. Feel free to take notes during the session.

Hazardous Materials

What Are Hazardous Materials?

Hazardous materials are any materials that corrode other materials, explode or are easily ignited, react strongly with water, are unstable when exposed to heat or shock, or are otherwise toxic to humans, animals, or the environment. Hazardous materials include, but are not limited to:

- Explosives
- Flammable gas and liquid
- Poisons and poisonous gases
- Corrosives
- Nonflammable gas
- Oxidizers
- Radioactive materials

Hazardous materials pose an ever-present danger. They are stored in all types of locations, and they are transported by a variety of means. They are commonly found in such places as industrial and commercial districts, highways, harbors, airports, and railroads. They are also found in homes and offices.

Identifying Stored Hazardous Materials

Stored hazardous materials may be identified by means of the National Fire Protection Association (NFPA) 704 Diamond system of placards. These placards are located on the outside of buildings at the entrance to the storage area. An example of the NFPA 704 Diamond is shown in the following figure.

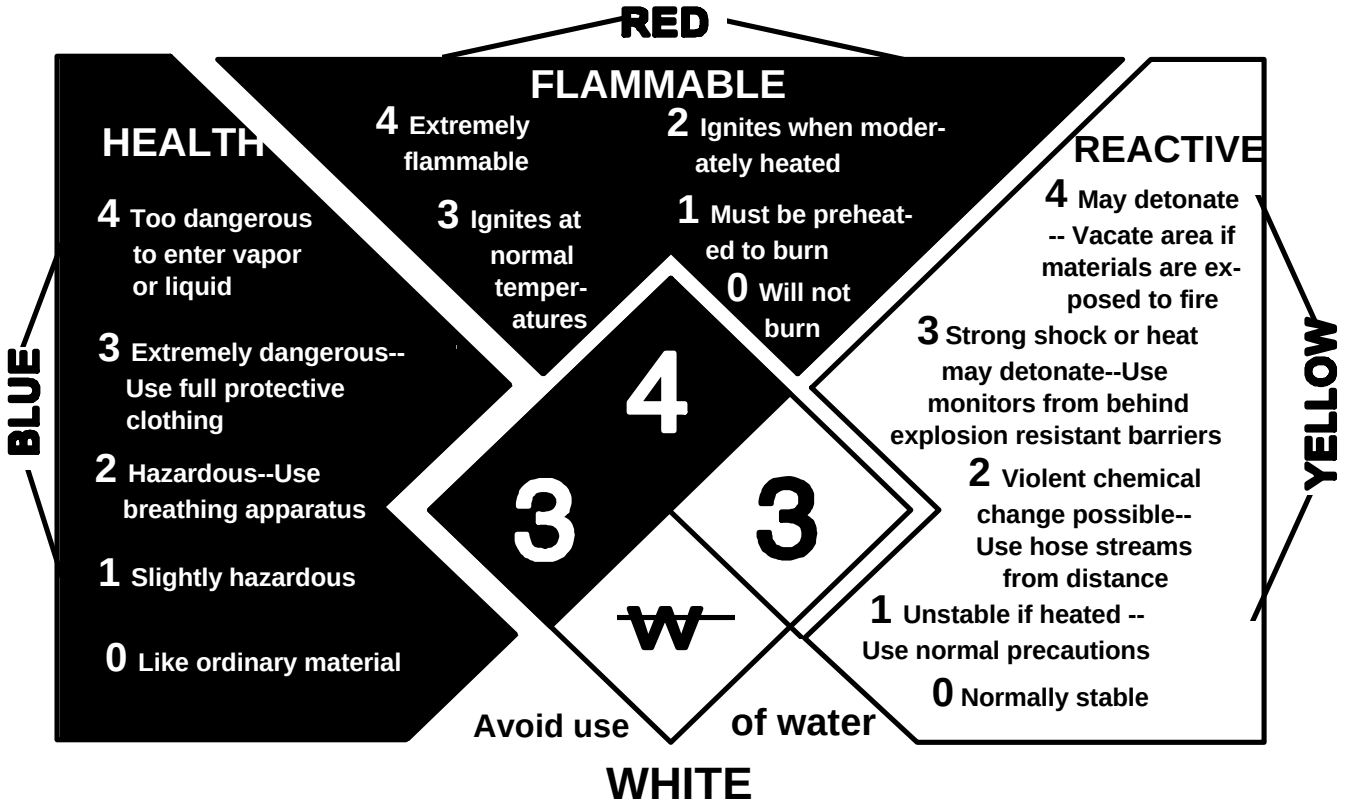


Figure II-3. National Fire Protection Association 704 Diamond

Identifying Stored Hazardous Materials (Continued)

The diamond is divided into four colored quadrants, each with a rating number inside it. The colored quadrants provide information about the type of danger caused by the material. The numbers within the red, blue, and yellow quadrants (provided for professional firefighter use only) indicate the degree of risk associated with the material. *Consider these placards a "stop sign" for CERT members*, unless in your planning stages you have identified the dangers involved.

Identifying Hazardous Materials In Transit

Hazardous materials that are being transported are marked with Department of Transportation (DOT), United Nations (UN), or North American (NA) warning placards. For the DOT system, each diamond-shaped placard includes a color, symbol, name, and number, each of which indicates the type of hazard. The DOT placards are illustrated in the figure below.

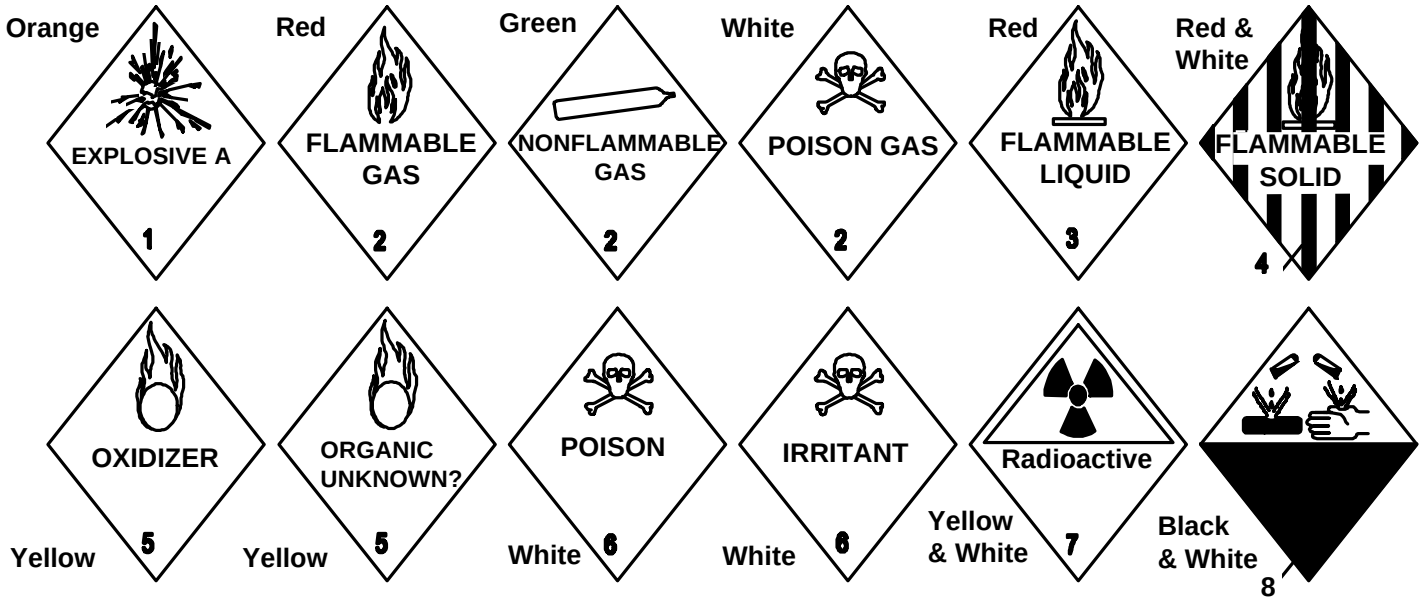


Figure II-4. DOT Warning Placards

Identifying Hazardous Materials In Transit (Continued)

The UN and NA systems are displayed mainly on tank cars, cargo tanks, and portable tanks. Examples of UN and NA placards are shown in the figures below.

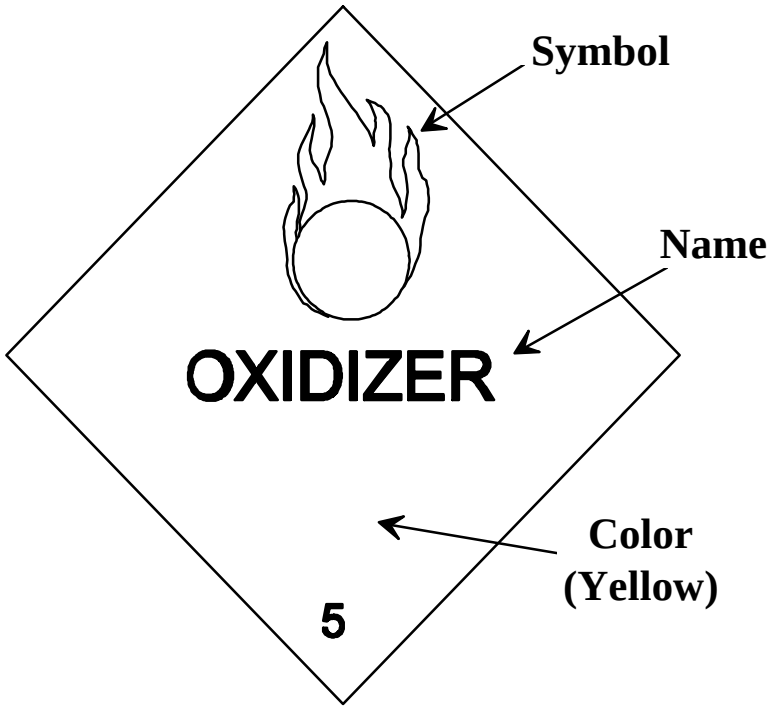


Figure II-5. UN Placarding System

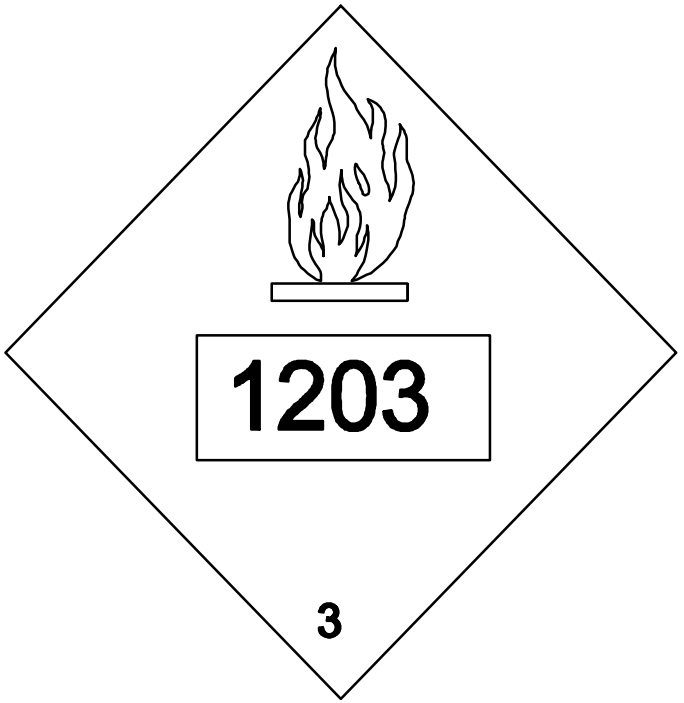


Figure II-6. NA Numbering System

Like the NFPA 704 Diamond, the DOT, UN, and NA placards should mean a "stop sign" for CERT members. If they are present, there is danger. *STOP!*

Reducing Hazards In Home And Office

Introduction

What can you do about fire hazards in the home or office? Simple fire prevention practices will go far in reducing the likelihood of fires. First, *locate* potential sources of ignition. They may include electrical hazards, natural gas hazards, and flammable or combustible liquids. Then do what you can to *reduce or eliminate* fire hazards. This section will address the elimination of hazards related to:

- Electricity
- Natural gas
- Flammable or combustible liquids

Electrical Hazards

When misused or neglected, electricity can cause serious injury or death. With a little effort, however, most electrical hazards can be eliminated. Ways to reduce electrical hazards include:

- Avoid the "electrical octopus." Eliminate tangles of electrical cords and don't overload electrical outlets.
- Don't run electrical cords under carpets.
- Replace broken or frayed cords immediately.
- Properly maintain electrical appliances. Remove or replace malfunctioning appliances.

Fire safety begins at home.

Electrical Hazards *(Continued)*

When an electrical emergency does occur, be prepared to handle an electrically charged appliance fire. Know where the power shut-off and circuit breakers or fuses are, and know how to shut off the power.

- For circuit boxes: Switch off smaller breakers first, then the main breaker.
- Fuse boxes: Unscrew the individual fuses, then pull the main switch.

Examples of circuit and fuse boxes are shown in the figures below. Do *not*, however, enter a flooded basement to shut off the electrical supply.

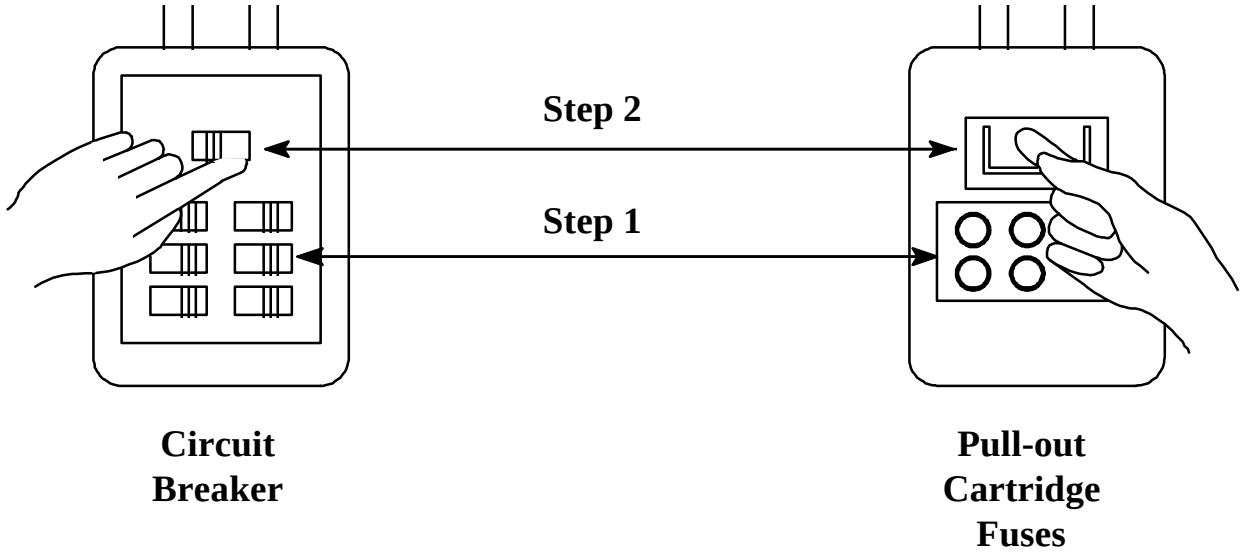


Figure II-7. Circuit Box With Shut-Off

Figure II-8. Fuse Box With Shut-Off

When turning power back on, turn the main breaker or switch on first, then switch on the smaller breakers or fuses.

Natural Gas Hazards

Natural gas presents two kinds of hazards. It is an *asphyxiant*, meaning that it robs the body of oxygen, and it is *explosive*—leaking gas can easily be ignited, causing an explosion and subsequent fires. Ways to reduce natural gas hazards in a disaster include:

- Installing a gas detector near your furnace and hot water heater and testing the detector monthly to ensure that it works.

- Locating and labeling the gas shut-off valve. (Multiple gas units in an apartment building are usually identified by apartment number or letter.) **NOTE:** After the natural gas is turned off, it should be turned on only by a trained utility technician.

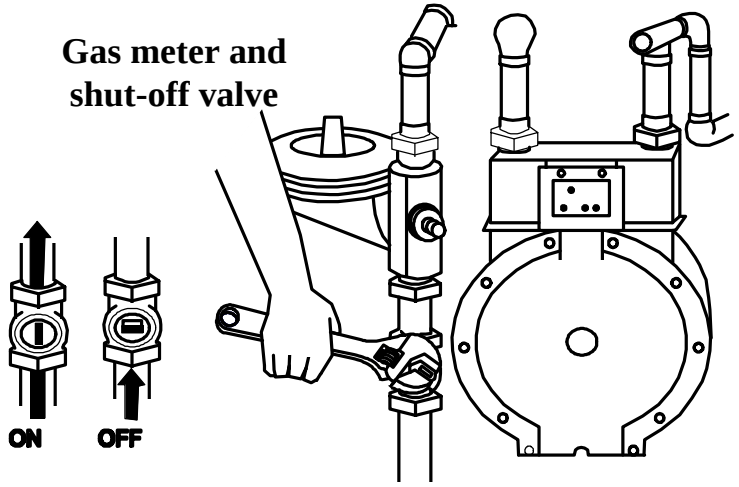


Figure II-9. Natural Gas Meter With Shut-Off

- Knowing how to shut off the gas. The valve position indicates ON/OFF. **NOTE:** Never enter the basement of a structure that is on fire to turn off any utility.

- Having the proper tool (gas wrench, pliers, channel locks, ViseGrips, etc.) in your disaster supplies kit or near the gas valve.

Natural Gas Hazards *(Continued)*

- Strapping the water heater to the wall in two places: ♋ from the top and ♋ from the bottom of the tank. Each strap should cross behind the water tank and fasten to wall studs behind the tank. (See Figure II-10 below.)

- Have a licensed plumber attach the water heater to the gas supply by a flexible gas line with shut-off that will move in the event of an earthquake.

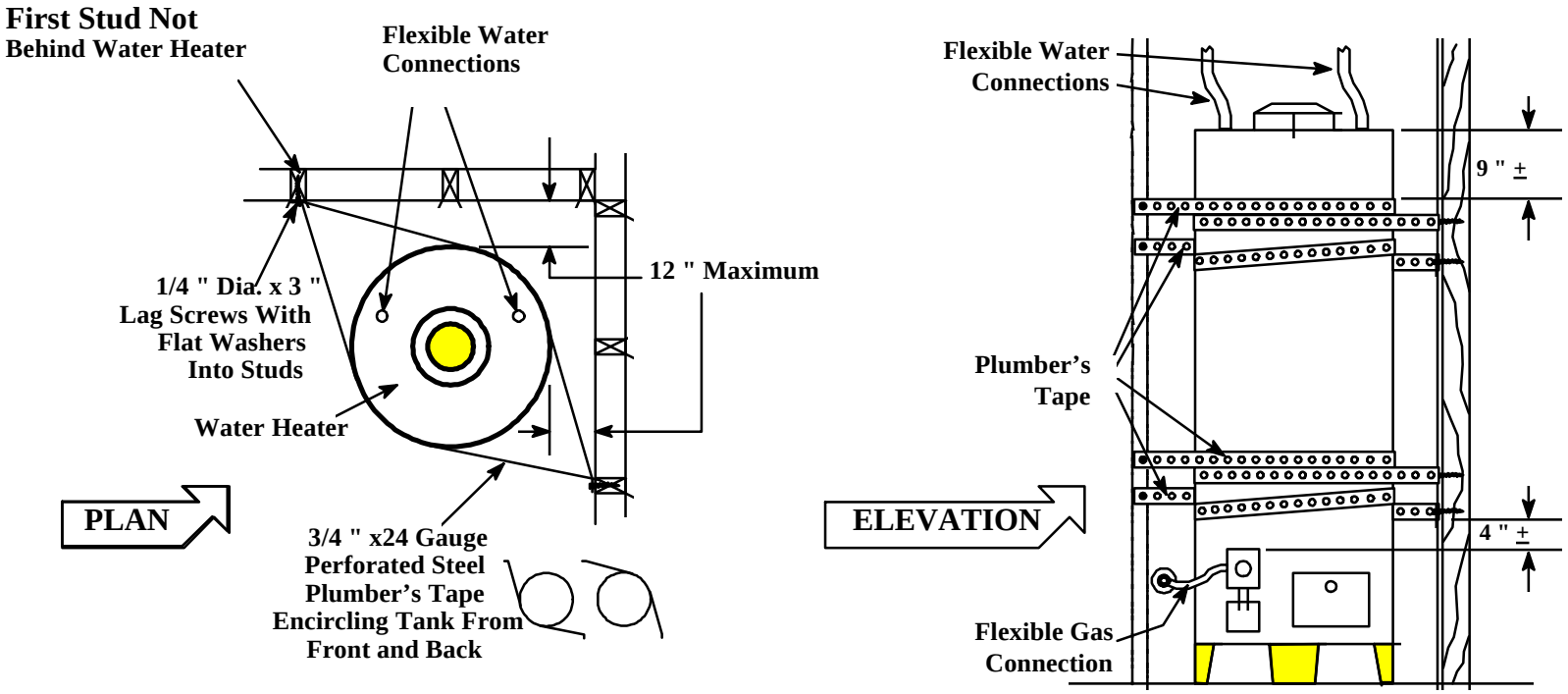


Figure II-10. Hot Water Heater Bracing

Flammable Liquid Hazards

Many typical household products, such as gasoline, charcoal lighter, and paint thinners and removers are flammable. In addition, many household products such as air fresheners, deodorants, hair sprays, insecticides, and furniture polish are packaged as aerosols. Aerosols contain flammable propellants and may explode if heated.

To minimize hazards associated with flammable products:

- Read labels to identify flammable products.
- Store them properly (remember the L.I.E.S. rules—Limit, Isolate, Eliminate, Separate).

CERT Size-Up

Before fire suppression operations can begin, rescue teams must first ensure the safety of all rescuers, then citizen life safety. Once these primary concerns have been addressed, CERT size-up can begin.

The first task in fire suppression is the size-up or gathering of information for decision making and planning. Size-up is a continuous data-gathering process that will dictate whether to attempt fire suppression, and planning for extinguishing the fire. CERT size-up answers these questions:

- Can my buddy and I fight the fire safely?
- Do my buddy and I have the right equipment?
- Are there other hazards?
- Is the building going to collapse?
- Can my buddy and I escape?

Some of the factors involved in each step of size-up are shown in the checklist on the following pages. Use the checklist as a guide for CERT size-up. Taking the actions listed will help the CERT member make safer decisions. Practice will make this process more automatic.

CERT Size-Up
(Continued)

Step 1: Gather Facts	**Yes**	**No**
☞ *Time*		
Does the time of day or week impact fire suppression efforts?	☐	☐
How?		
☞ *Weather*		
Will weather conditions impact your safety?	☐	☐
If yes, how will your safety be impacted?		
Will weather conditions impact the fire situation?	☐	☐
If yes, how will the fire situation be impacted?		
☞ *Type Of Construction*		
What type(s) of structure(s) are involved?		
What type(s) of construction are involved?		

Table II-1. CERT Size-Up Checklist

CERT Size-Up
(Continued)

Step 1: Gather Facts (Continued)	**Yes**	**No**
Occupancy		
Are the structures occupied?	☐	☐
If yes, how many people are likely to be affected?		
Are there special considerations (e.g., children, elderly)?	☐	☐
Hazards		
Are hazardous materials involved?	☐	☐
Are any other types of hazards likely to be involved?	☐	☐
If yes, what other hazards?		
Step 2: Assess And Communicate The Damage		
Take a lap around the building. Is the damage beyond the CERT team's capability?	☐	☐
If yes, what special requirements or qualifications are required?		
Are normal communication channels functioning?	☐	☐

Table II-1. CERT Size-Up Checklist
(Continued)

CERT Size-Up
(Continued)

Step 3: Consider Probabilities	**Yes**	**No**
☞ *Life Hazards*		
Are there potentially life-threatening hazards?	☝	☝
If yes, what are the hazards?		
☞ *Path Of Fire*		
What is the path of the fire?		
Does the fire's path jeopardize other areas?	☝	☝
If yes, what other areas may be jeopardized?		
☞ *Additional Damage*		
Is there great risk or potential for more disaster activity that will impact personal safety?	☝	☝
Step 4: Assess Your Own Situation		
☞ What resources are available with which you can suppress the fires?		
☞ What equipment is available?		
Step 5: Establish Priorities		
☞ Can fire suppression be *safely* attempted by CERT members? If no, do *not* attempt suppression.	☝	☝
☞ Are there other, more pressing needs at the moment?	☝	☝

Table II-1. CERT Size-Up Checklist
(Continued)

CERT Size-Up
(Continued)

Step 6: Make Decisions

- Where will deployment of available resources do the most good while maintaining an adequate margin of safety?

Step 7: Develop Action Plans

- Determine how personnel and other resources should be deployed.

Step 8: Take Action

- Put the plans into effect.

Step 9: Evaluate Progress

- Continually size up the situation to identify changes in the:
  - Scope of the problem.
  - Safety risks.
  - Resource availability.
- Adjust strategies as required.

Table II-1. CERT Size-Up Checklist
(Continued)

Firefighting Resources

A variety of resources may be available for fire suppression, including:

- *Portable Fire Extinguishers.* Portable fire extinguishers are an invaluable tool for putting out small fires. A well-prepared home or office will have at least two.

- *Interior Wet Standpipes.* In commercial buildings and apartment buildings, interior wet standpipes should be available for use by occupants or tenants. These standpipes usually consist of about 100 feet of 1½-inch jacketed hose with a 3/8-inch nozzle tip. They deliver up to 125 gallons of water per minute. **NOTE:** Always work in 3-person teams when using an interior wet standpipe. One person handles the hose, another bleeds the air from the line, and the third controls the water pressure.

- *Confinement.* In interior spaces, the ability to confine the fire by closing doors is a valuable resource. Close doors to rooms and hallways to restrict the spread of smoke and heat while you escape to the outside.

- *"Creative" Resources.* Sometimes it is necessary to make use of other materials and equipment that may be at hand. Examples include:
  - Swimming pool or spa, with buckets
  - Dirt or sand and shovels
  - Garden hose and ladders (for second floor or roof)

The type of fuel will determine which firefighting agent(s) you select.

This section will focus on portable fire extinguishers, as they are the most likely resource available in an emergency.

Extinguisher Rating And Labeling

Portable fire extinguishers must be rated and approved by the State Fire Marshal and Underwriters' Laboratories. They are rated according to their effectiveness on classes of fire and their relative strength and capability and must be so labeled by the manufacturer. An example of a manufacturer's label is shown in the figure below.

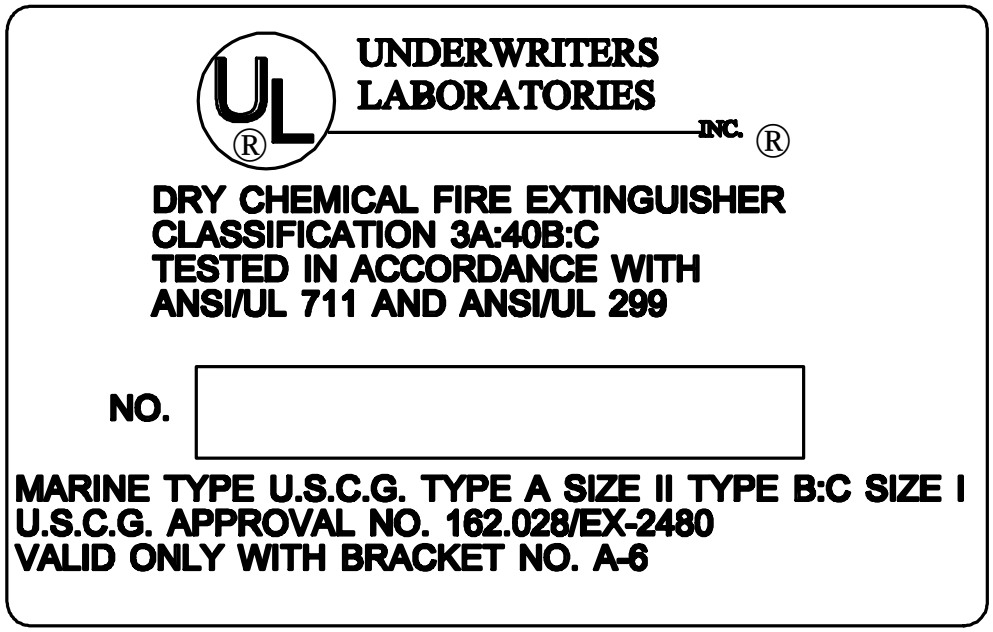


Figure II-11. Manufacturer's Label

Each manufacturer's label also displays the NFPA *rating* code for the extinguisher. The rating provides important information about the types of fires that can be extinguished using the extinguisher.

Types Of Fire Extinguishers

There are five types of extinguishers:

- Water
- Dry chemical
- Halon
- Carbon dioxide
- Foam

It is extremely important to use the correct agent and method for the class of fire. The chart in Figure II-12 on the following page shows appropriate agents and methods for each type of fire. The characteristics of each type of fire extinguisher are listed below and on page II-25.

Water Extinguishers

Water extinguishers are among the most commonly used. They are excellent for heat removal on Class A fires. Extreme caution should be exercised when using a water extinguisher to ensure that the water, which is under extreme pressure, does not scatter lightweight materials and spread the fire. Common characteristics for water fire extinguishers are:

- *Capacity.* Standard size is 2½ gallons.
- *Range.* 30-40 feet.
- *Pressure.* 110 pounds per square inch (psi).

Types Of Fire Extinguishers *(Continued)*

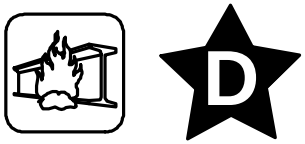
FIRE TYPE	EXTINGUISHING AGENT	METHOD
ORDINARY SOLID MATERIALS 	WATER FOAM	REMOVES HEAT REMOVES AIR AND HEAT
	DRY CHEMICAL	BREAKS CHAIN REACTION
FLAMMABLE LIQUIDS 	FOAM CO_2	REMOVES AIR
	DRY CHEMICAL HALON	BREAKS CHAIN REACTION
ELECTRICAL EQUIPMENT 	CO_2	REMOVES AIR
	DRY CHEMICAL HALON	BREAKS CHAIN REACTION
COMBUSTIBLE METALS 	SPECIAL AGENTS	USUALLY REMOVE AIR

Figure II-12. Fire Types, Extinguishing Agents, And Methods

Dry Chemical Extinguishers

Dry chemical extinguishers are also commonly used. Regular dry chemical extinguishers have a sodium bicarbonate base and are effective on Class B and C fires. Multipurpose dry chemical extinguishers have a monoammonium phosphate base and are effective for Class A, B, and C fires. Both types of dry chemical extinguishers are nontoxic. Both should be inverted monthly to prevent caking. Common characteristics for dry chemical extinguishers are:

- *Capacity.* Approximately 10-20 seconds discharge time.
- *Range.* 8-12 feet.
- *Pressure.* 175-250 psi.

Other Types Of Extinguishers

Although still in use, carbon dioxide, halon, and foam extinguishers are becoming less common.

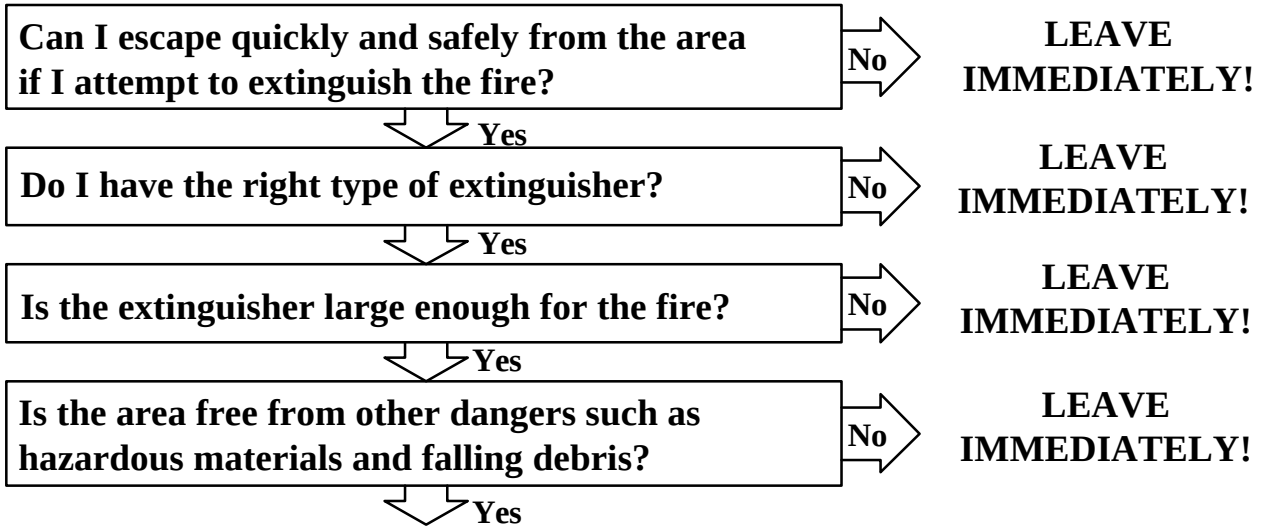
- *Carbon Dioxide Extinguishers* are used primarily on Class C fires and are also effective on Class B fires. They have limited use on Class A fires because of reflash potential. They suppress fire by displacing or diluting oxygen levels.
- *Halon Extinguishers* are best used on Class B or C fires. Halon is a clean agent and is nontoxic when used in low concentrations or in nonconfined areas. However, halon extinguishers are being phased out because of potential impact on the environment.
- *Foam Extinguishers* are used for special applications and are less common.

Deciding To Use A Fire Extinguisher

Below is a decision making guide for using a portable fire extinguisher during a fire in a disaster. Ask yourself each of the questions before attempting to extinguish a fire. If you answer "NO" to any of these questions:

- Leave the building immediately.
- Shut all doors as you leave to slow the spread of the fire.

If you answer "YES" to all of the questions, you may attempt to extinguish the fire. If you feel unable to extinguish the fire, however, leave immediately.



Courtesy of Public Education Specialist, City of Colorado Springs Fire Department

Figure II-13. Deciding To Use A Fire Extinguisher

Operating A Fire Extinguisher

A portable fire extinguisher includes the following components:

- Pressure gauge.
- Hose.
- Cylinder.
- Carrying handle and trigger.

These components are shown in the figure below.

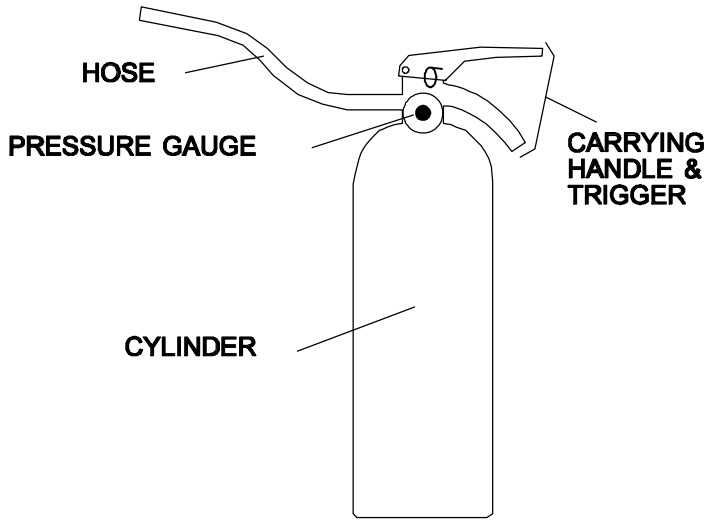


Figure II-14. Components Of A Portable Fire Extinguisher

Operating A Fire Extinguisher (Continued)

Always operate extinguishers in an upright position. As shown in the figure below, the acronym to remember when operating a portable extinguisher is *P.A.S.S.*: *P*ull, *A*im, *S*queeze, *S*weep. Aim at the base of the fire.

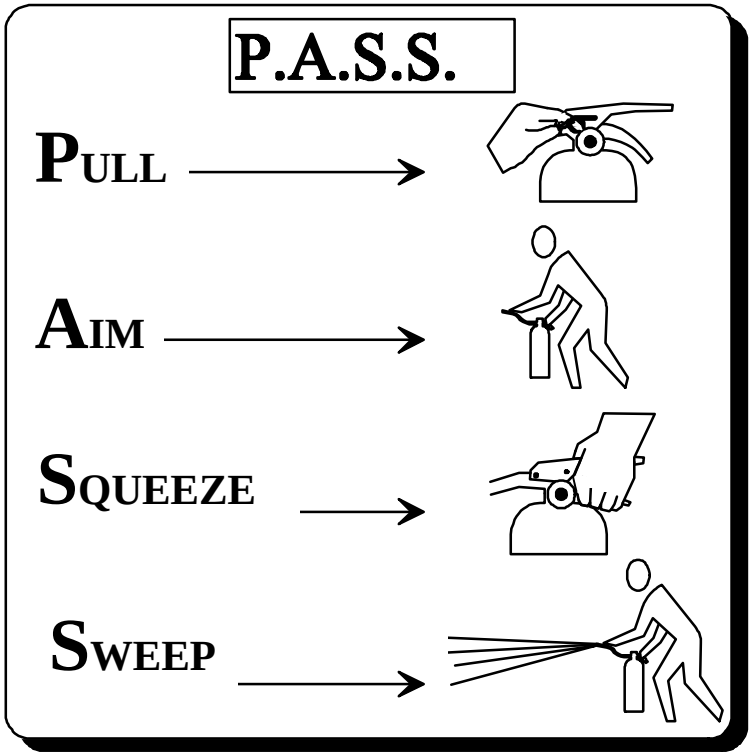


Figure II-15. P.A.S.S.

Fire Suppression Safety

As in all emergency operations, safety is key when fighting fires. CERT teams should use the following guidelines when approaching and suppressing a fire.

- Do *not* attempt to suppress a fire that is clearly too large for the equipment at hand.
- Use safety equipment (helmet, goggles, dust mask, all-leather work gloves, heavy shoes).
- Work in a buddy system.
- Have a backup team when possible.
- Always have two ways to exit the fire area.
- Approach smoke-filled areas correctly. The primary component of smoke is carbon monoxide. Without proper self-contained breathing apparatus, firefighting will be limited. Use extreme caution when entering smoke-filled areas.
  - Feel closed doors with the back of the hand, working from the bottom of the door up. If the door is hot, there is fire behind it.
  - Confine the fire whenever possible by keeping doors closed.
  - Stay low to the ground.
  - Always know a second escape route.
  - Use natural ventilation techniques to clear smoke:
    - Open windows if possible.
    - Create cross-ventilation by channeling natural wind flow.
- Maintain a safe distance. Remember the effective extinguisher range.
- Move around the perimeter of the fire to maximize coverage of the extinguisher agent.

Fire Suppression Safety
(Continued)

- Overhaul ensures that every piece of burning material is completely extinguished. To prevent rekindling of the fire:
  - Locate hidden burning material. Extinguish and safely remove it.
  - Remove heat by cooling.

Wear safety equipment: helmet, goggles, dust mask, gloves, and boots.

Summary

Introduction

Effective fire suppression depends on an understanding of:

- The elements required for fire to exist.
- The class of fire.
- The type of material involved.
- The resources required to extinguish each type of fire.
- Fire suppression techniques.

The Fire Triangle

Fires require three elements to exist:

- Heat
- Fuel
- Oxygen

If any of the elements are missing or can be suppressed, the fire can be extinguished.

Classes Of Fire

There are four types of fire:

- Class A. Ordinary combustibles.
- Class B. Flammable liquids.
- Class C. Electrical equipment.
- Class D. Combustible metals.

It is extremely important to identify the class of fire so that you can select the proper means of extinguishing the fire.

Hazardous Materials

To help understand the types of materials, several organizations have developed placarding systems for hazardous and nonhazardous materials being stored or transported.

- The NFPA 704 diamond system uses a combination of colors and numbers to placard stored materials according to the type of hazard and level of danger they present.
- Several organizations have developed placarding systems for transported materials:
  - Like the NFPA 704 diamond, the DOT placard uses numbers and colors to identify placard-transported materials according to type of hazard and level of danger.
  - UN and NA placards use numbers to identify specific types of hazards.

When approaching accidents involving materials that are placarded as hazardous or when the material is unknown, *keep away and call for professional help immediately*. Do *not* attempt to deal with the hazard yourself. NFPA 704 Diamond system and UN and NA placards are "stop signs" to CERT teams.

Firefighting Resources

While there are many resources available for extinguishing fires, the resource that you will use most frequently is the portable fire extinguisher. Portable extinguishers are labeled according to:

- The class(es) of the fire against which they are effective.
- The fire area that they can suppress.

Water and dry foam extinguishers are the most commonly used. Water extinguishers are effective for Class A fires. Regular dry foam extinguishers are effective for Class B and C fires. Multipurpose dry foam extinguishers, however, are effective for Class A, B, or C fires.

Other types of portable fire extinguishers that are less commonly used are carbon dioxide extinguishers, halon extinguishers, and foam extinguishers.

Fire Suppression Techniques

When using a portable fire extinguisher, remember to use the *P.A.S.S.* method: Pull, Aim, Squeeze, Sweep. You will have the opportunity to practice using a portable fire extinguisher during the classroom session.

Assignment

Before the next session:

- Read and familiarize yourself with Chapter III: Disaster Medical Operations—Part I.

Assignment (Continued)

- Purchase the following items:

  - 1 box of 4 ″ 4 bandages
  - 1 triangular bandage
  - 1 roll of roller gauze
  - 1 medical mask
  - 1 pair of latex examination gloves

- Bring a blanket to the next session.

- Wear comfortable clothes, since you will be practicing medical techniques.

Additional Reading

The reference below is available if you would like to know more about the information in this chapter.

International Fire Service Training Association Manual, Fifth Edition. Oklahoma State University Fire Protection Publications, Stillwater, OK: 1981.

Chapter III

Disaster Medical Operations—Part 1

In this chapter you will learn about:

- **Life-threatening conditions:** How to recognize and treat airway obstruction, bleeding, and shock.
- **Triage:** Principles of triage and how to conduct triage evaluations.

Introduction

Most disasters are relatively unexpected, endanger lives and health, and overwhelm existing emergency resources. These elements lead to some basic assumptions about disaster medical operations:

- The number of victims will exceed local capacity for treatment.
- Survivors will assist others. They will do whatever they know how to do, although it cannot be assumed that most people know lifesaving first aid or post-disaster survival techniques.

The American College of Surgeons has described three phases of death due to trauma:

- *Phase 1.* Death within minutes due to overwhelming and irreversible damage to vital organs.
- *Phase 2.* Death within several hours due to excessive bleeding.
- *Phase 3.* Death in several days or weeks due to infection or multiple-system failure (i.e., not from the injury per se).

Experts agree that over 40 percent of disaster victims in the second and third phases of death could be saved by providing simple medical care. CERT disaster medical operations personnel are trained to provide treatment for life-threatening conditions—airway obstruction, bleeding, and shock—and treatment for other less urgent conditions. They are also trained to **provide the greatest good for the greatest number of victims** through principles of triage. Given the overwhelming nature of disasters, the CERT members' training in medical operations can play a critical role in disaster response.

Introduction
(Continued)

This chapter will introduce disaster medical operations and train you to:

- Recognize and treat life-threatening conditions (i.e., open the airway, control bleeding, treat for shock).
- Conduct triage evaluations.

Remember that the goal of disaster medical operations is to do the greatest good for the greatest number.
Your instructor may present additional information not covered in this Participant Handbook. Be sure to take notes during the classroom presentation of this material.

RESCUER SAFETY: Be sure to wear a helmet, goggles, mask, gloves, and boots for all medical operations.

Recognizing And Treating Life-Threatening Conditions

Introduction

In emergency medicine, airway obstruction, bleeding, and shock are "killers"—life-threatening conditions that can kill a patient if not treated immediately. The first priority of medical operations workers is to attend to these potential killers by:

- Restoring breathing.
- Controlling severe bleeding.
- Ensuring adequate circulation (treating for shock).

When working in a disaster with multiple casualties, the first goal is Simple Triage And Rapid Treatment (START).

This section will train you how to recognize the "killers" by recognizing their symptoms and their effects on body systems. It will also provide you with practice in providing immediate treatment to minimize disaster casualties.

Opening The Airway

An airway obstruction is anything that hinders or prevents the exchange of oxygen and carbon dioxide through the body's respiratory system. Through the respiratory system, we obtain oxygen by inhaling and rid ourselves of carbon dioxide by exhaling. Once in the lungs, oxygen is transferred to red blood cells and transported through the bloodstream to nourish our cells. The major components of the respiratory system are shown in Figure III-1.

Opening The Airway (Continued)

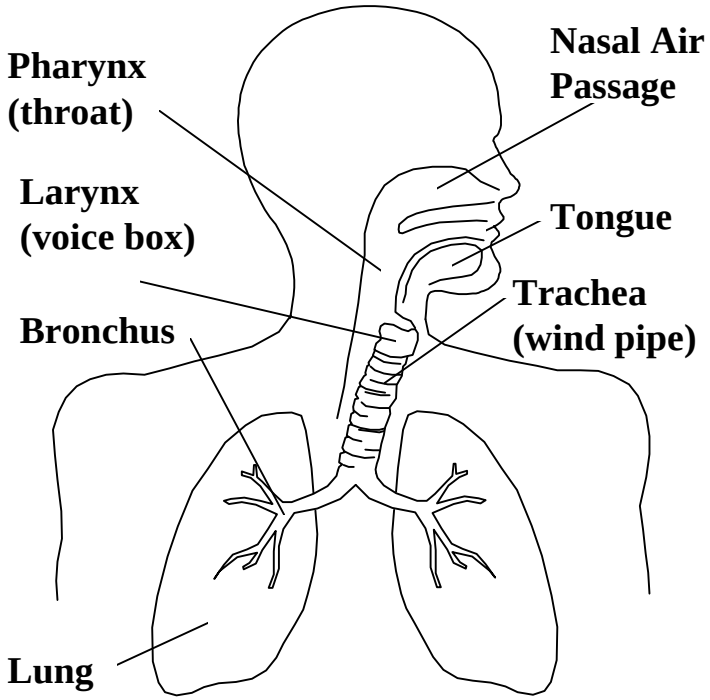


Figure III-1. Components Of The Respiratory System

An unconscious or semiconscious victim may have an obstructed airway. If the airway is obstructed, the victim cannot get oxygen, and the impact is felt very quickly in the heart and brain. A victim with suspected airway obstruction must be checked *immediately* for breathing, and if necessary, the airway must be opened.

Time is critical when dealing with airway obstructions. Heart function may be affected within the first few minutes and brain damage is possible after 4 minutes without oxygen.

Opening The Airway (Continued)

The most common airway obstruction is the tongue. In an unconscious victim, especially one positioned on his or her back, the tongue relaxes and may block the airway. This condition is shown in the figure below.

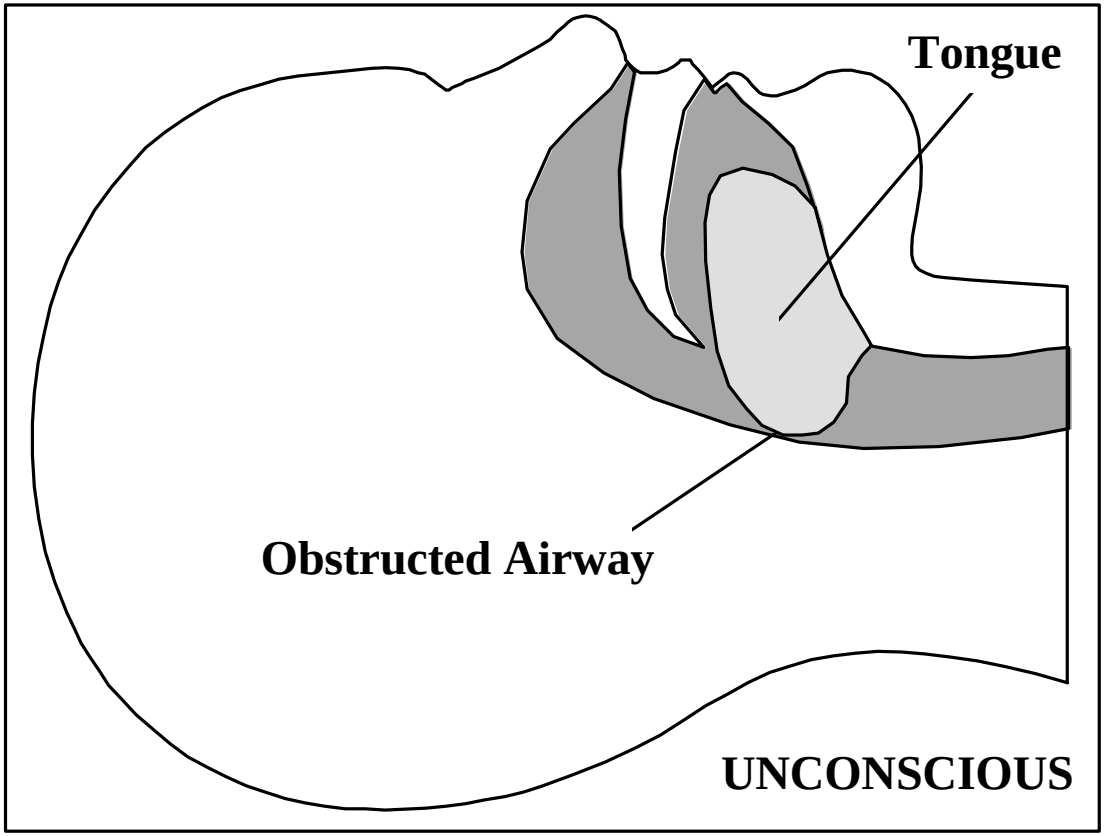


Figure III-2. Airway Obstructed By The Tongue

Opening The Airway (Continued)

When the victim is not breathing, use the Head-Tilt/Chin-Lift method of opening the airway. The Head-Tilt/Chin-Lift method involves following the six steps shown in the table below.

Step	*Action*
1	At an arm's distance, shake the victim by touching the shoulder and shout, "Can you hear me?"
2	If the victim does not or cannot respond, place one hand on the forehead.
3	Place two fingers of the other hand under the chin and tilt the jaw upward while tilting the head back slightly.
4	*Look* for chest rise.
5	*Listen* for air exchange.
6	*Feel* for abdominal movement.

Table III-1. Head-Tilt/Chin-Lift Method For Opening An Airway

If the victim does *not* start breathing using the Head-Tilt/Chin-Lift method, try the procedure one more time. If the victim does not respond the second time, move on to the next victim. Remember, the CERT team's mission is to do the greatest good for the greatest number of victims possible. Although it may be difficult to leave the victim, it is necessary to do so under disaster circumstances.

If the victim begins breathing, the airway must still be maintained. Try to get a volunteer to hold the head back to maintain the open airway, or place something (such as a shoe or soft object) under each of the victim's shoulders to slightly elevate the shoulders, which will keep the airway open.

Controlling Bleeding

Uncontrolled bleeding initially causes weakness. If bleeding is not controlled within a short period, the victim will go into shock (described in the next section), and finally die. The average adult has about 5 liters of blood. Because the loss of just 1 liter poses a risk of death, it is critical that excessive bleeding be controlled in the shortest amount of time possible.

There are three main types of bleeding. The type can usually be identified by how fast the blood flows.

- *Arterial Bleeding.* Arteries transport blood under high pressure. Therefore, bleeding from an artery is *spurting bleeding.*
- *Venous Bleeding.* Veins transport blood under low pressure. Bleeding from a vein is *flowing bleeding.*
- *Capillary Bleeding.* Capillaries also carry blood under low pressure. Bleeding from capillaries is *oozing bleeding.*

Use one or more of the procedures on page III-10 to control bleeding. If you cannot control the bleeding using one method, try another, or a combination of methods.

Controlling Bleeding *(Continued)*

Method	*Procedures*
Direct Local Pressure	☙ Place direct pressure over the wound by putting a clean pad over the wound and pressing firmly. ☙ Maintain compression by wrapping the wound firmly with a pressure bandage.
Elevation	☙ Elevate the wound above the level of the heart.
Pressure Points	☙ Put pressure on the nearest pressure point to slow the flow of blood to the wound. A pressure point is a pulse point for a major artery. Use the: - Brachial point for bleeding in the arm. - Femoral point for bleeding in the leg. (See the figures on the following page for illustrations of these pressure points.) There are other pressure points that your instructor may demonstrate.

Table III-2. Procedures For Controlling Bleeding

Ninety-five percent of bleeding can be controlled by direct pressure combined with elevation.

Controlling Bleeding *(Continued)*

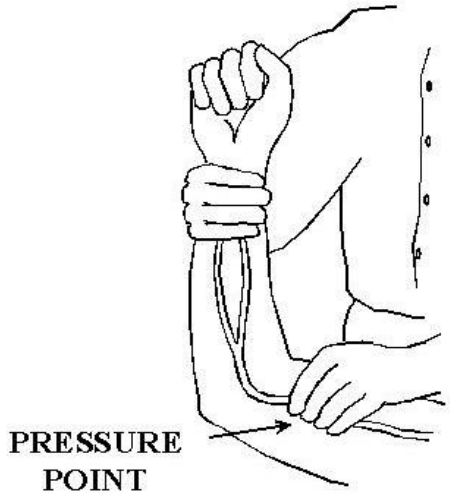


Figure III-3.
Brachial Pressure Point

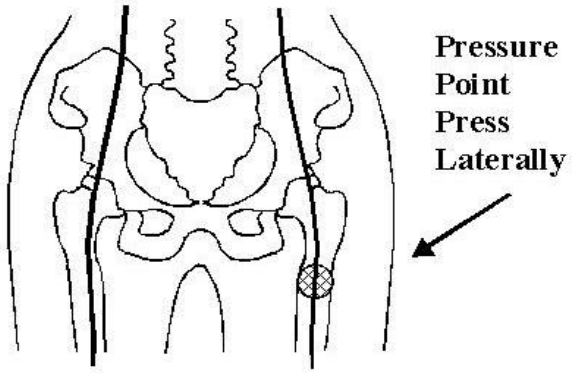


Figure III-4.
Femoral Pressure Point

Controlling Bleeding (Continued)

An illustration of the three main methods to control bleeding is shown in the figure below.

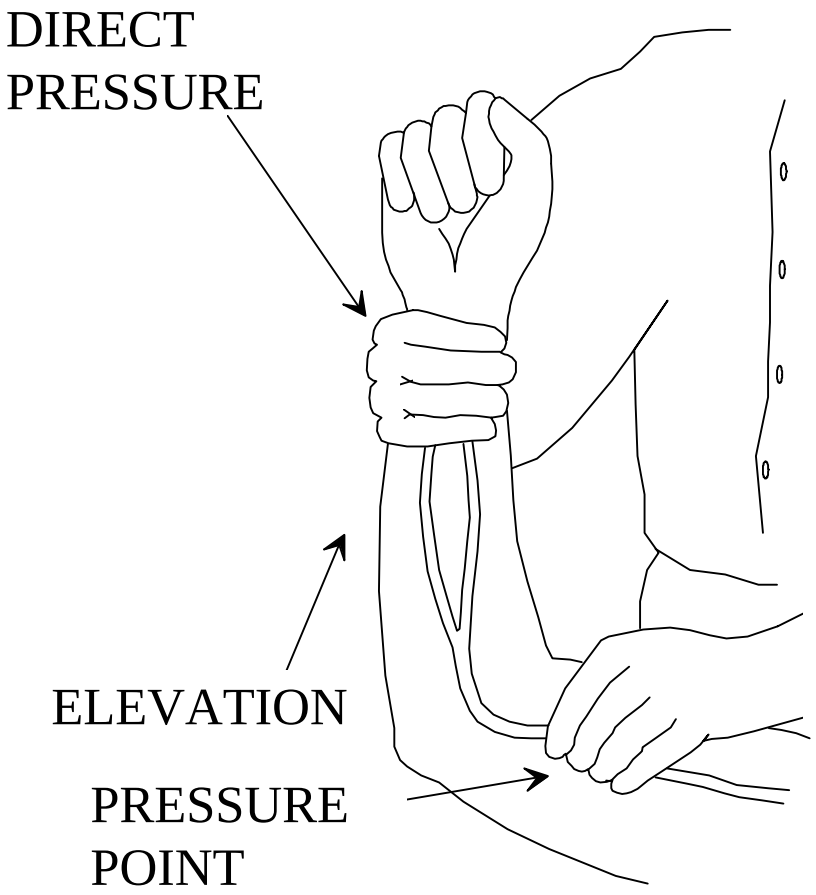


Figure III-5. Methods For Controlling Bleeding

Controlling Bleeding (Continued)

If none of the other methods for controlling bleeding is successful, a tourniquet may be necessary. A tourniquet is *rarely* required and should be used only as a *last resort*—a "life or limb" situation. Tourniquets are considered appropriate treatment for crushing-type injuries and for partial amputations. Using a tourniquet can pose serious risks to the affected limb, so it should not be used unless *not* using it will endanger the person's life from excessive blood loss. The most serious dangers in tourniquet use stem from:

- *Incorrect materials or application,* which increases the damage and bleeding. If narrow materials are used or the tourniquet is too tight, nerves, blood vessels, and muscles may be damaged.

- *Damage to the limb from a tourniquet.* Survival of a limb is almost never possible after a correctly applied tourniquet is left in place too long. Only a physician should remove a tourniquet. If you apply a tourniquet, leave it in plain sight (don't bandage over it), and attach an adhesive label to the victim's forehead stating the time the tourniquet was applied.

NOTE: Detailed information on dressing and bandaging is provided in Chapter IV.

Your instructor will demonstrate application of a tourniquet. Procedures for using a tourniquet are illustrated in Figure III-6 on the next page.

Controlling Bleeding *(Continued)*

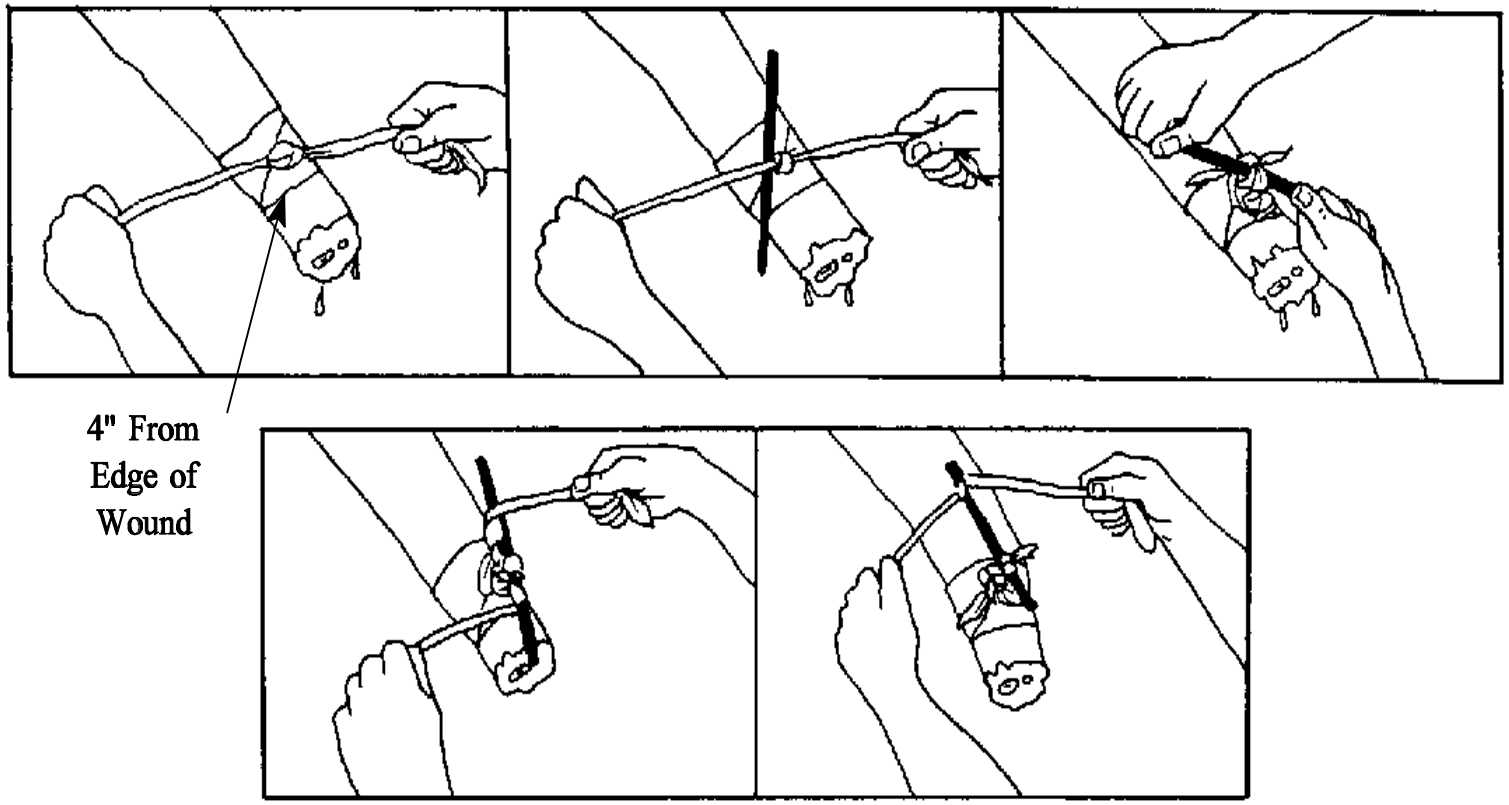


Figure III-6. Tourniquet

Recognizing And Treating For Shock

Shock is a disorder resulting from ineffective circulation of blood. Remaining in shock will lead to the death of cells, tissues, and entire organs.

Initially, the body will compensate for blood loss, so signs of shock may not appear immediately. It is important, therefore, to continually evaluate and monitor the victim's condition. Observable symptoms of shock to look for are:

- Rapid, shallow breathing (rate greater than 30 per minute).
- Cold, pale skin (capillary refill greater than 2 seconds).
- Failure to respond to simple commands, such as "Squeeze my hand."

To treat a person for shock, follow the steps in the table below.

Step	*Procedure*
1	Lay the victim on his or her back. Elevate the feet 6-10 inches. Maintain an open airway.
2	Control obvious bleeding.
3	Maintain body temperature (e.g., cover the ground and the victim with a blanket).
4	Avoid rough or excessive handling.

Table III-3. Procedures For Controlling Shock

Recognizing And Treating For Shock (Continued)

An illustration of correct shock position is shown in the figure below.

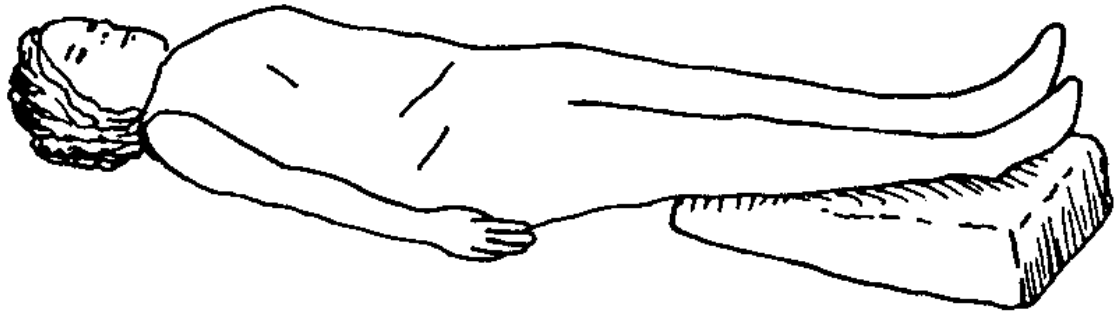


Figure III-7. Shock Position

Do *not* give a victim who is suffering from shock anything to eat or drink. People in shock may be nauseous and thirsty.

In a disaster scenario, you may have many victims requiring attention and few resources to use. The remainder of this chapter will address the triage system for analyzing victim condition and prioritizing treatment.

Triage

What Is Triage?

Triage is a French verb, meaning "to sort." Victims are evaluated, sorted by immediacy of treatment needed, and set up for immediate or delayed treatment. Military experience has shown that triage is an effective strategy in situations where rescuers are overwhelmed, there are limited resources, and time is a critical factor.

Triage occurs as quickly as possible after a victim is located or rescued. Triage personnel evaluate victims' conditions and sort them into three categories:

- *Immediate (I).* The victim has life-threatening (airway, bleeding, or shock) injuries that demand immediate attention to save his or her life; rapid treatment is imperative.
- *Delayed (D).* Injuries do not jeopardize the victim's life if definitive treatment is delayed. Victim may require professional care, but immediate treatment is not imperative.
- *Dead (DEAD).* No respiration after two attempts to open the airway. (CPR is not performed in the disaster environment because resuscitation of a person in full cardiorespiratory arrest takes a tremendous amount of time and human resources.)

> The goal of triage is to do the greatest good for the greatest number of victims.

What Is Triage? (Continued)

From triage, victims are taken to the designated medical treatment area (immediate care, delayed care, or morgue) and from there are transported out of the disaster area. The flow of patients is illustrated below.

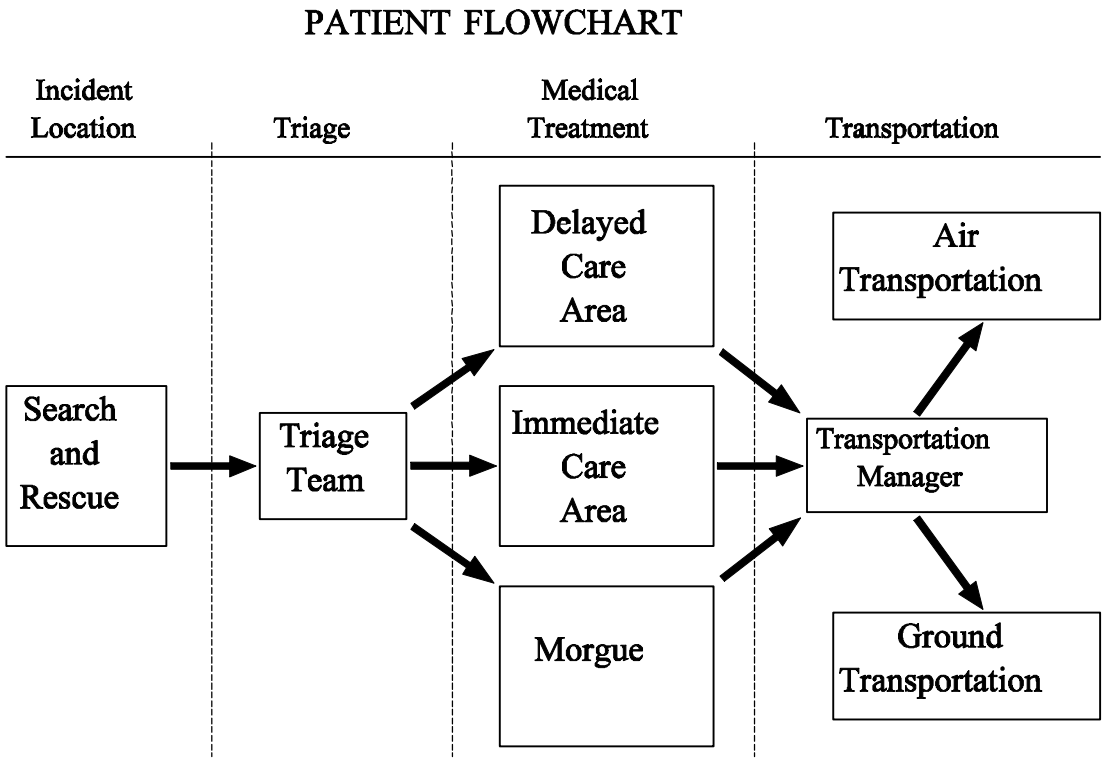


Figure III-8. Triage Patient Flow

Triage In A Disaster Environment

Triage, like other disaster response efforts, begins with size-up. The general procedure for triage in a disaster environment is as follows:

- *Stop, Look, Listen, and Think.* Before you start, stop and size up the situation by looking around you and listening. Above all, THINK about how you will approach the task at hand. Continue to size up the situation as you work.

- *Conduct Voice Triage.* Begin with voice triage, calling out something like, "Emergency Response Team. If you can walk, come to the sound of my voice." Instruct those survivors who are ambulatory to remain at a designated location, and continue with the triage operation.

- *Follow A Systematic Route.* Start with victims closest to you and work outward in a systematic fashion.

- *Conduct Triage Evaluation.* Evaluate victims and tag them **I** (immediate), **D** (delayed), or **DEAD**. Remember to evaluate the walking wounded. Everyone must get a tag.

- *Treat "I" Victims Immediately.* Initiate airway management, bleeding control, and/or treatment for shock for Category I (immediate) victims.

- *Document Results.* Document triage results for:

  - Effective deployment of resources.
  - Information on locations of victims.
  - A quick record of the number of casualties by degree of severity.

  This will be very useful information for responders and transportation units.

> Always wear protective gear when performing triage, so that you do not endanger your own health.

Performing A Triage Evaluation

Use the procedures below when performing triage.

Step	*Procedures*
1	Check airway/breathing. At an arm's distance, shake the victim and shout. If the victim does not respond: - Position the airway. - Look, listen, and feel. - Check breathing rate. Abnormally rapid respiration (above 30 per minute) indicates shock. Treat for shock and tag "I." - If below 30 per minute, them move to Step 2. - If the victim is not breathing after 2 attempts to open airway, then tag "DEAD."

2	Check circulation/bleeding:
	- Take immediate action to control severe bleeding.
	- Check circulation using the blanch test (for capillary refill).
	  - Press on an area of skin until normal skin color is gone. A good place to do this is on the palm of the hand. The forehead and nailbeds are sometimes used.
	  - Time how long it takes for normal color to return.
	- Treat for shock if normal color takes longer than 2 seconds to return, and tag "I."

3	Check mental status. Give a simple command, such as "Squeeze my hand." Inability to respond indicates that immediate treatment for shock is necessary. Treat for shock and tag "I."

Table III-4. Triage Procedure

If the victim passes all tests, then tag "D." If the victim fails one test, tag "I." Remember that everyone gets a tag.

Performing A Triage Evaluation *(Continued)*

The flowchart in Figure III-9 below illustrates the three triage steps and the decisions that you will be required to make during a triage evaluation.

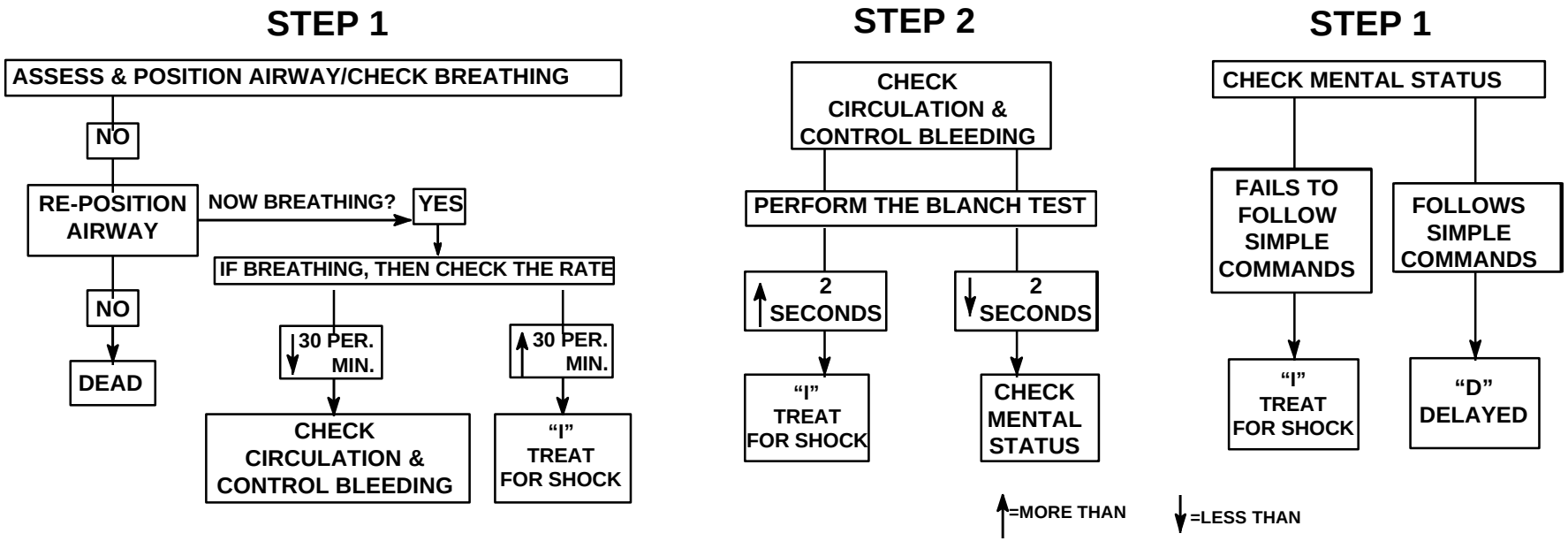


Figure III-9. Triage Decision Flowchart

Note: The blanch test (used in Step 2) is not valid in children. Check mental status as the main indicator.

Triage Planning

There are several common problems in triage operations that can be avoided through careful planning and preparation. These include:

- Inadequate medical size-up.
- No team plan/organization/goal.
- Indecisive leadership.
- Too much focus on one injury. (In a disaster, time is critical. You cannot spend very much time with any single victim.)
- Treatment (rather than triage) performed.

Remember, triage is a process that needs to be *practiced.* Practicing triage in disaster simulations as often as you can will help you avoid these pitfalls.

Summary

Introduction

CERT members' abilities to restore breathing, control severe bleeding, and treat for shock are critical to saving lives in the aftermath of a disaster.

Airway Obstructions

Time is critical when treating a victim who has an airway obstruction. The tongue is the most frequent obstruction. Breathing may be restored using the Head-Tilt/Chin-Lift method. Once a victim's breathing has been restored, take steps to keep the airway open.

Excessive Bleeding

There are three types of bleeding that can be identified by the flow of blood:

- Arterial bleeding results in spurting blood.
- Venous bleeding results in excessive blood flow.
- Capillary bleeding causes oozing.

You can use one or more of the following methods to control bleeding:

- Placing pressure directly over the wound.
- Elevating the wound above the level of the heart.
- Putting pressure on the nearest pressure point to slow the flow of blood.

***Excessive Bleeding** (Continued)*

In extreme cases, a tourniquet can be used. A tourniquet should be a last resort. It is only used in a life-or-limb situation where other methods have not controlled the bleeding.

Shock

Shock has symptoms that are readily observable. Shock requires immediate treatment, or death can result. To treat for shock:

- Lay the victim on his or her back. Elevate the feet 6-10 inches. Maintain an open airway.
- Control obvious bleeding.
- Maintain the body temperature.
- Avoid rough or excessive handling.

Never give a victim who is suffering from shock anything to eat or drink.

Triage

Triage is a system of rapidly evaluating victims and prioritizing treatment according to three categories:

- Immediate
- Delayed
- Dead

Triage *(Continued)*

The procedure for performing triage involves:

- Checking the airway and breathing rate.
- Checking circulation and controlling severe bleeding.
- Checking mental status.

Triage operations require careful planning and practice. Practicing triage in exercise situations can help avoid problems during an actual emergency.

Assignment

Before the next session:

- Read and familiarize yourself with Chapter IV: Disaster Medical Operations—Part 2.

Bring the following materials to the next session:

- Blanket
- 1 box of roller gauze
- 1 roll of adhesive tape (- or 1-inch)
- 2 pieces of cardboard (approximately 4 inches 12 inches)

Additional Reading

The references below are available if you would like to know more about the information in this chapter.

California Specialized Training Institute. Disaster Medical Operations. Sacramento, CA: Office Of The State Fire Marshal, 1987.

Grant, Murry Jr., Bergeron, Brady. Brady Emergency Care, Fifth Edition. Prentice Hall, Englewood Cliffs, NJ: 1990.

Heckman, James D. (Ed.). Emergency Care And Transportation Of The Sick And Injured, Fifth Edition. American Association of Orthopaedic Surgeons, Park Ridge, IL: 1988.

Reader's Digest Action Guide: What To Do In An Emergency. Pleasantville, NY: 1988.

U.S. Department Of Mine Safety. First Aid. U.S. Government Printing Office, Washington, DC: 1986.

U.S. Department Of The Navy. Self-Care/Buddy-Care. U.S. Government Printing Office, Washington DC: 1988.

The American Red Cross also provides resources on this subject. Contact your local chapter for information.

Chapter IV

Disaster Medical Operations—Part 2

In this chapter you will learn about:

- **Patient evaluation:** How to perform a head-to-toe patient evaluation in order to identify and treat injuries.
- **Disaster medical treatment areas:** How to establish them and what their functions are.
- **Basic first aid treatment:** How to:
  - Treat burns.
  - Dress and bandage wounds.
  - Treat fractures, sprains, and strains.
  - Apply splints to hands, arms, and legs.
  - Treat hypothermia and frostbite.
- **Public health considerations:** Public health concerns related to sanitation, hygiene, and water purification.

Introduction

Overview

Chapter III described triage—the evaluation and prioritizing of patients into treatment groups and the provision of immediate life-saving measures. From triage, live patients are transported to the immediate and delayed treatment areas as needed, and the dead are transported to the morgue. As patients are brought to the treatment areas, medical operations personnel:

- Perform additional triage as needed.
- Give patients a thorough head-to-toe assessment to determine the extent of injuries.
- Render all possible first aid until professional care can be obtained.
- Take appropriate sanitation measures.

This chapter will introduce disaster medical operations and describe the factors involved in establishing treatment areas. It will also present the processes to follow for completing a head-to-toe assessment and train you to provide immediate treatment for:

- Burns.
- Open wounds.
- Fractures, sprains, and strains.
- Hypothermia.
- Frostbite.

Overview (Continued)

This chapter will also describe public health considerations surrounding disaster medical operations and provide basic information that you will need to prepare for medical operations in a disaster. Your instructor may present additional information during the classroom session. Be sure to take careful notes.

Organization Of Disaster Medical Operations

Within medical operations, there are five major subfunctions:

- Triage
- Transport
- Treatment
- Morgue
- Supply

These functions are shown in the figure on the next page.

Organization Of Disaster Medical Operations *(Continued)*

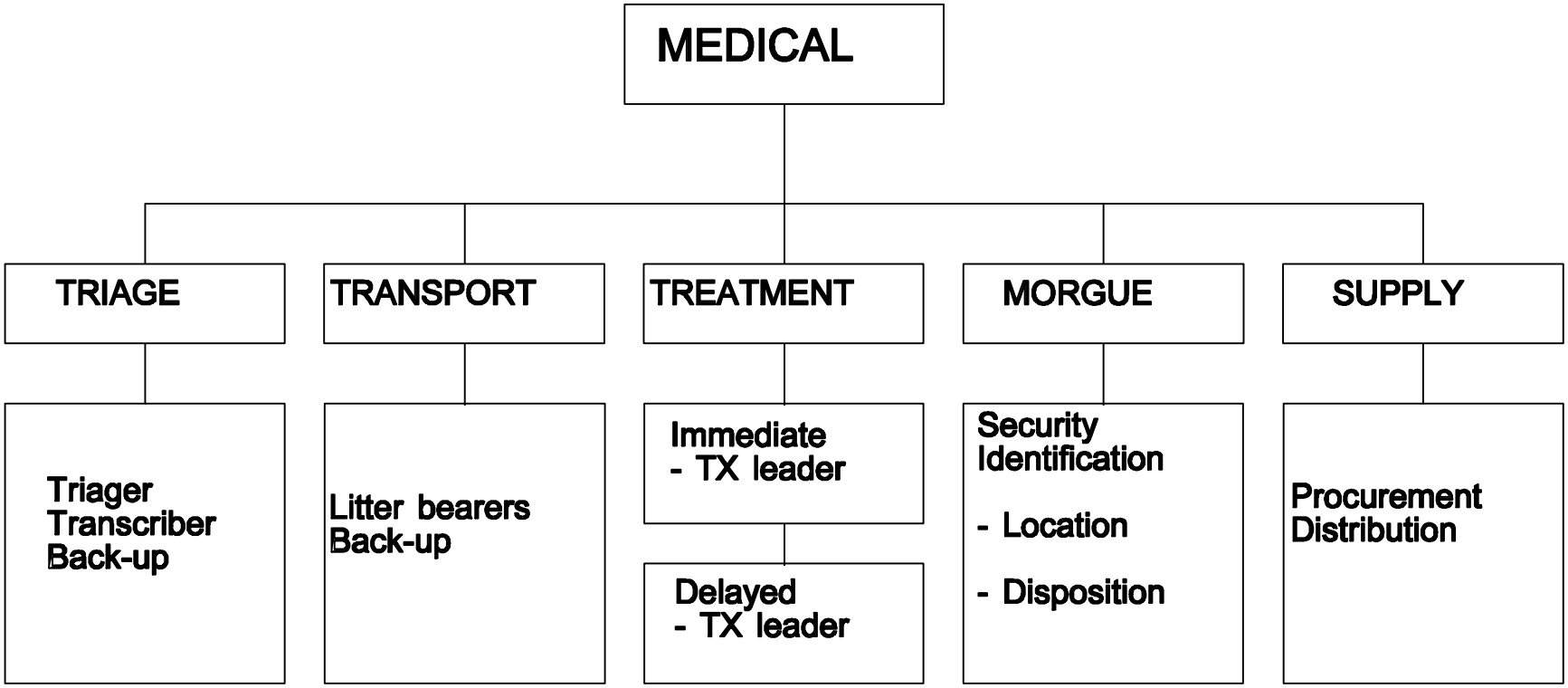


Figure IV-1. Disaster Medical Operations Organization

Major Causes Of Injury

Injury, or *trauma*, can result from the body being hit by flying debris or collapsing building materials, being thrown against an object, or falling onto a surface. The energy of impact may cause damage to soft tissues, bones, organs, and other body structures.

Injuries may include the following:

- *Penetrating injury* (an injury that breaks the skin at a small point of contact). Penetrating injuries include lacerations (open wounds) and impaled objects.
- *Blunt trauma* (damage to deeper tissues by impact over a larger area). Blunt trauma can cause internal bleeding, organ rupture, bruising, fractures, brain injury, and other injuries.
- *Crushing injury* (force applied to the body over a relatively long period of time).

As a worker in disaster medical operations, you may give first aid to victims with a wide range of injuries.

Conducting Head-To-Toe Assessments

Objective

Among the first steps when a patient is receiving medical treatment is to conduct a triage for airway, bleeding, and shock. Then do a size-up—that is, conduct a thorough head-to-toe assessment. This can be done in place in a lightly damaged building. If the building is more heavily damaged, the victim should be moved to a safe zone for the head-to-toe assessment. The objectives of this assessment are to determine, as clearly as possible, the extent of injuries and the type of treatment that is needed, and to document the injuries.

This section will provide you with the basic information you need to conduct head-to-toe assessments under emergency conditions.

Assessment Procedures

Head-to-toe assessments must be performed for all victims, even those that are awake. Assessments should be both *verbal* (if the patient is able to speak) and *hands-on.* Whenever possible, ask the person about any injuries, pain, bleeding, or other symptoms that he or she is aware of. If the victim is conscious, ask permission to conduct the assessment. Pay careful attention. Look, listen, and feel for anything unusual.

> All rescuers in medical operations must wear a helmet, goggles, mask, latex gloves, and boots.

Assessment Procedures *(Continued)*

When conducting triage during a disaster, it is essential to document the number of victims in each category of triage (immediate, delayed, and dead) and where these victims are located in the treatment area. See the figure below for an example of this kind of documentation. Such a record can be given to professional responders when they arrive so that no time is lost getting immediate care to those who need it.

STATUS	LOCATION			
	A	B	C	D
I	|	|||	Ø	|
D	Ø	||	𝍸	|||
Dead	|||	𝍸||	|	Ø

Figure IV-2. Sample Triage Documentation

What To Check

Perform the assessment systematically (always in the same order), checking body parts from the top to the bottom. Always assess the victim by examining the:

1. Head
2. Neck
3. Shoulders
4. Chest
5. Arms
6. Abdomen
7. Pelvis
8. Legs
9. Back

Completing your assessment in the same way every time will allow you to complete your assessment more quickly and accurately. Always perform an entire assessment before beginning any treatment. Treat victims as if they have a spinal injury until you are certain they do not.

What To Look For

As you conduct your assessment, look for anything that might indicate an injury. The most common injuries include lacerations, fractures, and bruises, but anything out of the ordinary might indicate an injury. Look especially for:

- How the person may have gotten hurt (the mechanism of injury), to help determine injuries.
- Signs of shock.
- Airway obstructions.
- Labored, shallow, or otherwise difficult breathing.

What To Look For (Continued)

- Excessive bleeding.
- Bruising.
- Swelling.
- Severe pain.
- Disfigurement.

Be sure to check your own hands during the assessment for any signs of patient bleeding.

Once you have completed your assessment, *provide immediate treatment* for victims tagged "I." During treatment, reclassify victims if necessary. Also, as you record medical information, try to document who the person is.

> Complete your head-to-toe assessment. Do not become fixed on one injury.

Closed Head, Neck, And Spinal Injuries

If, during a head-to-toe assessment, you encounter a victim with a suspected closed head, neck, or spinal injury, your main objective is to *do no harm*. Minimize movement of the head and spine, while treating any other life-threatening conditions (airway, bleeding, or shock).

Injuries to the head, neck, and spine often occur when victims fall, are hit by flying debris, or have objects fall on them—situations that are common when there is structural collapse. Closed head, neck, and spinal injuries may be life-threatening. They can also cause paralysis, affect speech and memory, and disable the victim in other ways. Any time a head, neck, or spinal injury is even suspected, it should be treated as a head, neck, or spine injury. Talk to the victim to determine symptoms, and to keep the victim calm and still. All unconscious trauma patients should be suspected as having a head, neck, or spinal injury.

Symptoms

If the rescuer is not in immediate danger, check the victim for signs of injury to the head, neck, or spine before moving the victim. The main signs of closed head, neck, or spinal injury are:

- Change in consciousness: unconscious, dizzy, or confused
- Inability to move one or more body parts
- Severe pain or pressure in head, neck, or back
- Tingling or numbness in extremities
- Difficulty breathing or seeing
- Heavy bleeding, bruising, or deformity (e.g., bump or depression) of head or spine
- Blood/fluid in nose or ears
- Bruising behind the ears
- "Raccoon" eyes (bruising around eyes)
- Seizures
- Nausea, vomiting
- Victim found under collapsed building material or heavy debris

Stabilizing Head, Neck, Or Spinal Injuries

The process for immobilizing head, neck, or spinal injuries is called in-line stabilization. In-line stabilization means to *keep the spine in a straight line*. Ideally, this is done by carefully fitting a cervical collar on the victim's neck, placing the victim on a back board, and securing the victim so movement is impossible. However, in a disaster situation, ideal equipment and materials are seldom available. Spinal immobilization devices are not intended to be used for lifting or carrying.

Stabilizing Head, Neck, Or Spinal Injuries (Continued)

Head, neck, and spine treatment under emergency conditions may require creativity and will most likely involve:

- *Looking for materials that can be used as a backboard.* For example, a door, table, desktop, or building materials such as sheetrock or lumber can be used as a backboard when necessary.

- *Looking for items that can be used to stabilize the head on the board.* A towel, blanket, clothing, drapery material, or sandbags tucked snugly on either side of the head will immobilize it in an emergency.

Your instructor will demonstrate in-line stabilization during class. Whenever possible, defer closed head, neck, and spinal injuries to trained emergency medical personnel. Remember the goal when you suspect such injuries: *do no harm*.

> When moving victims, use teamwork, communication, proper lifting technique, and in-line stabilization.

The next sections of this chapter will provide you with the information you will need to establish a treatment area, provide treatment, and make the patient more comfortable (through splinting, applying dressings, or providing other treatment). You will also have the opportunity to practice some of the most common treatment techniques during class.

Establishing Treatment Areas

Because time is critical after a disaster, CERT medical operations personnel will need to select a site and set up a treatment area as soon as casualties are confirmed. The treatment area is the location where the most advanced medical care possible will be given to victims. The site selected should be:

- In a safe area, free of hazards and debris.
- Close to, but upwind and uphill from, the hazard zone(s).
- Accessible by transportation vehicles, such as ambulances, trucks, and helicopters.
- Able to grow.

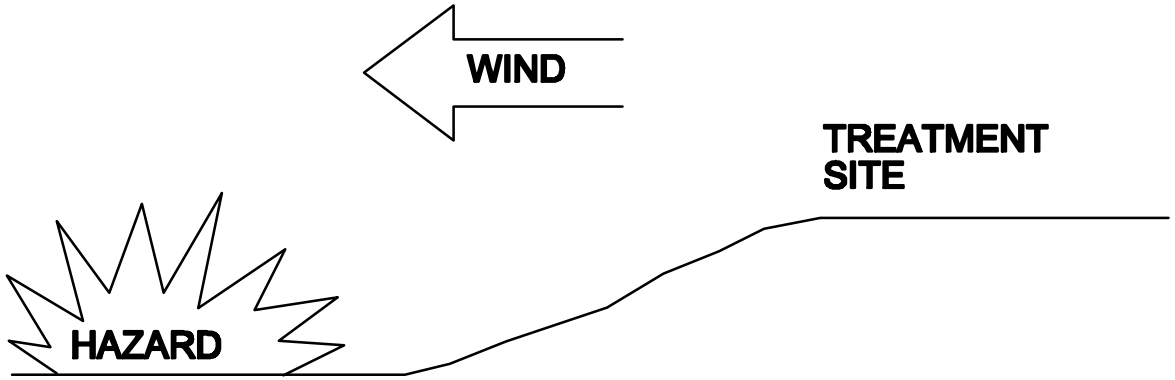


Figure IV-3. Treatment Area Site Selection

Treatment Area Layout

The treatment area must be protected and clearly delineated using a ground cover or tarp, and signs should identify the subdivisions of the area: "I" for Immediate care, "D" for Delayed care, "DEAD" for the morgue.

The "I" and "D" divisions should be relatively close to each other, to allow:

- Verbal communication between workers in the two areas.
- Shared access to medical supplies (which should be cached in a central location).
- Easy transfer of patients whose status has changed.

The morgue site should be secure, and away from and not visible from the medical treatment areas.

Patients in the treatment area should be positioned in a head-to-toe configuration, with two to three feet between victims. This system will provide effective use of space, and effective use of available personnel. (As a worker finishes one head-to-toe assessment, he or she turns around and finds the head of the next patient.)

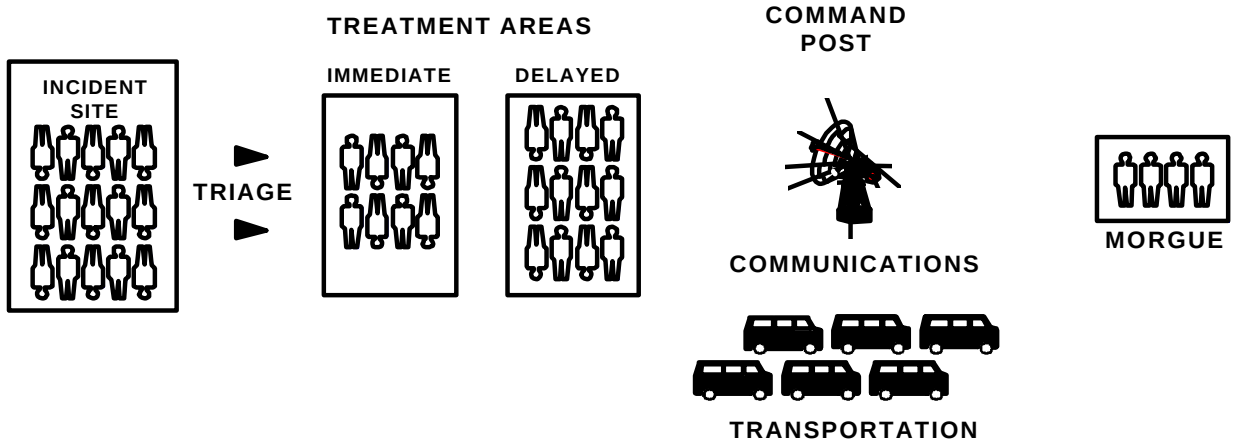


Figure IV-4. Treatment Area Layout

Treatment Area Organization

The CERT team must assign division leaders to maintain control in each of the medical treatment areas. Among the tasks of these division leaders will be ensuring orderly victim placement, and directing assistants to conduct head-to-toe assessments.

Thorough documentation of victims in the treatment area is essential. Documentation should include:

- Available identifying information.
- Description (age, sex, body build, height, weight).
- Clothing.
- Injuries.
- Treatment.
- Transfer location.

Treatment Area Planning

Clearly, advance planning for how treatment areas will be established is crucial. Before disaster strikes, team members should consider:

- Roles of personnel assigned to the treatment area.
- The availability of setup equipment, such as ground covers/tarps and signs for identifying divisions (immediate, delayed, morgue).

Treating Burns

The objectives of first aid treatment for burns are to stop the burning and cover to reduce pain and infection.

Burns may be caused by heat, chemicals, electrical current, and radiation. The severity of a burn depends on many factors the temperature of the burning agent, the period of time that the victim was exposed, the area of the body that is burned, how much area is affected, the age of the victim, and the burn depth.

Burn Classifications

The skin contains three layers:

- *Epidermis.* The outer layer of the skin. The epidermis contains nerve endings and is penetrated by hairs.
- *Dermis.* The middle layer of skin. The dermis contains blood vessels, oil glands, hair follicles, and sweat glands.
- *Subcutaneous layer.* The innermost layer of skin. The subcutaneous layer contains blood vessels and overlies the muscle and skin cells.

Depending on the severity, burns may affect all three layers of skin.

The critical areas of the body for burns are the:

- Face
- Hands
- Feet
- Genitalia

Burn Classifications *(Continued)*

Burns are classified as first-, second-, or third-degree depending on their severity. Burn classifications, the skin layers affected, and signs are shown in the table below.

Classification	***Skin Layers Affected***	***Signs***
1st Degree	✍ Epidermis (superficial)	✍ Reddened, dry skin ✍ Pain ✍ Swelling (possible)
2nd Degree	✍ Epidermis ✍ Partial destruction of dermis	✍ Reddened, blistered skin ✍ Wet appearance ✍ Pain ✍ Swelling (possible)
3rd Degree (Full Thickness Burns)	✍ Complete destruction of epidermis and dermis ✍ Possible subcutaneous damage (destroys all layers of skin and some or all underlying structures)	✍ Whitened, leathery, and charred (brown or black) ✍ Painful or relatively painless

Table IV-1. Burn Classifications

Burn Treatment

First aid treatment for burn victims involves removing the source of the burn, cooling the burn, and covering it. Guidelines for treating burns include:

- Remove the victim from the burn source. Put out any flames and remove smoldering clothing.
- If skin or clothing is still hot, cool them by immersing in cool water for not longer than 1 minute or covering with clean compresses that have been wrung out in cool water. Possible cooling sources include water from the bathroom or kitchen; garden hose; and soaked towels, sheets, or other cloths. Use clean water. For third-degree burns, do not apply water except to put out flames. Treat all victims of third-degree burns for shock.
- Cover loosely with dry, sterile dressings to keep air out, reduce pain, and prevent infection.
- Elevate burned extremities higher than the heart.

When treating burns:

- Do not use ice, which can cause hypothermia.
- Do not apply antiseptics, ointments, or other remedies.
- Do not remove shreds of tissue, break blisters, or remove adhered particles of clothing. (Cut burned-in clothing around the burn.)

With younger people, older people, and people with severe burns, use caution when applying cool dressings. These people are susceptible to hypothermia. A rule of thumb is do not cool more than fifteen percent of body surface area (the size of one arm) at once, to prevent hypothermia.

Wound Care

The objectives of first aid treatment for wounds are to control bleeding and prevent secondary infection. Methods for controlling bleeding were described in Chapter III of this Participant Handbook. Cleaning and bandaging help to prevent infection.

Clean the wound by irrigating with water, flushing with a mild concentration of soap and water, then irrigating with water again. *Do not scrub.* A bulb syringe or hypodermic syringe is useful for irrigating wounds.

After thoroughly cleaning the wound, you will need to apply a dressing and bandage to help to keep the wound clean.

A *dressing* is applied directly to the wound. A *bandage* is used to hold the dressing in place.

To dress and bandage the wound, clean the wound area as described above, place a sterile dressing directly over the wound, and apply a bandage to hold it in place. If the wound is still bleeding, the bandage should place enough pressure on the wound to help control bleeding without interfering with circulation. Check for color, warmth, and sensation to determine if the bandage is too tight. If capillary refill is slow, loosen the dressing.

Your instructor will demonstrate how to apply dressings and bandages.

Use the following rules for dressings and bandages:

- In the absence of active bleeding, dressings must be removed and the wound flushed and checked for signs of infection at least every 4 to 6 hours. Signs of possible infection include:
  - Swelling around the wound site.
  - Discoloration.
  - Discharge (pus) from the wound.
  - Red striations from the wound site.

- If there is active bleeding (the dressing is soaked with blood), redress over the existing dressing and maintain pressure and elevation.

Amputations

In an emergency situation, an amputation is the traumatic severing of a limb or other body part. To treat the victim, control bleeding, watch for signs of shock, and treat for shock as necessary.

If a part of the body is severed and can be found, save tissue parts, wrapped in clean material, in a plastic bag if available, and keep the tissue parts cool. Keep the severed part with the victim.

Impaled Objects

You may encounter some victims who have foreign objects lodged in their bodies—usually as the result of flying debris during the disaster event. When a foreign object is impaled in a patient's body:

- Immobilize the affected body part.
- Do *not* attempt to move or remove the object unless the object is occluding the airway.
- Try to control bleeding at the entrance wound without placing undue pressure on the foreign object.
- Clean and dress the wound. Wrap bulky dressings around the object to keep it from moving.

Treating Fractures, Sprains, And Strains

The objective when treating a suspected fracture, sprain, or strain is to immobilize the injury and the joints immediately above and immediately below the injury site.

Because there are several different types of injuries, however, and your actions depend in part on the type of injury encountered, this section will describe the different types of injuries possible next.

Fractures

A fracture is a complete break, a chip, or a crack in a bone. Fractures are classified as:

- *Closed.* A broken bone with no associated wound. First aid treatment for a closed fracture may require only splinting.

- *Open.* A broken bone with some kind of wound that allows contaminants to enter into or around the fracture site. Open fractures are more dangerous because of the risk of severe bleeding and infection. They are, therefore, a higher priority injury and should be checked more frequently. When treating an open fracture:

  - Do *not* draw the exposed bone ends back into the tissue.
  - Cover the wound with a sterile dressing. Do not irrigate the wound.
  - Cover the exposed bone with a moist 4 x 4 bandage to keep it from drying out.
  - Splint the fracture without disturbing the wound.

Fractures *(Continued)*

Examples of open and closed fractures are shown in Figures IV-5 and IV-6.

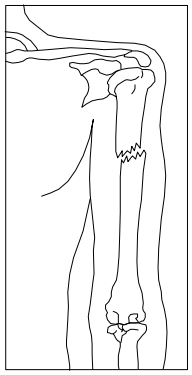


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Figure IV-5. Closed Fracture

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Figure IV-6. Open Fracture

Closed fractures may be described by the degree of displacement of the bone fragments. If the limb is angled, then there is a *displaced fracture*. A displaced fracture may be detected by seeing and feeling the deformity. A *nondisplaced fracture* is difficult to identify without x-rays. The main indicators are usually pain and swelling, which could also indicate a strain or sprain. Therefore, treat areas where there is pain and swelling as a suspected fracture until professional diagnosis and care can be obtained.

Fractures *(Continued)*

Examples of displaced and nondisplaced fractures are shown in Figures IV-7 and IV-8.

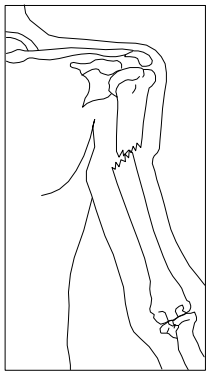

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Figure IV-7. Displaced Fracture

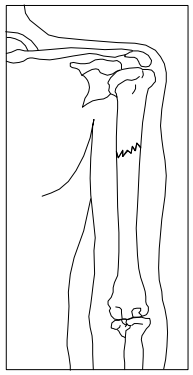

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Figure IV-8. Nondisplaced Fracture

Dislocations

Another common injury in emergency situations is a dislocation. A dislocation is an injury to the ligaments around a joint that is so severe that it results in separation of the bone from its normal position at a joint. Once dislocated, the bones lock in their new position. The joints most commonly dislocated are fingers, shoulders, elbows, hips, and ankles. The signs of a dislocation are similar to those of a fracture, so treat a suspected dislocation like a fracture.

When a dislocation is a possibility, do *not* attempt to relocate the joint. Immobilize the joint until it can be treated by trained medical staff.

Sprains And Strains

A *sprain* is the stretching or tearing of ligaments at a joint and is usually caused by stretching or extending the joint beyond its normal range of motion. A sprain is considered a partial dislocation, although (unlike a full dislocation) the bone is able to fall back into place after the injury. The joints most easily sprained are the ankle, knee, wrist, and fingers. Common symptoms of sprains include:

- Tenderness at the site of the injury.
- Swelling and/or bruising.
- Restricted use, or loss of use of the joint.

Because the signs of a sprain are similar to those of a nondisplaced fracture, do *not* attempt to treat the injury beyond immobilization and elevation.

A *strain* is the stretching and tearing of muscles or tendons. Strains most often involve the muscles in the neck, back, thigh, or calf. In some cases, a strain is indistinguishable from a sprain or fracture without x-rays or other, more sophisticated diagnostic methods. In these cases, treat the injury as a fracture.

> **CAUTION:** Remove shoes, tight clothing, and jewelry from an injured area to prevent these items from acting as a tourniquet if swelling occurs.

Nasal Injuries

Bleeding from the nose may be caused by:

- Facial injuries (blunt force to the nose).
- Skull fracture.
- Non-trauma-related conditions such as sinus infections, high blood pressure, and bleeding disorders.

A large blood loss from a nosebleed can lead to shock. The actual blood loss may not be evident because some blood goes down the throat and is swallowed. A victim who swallows a lot of blood may become nauseated and vomit. Vomitus that is inhaled into the lungs will result in serious complications.

To control nosebleeds caused by injuries to the nose:

- Control bleeding by:
  - Pinching the nostrils together.
  - Putting pressure on the upper lip just under the nose (e.g., place rolled gauze between the upper lip and gum and press against it with the fingers).
- Have the victim sit with the head slightly forward so that blood trickling down the throat will not be breathed into the lungs. Do *not* put the head back.
- Be sure the victim's airway remains open.
- Keep the victim quiet. Anxiety will increase blood flow.

Splinting

Splinting is the most common method for immobilization in emergency conditions. A variety of materials may be used for first aid splinting. Typically, cardboard is used until professional care can be obtained. (See Figure IV-9 on the following page.) However, other materials that may be available can also be used, including:

- *Soft Materials.* A towel can be rolled into a thick tube shape, placed around the injury, and secured in several places with bandaging materials or cloth strips. (See Figure IV-10 on page IV-28.) A blanket can be used in the same way. A pillow can be wrapped around an injured limb and secured in several places with bandaging materials or cloth strips. (See Figure IV-11 on page IV-28.)

- *Rigid Materials.* A board, metal strip, folded magazine or newspaper, or other rigid item may be used to support the injured part and secured with bandaging materials or strips of cloth. (See Figure IV-12 on page IV-29.)

- *Anatomical Splint.* A fractured bone can be secured to an adjacent unfractured bone by binding the two together in several places (for example, two fingers or two legs).

Your instructor will demonstrate proper techniques for splinting hands and fingers, the humerus (upper arm), and the tibia or fibula (lower leg).

Guidelines for placing and checking splints include:

- Support the injured area above and below the site of the injury, including the joints.

- If possible, splint the injury in the position you find it.

- Don’t try to realign bones or joints.

- After splinting, check for proper circulation (warmth, feeling, color).

Splinting
(Continued)

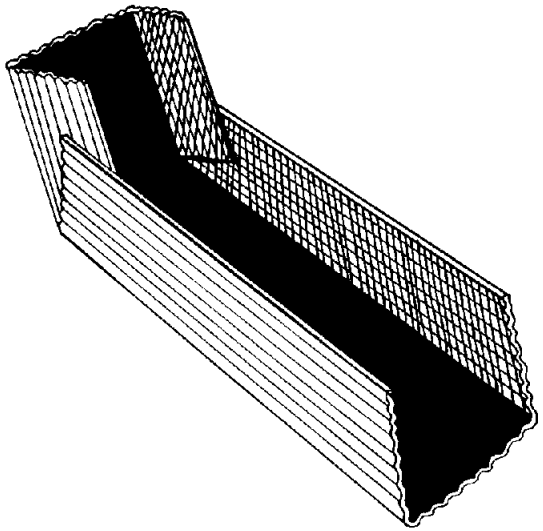


Figure IV-9. Cardboard Splint

Splinting
(Continued)

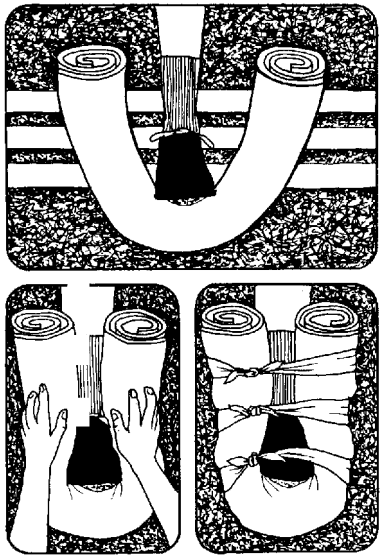


Figure IV-10. Splinting Using A Towel

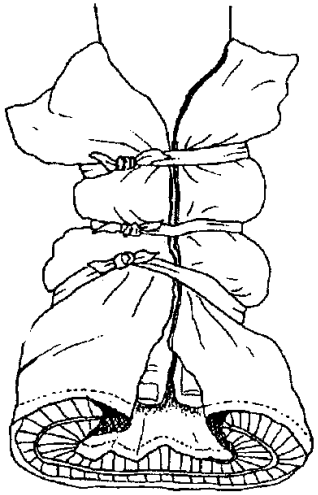


Figure IV-11. Splinting Using A Pillow

Splinting
(Continued)

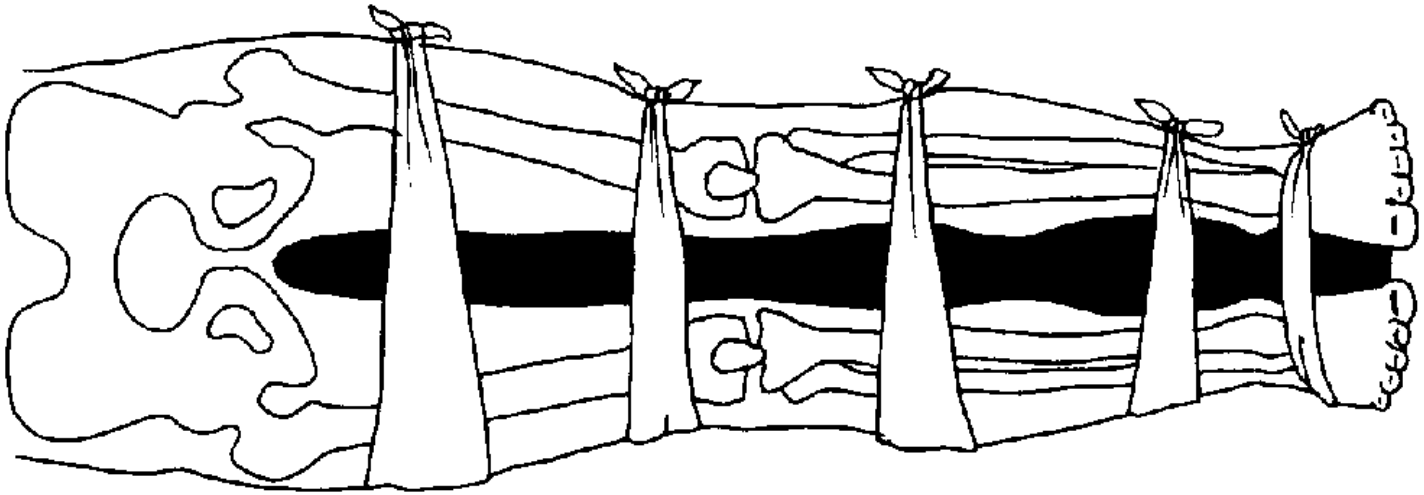


Figure IV-12. Splinting Using A Board

NOTE: Fill in gaps between limbs with soft materials.

Treating Hypothermia

Hypothermia is a condition that occurs when the body temperature drops below normal. Hypothermia may be brought on by exposure to cold air or water or, especially in older people, inadequate food combined with inadequate clothing and/or heat. The primary signs and symptoms of hypothermia are:

- A body temperature of 95° Fahrenheit (37° Celsius) or less.
- Redness or blueness of the skin.
- Numbness accompanied by shivering.

In later stages, hypothermia will be accompanied by slurred speech, unpredictable behavior, and/or listlessness.

Because hypothermia can set in within only a few minutes, victims who have been rescued from cold air or water environments should always be treated for hypothermia. To treat for hypothermia:

- Remove wet clothing, and wrap the victim in a blanket or sleeping bag covering the head and neck.
- Protect the victim against the weather.
- If the victim is conscious, provide warm, sweet drinks and food. Do *not* offer alcohol or massage.
- If the victim is unconscious, place him or her in the recovery position.
- When possible and only when the victim is conscious, place the victim in a warm bath. Do not rewarm the victim too quickly.

Even when he or she appears to be fully recovered, do not allow the victim to walk around. Do not move the victim outdoors without covering the victim's head and face.

Treating Frostbite

Frostbite is caused by a constriction of the blood vessels in the extremities as the body acts to maintain warmth to the vital organs. Victims who have been exposed to freezing or below-freezing weather may experience frostbite on exposed areas of skin, and on the extremities even when they are covered. The main symptoms of frostbite include:

- Coldness, stiffness, and a "prickly" sensation. (As the area becomes numb, all sensation will disappear.)
- Hardness of the skin.
- Bluish-white discoloration of the affected areas.

To treat victims for frostbite:

- Transport the victim to shelter as soon as possible.
- Remove clothing and jewelry from the affected areas.
- Warm the frostbitten areas with skin-to-skin contact. Do *not* warm the area by placing the victim in front of a heat source. Do *not* massage the affected areas.
- When warmth returns to the affected area, it may develop small blood blisters. Do *not* break the blisters.
- If the frostbitten area is an extremity, elevate it above the level of the chest to reduce pain and swelling.

Public Health Considerations

Introduction

When disaster victims are sheltered together for treatment, public health becomes a concern. Measures must be taken, both by individual medical workers and on a programmatic basis, to avoid the spread of disease through proper hygiene, sanitation, and water purification. Minimizing the spread of disease in the medical operation involves:

- Maintaining proper hygiene.
- Maintaining proper sanitation.
- Purifying water.

Your instructor may add to the guidance suggested in this section. If so, be sure to take careful notes.

Maintaining Hygiene

Maintenance of proper hygiene is critical even under the makeshift conditions encountered in a disaster. Careful attention must be paid to hygiene throughout both triage and treatment to avoid contamination, minimize the risk of infection, and minimize the risk of spreading disease. Some steps that are central to maintaining hygiene include:

- Washing hands frequently with soap and water.
- Wearing latex gloves at all times.
- Changing gloves after examining and/or treating each patient. Under extreme field conditions, use rubber gloves, sterilizing them between victims by washing them in a bleach-and-water solution (1 part bleach to 10 parts water).

Maintaining Hygiene (Continued)

- Wear a mask and goggles.
- Keeping dressings and bandages sterile.
- Avoiding contact with bodily fluids.

Hygiene considerations are an essential part of planning for disaster medical operations and should be emphasized during exercises.

Maintaining Sanitation

Poor sanitation is a major cause of illness, disease, and death. Maintain sanitary conditions during disaster medical operations by:

- Controlling the disposal of bacterial sources (e.g., latex gloves, dressings, etc.).
- Putting waste products in plastic bags and burying them in a designated, well-marked location.
- Burying human waste.

Again, proper sanitation measures should be included in planning and exercise operations.

Water Purification

In the aftermath of a disaster, potable water is often not available or not available in the quantities required. If potable water supplies have been exhausted or are otherwise not available, purify water for drinking, cooking, and medical use by boiling (rolling boil for 10 minutes), using water purification tablets, or using unscented liquid bleach (16 drops per gallon of water; 1 teaspoon per 5 gallons. After adding bleach, shake or stir the water and let it stand 30 minutes before drinking or other use.).

Summary

Introduction

Disaster medical operations are organized under the CERT Commander. Within medical operations, there are five subfunctions:

- Triage
- Transport
- Treatment
- Morgue
- Supply

After completing triage, victims are sent to treatment areas for:

- Additional triage.
- Further assessment.
- Immediate first aid treatment.

Conducting Head-To-Toe Assessments

Head-to-toe assessments should be both verbal and hands-on. Always perform head-to-toe assessments in the same way, beginning with the head and moving toward the victim's feet.

When conducting head-to-toe assessments, look for anything that might indicate an injury, including:

- Signs of shock.
- Excessive bleeding.
- Bruising or swelling.
- Severe pain.
- Disfigurement.

Always wear latex gloves during assessments and check your own hands for signs of victim bleeding.

The main objective in treating suspected closed head, neck, or spinal injuries is to not cause additional injury. Treat any suspected closed head, neck, or spinal injury as if it were such an injury by using in-line stabilization.

Establishing Treatment Areas

Treatment areas must be established as soon as casualties are confirmed and should be:

- In a safe area, free of hazards and debris.
- Close to, but upwind and uphill from, the hazard zone(s).
- Accessible by transportation vehicles, such as ambulances, trucks, and helicopters.
- Able to grow.

The treatment area must be clearly delineated. Activities there must be well organized and thoroughly documented.

Treating Burns

Burns are classified as first-, second-, or third-degree depending on severity and the depth of skin layers affected. Treatment for burns involves removing the source of the burn, cooling the burn, and covering it. Do *not* use ice or apply antiseptics or ointments to a burn, and do *not* remove shreds of tissue or break blisters. For third-degree burns, always treat for shock.

Wound Care

The main emergency treatment for wounds consists of controlling bleeding, cleaning, and bandaging. Clean the wound with soap and water. Then apply a dressing on the wound area and secure with a bandage. In the absence of active bleeding, dressings must be removed and the wound checked at least every 4 to 6 hours. If there is active bleeding, a new dressing should be placed over the existing dressing, and pressure and elevation should be maintained.

Treating Fractures, Sprains, And Strains

Fractures, sprains, and strains may have similar signs, and exact diagnosis may not be possible without x-rays or other diagnostic measures. Treat fractures, sprains, and strains by immobilizing the affected area using a splint.

Splints can be made from soft or rigid materials, depending on what is available in the immediate treatment area. In some cases, splints may be made by binding two fingers or legs together in several places to immobilize them.

Public Health Considerations

Public health is always a concern in the aftermath of a disaster event. To safeguard public health, take measures to maintain proper hygiene and sanitation and purify water as necessary. All three measures should be thoroughly planned in advance and practiced during disaster exercises.

Preparing For Disaster Medical Operations

In these lessons you have learned some basic lifesaving and first aid techniques to be used in disaster medical operations. This training is only a first step. There is much that cannot be covered within the time constraints of this course. You can enhance your effectiveness as an emergency response team member through practice and continuing education.

- *Practice.* Disaster response teams must work effectively as a team, and each person must know and be comfortable with his or her role. Plan to participate in refresher course simulations as often as they are offered.

- *Continuing Education.* First aid training is an area in which everyone should have a solid foundation of knowledge and skills. This is especially true of disaster workers. To continue developing into an effective rescuer, you should seek supplemental training in skills related to disaster medical operations. Many classes such as Standard and Advanced First Aid, CPR, and Emergency Medical Technician training are available at local American Red Cross chapters and community colleges.

Assignment

Before the next session:

- Read and become familiar with Chapter V: Light Search And Rescue Operations.

Assignment (Continued)

Obtain the following search and rescue safety equipment. Be sure all items have been acquired in time for Session VII.

- Helmet or hardhat
- Goggles
- Leather work gloves
- Sturdy work shoes (preferably steel-toed)
- Clothing appropriate for expected weather conditions (e.g., rain or cold)
- Dust mask
- Whistle (e.g., Clog rescue whistle)

Additional Reading

The references below are available if you would like to know more about the information in this chapter.

California Specialized Training Institute. Disaster Medical Operations. Sacramento, CA: Office Of The State Fire Marshal, 1987.

Grant, Murry Jr., Bergeron, Brady. Brady Emergency Care, Fifth Edition. Prentice Hall, Englewood Cliffs, NJ: 1990.

Heckman, James D. (Ed.). Emergency Care And Transportation Of The Sick And Injured, Fifth Edition. American Academy of Orthopaedic Surgeons, Park Ridge, IL: 1992.

Reader's Digest Action Guide: What To Do In An Emergency. Reader's Digest Association, Pleasantville, NY: 1988.

U.S. Department Of Mine Safety. First Aid. U.S. Government Printing Office, Washington, DC: 1986.

U.S. Department Of The Navy. Self-Care/Buddy-Care. U.S. Government Printing Office, Washington, DC: 1988.

The American Red Cross also provides resources on this subject. Contact your local chapter for information.

Chapter V

Light Search And Rescue Operations

In this chapter you will learn about:

- **Search and rescue planning:** Assessing search and rescue needs, risks, and resources.
- **Size-up:** How to size up the situation in which the search and rescue teams will operate.
- **Search techniques:** How to search systematically for disaster victims.
- **Rescue techniques:** Safe techniques for lifting, leveraging, cribbing, and victim removal.
- **Rescuer safety:** How to protect your own safety and your buddy's during search and rescue.

I. Disaster Preparedness

Introduction

What Is Search And Rescue?

The search and rescue function is really two separate activities:

- *Search.* To look through (a place, an area, etc.) carefully in order to find something missing or lost.
- *Rescue.* To free or deliver from confinement.

Objectives

The objectives of search and rescue are to:

- Acknowledge that the most important person in a rescue attempt is the rescuer.
- Rescue the greatest number of people in the shortest amount of time.
- Rescue lightly trapped victims first.

As a volunteer worker, you will confine your efforts to *light search and rescue;* that is, the relatively uncomplicated extrication of victims from situations that pose minimal risk to the rescuer.

The Need For Planning

Experience has shown that immediately after almost every major disaster, the first response to trapped and injured victims is by spontaneous, untrained, and well-intentioned persons paying little or no regard to personal safety. In some cases, further loss of life is avoided. More often than not, however, spontaneous rescue efforts result in serious injuries and compounded problems.

The Need For Planning (Continued)

To avoid the problems associated with spontaneous actions, rescue efforts should be planned and practiced in advance. The decision to attempt a rescue should be based on two factors:

- The risks involved.
- The overall goal of doing the greatest good for the greatest number of people.

This chapter will initially focus on the planning issues surrounding search and rescue operations, then address:

- Size-up.
- Search techniques.
- Rescue techniques.

You will have the opportunity to practice some of the rescue techniques in this unit during class. Your instructor may present additional information that is not included in this Participant Handbook. Be sure to take careful notes.

Search And Rescue Resources

As shown in the figure on page V-5, search and rescue operations require three components:

- *Rescuers* include trained personnel and volunteers.
- *Tools* depend on their availability and the needs of the situation. For example, storm or earthquake damage may require tools for lifting debris whereas flood damage may require boats, ropes, and life preservers.
- *Time* may be very limited for some victims. The first 24 hours after a disaster has been called the "Golden Day"—that period during which injured or trapped victims have an 80 percent chance of survival if rescued.

Search And Rescue Resources *(Continued)*

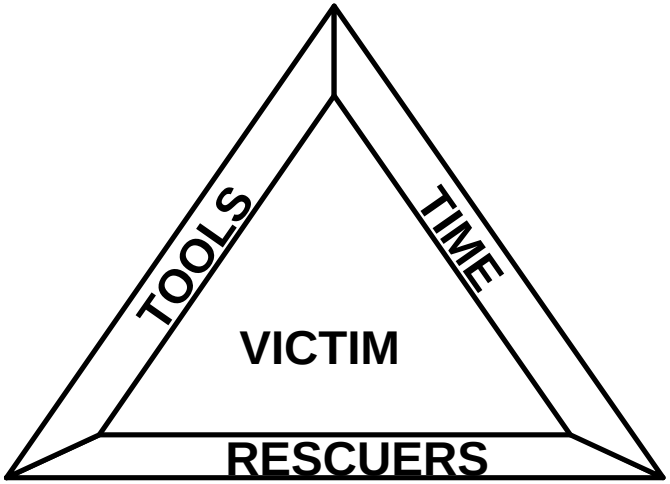


Figure V-1. Components Of Search And Rescue Operations

In the aftermath of a disaster, each of these components may be very limited. CERT search and rescue teams can make their efforts more effective in the time available through:

- Planning (developing rescue action plans based on probable search and rescue situations), and practicing implementing those plans.
- Realistic size-up of the situation.
- Careful attention to rescuer safety.

The remainder of this chapter will focus on these factors.

Planning

Introduction

Planning involves assessing probable needs, risks, and resources before disaster strikes and developing an action plan that takes these factors into account. Action plans should be implemented under simulated disaster conditions to identify their strengths and weaknesses and ways to improve their implementation.

Assessing Needs And Risks

Needs and risks are determined to some extent by the types of occupancies in the local area. Type of occupancies in this case does not just refer to houses. It also refers to any place where people might be during a disaster, including:

- Apartments, condominiums, and mobile homes.
- Industrial, commercial, or office space.
- Schools.
- Places of worship.
- Hospitals and nursing homes.
- Airports.

> Don't be part of the problem; be part of the solution.

Assessing Needs And Risks (Continued)

Part of search and rescue planning involves identifying the different types of occupancies in the local area and asking:

- What does this mean in terms of population density?
- What does it mean for the kinds of rescue efforts that may be required?
- What are the implications for rescuer safety?

Careful examination of the types of occupancies that may be involved in a disaster will provide valuable information about the human and physical resources that may be required and the amount of time that may be available for search and rescue operations.

Assessing Resources

The very first step in search and rescue operations is to identify local resources *before* a disaster even occurs. Search and rescue resources may include personnel, equipment, and tools. CERT planners should use the questions in the table below to guide their resource planning efforts.

Resource	***Planning Questions***
Personnel	✍ Who lives and/or works in the area? ✍ During which hours are these people most likely to be available? ✍ What skills or hobbies do they have that might be useful in search and rescue operations? ✍ What might be the most effective means of mobilizing their efforts?
Equipment	✍ What equipment is available locally that might be useful for search and rescue? ✍ Where is it located? ✍ How can it be accessed? ✍ On which structures (or types of structures) might it be most effective?
Tools	✍ What tools are available that might be useful for lifting, moving, or cutting disaster debris?

Table V-1. Search And Rescue Resource Planning Questions

Considering each of these questions will greatly facilitate search and rescue operations under disaster conditions.

Search And Rescue Size-Up

What Is Search And Rescue Size-Up?

As described in earlier chapters, size-up is a continuous analysis of facts that forms the basis for decision making and planning. Rescues must be planned and carefully executed to ensure the success of the rescue and the safety of the rescuer. Like size-up for other disaster operations, search and rescue size-up continues throughout the disaster response. It includes seven steps:

- Step 1: Gather facts.
- Step 2: Assess damage to the building.
- Step 3: Identify your resources.
- Step 4: Establish the rescue priorities.
- Step 5: Develop a rescue plan.
- Step 6: Conduct the rescue.
- Step 7: Evaluate your progress.

Each of the size-up steps will provide information that may be critical to search and rescue efforts.

Step 1: Gather Facts

Let the facts of the situation guide your search and rescue efforts. Consider the types of structure and construction, location, and severity of damage, as well as environmental conditions and hazards, the probable number of victims, and their conditions. Because the search and rescue situation continually changes, gather facts about the situation on a continual basis and revise plans as needed. Some of the questions that CERT search and rescue personnel must answer during fact-gathering are included in the table below. The answers to these questions will enable you to complete size-up Step 2: Assess Damage To The Building.

Planning Factor	*Questions*
Time of Day/Week	☞ How does the time of day/week affect numbers of people possibly trapped in the area? ☞ Where are the victims likely to be (e.g., home, work, in bed, on the road)? ☞ How much daylight is available for search and rescue efforts☜or, if none: - How long will it be until sunrise? - Is artificial lighting available and practical?
Occupancy Type	☞ Where are potential victims likely to be in the structure? ☞ How many potential victims are likely?
Construction Type	☞ What types of construction have been affected? ☞ What are the implications for search and rescue? ☞ Is the age of construction significant?
Weather	☞ What is the current and forecast weather? ☞ How will the weather affect rescue efforts? ☞ How will it affect victims? ☞ How will it affect rescuers?
Hazards	☞ What and where are the general hazards in the area (e.g., utilities, natural hazards, hazardous materials)? ☞ What steps are necessary to mitigate these hazards? ☞ How long will mitigation efforts take? ☞ What effect might the delay have on the victims?

Table V-2. Planning Factors For Search And Rescue Fact-Gathering

Step 2: Assess Damage To The Building

There are no hard and fast rules for assessing damage. However, the damage categories in the table below will serve as a reference point for defining your primary search and rescue mission. In Chapter VI, you will learn more about formulating rescue strategies based on structural damage assessment.

If Structural Damage Is . . .	*Then The CERT Mission Is . . .*
Light: Superficial or cosmetic damage, broken windows, fallen plaster; primary damage to contents of structure . . .	To locate, triage, and prioritize removal of victims to designated treatment areas by the medical operation teams.
Moderate: Questionable structural stability; fractures, tilting, foundation movement or displacement . . .	To locate, stabilize, and immediately evacuate victims to a safe area while minimizing the number of rescuers inside the building.
Heavy: Obvious structural instability; partial or total wall collapse, ceiling failures . . .	To secure the building perimeter and control access into the structure by untrained but well-intentioned volunteers.

Table V-3. CERT Mission By Structural Damage Category

After or in conjunction with the damage assessment, CERT search and rescue personnel must consider probable amounts of damage and rescue requirements based on the type and age of construction.

> Assess the damage from all sides by "taking a lap" around the building.

Step 2: Assess Damage To The Building (Continued)

Experienced search and rescue personnel can anticipate probable amounts of damage following a disaster event based on the severity of the event and the types of structures involved. The table below presents examples of the types and degree of damage likely to be found in various types of structures after an earthquake.

Construction Type	*Description*	*Probable Damage Areas*	*Severity*
Single-Family Dwelling	✍ Wood frame	✍ Masonry chimney ✍ Utilities	Light
	✍ Pre-1933	✍ Foundation movement ✍ Utilities ✍ Porches	Moderate
	✍ Hillside	✍ Unique hazards ✍ Ground failure	Heavy
Multiple-Family Dwelling	✍ Up-and-down and/or side-by-side living units	✍ Soft first floor ✍ Utilities	Moderate
Unreinforced Brick	✍ Pre-1933 construction ✍ Lime or sand mortar ✍ "King Row" or "Soldier Row" (bricks turned on edge every 5-7 rows) ✍ Reinforcing plates	✍ Arched/recessed windows and doors ✍ Walls collapse, then roof	Heavy
Tilt-Up	✍ Large warehouses and plants ✍ Concrete slabs lifted into place ✍ Walls inset approximately 6-8 inches ✍ Lightweight roof construction	✍ Roof collapses, then walls	Heavy
High-Rise	✍ Steel reinforced	✍ Broken glass ✍ Content movement ✍ Exterior trim/fascia	Light

Table V-4. Probable Severity And Type Of Damage Based On Construction Type

Step 3: Identify Your Resources

In this step, the rescue team identifies all of the resources, such as personnel, equipment, and tools, that are available to assist in rescuing victims.

Step 4: Establish The Rescue Priorities

Once resources have been identified, the rescuers must determine what the priorities are for the situation at hand. For example, in a certain building there may be water rising, with victims trapped inside. In that case, the priority becomes getting out those victims who can be easily reached and removed without putting any rescuers at risk.

Step 5: Develop A Rescue Plan

Next, the rescuers decide specifically how they are going to complete the tasks that they have determined are the highest priorities. In the example just cited, the plan might be, "Joe, you and Bill do a quick search of the first floor. John and Sue, gather up all the loose 2 x 4 lumber you can find and break it into lengths of 3 feet and 6 feet. Sally, you will keep in voice contact with Joe and Bill when they go inside. Any questions? Great, let's get started."

Step 6: Conduct The Rescue

Once the plan has been developed, the rescue team puts it into action and begins the rescue.

Step 7: Evaluate Your Progress

This is the most important step from a safety standpoint. The rescuers must continually monitor the situation to prevent any harm to the rescuers. Also, they determine if their plan is working, and if not, how it can be changed to make it work.

Safety Considerations

In assessing your own situation and making decisions about search and rescue strategies, rescuer safety must be the primary concern. The two most frequent causes of rescuer deaths are *disorientation* and *secondary collapse*. The following are guidelines for safe search and rescue.

- *Buddy System.* Always work in pairs, with a third person acting as a runner.

- *Hazards.* Be alert for hazards, such as sharp objects, dust, hazardous materials, power lines, leaking natural gas, high water, fire hazards, and unstable structures. If water is present, check the depth before entering. Never enter rising water.

- *Safety Equipment.* Wear safety equipment and clothing appropriate to the task. In search and rescue operations, the equipment will include:

  - Helmet or hard hat.
  - Goggles.
  - Dust mask.
  - Whistle (e.g., Clog rescue whistle) for signaling other rescue workers.
  - Leather work gloves.
  - Clothing appropriate for the weather (e.g., protection from cold or rain).
  - Sturdy shoes (preferably steel-toed).

> Remember, a dust mask offers protection only against airborne particulates. It will not filter harmful materials such as carbon monoxide or other hazardous materials.

- *Rotate Teams.* Have back-up teams available. Monitor the length of exposure of active teams. Be alert to signs of fatigue. Establish regular search and rescue shifts or rotate personnel (as a team) as needed. Have teams drink fluids and eat to maintain themselves.

Evacuation

Evacuation is the organized withdrawal from an area for purposes of protecting the safety of the area's inhabitants. In the event that evacuation becomes necessary, use the following steps as guidelines to ensure safety and organization.

Step	*Action*
1. Determine the need	Determine whether there is a need for total or partial evacuation.
2. Identify a relocation area	Select an area that is free of hazards and easily accessible.
3. Communicate	Communicate to everyone involved the need to evacuate and the locations of shelters.
4. Predesignate routes	Designate routes from the area to be evacuated to the area of relocation. Consider alternatives.
5. Report the evacuation	Be sure to inform emergency management personnel about the evacuation to avoid unnecessary duplication of effort and risk.

Table V-5. Guidelines For Safe Evacuation

The #1 rescuer problem while working in a structural collapse is from breathing dust. Wear a dust mask/safety equipment.

Conducting Search Operations

Introduction

Once the decision is made to initiate search operations within a specific structure or area, CERT members must systematically inspect the area for victims, as assigned by the CERT Area Team Leader. This involves two processes:

- Locating potential victims.
- Employing search techniques appropriate to the operation.

By following these processes, search operations will be more efficient, thorough, and safe and will facilitate later rescue operations.

Locating Potential Victims

The first step in locating potential victims is to gather any additional information required for the specific structure or area. This requires searchers to conduct a "mini-size-up" to gain more precise damage information and develop priorities and plans. Detailed information about a structure, together with information about the type of construction, will provide information about areas of entrapment. Inspecting a structure by taking a lap around it will also provide useful information.

Areas Of Entrapment

Locating victims in and around a damaged structure generally means finding the areas of entrapment or *voids* in which they are concealed. There are several types of voids to look for.

- *Pancake Voids.* Pancake voids (most common in pre-1933 buildings) are small voids throughout a structure that are created by weakening or destruction of load-bearing walls and the resulting collapse of floors onto each other. Pancake voids are the most difficult and time-consuming to search. An illustration of a pancake void is shown in Figure V-2 on the following page.

Areas Of Entrapment (Continued)

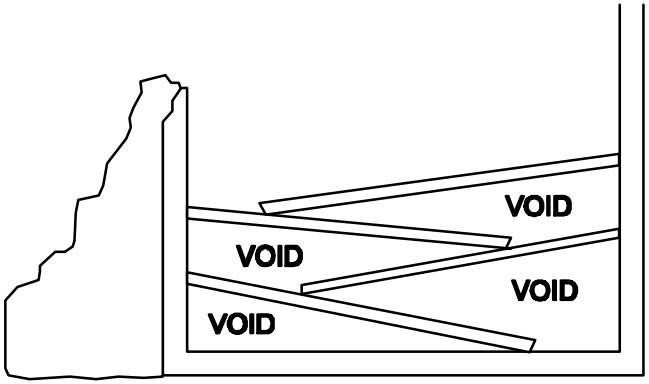


Figure V-2. Pancake Void

- *Lean-To Voids.* Lean-to voids are created when a collapsed wall or floor is resting against an outside wall, creating a pocket of space. A victim trapped in this type of void has the greatest chance of being alive. An example of a lean-to void is shown in the figure below.

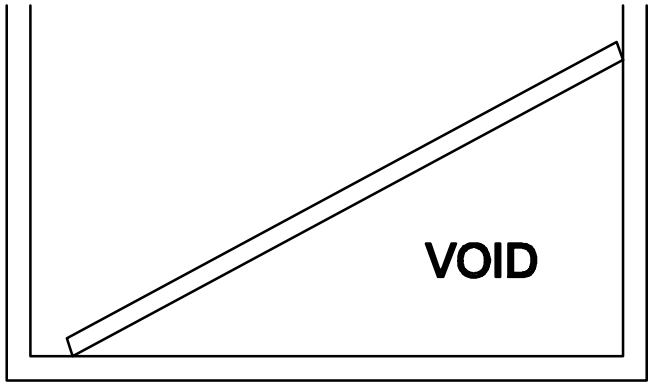


Figure V-3. Lean-To Void

Areas Of Entrapment (Continued)

- *"V" Voids.* These voids are created by a "V" collapse of a floor or wall: the middle collapses and the ends lean against the outside walls. Upturned heavy furniture or materials may be concentrated near the center of the floor. A drawing of a "V" void is shown in the figure below.

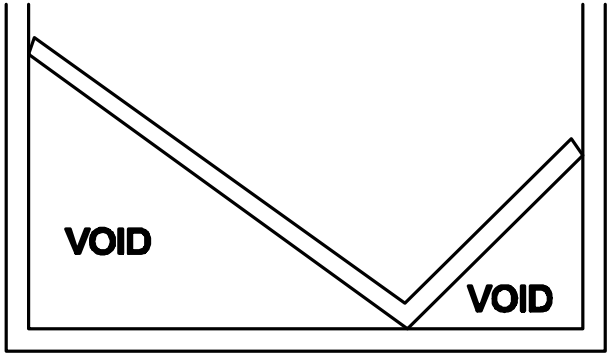


Figure V-4. "V" Void

- *Individual Voids.* Individual voids are spaces into which the victim may have crawled for protection. For example, victims might be found under desks or in bathtubs.

After identifying the possible areas of entrapment, the next step is to determine the potential number of victims and identify the most probable areas of entrapment. Some of this information may be known through preplanning, but some may need to be obtained by other means, such as by talking with bystanders. When talking with bystanders, get as much information as possible. (For example, how many people live/work here? Where would they be at this time? What do you know about the building layout? What have you seen or heard? Has anyone come out?) Realize that bystanders may be traumatized by the event, however, and may tend to exaggerate potential numbers or may not remember events or even building floor plans accurately.

Finally, determine the normal exit routes from the building. Some victims may have become trapped while trying to escape.

After gathering the additional information, CERT members will be able to plan search priorities and implement the search.

Search Methodology

An effective search methodology:

- Is systematic and thorough.
- Avoids unnecessary duplication of effort.
- Provides for documentation of search results.

Experienced search and rescue personnel have found the search procedures listed below to be effective.

1. *Call Out.* Begin the search by shouting something like, "If anyone can hear my voice, come here." If any victims respond, give them further directions such as "Stay here" or "Wait outside" (depending on the condition of the building). Be sure to ask victims for any information they may have about building damage or about others trapped in the building.

2. *Be Systematic.* Use a systematic search pattern to ensure that all areas of the building are covered. For example:

   - *Bottom-Up/Top-Down.* Searching from the bottom of the building up and/or from the top down is well suited to multi-story buildings.

   - *Right Wall/Left Wall.* Moving systematically from one side to the other is well suited to single-floor structures and avoids repetition. The wall is the rescuer's lifeline. (See Figure V-5 on the following page.) If you or your partner become disoriented, reverse your steps, staying close to the wall until you get back to the doorway. Throughout your search, maintain voice contact with your partner so you do not get separated.

Search Methodology (Continued)

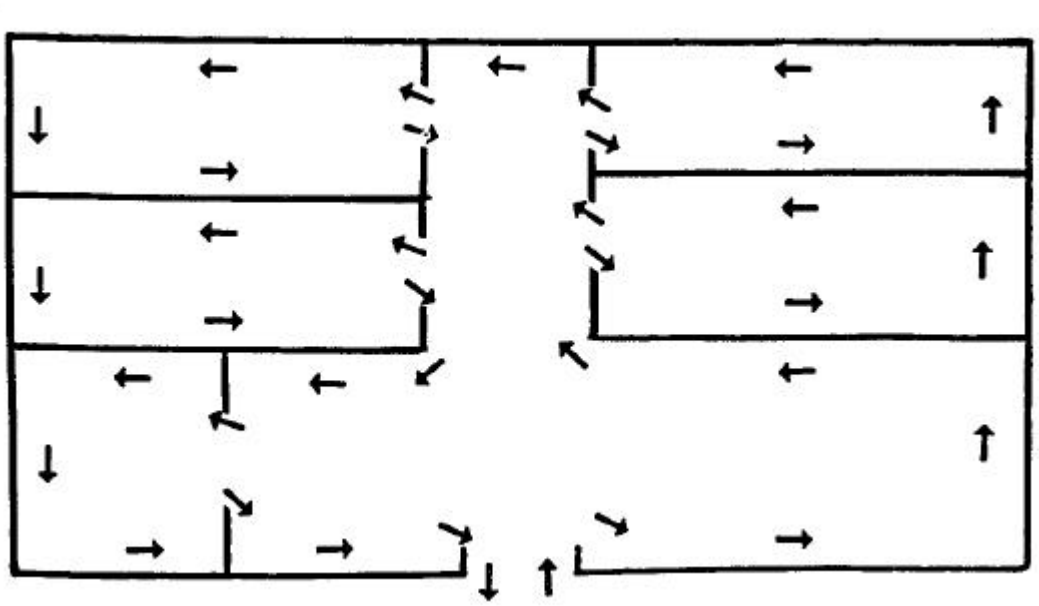


Figure V-5. Systematic Room-Search Pattern

3. *Listen Carefully.* Stop frequently and just listen for tapping sounds, movement, or voices.

4. *Triangulate.* Triangulation enables rescuers to view a single location from several perspectives. Three rescuers, guided by victim sounds, form a triangle around a designated area and direct flashlights into the area. The light shining from different directions will eliminate shadows that could otherwise hide victims. Triangulation is illustrated in Figure V-6 on the next page.

5. *Use The Buddy System.* Working together, two rescuers can search a structure more effectively and provide an additional measure of safety to each other. Buddies should also use a web belt to connect one another, especially in dark or smoke-filled areas.

Search Methodology *(Continued)*

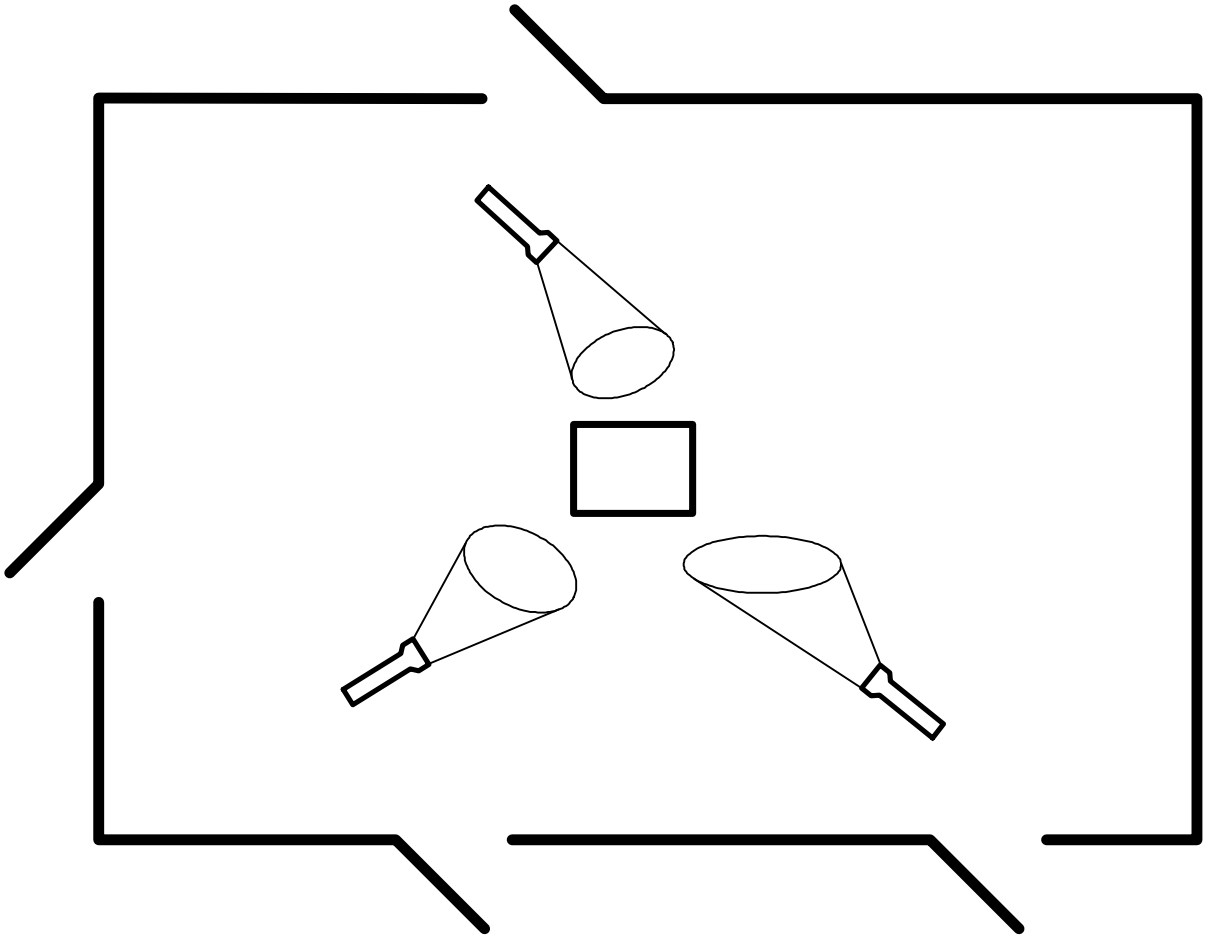


Figure V-6. Triangulation

Search Methodology *(Continued)*

6. *Mark Searched Areas.* Marking searched areas prevents duplication of efforts and identifies where rescuers are and have been. Make a single diagonal slash on or next to the door just before entering. Make an opposite slash (creating an "X") when all occupants have been removed and the search of that area is finished (as shown on the left side of Figure V-7 below). As shown on the right side of Figure V-7, the four quadrants of the "X" can be used to indicate the initials of the searcher (left quadrant), the time/date of the search (top quadrant), personal hazards (right quadrant), and number of victims still inside (bottom quadrant). Use a zero if no victims are found. Put a box around the "X" if it is not safe to conduct search and rescue efforts in the room or building

7. *Document Results.* Keep complete records both of removed victims and of victims who remain trapped or dead, then report this information to emergency agencies when they reach your CERT (as described in Chapter IV).

Following these steps will avoid duplication of effort and will help rescue operations.

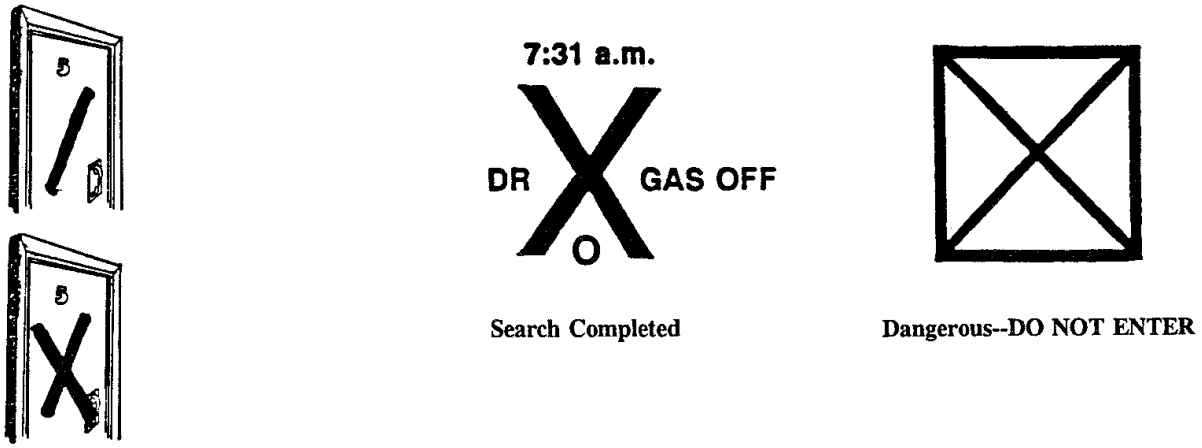


Figure V-7. Marking Searched Areas

Conducting Rescue Operations

Introduction

Rescues involve three primary functions:

- *Creating a safe rescue environment.* Creating a safe rescue environment may involve lifting objects out of the way, using tools to move objects, shoring up walls, and removing debris.
- *Triaging or stabilizing victims.*
- *Victim removal.* Search and rescue teams will remove victims immediately from moderately damaged buildings to a safe zone. Medical teams will remove victims from lightly damaged buildings, after head-to-toe assessment and treatment.

This section will focus on creating a safe environment and victim removal.

Creating A Safe Rescue Environment

The goals of victim rescue operations are to:

- Maintain rescuer safety.
- Triage in lightly damaged buildings.
- Stabilize (airway, bleeding, and shock) and evacuate as quickly as possible from moderately damaged buildings, while minimizing additional injury.

None of these goals can be achieved without first creating as safe an environment as possible prior to beginning extrication. There are, therefore, certain precautions that CERT rescuers must take to minimize the risk involved in rescue efforts.

Know Your Limitations

Many well-intentioned volunteers have been injured or killed during rescue operations simply because they did not pay attention to their own physical and mental limitations. As a CERT rescuer, you must know your limits and monitor your condition. Take time to eat, drink fluids, rest, and recuperate so you can return with a clear mind and refreshed energy. Remember: *Fatigue leads to injury.*

Follow Safety Procedures

Always protect yourself by wearing and/or using the safety equipment required for the situation and following established procedures, including:

- Working in pairs.
- Never entering an unstable structure.
- Following recommended procedures for lifting and carrying.

Lifting should always be done in a way that protects the rescuer's back from strain or other injury. To lift safely:

- Bend your knees and squat.
- Keep the load close to your body.
- Keep your back straight.
- Push up with your legs.

Proper body position for lifting is shown in the figure to the right.

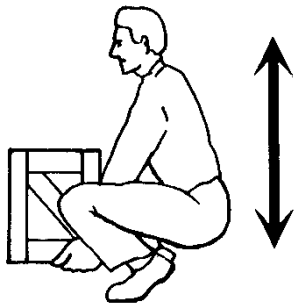


Figure V-8. Proper Body Position For Lifting

Follow Safety Procedures (Continued)

Never put your own safety in jeopardy. You can only be valuable as a rescuer if you remain healthy and uninjured.

Identifying Tool And Equipment Requirements

Rescue tools may be anything that can be used to find and reach victims or to move large objects out of the way. Tool and equipment requirements will vary somewhat depending on the type of disaster and rescue requirements. Identify probable tool and equipment requirements during planning so that appropriate tools and equipment will be more readily available when needed.

Leveraging And Cribbing

When a large object such as a collapsed wall or heavy debris needs to be moved in order to free victims, leverage and cribbing may be used.

- *Leverage* is obtained by wedging a lever (pole or other long object) under the object that needs to be moved, with a stationary object underneath it to act as a fulcrum. When the lever is forced down over the fulcrum, greater force is obtained to lift the object. (See pages V-43 and V-44 in this book.)

- A *crib* is a framework of wooden or metal bars used for support or strengthening. *Box cribbing* means arranging pairs of wood pieces alternately to form a stable rectangle. In a disaster situation, debris may be available to use for cribbing. (See page V-45 in this book.)

Leveraging and cribbing are used together by alternately lifting the object a little (using the lever) and placing cribbing materials underneath the lifted edge to stabilize it. The process should be gradual: *"Lift an inch ✍ crib an inch."* When leveraging and cribbing one end of an object, make sure that you are not creating an unstable condition at the other. You may have to leverage and crib both ends.

When sufficient lift is achieved, remove the victim, reverse the procedure, and lower the object. *Never leave an unsafe condition.*

Removing Debris

When you must remove debris in order to locate or extricate victims, a "human chain" may be used. Have volunteers line up so that they can hand debris from one person to the next, away from the rescue site. The chain should be located so as not to impede victim removal or restrict any path of travel. Wear leather gloves to protect your hands. Your hands are your most important rescue tool.

Removing Victims

Basically, there are two main methods of removal that rescuers can employ to get victims out of a structure. They are:

- Self-removal or assist.
- Lifts and drags.

Self-Removal Or Assist

Ambulatory victims may be able to get out, with or without assistance, once obstacles are removed. Even when a victim is capable of self-removal, provide assistance and support as the victim vacates the area to avoid the possibility of additional injury.

Lifts And Drags

If a victim cannot get out on his or her own, size up the situation to determine the most appropriate means of removal. The extrication method selected depends on the number of rescuers available, the strength and ability of the rescuers, the condition of the victim, and the general stability of the immediate environment.

> Unless there is a condition that threatens rescuer safety (e.g., the building is on fire, or collapsing, or filling with water), do not use these types of victim removal if you suspect a closed head, neck, or spine injury. Victims with injuries to the head or spine should be stabilized on a backboard (as described in Chapter IV) before removal. Remember to use in-line stabilization.

Lifts And Drags (Continued)

- *One-Person Arm Carry.* If you are physically strong, you may be able to lift and carry a victim by yourself. Reach around the victim's back and under the knees, and lift. The victim may be able to assist by placing an arm around your shoulder.

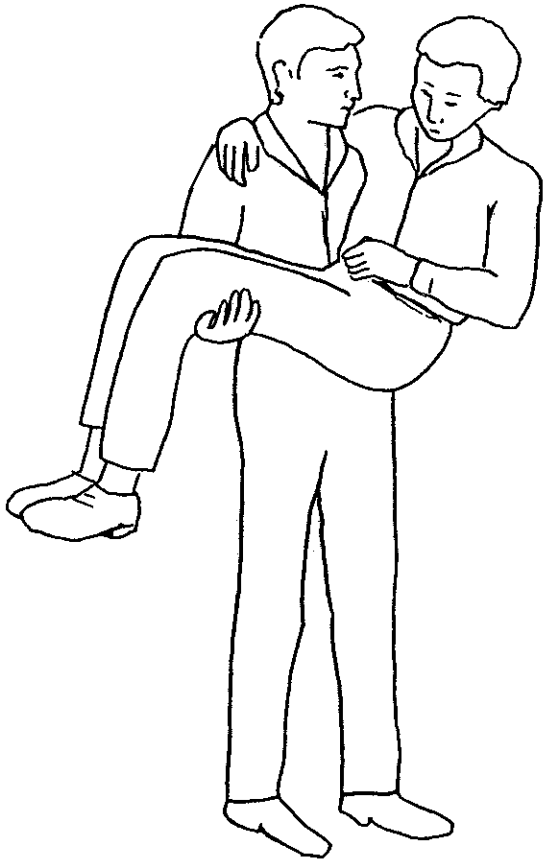


Figure V-9. One-Person Arm Carry

Lifts And Drags (Continued)

- *One-Person Pack-Strap Carry.* To accomplish this carry:

  - Stand with your back to the victim.
  - Place the victim's arms over your shoulders and grab the hands in front of your chest.
  - Hoist the victim onto your back by bending forward slightly, so his or her feet just clear the floor.

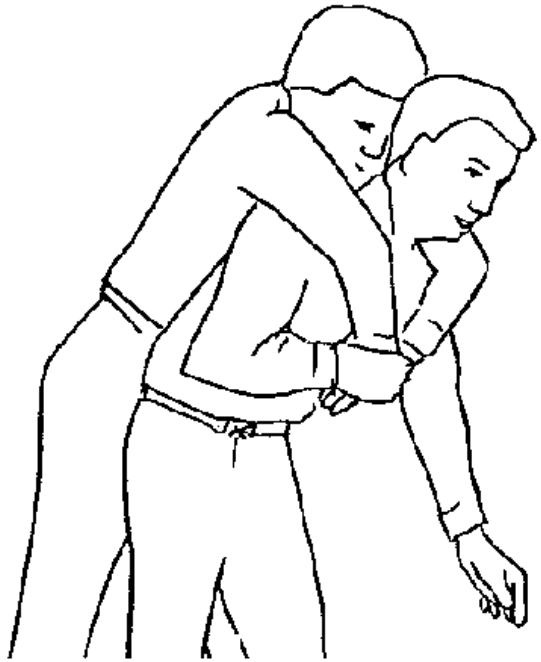


Figure V-10. One-Person Pack-Strap Carry

Lifts And Drags (Continued)

- *Two-Person Lift.* The two-person lift is also called the "Georgia Street Carry."

  - Rescuer 1: Squat at the victim's head and grasp the victim from behind around the midsection. Reach under the arms and grasp the victim's forearms.

  - Rescuer 2: Squat between the victim's knees, facing either toward or away from the victim. Grasp the outside of the victim's legs at the knees.

  - Using safe lifting procedures, rise to a standing position, lifting the victim. The victim can then be walked to safety.

Figure V-11. Two-Person Carry

Lifts And Drags (Continued)

- *Chair Carry.* This technique requires two rescuers:

  - Place the victim in a straight-back chair (e.g., a wooden kitchen chair).
  - Rescuer 1: Facing the back of the chair, grasp the back uprights.
  - Rescuer 2: With your back to the victim's knees, reach back and grasp the two front legs of the chair.
  - Tilt the chair back, lift, and walk out.

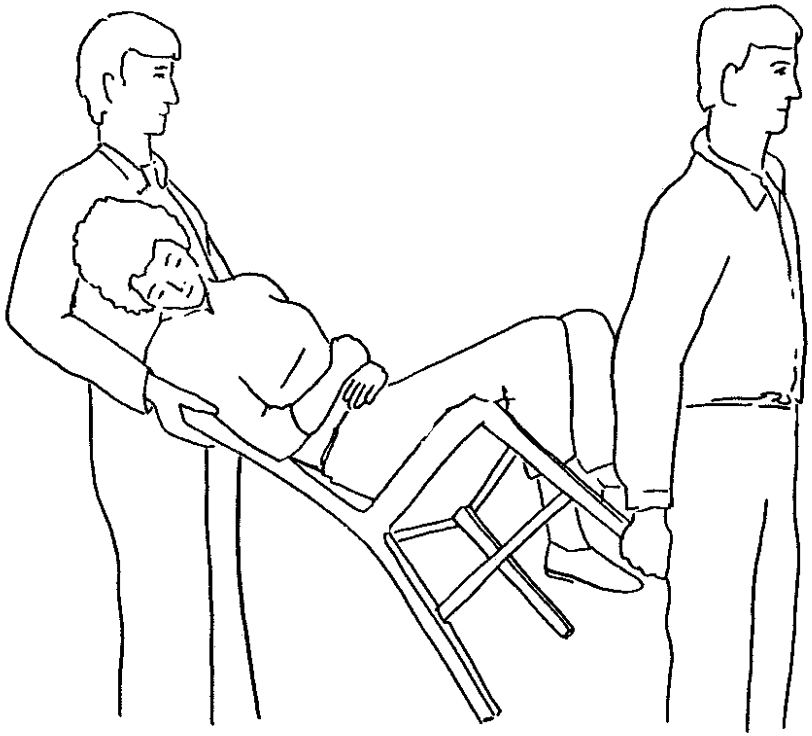


Figure V-12. Chair Carry

Lifts And Drags (Continued)

- *Blanket Carry.* The blanket carry requires at least six rescuers to provide stability to the victim, with one person designated as the lead person.

  - Lay a blanket next to the victim.
  - Tuck the blanket under the victim, and roll the victim into the center of the blanket.
  - Roll up the blanket edges toward the victim, to form tube-like handles on each side of the victim.
  - With three rescuers squatting on each side and grasping the "handle," the lead person checks the team for even weight distribution and correct lifting position.
  - The lead person calls out, "Ready to lift on the count of three: one, two, three, *lift.*"
  - The team lifts and stands in unison, keeping the victim level, and carries the victim feet first.
  - To lower the victim, the lead person calls out, "Ready to lower on the count of three: one, two, three, *lower.*"

- *Improvised Stretchers.* A variety of materials can be used as improvised stretchers, which can be carried by two rescuers. For example, your instructors will demonstrate how to make a stretcher from poles and jackets.

Lifts And Drags (Continued)

- *Drag.* Drag the victim out of the confined area by grasping either under the arms or by the feet and pulling across the floor. Remember to use safe lifting procedures. Both dragging techniques are shown in the figure below. One rescuer can also use the *blanket drag* (shown in the figure on the following page) by wrapping the victim in a blanket, squatting down and grasping an edge of the blanket, and dragging the victim across the floor. By carefully assessing the situation and the victim's physical condition, then using correct removal techniques, CERT members can remove entrapped victims safely.

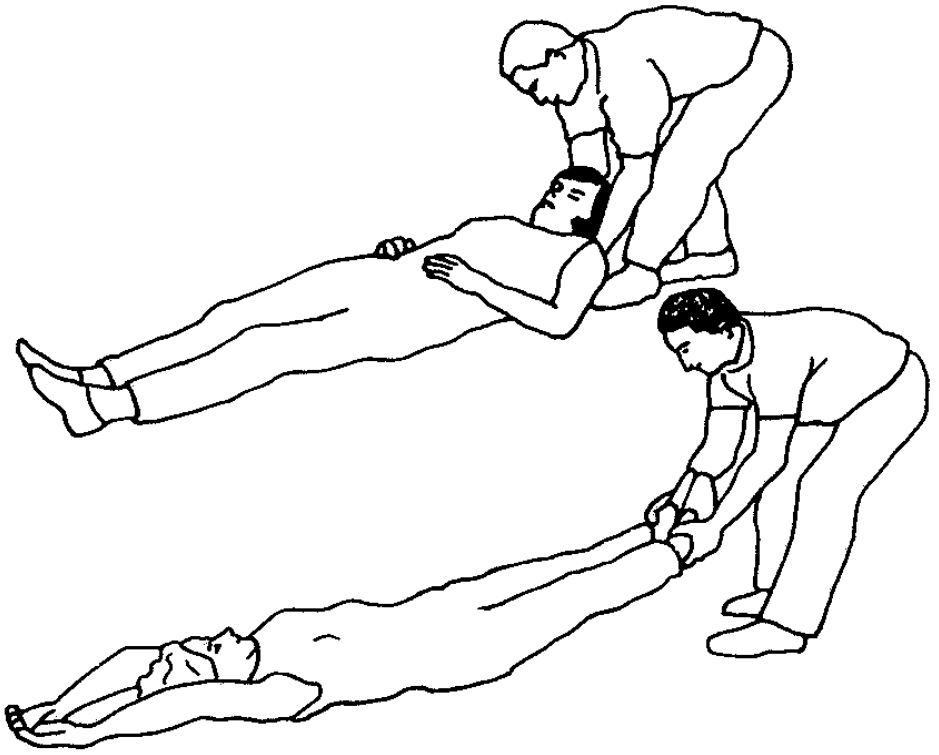


Figure V-13. Correct Drag Techniques

Lifts And Drags (Continued)

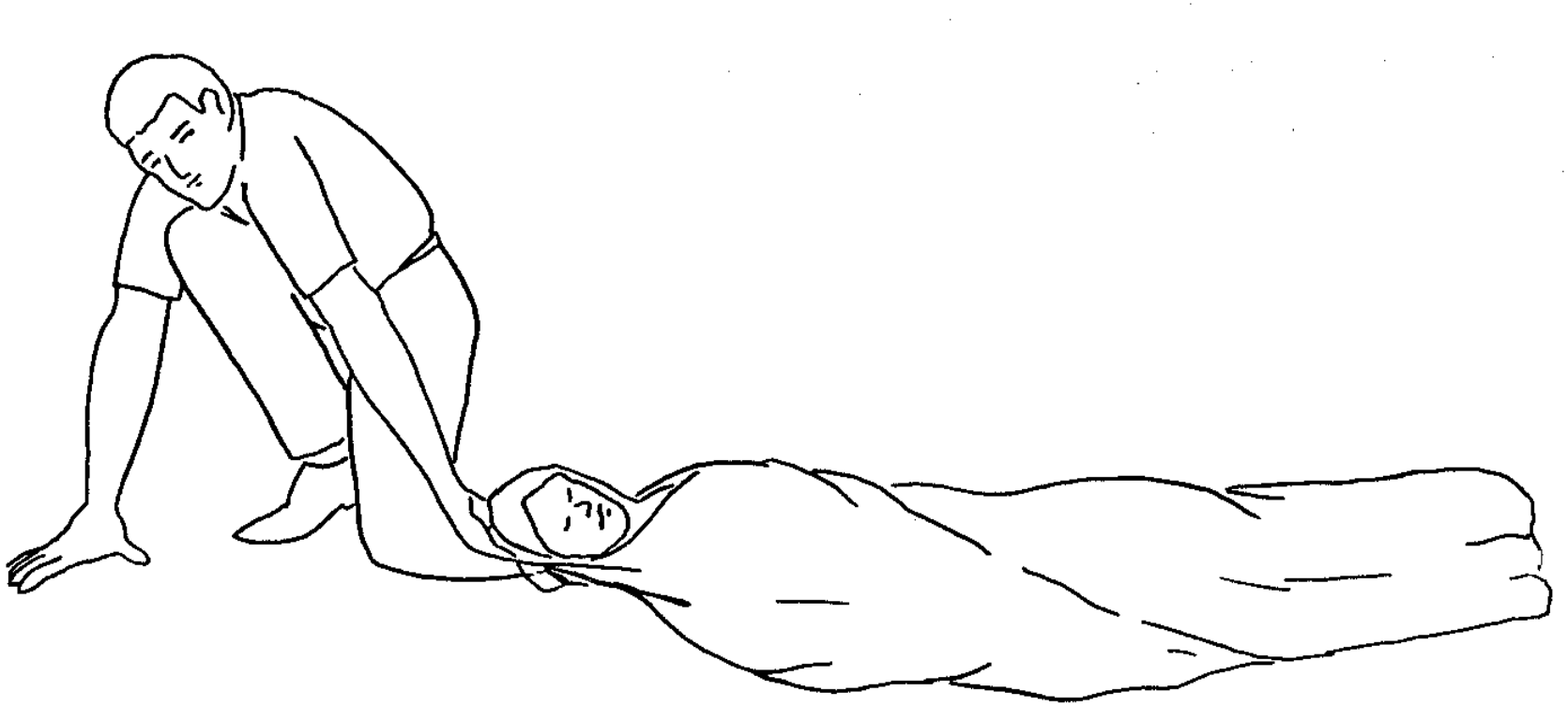


Figure V-14. Blanket Drag

Summary

Introduction

Search and rescue are two different activities that should be planned carefully and practiced in advance. The decision to attempt a rescue should be based on:

- The risks involved.
- Achievement of the overall goal of doing the greatest good for the greatest number.

The objectives of search and rescue are to:

- Maintain rescuer safety at all times.
- Rescue the greatest number of people in the shortest amount of time.
- Rescue the lightly trapped victims first.

CERT members are restricted to *light search and rescue.* Their mission when dealing with heavily damaged structures is to:

- Isolate the area.
- Warn others.

Search And Rescue Resources

The three main resources required for search and rescue operations are:

- Rescuers.
- Tools.
- Time.

Each of these resources may be very limited. Planning, accurate size-up, and careful attention to rescuer safety will be critical.

Conducting Search And Rescue Size-Up

As in other CERT operations, size-up is a critical first step. Search and rescue size-up follows the same basic process as for fire-suppression or medical operations. Size-up continues throughout response efforts and provides valuable information about how search and rescue efforts should proceed.

Should size-up indicate that total or partial evacuation is necessary, the CERT mission is to ensure safety and organization during the evacuation.

Conducting Search Operations

Once the decision to begin search operations is made, CERT members must systematically:

- Locate potential victims.
- Employ appropriate search techniques.

Conducting Search Operations (Continued)

Locating potential victims requires CERT members to conduct a "mini-size-up" of areas of entrapment and potential number of victims. After locating potential victims, CERT members will implement a search methodology that:

- Is systematic and thorough.
- Avoids unnecessary duplication of effort.
- Provides documentation of results.

Conducting Rescue Operations

Rescues involve three functions:

- Creating a safe environment.
- Triaging or stabilizing victims.
- Removing victims.

The goals of creating a safe environment are to maintain rescuer safety and to remove victims as quickly as possible while minimizing additional injury. A large part of maintaining rescuer safety is for every CERT member to recognize his or her personal limitations and follow prescribed safety procedures.

Once the environment is stabilized, victims can be removed in a number of ways, depending on their condition, the number of rescuers available, the strength and abilities of the rescuers, and the stability of the immediate environment. Sometimes, a victim may be able to get out once obstacles are removed. Leveraging and cribbing may be used for debris removal. When victim removal is required, CERT members must assess the situation and select the extrication method that is best suited for the situation. Victims with head or spine injuries must be stabilized to avoid additional injury. In these cases, EMS personnel should be called in if possible.

Assignment

Before the next session:

- Read and become familiar with Chapter VI: Disaster Psychology And Team Organization in this Participant Handbook.

Additional Reading

The reference below is available if you would like to know more about the information in this chapter.

California Fire Service, Training And Education Services. Fundamentals Of Heavy Rescue. 1987.

Additional Materials
Chapter V

Scenario V-1

At 10:00 on Tuesday, August 9, an earthquake (magnitude 5.9) shook Memphis, Tennessee. During the quake, the electricity in your neighborhood went out. On the way to the staging area at the local high school, you notice considerable damage, including several broken water mains, building collapses, and what looks like heavy structural damage in a local strip shopping center. When you arrive at your staging area, you can see that the west wing of the elementary school has partially collapsed.

Discuss the scenario with the group to answer the following questions:

- What does this scenario tell you about the probable density for the affected area?
- What kinds of search and rescue operations are probable?
- What, if any, are the constraints that search and rescue personnel may face in this scenario?
- Can these constraints be overcome within the established CERT mission? If so, how?

Scenario V-2

After reaching the staging area, you check in with the Logistics Team Leader, who assigns you to search and rescue team 2. Although CERT teams cannot venture into the section of the school building that has collapsed, search and rescue team 2 will be searching part of the east wing of the building to determine if there are victims in that area. Because your child once attended the school, you know that the building is heated by natural gas. You also remember that a storage shed for the school district's tractors is located about 50 feet outside the east wing of the school.

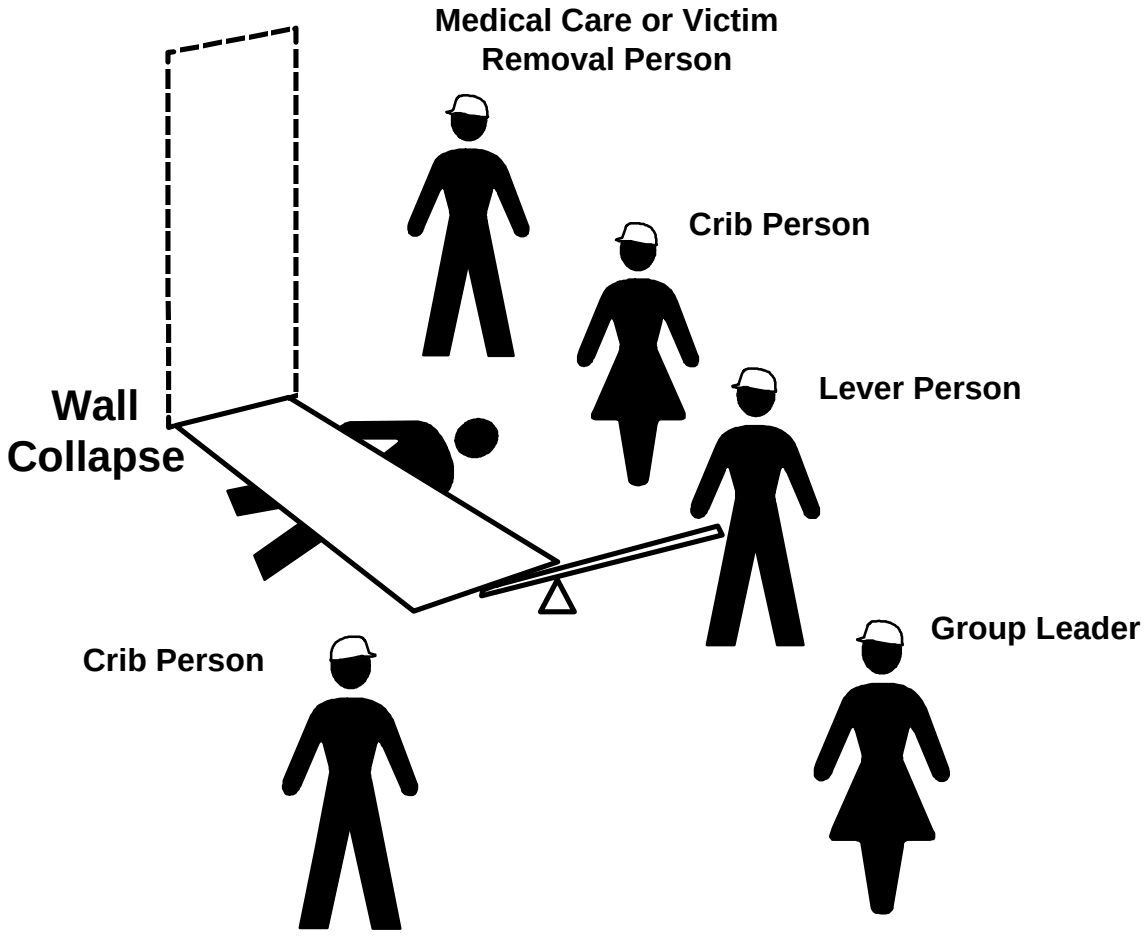
Discuss the scenario with the group to answer the following questions:

- What does this scenario tell you about the facts that must be gathered?
- What impact could these facts have on search and rescue operations?

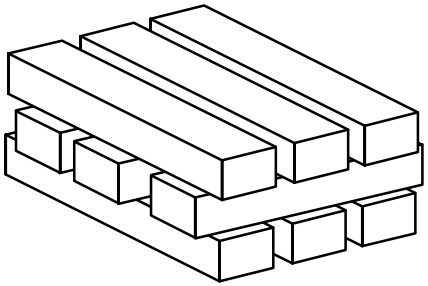
Leveraging/Cribbing Operation

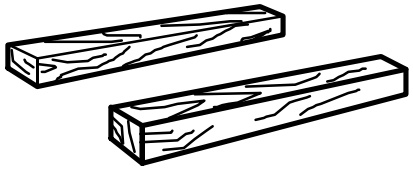
1. Conduct a size-up of the scene: gather facts, identify hazards, and establish priorities.
2. Have one person in charge and formulate a plan of action based upon the information you have received. Identify how and where to lift and crib.
3. Gather necessary materials for lifting/cribbing operations: lever, fulcrum, cribbing blocks, spacers/wedges.
4. Use cribbing materials to stabilize the object prior to lifting. (Set the foundation of the box crib.)
5. Distribute crib materials as necessary to be readily accessible during the lifting operation.
6. Prepare to lift the object: assemble the lever and fulcrum at the previously identified location.
7. Have someone available to handle the victim.
8. Initiate the lift, using the lever and fulcrum for mechanical advantage.
9. As the object is lifted, add cribbing as needed; build on the foundation of the box crib.
10. When the object is adequately supported, remove the lever and fulcrum. The victim may then be removed.
11. Reinitiate the lift and begin removing cribbing materials, reversing the process by which the crib was built.
12. Progressively lower the object to the ground.
13. Reassemble the lifting/cribbing supplies to be available for additional operations.

Arrangement For Leveraging/Cribbing Operation

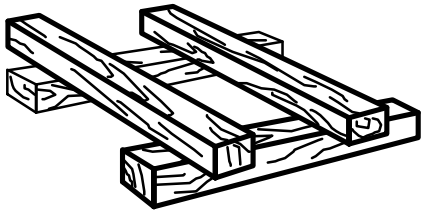


Box Cribbing

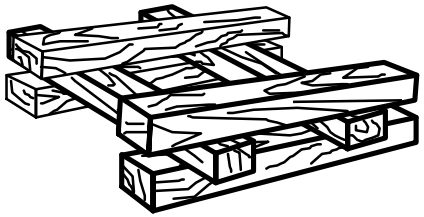




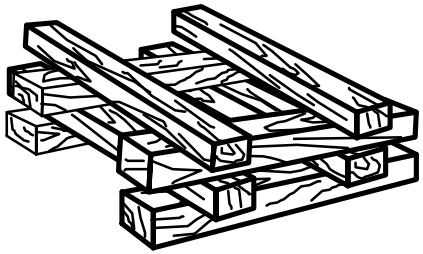
Step 1



Step 2



Step 3



Step 4

hapter VI

Disaster Psychology And Team Organization

In this chapter you will learn about:

- **Disaster psychology:** Psychological impact of a disaster on rescuers and victims, and how to provide "psychological first aid."
- **CERT team organization:** How to organize and deploy volunteer resources according to CERT organizational principles.
- **Documentation:** Strategies for documenting situation and resource status.

Pulling It All Together

In previous chapters you have learned specific strategies and tasks to use as a CERT member. In this chapter you will learn to pull those strategies together in the team environment, using the principles of the Incident Command System as a foundation.

Emergency response teams must be flexible, able to adapt to the needs of a changing situation. Part of the organizational challenge following a disaster is to be able to:

- Size up the scope and requirements of the situation.
- Identify resources as they become available.
- Deploy those resources in a coordinated manner.
- Continue the size-up, assessment, and deployment process on an ongoing basis as more becomes known about the post-disaster situation.

As an individual volunteer, you must be ready to function in various team roles perhaps wear more than one "hat" at a time or "change hats" as the availability of resources changes. You will begin by assessing and managing your own personal situation, then that of the immediately adjacent area (neighbors or coworkers), and then join others in forming response teams. This type of concentric development results in an evolving team structure and requires flexibility both in its members and its managers. In this chapter you will learn to use a basic organizational framework for flexible disaster response.

When response teams assist disaster victims, physical assistance may be only part of what victims need from the volunteer workforce. "Psychological first aid" for disaster-induced stress and trauma may also be required. In preparation for this role, we begin with an overview of the psychological impact of disaster on the disaster survivors.

Disaster Psychology

Phases Of A Crisis

Disaster survivors normally experience a range of psychological and physiological reactions, the strength and type of which depend on several factors:

- Prior experience with the same or a similar event.
- The intensity of the disruption.
- The length of time that has elapsed between the event occurrence and the present.
- Individual feelings that there is no escape, which sets the stage for panic.
- The emotional strength of the individual.

Survivors' reactions may become more intense as the amount of disruption to their lives increases. That is, the more the survivors' lives are disrupted, the greater their psychological and physiological reactions may become.

Some research studies have indicated that survivors go through distinct emotional *phases* following a disaster:

- In the *impact phase*, survivors do not panic and may, in fact, show no emotion. They do what they must to keep themselves and their families alive.
- In the *inventory phase,* which immediately follows the event, survivors assess damage and try to locate other survivors. During this phase, routine social ties tend to be discarded in favor of the more functional relationships required for initial response activities such as search and rescue and emergency medical operations.
- In the *rescue phase,* emergency services personnel, including CERTs, are responding and survivors are willing to take their direction from these groups without protest. They exhibit a sense of trust that their rescuers will address their needs and that they can then put their lives together quickly. This is why CERT identification, such as helmets and vests, is important.

Phases Of A Crisis (Continued)

- In the *recovery phase,* however, survivors may believe that rescue efforts are not proceeding quickly enough. That feeling, combined with other emotional stressors (for example, dealing with insurance adjustors and having to find temporary living accommodations), may cause survivors to pull together *against* their rescuers.

As CERT members, you should expect that survivors will show psychological effects from the impact of the event and that, at some point, some degree of psychological warfare will be directed toward you. You should expect to see a range of responses that will vary from person to person. You should not, however, take the survivors' comments and actions personally. Rather, approach these responses as part of the psychological impact of the event not related to anything that you or your fellow rescuers have done.

Post-Event Psychological And Physiological Symptoms

Following an abnormally stressful event such as a disaster, people normally experience a range of psychological and physiological reactions even as they put the pieces back together. The following are some common responses:

Psychological Symptoms

- Irritability or anger.
- Self-blame, blaming others.
- Isolation, withdrawal.
- Fear of recurrence.
- Feeling stunned, numb, or overwhelmed.
- Feeling helpless.
- Concentration and memory problems.
- Sadness, depression, grief.
- Denial.
- Mood swings.

Physiological Symptoms

- Loss of appetite.
- Headaches, chest pain.
- Diarrhea, stomach pain, nausea.
- Hyperactivity.
- Increase in alcohol or drug consumption.
- Nightmares.
- Inability to sleep.
- Fatigue, low energy.

Post-Event Psychological And Physiological Symptoms (Continued)

The intensity, timing, and duration of such responses will vary from person to person. They may be:

- Acute or mild.
- Immediate and/or delayed.
- Cumulative in intensity.

Children also may experience psychological or physical upset following a disaster. These feelings may not last long, but it is not uncommon to have disturbing reactions many months after the event.

> It is important to remember that emotional responses apply to both disaster victims and rescue personnel. Be alert to signs of disaster trauma in yourself and coworkers, and take steps to alleviate stress. Also, incorporate stress-relieving elements (exercise, rest, good nutrition) into your everyday life to better prepare yourself for disaster situations.

Humanizing The Rescue Operation

The rescue operation can be made more responsive to both survivors' and rescuers' psychological needs if their feelings are recognized. Psychologists encourage open, honest expression of emotions as a self-protection mechanism. To avoid "emotional overload," survivors and rescuers should be allowed to express their feelings openly as long as doing so does not interfere with the rescue.

> Listen, but try not to take ownership of others' feelings.

Emotional First Aid For Rescuers

To assist rescue workers in dealing with the effects of disaster-related stress, CERT managers should try the following approaches:

- *Brief Personnel.* Explain to rescue personnel before the rescue operation begins what they can expect to see and what they can expect in terms of emotional responses in themselves and others.
- *Emphasize Teamwork.* Sharing the workload and emotional load with team members can help to defuse pent-up emotions.
- *Rotate Personnel.* Encourage rescuers to rest and regroup and to avoid becoming overtired.
- *Encourage Breaks.* Encourage rescuers to take breaks away from the incident area, to get relief from the stressors associated with disaster.
- *Provide For Proper Nutrition.* Provide adequate food for rescue volunteers. Encourage them to stop and eat properly, drink water or other electrolyte-replacing fluids, and avoid drinks with caffeine or refined sugar.
- *Rotate Teams.* Team members can talk with each other about their experiences. This is very important to their psychological health. You are encouraged to talk with your buddy.
- *Phase Out Workers Gradually.* Do not remove rescuers from their duties abruptly. Allow rescuers to gradually stand down from the incident by working from high- to medium- to low-stress areas of the incident. Abrupt removal causes additional stress.

Furthermore, as a team, CERT members should organize a debriefing after the operation, in which workers are encouraged to describe what they encountered and how they felt about it. Experienced rescue workers find these steps helpful in controlling their own stress levels, but in some cases it may be necessary to seek help from mental health professionals.

Emotional First Aid For Victims

To assist disaster victims in dealing with the effects of disaster-related stress, try the following approaches:

- *Establish Rapport.* Talk to the victims. Encourage them to talk about their feelings as well as their physical needs.
- *Listen.* If the victim has something to say, take the time to listen.
- *Empathize.* Show through your response that you understand the person's concerns or worries and that such feelings are to be expected.
- *Provide Confidentiality.* Respect the person's confidence. Don't repeat personal information to other people.

Using these techniques will provide the survivor the initial comfort and support he or she needs in taking a first step toward recovery.

CERT Organization

In a disaster situation, emergency on-scene management is needed to ensure the safety of disaster workers, provide clear leadership for rescuers, and improve the effectiveness of rescue efforts.

The Need For CERT Organization

The CERT organizational framework in use today was created to address the following needs for local emergency operations:

- Effective communications among agency personnel.
- A well-defined management structure.
- Accountability.

The CERT structure now in use fulfills these needs, and also provides the advantages of:

- *Terminology* that contributes to effective communication and shared understanding.
- *Consolidated action plans* that coordinate strategic goals, tactical objectives, and support activities.
- *Comprehensive resource management* that facilitates application of available resources to the right incident in a timely manner.
- *Manageable span of control* that provides for a desirable rescuer/supervisor ratio of between three and seven rescuers per supervisor.

Objectives Of The CERT Organization

In a disaster situation, the objectives of the CERT organization are to:

- Identify the scope of the incident. *(What is the problem?)*
- Determine an overall strategy. *(What can we do, and how will we do it?)*
- Deploy resources. *(Who is going to do what?)*

Because the CERT organizational structure is flexible, it can change depending on the need to achieve these objectives.

CERT Structure

The following basic rules make up the foundation of the CERT organizational framework:

- Each CERT must establish a command structure.
- A CERT leader is appointed to direct the operations of the team.
- The location of the CERT leader is considered the Command Post for the CERT.
- The CERT leader may appoint members to assist with managing resources, services, and supplies (logistics).
- The CERT may operate as a single team that performs all functions as required.
- The CERT may be divided into small teams (ERTs) of at least three people to achieve specific goals (e.g., fire suppression, medical, search and rescue), with a leader for each ERT.
- In all situations, each functioning unit must have an identified leader to supervise tasks being performed.

Note that CERT personnel should always be assigned to teams consisting of at least three persons. One person will serve as a runner and communicate with the Command Post, and two people will "buddy up" to respond to the immediate needs. A diagram of the basic CERT structure is shown in the figure below.

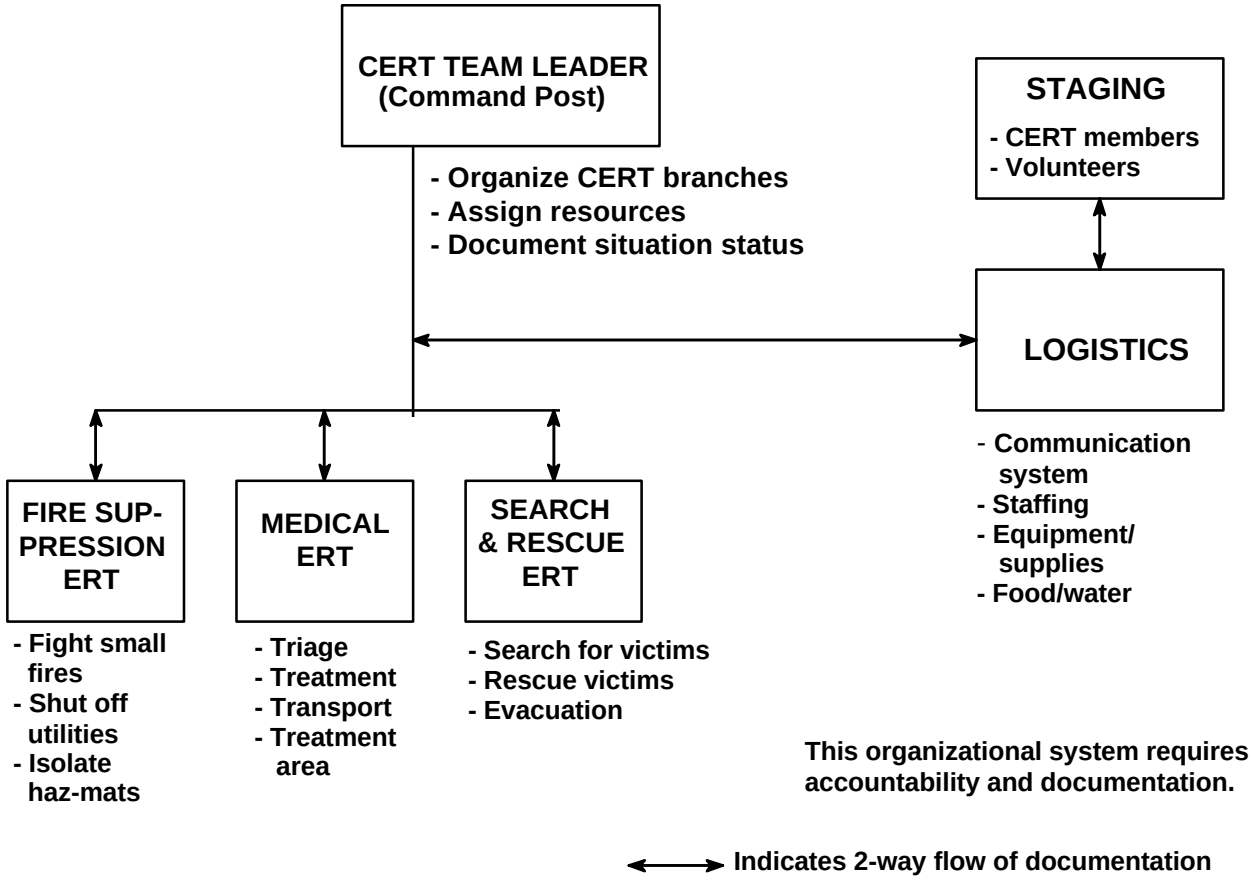


Figure VI-1. CERT Structure

Incident Command System

The Incident Command System (ICS) is the system used by fire and law enforcement personnel to manage emergency operations. CERTs are part of the Operations function of the ICS, as shown in the figure below. In a disaster situation, all CERTs report to the first fire or law enforcement official at their location and take directions from that person.

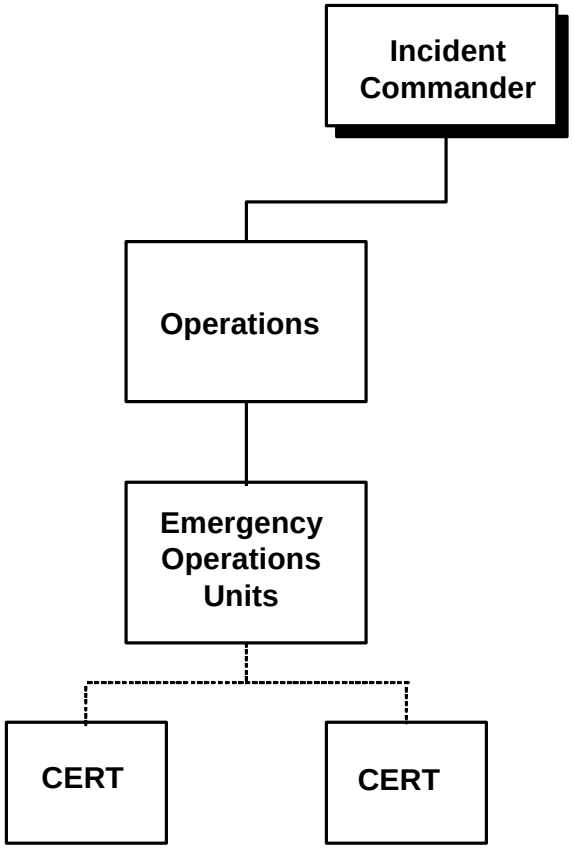


Figure VI-2. How CERTs Interrelate With The ICS

CERT Decision Making

CERT Mobilization

After a disaster incident has taken place, CERT organization proceeds in the following manner:

1. First, CERT members take care of themselves, their families, and their neighbors.

2. Then CERT members proceed to the staging area with their disaster supplies. Along the way, they make damage assessments that would be helpful for the CERT Team Leader's decision making.

3. The first CERT member at the staging area becomes the CERT Leader for the response. As other CERT members arrive, the CERT Leader makes team assignments, including the Logistics Team Leader who is responsible for maintaining the flow of CERT members into the staging area and tracking personnel and supplies. Other Team Leaders and team members are assigned based on their capabilities and the requirements of the incident.

4. As disaster intelligence becomes available through CERT members reporting to staging area, emergent volunteers, and functional group reports (e.g., search and rescue teams), the CERT Leader must prioritize actions and work with the functional team leaders to accomplish the CERT mission.

Remember that, following an incident, information and therefore, priorities will be changing rapidly. The CERT Leader must stay in close contact with the Logistics Team Leader and functional team leaders to ensure that CERTs do not overextend their resources or supplies.

Rescuer Safety

Effective scene management requires the formulation and communication of strategic goals and tactical objectives that are based primarily on the safety of rescue personnel. The question to ask is always: *Is it safe for the CERT members to attempt this rescue?* Answers to this question relate primarily to the degree of structure damage, as shown in the table below.

Degree Of Damage	*Should Rescue Be Attempted?*
Heavy	No – too dangerous to enter. Secure the perimeter and control access into the structure.
Moderate	Perform only quick and safe removals; limit onsite medical care to checking for breathing, stopping major bleeding, and treating for shock. Minimize the number of rescuers inside the building.
Light	Yes. Locate, triage, and prioritize removal of victims to the designated treatment area.

Table VI-1. CERT Rescue Efforts Based On Degree Of Damage

The Los Angeles City Fire Department has developed additional strategies for rescue efforts based on degree of damage. These strategies are presented on page VI-15.

Rescuer Safety *(Continued)*

STRATEGIES FOR DAMAGED STRUCTURES		
LIGHT	***MODERATE***	***HEAVY***
Superficial Damage, Broken Windows, Fallen Plaster, Primary Damage to Contents of Building	*Structural Stability Questionable Due to Fracturing, Tilting, or Displacement of Building Foundation*	*Partial or Total Collapse of Walls and/or Ceilings; Obvious Structural Instability*
1. Secure building utilities (as needed). 2. Establish and coordinate search and rescue teams with medical triage personnel. 3. Establish "I" and "D" treatment areas. 4. Primary Mission: Locate, triage, and prioritize removal of victims to designated treatment area. 5. Continue evacuation process until all victims have been removed and accounted for. 6. Re-assess structural stability and available resources for heavy rescue problems. Communicate and document location of trapped and/or missing persons to emergency personnel.	1. Secure building utilities (gas, electrical, water). 2. Gather information (victim locations). 3. Establish control person at exit and entry points. 4. Establish and coordinate two- to four-person rescue teams. 5. Primary Mission: Locate, stabilize, and immediately evacuate victims to a safe area while minimizing the number of rescuers inside the building. 6. Perform triage and other medical care in a safe area. 7. Continue rescuing lightly trapped victims until complete or no longer safe. 8. Continue size-up. 9. Communicate and document the location of heavily trapped or deceased victims.	1. Communicate the location and extent of damage to emergency services personnel. 2. Secure building perimeter and control access into the structure by untrained and well-intentioned volunteers. 3. From the exterior of the building, attempt to shut off gas (if it is possible and *safe* to do so). 4. Gather available information from survivors or witnesses for professional rescue teams.

This chart is used courtesy of the Los Angeles City Fire Department.

Table VI-2. Strategies For Damaged Structures

Rescuer Safety *(Continued)*

The involvement of various CERT operations for each type of damage is shown in the figure below.

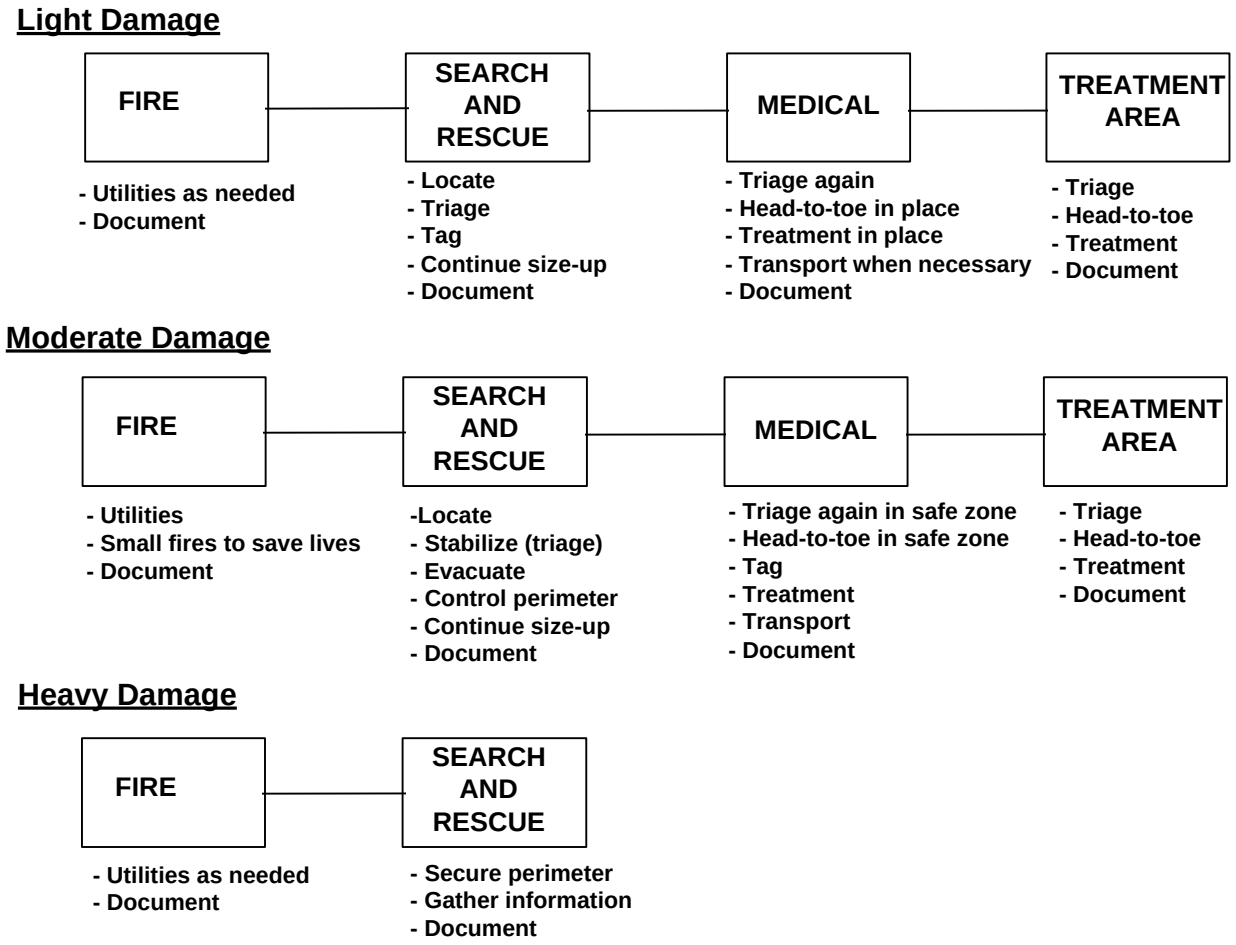


Figure VI-3. Involvement Of Functional Teams Based On Damage Level

Documentation

The Need To Document

It is vital to document and communicate information about situation and resource status at all levels throughout the response effort. Efficient flow of information makes it possible for resources to be deployed effectively and for professional emergency services to be applied appropriately. Under the CERT, each level of authority has documentation responsibilities:

- Response teams and their functional groups are responsible for providing the command post with ongoing information about damage assessment, group status, and ongoing needs.

- The command post is responsible for documenting the situation status, including incident locations, support locations, access routes, and identified hazards. This information is essential for tracking the overall disaster situation.

Forms For Documentation

Forms such as those described in the table below may be used to facilitate documentation and flow of information.

Form	*Purpose*
Damage Assessment Survey	☞ Completed by CERT leaders. Provides a summary of overall hazards in selected areas, including: - Fires - Utility hazards - Structural damage - Injuries and casualties - Available access ☞ Essential for prioritizing and formulating action plans.
Group Status Sheet	☞ Completed by functional group leaders. Used for: - Tracking personnel assigned to the group - Monitoring group accountability
Message Form	☞ Used for sending messages between command levels and groups. Messages should be clear and concise and should focus on such key issues as: - Assignment completed (or reason unable to complete assignment) - Additional resources required - Special information - Status update
Incident Status Record	☞ Used by the command post for keeping abreast of situation status. Contains essential information for tracking the overall situation.

Table VI-3. Forms Used For Response Documentation

Examples of these forms are shown on pages VI-19 through VI-22. (Full-size versions of these forms are also included following the Tabletop Exercise at the end of this chapter, for your CERT to copy and use.)

Forms For Documentation *(Continued)*

PAGE #:

PERSON REPORTING:

DATE REPORT: / /

PERSON RECEIVING:

TIME:

DAMAGE ASSESSMENT SURVEY

TIME	LOCATION/ADDRESS	FIRE		HAZARDS				STRUCTURE		PEOPLE			ROADS	
		BURNING	OUT	GAS LEAK	H2O LEAK	ELECTRIC	CHEMICAL	DAMAGED	COLLAPSE	INJURED	TRAPPED	DEAD	ACCESS	NO ACCESS

Figure VI-4. Damage Assessment Survey

Forms For Documentation *(Continued)*

Group Status Sheet

Group Leader: _____	*Group Assignment:*
Asst. Group Leader:_____	

Resources	Time	Inc. #	Assignment	Time Complete	Comments
TEAM 1					
MEMBERS:					
TEAM 2					
MEMBERS:					
TEAM 3					
MEMBERS:					
TEAM 4					
MEMBERS:					

Figure VI-5. Group Status Sheet

Forms For Documentation *(Continued)*

MESSAGE FORM

To:_____

From:_____

Time:_____

Message Center Use Only

Incident # : _____

Time : _____

Date : _____/_____/_____

☐ Incoming ☐ Outgoing

Message Text

Action Taken

Figure VI-6. Message Form

Forms For Documentation *(Continued)*

EMERGENCY RESPONSE TEAM

PAGE #

INCIDENT STATUS RECORD

DATE: / /

INC#	TIME	ADDRESS/LOCATION	FIRE	SAR	MEDICAL	TIME COMPLETED

Figure VI-6. Message Form

Forms For Documentation (Continued)

In addition to these forms, emergency response personnel use site maps and building plans to gain an overall view of the response situation. Site maps and building plans with plastic overlays are important tools for keeping an updated picture of response activities. Grease pencils or dry-erase markers may be used to mark incident locations, support locations, access, and hazards and to update the information on a continual basis. Color-coded symbols can be used to highlight areas of particular importance.

Summary

Post-Event Trauma

Following a disaster, children and adults may experience psychological and physiological symptoms related to the trauma. Symptoms ranging from depression to sleep disorders are common as survivors begin to rebuild their lives. The intensity and duration of the symptoms depend on the individuals' pre-event physical and mental state and on the length of time that they remain under stress.

Rescue workers should be alert to symptoms of disaster trauma in themselves, and CERT leaders must realize that team members are also undergoing emotional stress. Leaders can help team members deal with their stressors by:

- Briefing personnel.
- Emphasizing teamwork throughout rescue operations.
- Rotating personnel to the degree possible.
- Encouraging breaks.
- Providing for proper nutrition.
- Phasing out workers gradually.

To assist victims during this difficult period, CERT members can try several approaches, including:

- Establishing rapport with the victims.
- Listening carefully and empathizing with the victims' concerns.
- Keeping all conversations confidential.

CERT Organization

CERTs are part of the Operations function of the ICS. The CERT organizational framework provides for:

- Effective communications.
- Well-defined management structure.
- Accountability.
- Shared terminology.
- Consolidated action plans.
- Comprehensive resource management.
- Manageable span of control.

The objectives of the CERT are to identify the scope of the incident, determine an overall strategy, and deploy resources. The organizational structure is flexible, so it can change depending on the need to meet these objectives.

CERT Decision Making

The key question that CERT leaders must always ask is: *Is it safe for the CERT members to attempt this rescue?* Whether or not to attempt a rescue depends on the degree of damage to the structure involved:

- *When damage is light,* CERT members should search to locate victims, complete triage, and prioritize removal of victims to the designated treatment area.
- *When damage is moderate,* CERT members should locate, stabilize, and immediately evacuate victims to a safe area while minimizing the number of rescuers inside the building.

CERT Decision Making (Continued)

- *When damage is heavy,* CERT members should *not* attempt a rescue. Their primary mission in this case is to secure the building perimeter, control access into the structure, and communicate the structure's location and extent of damage to emergency services personnel.

Documentation

It is vital to document and communicate information about situation and resource status to all CERT levels throughout the response effort. Response teams and their functional groups must provide the command post with ongoing information about damage assessment, group status, and ongoing needs. The command post must document the situation status, including:

- Incident locations.
- Support locations.
- Access routes.
- Identified hazards.

There are several forms available to facilitate and standardize the documentation process. These forms include the:

- Damage Assessment Survey.
- Group Status Sheet.
- Message Form.
- Incident Status Record.

In addition to these forms, emergency response personnel use site maps and building plans to gain an overall view of incident locations, support locations, access, and hazards and to update the information on a continual basis.

Assignment

Before the next session:

1. Complete the take-home final examination.

2. Review your Participant Handbook and notes in preparation for the disaster simulation.

Bring the following items to the next session:

- Blanket
- Medical supplies (roller gauze, adhesive tape, 4 x 4 bandages, triangular bandages, cardboard)
- Search and rescue safety equipment (helmet or hardhat, goggles, dust mask, whistle, leather work gloves, appropriate clothing, sturdy work shoes)

Additional Reading

The references below are available if you would like to know more about the information in this chapter.

Landis, Pamela R. "Emergency Service Stress: Avoiding The Silent Slayer." American Fire Journal. Fire Publications, Inc. Bellflower, CA: July 1988.

McManus, Marianne. Quake Stress. Santa Monica, CA: California Psychological Publishers, 1988.

Mitchell, Jeffrey T. "When Disaster Strikes . . . The Critical Stress Debriefing Process." Journal Of Emergency Medical Services. Jems Publishing Co., Inc. Carlsbad, CA: January 1983.

Additional Materials
Chapter VI

CERT Tabletop Exercise

A Level IV hurricane has struck your coastal community. Although you evacuated the area at the time that the evacuation order was given, you know that many of the "old timers" in your neighborhood chose to stay and ride out the storm. Upon reentering your neighborhood, you are surprised at what you see. Many of the houses on your street have been washed off their footers by the storm.

As a CERT member, what are the first steps that you should take?

Your CERT staging area is located at the firehouse at Riverside and Main. On the way to the staging area, you find many streets impassable due to debris and fallen wires. Many of the newer homes in the community appear to have suffered moderate to heavy damage—several of them have trees across their roofs.

Upon arriving at the staging area, you check in and wait for an assignment. Damage information is coming in very quickly now. Among the reports that the CERT Leader receives are:

- A partial collapse of the shelter at 3d and Main that lost its roof in the wind. Initial reports indicate that as many as 50 persons may be inside the structure.

CERT Tabletop Exercise
(Continued)

- A fire in a single-family residence on 4th between Main and Secondary. The fire was caused by downed electrical lines. The structure is fully involved.
- The smell of gas in the area of the corner of Ocean View and Riverside.
- Several homes moved off of their footers along Beachfront Drive. Houses along this street are owned by older residents who refused to leave their homes. The woman at 2306 Beachfront is wheelchair-bound.

How would you prioritize the reports coming in? (Classify response priorities as high or low based on the information received.)

Given the supplies and equipment list on the following pages, how would you assign your resources?

CERT Tabletop Exercise
(Continued)

Supplies And Equipment Available

Medical Supplies	*Quantity*
Stretchers	4
Tarps	4
Blankets	10
Normal saline one-liter bottles	
Disinfectant	
Bandaging rolls	
Bandages	
Triangular bandages	
Splints	
Soap	
Adhesive tape	

CERT Tabletop Exercise
(Continued)

Supplies And Equipment Available *(Continued)*

Equipment	*Quantity*
Extinguishers 2A:40B:C	12
Shovels	4
Crowbars	4
Axes	4
AM/FM radios	3
Miscellaneous stationery supplies	
Flashlights	10

Forms For Documentation

PAGE #:	PERSON REPORTING:	DATE REPORT: / /
	PERSON RECEIVING:	TIME:

DAMAGE ASSESSMENT SURVEY

TIME	LOCATION/ADDRESS	FIRE		HAZARDS				STRUCTURE		PEOPLE			ROADS	
		BURNING	OUT	GAS LEAK	H20 LEAK	ELECTRIC	CHEMICAL	DAMAGED	COLLAPSE	INJURED	TRAPPED	DEAD	ACCESS	NO ACCESS

Group Status Sheet

Group Leader: _____ Asst. Group Leader:_____	*Group Assignment:*

Resources	Time	Inc. #	Assignment	Time Complete	Comments
TEAM 1					
MEMBERS:					
TEAM 2					
MEMBERS:					
TEAM 3					
MEMBERS:					
TEAM 4					
MEMBERS:					

MESSAGE FORM

To:_____

From:_____

Time:_____

Message Center Use Only

Incident # : _____

Time : _____

Date : _____/_____/_____

☐ Incoming ☐ Outgoing

Message Text

Action Taken

EMERGENCY RESPONSE TEAM

INCIDENT STATUS RECORD

PAGE #

DATE: / /

INC#	TIME	ADDRESS/LOCATION	FIRE	SAR	MEDICAL	TIME COMPLETED
