



Electricity, Natural Gas and the First Responder

A handbook for recognizing and handling electric
and natural gas hazards in an emergency.

HANDBOOK



Electric and Natural Gas Hazards and the First Responder



We Energies is committed to working with emergency personnel to assist in the safe and efficient handling of dangerous situations.

Introduction

This booklet is a guide for first responders and other emergency personnel who confront fires and other emergencies that involve, or pose the threat of, electricity and/or natural gas. The booklet contains information on electric and natural gas devices and how to deal with electric and natural gas emergencies. It is not intended to establish or replace any fire or emergency personnel training guidelines or policies covering this subject. Because fire and police personnel are often the first to arrive at the scenes of fires and emergencies, they should be able to identify electric and natural gas equipment and know how to handle fires involving electric and natural gas equipment.

Be sure to inform We Energies in the event of an electric and/or natural gas emergency. We have specialized knowledge, expertise, tools and equipment to handle any electric and/or natural gas hazard found on the scene. We can help you stay safe around unforeseen electric and/or natural gas hazards that may arise as the emergency progresses.

We are ready 24 hours every day of the year to provide assistance during emergencies. We have dedicated emergency numbers for public safety agencies – do not distribute these numbers to the public. Either number listed below may be called during an emergency.

888-296-4937

or

800-292-7098

Program these numbers into your cell phone so you have them when you need them.

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Utility Safety Pre-Test

Name: _____

Date: _____ Employee #: _____

1. Natural gas is toxic and will kill you if you breathe enough of it.	T	F
2. Natural gas is heavier than air.	T	F
3. Carbon monoxide is a toxic gas.	T	F
4. Carbon monoxide levels of 50 ppm can cause death.	T	F
5. High-pressure gas leaks can easily migrate under a frost cap through sewers or soil layers.	T	F
6. Natural gas has a lower explosive limit (LEL) of approximately 4 percent and upper explosive limit (UEL) of 5 percent.	T	F
7. Static electricity is hot enough to ignite natural gas.	T	F
8. Modern vehicles cannot ignite natural gas.	T	F
9. Police and fire department vehicles will not ignite natural gas.	T	F
10. Compressed natural gas (CNG) vehicles are only in use in Europe and California.	T	F
11. All downed wires should be treated as energized until tested and grounded dead by utility personnel.	T	F
12. Wooden pike poles will not conduct electricity.	T	F
13. The best way to de-energize power to a home where overhaul will be conducted is to pull the electric meter.	T	F
14. If a car hits a pole and wires are down, the best action for the driver to take is to stay in the vehicle.	T	F
15. Aerial ladders cannot conduct electricity because of the steel-belted radial tires found on most modern trucks.	T	F
16. All electric wires are insulated.	T	F
17. Secondary voltage is not enough to stop your heart.	T	F
18. Only tested and approved rubber gloves can be counted on to protect you from electrocution.	T	F
19. If your equipment contacts electrical wires, you should stay on the equipment, warn others away and move the equipment away from the wires, if possible.	T	F
20. We Energies can be called 24 hours a day to provide emergency service to fire departments that need help.	T	F

Answers for this pre-test are found on page 29 of this brochure.

Prevention/Safety Reference Information

National Fire Protection Agency (NFPA 54, NFPA 70)

NFPA 54 is the National Fuel Gas Code. It is a consensus standard that covers fuel gas delivery systems and utilization devices for LP gas and natural gas.

NFPA 70 is the National Electric Code. It is a consensus standard that covers electric delivery systems and utilization devices.

Both codes are used by utilities and building and fire inspectors to determine if electric and natural gas installations meet the code. Both codes are guidelines unless they have been adopted by ordinance in your community.

If you deal with natural gas or electric delivery and utilization systems or inspect them periodically, you should use the most current versions of NFPA 54 and NFPA 70.

If you have questions about specific applications of the code and how they relate to natural gas or electric facilities, call We Energies.

Consumer Product Safety Commission (CPSC)

The CPSC is a governmental body that publishes safety information on a variety of consumer products related to electric and natural gas safety. Examples include flexible connector recalls and ratings of home carbon monoxide detectors. Fire department prevention bureaus and inspectors can gain important information by using the CPSC's website at www.CPSC.gov.

DIGGERS HOTLINE

Damage to electric and natural gas facilities caused by third parties such as contractors and excavators is the leading cause of injury and property damage involving electric and natural gas utilities. For this reason, One-Call Systems are in place across the country to make it easy for excavators to have electric and natural gas facilities located prior to digging. Diggers Hotline is Wisconsin's one-call provider.

Underground facilities owners such as We Energies are required to belong to Diggers Hotline and to respond to locate requests within three business days of notification.

Excavators are required to call Diggers Hotline three working days prior to disturbing the soil.

If you observe excavators working around electric and natural gas facilities without the required locate marks or flags, call We Energies. We will investigate and make sure the contractor is aware of state law requiring utility notification, verification that hazards do not exist and that public safety is provided for.

Also, fire prevention bureaus can contact Diggers Hotline to obtain free information to distribute to homeowners and excavators.

**Call Diggers Hotline at 811
or 800-242-8511**



911/PSAP Dispatcher Considerations

911 and Public Service Answering Point (PSAP) dispatchers have an important role in electric and natural gas emergencies. They collect and forward information needed for emergency responders to handle utility emergencies. In some cases, we will call dispatchers for assistance. In other cases, fire and police departments will call for emergency assistance from us.

In both cases, clear, concise and accurate information must be relayed to the correct group or agency. Make sure the exact nature of the request is known when you call us for emergency response. We have a “staggered” or “tiered” response protocol for various situations. Knowing exactly what type of help is needed will get your agency the help it needs as quickly as possible. 911 dispatchers may need to ask field units for additional information in order to provide this type of specific information to our dispatchers.

911 dispatchers also need to know that there may be more than one utility that serves their response area. Calling the wrong utility can delay response or, in some cases, may even prevent us from knowing about the emergency.

Even when the same utility provides both natural gas and electric service, individual emergency numbers may need to be called for each service. 911 dispatchers need to make sure they know who provides which type of utility service for the jurisdiction for which they provide dispatching coverage. In addition, they need to know the appropriate emergency number for that utility.

Most utilities will periodically send out service area maps along with notification numbers and procedures. If you are not sure, call to verify the correct area and procedure for your jurisdiction.

If we work together and have specific operating procedures and protocols, utility emergencies will be handled safely and correctly.

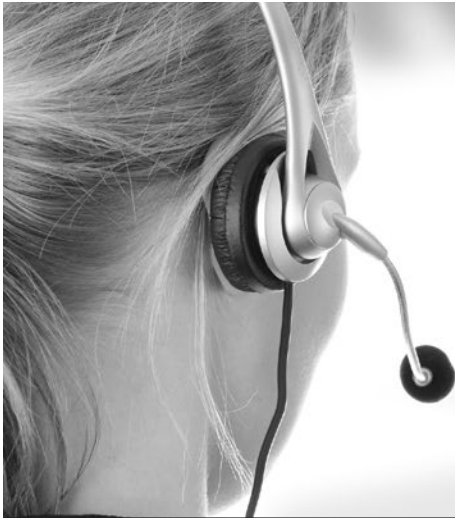
GENERAL DISPATCH PROCEDURES

- 1 **Follow your department’s standard operating procedures for electric or natural gas emergencies.**
- 2 **Call our Public Safety Agency dedicated phone lines as soon as you know you need our assistance. These phone lines place your call at the top of our answering queue. 888-296-4937 or 800-292-7098**
- 3 **Provide specific details about the situation:**
 - Original caller's description of the problem
 - Address, intersection or pole number closest to the emergency
 - Nature of emergency: building fire, wires down, car/pole accident, wire contact, natural gas odors, natural gas leaking or blowing, etc.
 - Assistance required
- 4 **Provide contact info for your on-site personnel and location of incident command post.**



If a natural gas odor or leak call – don’t phone the location. A ringing phone can ignite natural gas.

911/PSAP Dispatcher Considerations



Emergency phone numbers

888-296-4937

or

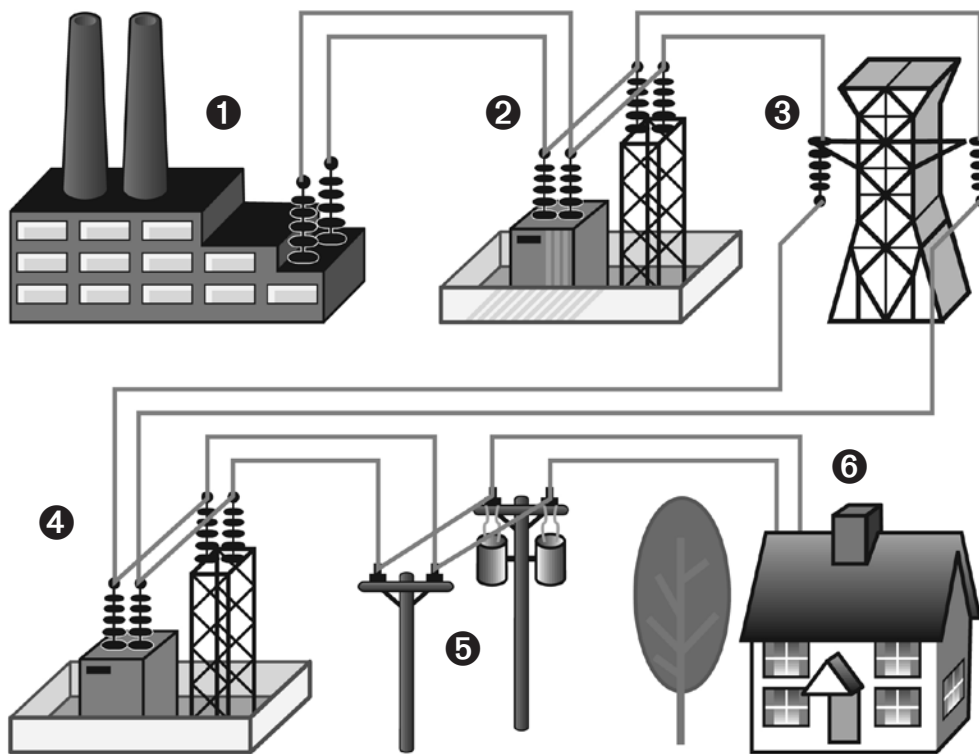
800-292-7098

SUGGESTED CALL RESPONSES

	NATURAL GAS EMERGENCY	SITUATION	ADVICE TO CALLER
NATURAL GAS ODOR	Inside Natural Gas Odor	Slight "rotten eggs" natural gas smell coming from inside building	<ol style="list-style-type: none"> 1. Don't use light switches or electrical devices. 2. Don't smoke or use open flame devices. 3. Open doors and windows to ventilate the area. 4. Leave the area if odor becomes too strong. 5. Keep others away from the area. 6. Await assistance from the fire department or natural gas utility.
	Outside Natural Gas Odor	Slight "rotten eggs" natural gas smell coming from outside building	<ol style="list-style-type: none"> 1. Keep ignition sources, such as lit cigarettes, matches, open flames and vehicles, away from the area. 2. Close doors and windows unless odor is strong inside building. 3. Leave the area. 4. Await assistance from the fire department or natural gas utility.
NATURAL GAS LEAK	Inside Natural Gas Leak	Strong "rotten eggs" natural gas smell or blowing/leaking natural gas coming from inside building	<ol style="list-style-type: none"> 1. Exit the building immediately. 2. Leave doors open for ventilation as you go. 3. Don't smoke or use open flame devices. 4. Don't use light switches or electrical devices. 5. Shut off natural gas at meter if it can be done safely. 6. Leave the area. 7. Await assistance from the fire department or natural gas utility.
	Outside Natural Gas Leak	Strong "rotten eggs" natural gas smell or blowing/leaking natural gas coming from outside building	<ol style="list-style-type: none"> 1. Leave the area immediately. 2. Keep ignition sources, such as lit cigarettes, matches, open flames and vehicles, away from the area. 3. Await assistance from the fire department or natural gas utility.
NATURAL GAS FIRE	Natural Gas Fire	Natural gas burning behind the range, dryer, meter unit, etc.	<ol style="list-style-type: none"> 1. Shut off the source of the natural gas if it can be done safely. A safe example would be if the meter valve or appliance valve is away from the fire. 2. Leave the area. 3. Await assistance from the fire department or natural gas utility.

We Energies uses nearly 30,000 miles of transmission and distribution lines to get electricity to our customers. Knowing how electricity gets to homes is important during emergency situations.

Transmission facilities are not owned by We Energies, but may pass through your local community. You can obtain safety information for transmission towers by contacting American Transmission Company.



- 1 Electricity leaves a power plant.
- 2 The voltage is increased at a "step-up" substation.
- 3 The energy travels along a transmission line to the area where the power is needed.
- 4 Once there, the voltage is decreased or "stepped-down" at another substation.
- 5 The "stepped-down" voltage travels along a distribution line.
- 6 The electricity reaches a home or business.

DOWNED WIRES

Treat all downed wires, including telephone and cable television wires, as energized and dangerous until proven otherwise. It is impossible to determine by its appearance if a wire is energized. While some wires will jump, whip around, curl up, make loud sounds or emit showers of sparks, others will lie silent – and deadly.

When you arrive at the scene of a downed wire or broken pole:

1. Establish a safety zone that only authorized persons may enter.

The safety zone should extend a minimum of two full span lengths of wire in each direction beyond the downed wire. When establishing the safety zone, keep the following items in mind:

- Stresses may be placed on poles adjacent to the downed wire causing them to break and fall.
- Wires can slip through insulators and sag to the ground in adjacent spans of wire.
- Always be on the alert for conductive materials that may be in contact with the fallen wire such as metal fences, guard rails and metal buildings. The safety zone will have to be increased to include them.
- Continue to guard the scene until relieved by a We Energies employee or other authorized person.
- Be aware that when a body is in contact with a wire it may be energized. Do not touch the injured individual until the wire has been cleared from the body.

2. Notify We Energies as soon as possible. Include information such as:

- Nature of incident.
- Is life in danger?
- Exact location. The pole tag numbers of each pole involved and adjacent poles are helpful in gathering needed information. However, they should only be obtained if your safety and the safety of the general public is not compromised.
- Any other hazards involved.

3. Never attempt to move or cut any downed conductors.

Only electric utility employees, using approved procedures and highly specialized tools, should move or cut any wire.



Other safety points around downed wires:

1. Wood or fiberglass pike poles are not the same as the insulated hot sticks used by electric utility employees. They most likely contain sufficient moisture and/or are contaminated enough to be conductive.
2. Any high-voltage wire, when disturbed, can get out of control. It may dance about, curl up and strike you or bystanders.
3. Keep in mind that your firefighter's boots are only designed to keep your feet dry. They will not insulate or isolate you from a voltage source.
4. High voltage wires are not insulated. The protective coating found on some wires is to protect the wire from damage, not to insulate it.
5. Be particularly wary during storms or hours of darkness. It is often difficult to see downed or sagging wires. Always use a light when moving about.

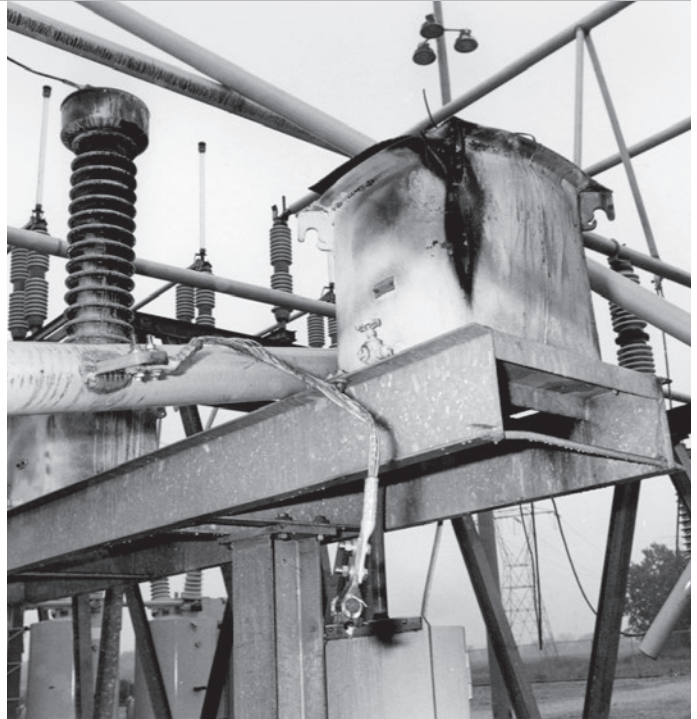
SUBSTATIONS

First responders should never enter an electric utility substation unless accompanied by an authorized We Energies representative. Our trained employees can walk you through the substation safely by identifying specific equipment and the voltages that are present. Only our trained employees have the ability and knowledge to de-energize a substation.

If an authorized We Energies representative is not on-site when you arrive, immediately notify us. We've included a listing of dedicated phone numbers for your use in the back of this booklet. Be sure to protect the surrounding property and stand by until our representative arrives.

The hazards you may encounter include:

1. High-voltage lines entering the substation, both overhead and underground.
2. Open high-voltage bus work (conductors, wire and aluminum pipe) crisscrossing the station at a relatively low height. Never drive beneath overhead structures without specific approval.
3. Oil-filled switch gear, transformers, regulators and capacitors. Oil is the major firefighting concern. The only practical way to extinguish the fire is to cool the oil below its ignition temperature (400° F). A spray or fog stream, rather than a straight stream, works best.
4. Toxic smoke and gases due to burning oil and insulating materials.
5. Collapsed steel framework and aluminum bus work caused by the intense heat of a fire.
6. Explosions from oil-filled equipment, both overhead and at ground level.
7. Exploding glass and porcelain insulators. The yard stone may spall and throw fragments with considerable force.
8. Falling wires, both inside and outside the substation.



CAUTION: Some equipment, such as circuit switches and breakers, have porcelain housings that are pressurized with SF-6 gas. If they are involved in the fire and sprayed with water, the sudden temperature change may cause a violent failure.

Privately Owned and Municipal Substations

Fire departments should contact the owners of these stations to develop a pre-emergency plan. In most cases, the primary power entering the substation is provided by the local utility, and they should be included as part of the plan.

Do not try to salvage any electrical apparatus, transformer or switch that is on fire. There is nothing in the substation worth a fire-fighter's life.

Never operate electric utility high-voltage switches that are within a substation property, mounted on poles, or located within manholes or vaults. Many of these switches are not designed to drop electric load. Attempting to open the switch could cause an explosion or flashover and create an extremely hazardous situation.

CAR/POLE ACCIDENTS

Arriving at the Scene

When you arrive at the scene of a vehicle accident involving electrical equipment or wires, address all potential hazards before reacting to the accident itself. There may be downed wires or wires hanging low to the ground that are energized. These wires may energize other objects they are in contact with such as guard rails, fences, or telephone and cable television wires. Also, be aware that overhead conductors could fall any time as a result of the accident.

You must remain alert. As in any emergency, do not develop a false sense of security because the wire and/or electrical equipment involved appears harmless.

As outlined in the section on downed wires, establish a safety zone and notify We Energies. If there appears to be a possibility of fire, lay out hose lines. Use a spray or fog nozzle rather than a straight stream nozzle.

If there are not enough personnel on hand to accomplish these tasks, delegate bystanders to make phone calls and help maintain the safety zone.

Helping Individuals in a Vehicle

You should always be cautious while approaching a vehicle. Remember, the vehicle and anything attached to it (such as a camper or trailer) may be energized at hazardous voltages. Without endangering your life, get as close to the vehicle as possible, but no closer than 10 feet. This is to provide a margin of safety in case an occupant suddenly opens a vehicle door. With a calm, authoritative voice, gain the attention of the people inside the vehicle. Tell them they are safe as long as they remain in the vehicle and that help is on the way. Be careful not to frighten them any more than they already are.



Gain their confidence and trust, and stay with them until the emergency is over. The vehicle occupants have one overriding thought in mind: to get out of the vehicle. If you were to leave them, even for a short period of time, they might feel the emergency is over or they may once again become frightened and attempt to leave the vehicle. In dire emergencies and under ideal conditions, the driver can try to start the vehicle and carefully drive or back the vehicle out from under the wires. Be aware that the wire may weld itself to the vehicle body or become lodged behind a bumper or door handle.

If it is imperative to have the occupants exit a vehicle in contact with a conductor (for example, the vehicle is burning), they must not contact the ground and any part of the vehicle at the same time. In most cases, this is an extremely dangerous maneuver because secure footing is unavailable. Coach the occupants to jump as far as possible away from the vehicle to avoid any contact and/or falling back onto the vehicle. Once on the ground, they should use small shuffling steps to move a safe distance away from the vehicle.

UNDERGROUND LINES AND EQUIPMENT

We Energies has two separate underground electrical distribution systems. One is a conduit system, the other a direct burial system (URD). While both systems utilize wires and cables that run underground, they differ from each other dramatically. The hazards presented by each system also are unique.

Conduit system

Conduit systems are usually located in metropolitan areas. URD systems may be found in metropolitan areas, but are more prevalent in suburban and rural areas.

The conduit system consists of lead-covered, high-voltage cables; rubber-covered, low-voltage cables; and transformers and switch gear. These are located in manholes, vaults, cable manholes and throughout a system of concrete covered ducts.

Under normal conditions, the insulation and lead sheath covering these cables provide adequate electrical protection. However, an electrical failure of a cable could result in an explosion and/or fire. In addition, gases from failed cables could accumulate in manholes or vaults providing another potential explosion source. Natural or manufactured gases may also seep into manholes, vaults or tunnels through conduit runs and broken sewers.



CAUTION: Unless human life is at stake, there is no great urgency to extinguish the fire or enter a manhole. Maximum damage to its contents has already taken place.

When attempting to cope with a fire or explosion in a manhole a first responder should:

1. Call We Energies. Give the location, number of manholes involved and nature of emergency.
2. Establish a safety zone. Keep the public away and route traffic around the area.
3. If the cover is in place and smoke is coming from the holes in the cover, do not attempt to remove it until the conditions have been thoroughly discussed with an authorized We Energies representative. If flammable gases are present in the manhole, removing the cover may provide sufficient air to cause an explosion. If the transformer has failed and the oil is above the ignition temperature, removing the manhole cover may cause a backdraft. The resulting explosion could seriously harm you and others nearby.

A spark resulting from removing the cover may cause a gas explosion in the manhole. If there are gases present in the duct package that runs manhole-to-manhole, there may be additional explosions in other manholes.

Explosions in manholes can propel a manhole cover (which weighs approximately 270 pounds) a significant distance. Maintain a safe distance and be prepared to evacuate the area quickly if an explosion occurs.

4. If the manhole cover is off, do not enter the manhole or take any further action until the conditions have been discussed with an authorized We Energies representative. Manholes must always be treated as highly hazardous confined spaces. Except for rescue in coordination with a We Energies representative, a first responder should never enter a manhole.

Direct Burial (URD)

The direct burial system consists of wires and cables buried in the ground. High-voltage switchgear and transformers are contained in metal enclosures mounted on top of concrete pads on the ground. Pedestals (small upright metal boxes) stand above ground and are connection points for underground low-voltage cables (120 to 240 volts).

Never open ground-mount electrical equipment or attempt to extinguish a fire involving the equipment until it is de-energized by We Energies personnel. There are two reasons for this:

- You risk electrocution if you open energized ground-mount electrical equipment.
- Any piece of electrical equipment will continue to burn until it is de-energized, regardless of the method employed to extinguish the fire. If one is on fire, nothing can be done to save it. It is already beyond repair.

If the emergency involves a motor vehicle running into a piece of ground-mount equipment, it should be handled as if it were an electrical wire on a vehicle. If the car is no longer in contact with the equipment, continue to treat the metal equipment enclosure as energized at high voltage.

AERIAL EQUIPMENT

Whenever possible, contact We Energies to de-energize electrical lines in advance of working with aerial equipment.

If action is needed before you contact We Energies, use extreme caution when positioning fire department apparatus at the scene of a fire. Never park vehicles near or under overhead electrical conductors. The heat of the fire could cause a wire to melt or burn.

Position aerial ladders and articulating booms as far away as possible from overhead wires. While the requirements of the law allow the aerial device to be as close as 10 feet to a wire energized at 50,000 volts, that is too close to be safe. Operator error, or one of the outriggers settling slightly into the ground, may cause the boom or aerial ladder to swing into the wire or become dangerously close.

If any part of the aerial apparatus comes into contact with an electrical conductor, the entire vehicle must be considered energized at high voltage.

If the aerial device is an articulated arm, the firefighter in the basket should immediately rotate the arm away from the wire, cradle the arms and reposition the vehicle.

If the apparatus is an aerial ladder, the vehicle should be considered energized at high voltage and guarded as such. As long as the firefighter on the vehicle remains still and does not touch the wire or any other object such as the building, they will remain safe from electric shock. Remember, if you touch the wire and contact any other object you will provide a path to ground and will most certainly be injured and possibly killed. Immediately request that the line be de-energized. When the line has been de-energized, the vehicle can be considered operational. Ideally, the vehicle should be relocated.

As in most overhead wire contacts, those who are at the highest risk of electric shock are those who are in contact with the ground such as firefighters at the end of the hose lines or anyone who touches the energized truck while standing on the ground.

STRUCTURE FIRES

In residential and commercial buildings, it is seldom necessary to interrupt the electric service to the entire building. It is usually best to leave the power on as long as you safely can. The electric power may be useful for lighting during firefighting, evacuation and overhaul operations. It also may be useful in running pumps, fans and other power equipment needed to minimize property damage.

When safe firefighting tactics require the power to be shut off, use the following actions as appropriate:

1. First, de-energize the fire-affected area by removing the fuses or opening circuit breakers or safety switches as needed.
2. Open the main disconnects to de-energize the entire building.
3. If the building is damaged to the extent that the service is no longer required, or if the main disconnects cannot be utilized, the power supply to the building should be interrupted. This should only be done by an authorized We Energies representative.



Never pull an electric meter to de-energize the building. Meters are not switches. They have been known to explode, sending out a shower of razor-sharp glass splinters.

Reasons for not removing a meter include:

1. Pulling an electric meter may not de-energize the electric service to the building.
 - Services over 200 amperes are metered by current transformers. Pulling the electric meter will not shut off the electric supply to the building.
 - Some meter bases are equipped with automatic bypasses. When the meter is removed, the bypasses close and the building remains energized.
 - People have developed many unique methods to bypass the meter. While We Energies continually looks for these dangerous and illegal practices, we can't guarantee they don't exist.
2. If explosive gases are present in the building, the service wire piping can act as a chimney. A small amount of gas may be present in the meter socket and pipe. When the meter is removed, a small arc will occur and the gas may explode.
3. If the meter glass is exposed to the heat of a fire, it can build up internal stresses and explode on contact.
4. After an electric meter is removed, the energized contacts in the meter socket are left exposed. The exposed contacts present an electrical hazard to anyone who is near the meter base.



CAUTION: Use extreme caution when installing and removing roof ladders and stay a safe distance away from overhead conductors. Contact with an overhead electric line can cause serious injury or death.

POLE AND POLE-MOUNTED EQUIPMENT FIRES

Most pole fires are caused by lightning, equipment failure or insulator breakdown (broken or contaminated by salt spray or air pollution).

If a grass or small brush fire is burning under power lines or around poles, use standard firefighting practices to extinguish the fire. If the pole bases are deeply charred, contact We Energies. We will inspect the poles for possible replacement.

If there is a downed wire involved in the fire, use a spray stream to keep the fire in check and protect the surrounding area.

If the fire is near the top of the pole or is in pole-mounted equipment and it appears that the fire will not endanger life or property, let it burn. Most pole-mounted equipment contains oil. If the equipment is still energized, little can be done to extinguish the fire, as the oil will continue to re-ignite. Notify We Energies and protect the area as outlined in "Downed Wires."

In rare cases where the fire must be attacked and the electric equipment has not been de-energized, use extreme care. The extinguishing agents of choice are dry chemical or water spray. If the pole or cross arm continues to burn, chances are one or more insulators are broken. There is little that can be done until the line is de-energized.



CAUTION: Never use a straight stream. Although the firefighters manning the hose line may be far enough away to be safe, the distances between wires or from a wire to a ground source are not sufficient to prevent a flash over (arc) caused by a straight stream. Thus, you may burn down the wire and nothing would be gained.

ANIMAL RESCUE

The fire department is usually the first to be called upon to rescue cats or other animals that have climbed utility poles. There have been times when firefighters have lost their lives while attempting to rescue animals. All of these calls should be turned over to We Energies. In most cases, these animals will return to the ground if left alone.

If you are attempting to rescue an animal from a tree, check carefully for nearby over-head lines. Power lines in trees are particularly difficult to see. Identify their location before going aloft. Never touch a power line or allow a tree branch to make contact.



CAUTION: It is difficult to tell utility lines apart. It's safest to assume all overhead lines, including cable and phone, are energized.

SUMMARY

Remember the following principles when dealing with electrical emergencies:

1. Call We Energies or the local power company.
2. Treat all wires as dangerous and energized at high voltage.
3. Exercise extreme caution when approaching the scene of an electrical emergency.
4. Establish a safety zone at the scene of an electrical emergency. Prevent all unauthorized persons from approaching the scene.
5. Continue to guard the scene until relieved by an authorized utility representative.
6. Never tamper with energized wires or equipment. Your primary responsibility is to save lives, including your own.

G

NATURAL GAS HAZARDS

Natural Gas Distribution

PROPERTIES OF NATURAL GAS

Natural gas by itself will not burn. Before it will ignite, it must be mixed with air in a proportion of approximately 4 percent to 15 percent gas in air. Unless the gas-to-air ratio is within this range, natural gas will not ignite.

Natural gas is non-toxic. However, it is a simple asphyxiant. If an enclosed area contains enough natural gas to displace the oxygen, people could suffocate from a lack of oxygen as they would if they were drowning in water.

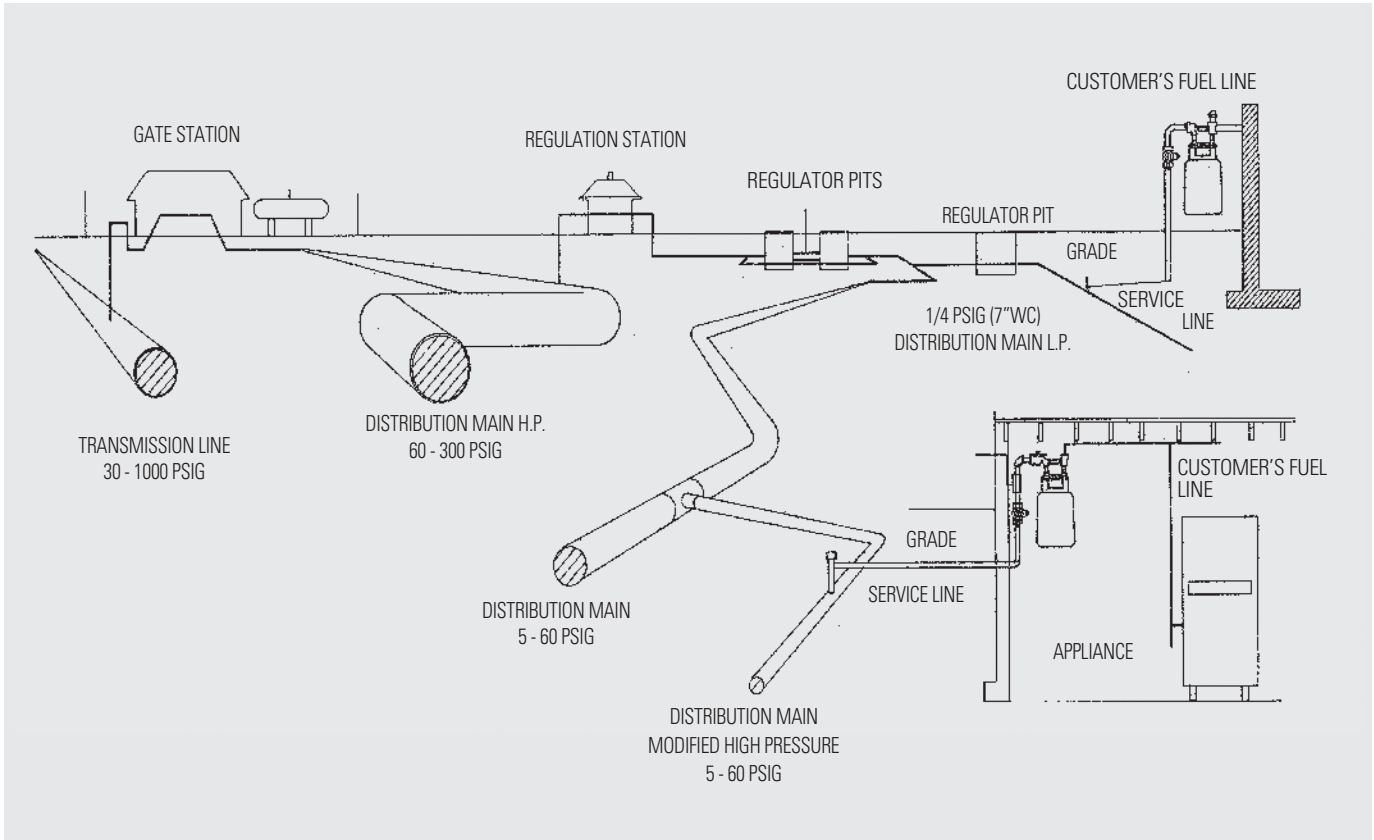
When it is burned properly, the major by-products of combustion are harmless carbon dioxide and water vapor. However, if it is not burned completely, dangerous carbon monoxide gas can form.

Natural gas is the predominate fuel for heating in Wisconsin and much of the nation. In addition, cooking ranges, water heaters, clothes dryers and other household appliances use natural gas.

Natural gas is used by retail stores, office buildings, churches, schools, restaurants, public buildings, theaters and other types of buildings for heating, cooling and to run appliances.

Compressed natural gas is becoming more popular as a safe, economical alternative fuel for automobiles, trucks, buses and industrial equipment, such as forklifts.

Factories use natural gas for cooling, space heating and industrial processes such as the heat-treating of metals and drying procedures.



TRANSMISSION FACILITIES

We Energies receives its natural gas from large pipeline companies. This gas is compressed in large diameter pipelines at high pressure (300 to 1,000 p.s.i.) from natural gas fields in Texas, Louisiana and other locations. These pipelines are not owned by We Energies, but may pass through your local community. Obtain safety information for these pipelines directly from their owners.

LOCAL DISTRIBUTION

Natural gas enters the local pipe distribution system through facilities called gate stations. At gate stations the natural gas is metered, reduced in pressure, and an odorant is added to make the gas easier to detect.

PIPING SYSTEM

Natural gas is supplied to homes and other buildings by means of underground gas mains and service laterals.

The We Energies underground distribution system is composed of thousands of miles of gas mains and hundreds of thousands of gas service laterals.

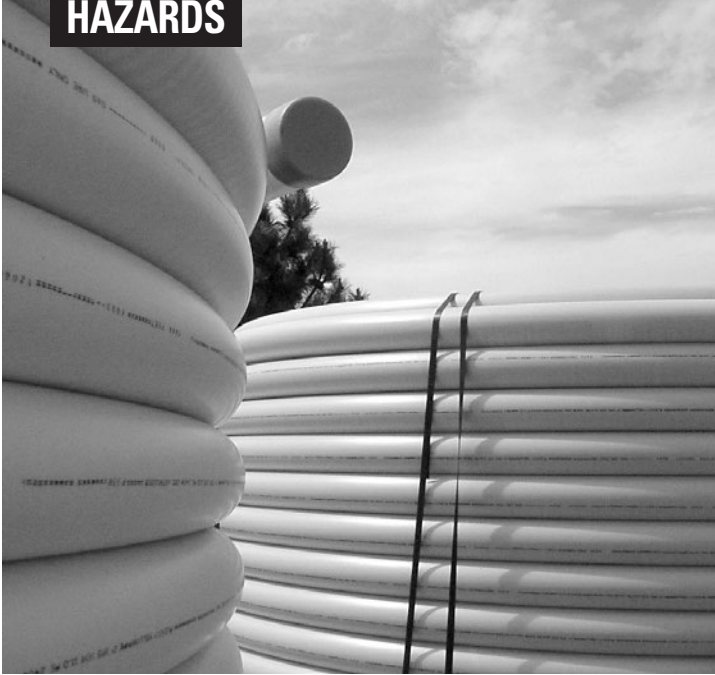
In the 1920s and 30s, cast iron pipes were used for gas mains. Later, pipe materials such as steel and special plastics became available.

In the 1950s, the company began a long-term program to replace all cast iron pipe, first with coated steel pipe and later with newly developed plastic pipe. Both of these are used extensively today.

G

NATURAL GAS HAZARDS

Natural Gas Distribution



The system in the Milwaukee area was renewed by inserting plastic pipe inside the old cast iron. The system now is composed almost entirely of plastic and steel pipe.

Natural gas mains are usually located underground in roadways or under the grassy areas between curbs and property lines. Some mains are located on private property. We Energies has records showing the locations of all mains and service laterals in its distribution system.

A typical natural gas main is two inches in diameter and carries 15 to 60 p.s.i. of gas pressure. Main sizes range from 3/4-inch to 30 inches in diameter. Pressures go as high as 1,000 p.s.i.

TELEMETERING EQUIPMENT

Another type of equipment used with natural gas service is the telemeter box. Always located outdoors, these gray, metal boxes are mounted on posts. This equipment is located near natural gas mains.

Telemeters monitor and report natural gas line pressure information by means of electrical impulses sent over telephone lines. With this equipment, the underground system can be monitored 24 hours a day for changes in pressure. Significant changes in pressure can indicate problems in the system. Currently these are only used in southeast Wisconsin.

The telemeter box is usually located between the curb and sidewalk or on the lot line just behind the sidewalk and adjacent to a power pole.

If a telemeter device is damaged (for example, by a vehicle), there is an underground shut-off valve that firefighters are allowed to operate.

This is the only exception to the rule against emergency personnel operating underground valves.

You can recognize this underground valve because the valve box cover is square, rather than round, and is always located at the base of the post. Because of this, it should never be mistaken for another valve.

LIQUID ODORANT STORAGE

The odorant that gives natural gas its distinctive smell is called mercaptan. It's a flammable sulphur-based compound that is injected in the pipeline at gate stations. Liquid odorant may be stored in cylinders at these gate stations prior to injection. The storage of this compound does not cause an extreme hazard, but fire departments that have gate stations and mercaptan storage cylinders in their communities should be aware of the properties and characteristics of this chemical. Contact Customer Services at We Energies for more information on the chemical properties of mercaptan if there is storage in your area.

OTHER FUEL TYPES

Liquid Propane Gas (LPG) and Liquefied Natural Gas (LNG)

In certain areas Liquid Propane Gas (LPG) or Liquefied Natural Gas (LNG) is used to augment the supply to the natural gas system. LPG or LNG used for this process is stored in large storage cylinders at these locations. The LNG or LPG is vaporized at these locations and injected into the existing natural gas distribution system. This vaporization of the LNG or LPG is generally done during extremely cold weather to maintain adequate gas supplies to the area and to reduce costs.

When the LPG or LNG is vaporized, the flammable gas that is present at the plant is heavier than air and more difficult to dissipate in a leak situation than natural gas.

For these reasons LPG and LNG storage facilities have special fire protection and prevention requirements specified in NFPA 58, NFPA 59 respectively. Department of Transportation codes also apply. Utilities that own these facilities will provide information on fire control equipment, its location and quantity of units, and familiarize you with potential hazards, communications and emergency control capabilities at the plant. Contact the gas utility that owns these facilities for more information.

Compressed Natural Gas (CNG) Vehicles and Stations

More and more vehicles are being modified to run on Compressed Natural Gas (CNG). It burns cleaner than other fossil fuels and is more economical. These vehicles are equipped with special cylinders that are capable of holding the high pressures required, from 2,000 to 3,600 p.s.i., to store CNG for vehicle operation. Vehicles that use CNG have a blue and silver diamond sticker on the body of the vehicle to warn emergency responders that CNG in cylinders is present. If there is an emergency involving CNG, treat it like any other natural gas emergency:

- Keep people away.
- Keep ignition sources away.
- If ignited, protect exposures with fog spray.
- Use fog spray to direct gas vapors away from ignition sources or from accumulating in confined areas.

Vehicles that use CNG must follow the guidelines published in NFPA 52 and filling stations must also follow Wisconsin Department of Commerce rules on location and required safeguards.



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NATURAL GAS HAZARDS

Shutting off Natural Gas at the Source

Taking control of a natural gas emergency may involve closing an above-ground natural gas valve. Natural gas mains and services are equipped with valves that can be used to control the flow of natural gas through the pipe.

Do not attempt to operate underground valves or above-ground valves at regulator sites or at meters.

The only service valves fire and emergency personnel should operate are those located above ground.

Only personnel from We Energies should operate underground valves. We Energies has engineering records that indicate the location of all valves and what each one controls. By verifying the location and purpose of a valve, the possibility of operating the wrong valve and creating a greater hazard is eliminated.

Fire and emergency personnel are authorized to operate the above-ground meter shut-off valve. This valve is located at the natural gas meter serving homes and smaller buildings. Some commercial and industrial buildings have special processes that can be damaged or malfunction if natural gas is shut off. Make sure you have pre-plans with these businesses so you know what to do in the event of an incident.

CLOSING NATURAL GAS VALVES

The diagrams illustrate three types of natural gas valves:

- LOCKWING VALVE:** Shows two views. The open position has the handle perpendicular to the pipe with an upward arrow labeled 'FLOW' and a double-headed vertical arrow labeled 'OPEN'. The closed position has the handle parallel to the pipe with a double-headed horizontal arrow labeled 'CLOSED'. A curved arrow indicates a 1/4" turn from open to closed.
- FLATHEAD VALVE:** Shows two views. The open position has the handle perpendicular to the pipe with an upward arrow labeled 'FLOW' and a double-headed vertical arrow labeled 'OPEN'. The closed position has the handle parallel to the pipe with a double-headed horizontal arrow labeled 'CLOSED'.
- LUBRICATED PLUG VALVE:** Shows a top-down view of the valve handle. The open position has the handle in a vertical position with a double-headed vertical arrow labeled 'OPEN'. The closed position has the handle in a horizontal position with a double-headed horizontal arrow labeled 'CLOSED'.

- 1 If you shut off a valve, leave it off and notify We Energies.
- 2 We Energies will ensure safety and turn the service back on. Shutting off the natural gas supply extinguishes all pilot lights, which are small, constantly burning flames used to ignite gas at a burner. If you open the valve, you may create hazard.
- 3 Most shut-off valves installed on service laterals, whether above ground or below ground, require only a 1/4 turn clockwise to shut off the natural gas supply.

SERVICE LATERALS

Service laterals are pipes that carry natural gas from the main to homes and buildings.

For homes and most buildings, service laterals in areas served by We Energies are of three types: copper, steel and plastic. Service laterals range from 1-1/8 inches in diameter for copper and polyvinylchloride (PVC), to 3/4 to 2 inches for steel, and 5/8 to 4 inches for polyethylene plastic. Larger service laterals, such as those serving factories, are usually made of steel and range in size from 2 to 12 inches in diameter.

Outside Meters and Valves

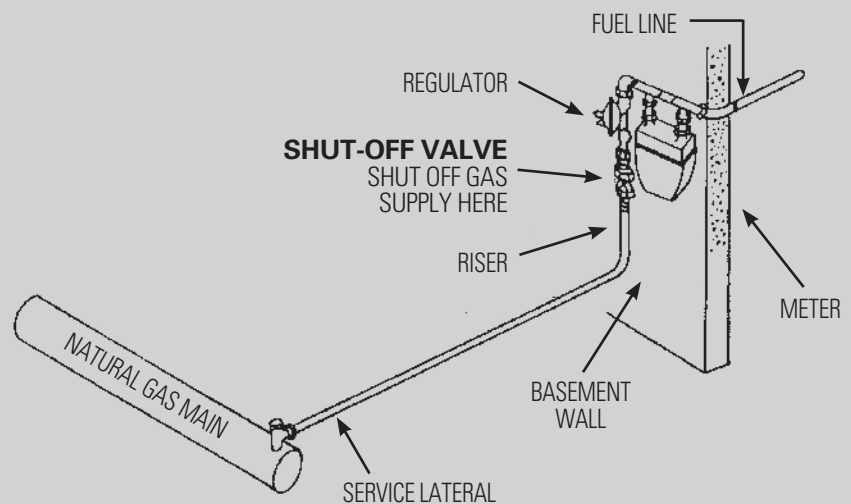
We Energies prefers to install meters outdoors, adjacent to homes or buildings. An outside meter allows greater accessibility and safety.

On an outside meter, the natural gas inlet pipe (riser) is above grade leading to the meter. The shut-off valve is located below the regulator (see *Service Lateral – Outside Meter Set* below). To close the valve, use an adjustable or pipe wrench and give the valve core a 1/4 turn clockwise (see *Closing Natural Gas Valves* on page 18).

The service regulator is located above the valve. The regulator reduces line pressure from 15 to 60 p.s.i. to approximately 1/4 p.s.i. to 2 p.s.i. Some large buildings and businesses may have a 2 p.s.i. or higher system after regulation. High pressure services also may be found in our service territory. The pressure in these steel services can be 100 to 720 p.s.i. before regulation takes place at the wall of the building or at lot line regulators.

SERVICE LATERAL – OUTSIDE METER SET

- 1 A regulator (pressure reducing device) is located in the vertical pipe coming up from the service lateral (riser) ahead of the meter.
- 2 A shut-off valve is located in the riser below the regulator.
- 3 An underground shut-off valve is generally not installed.



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NATURAL GAS HAZARDS

Shutting off Natural Gas at the Source

Inside Meters and Valves

Many meters are still located inside homes and buildings.

The meter shut-off valve for this type of installation is located inside the building at the point where the service pipe comes through the basement wall (see *Service Lateral Inside Meter Set* below).

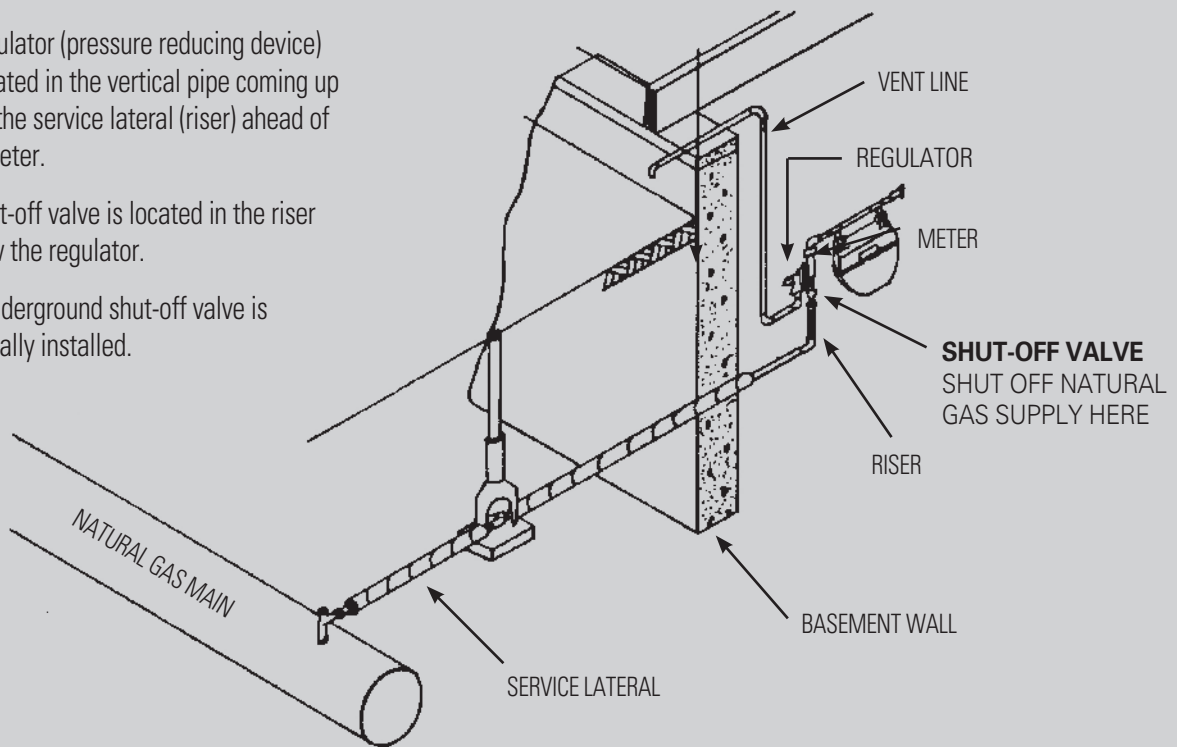
This valve may not be accessible because of fire or water in the basement. In this situation, an underground shut-off valve or “curb stop” should be operated only by We Energies personnel. An underground curb stop is installed on all services where the meter is located inside buildings.

Also, an underground stop is part of the equipment serving all larger buildings, such as four family or larger apartment buildings, hospitals, churches, theaters, schools, commercial buildings and industrial buildings.



SERVICE LATERAL – INSIDE METER SET

- 1 A regulator (pressure reducing device) is located in the vertical pipe coming up from the service lateral (riser) ahead of the meter.
- 2 A shut-off valve is located in the riser below the regulator.
- 3 An underground shut-off valve is generally installed.



Shutting off Natural Gas at the Source

LARGE BUILDINGS/INDUSTRIAL AND COMMERCIAL

Natural gas equipment for larger buildings and factories often includes other devices such as secondary regulators, relief valves and overpressure automatic shut-off valves.

These devices are usually found in conjunction with the meter. The meter and its equipment may be located:

- Outside, either above or below ground.
- Indoors, in a vault or pit.
- In a special building or room.
- On rooftops.

Some buildings may have an inside meter and an outside regulator. In this application, the above-ground valve is located outside with the regulator.

Fire Department personnel can operate the above-ground natural gas service line valve, which is common to larger meter installations (see *Typical Industrial Meter Installation* below).

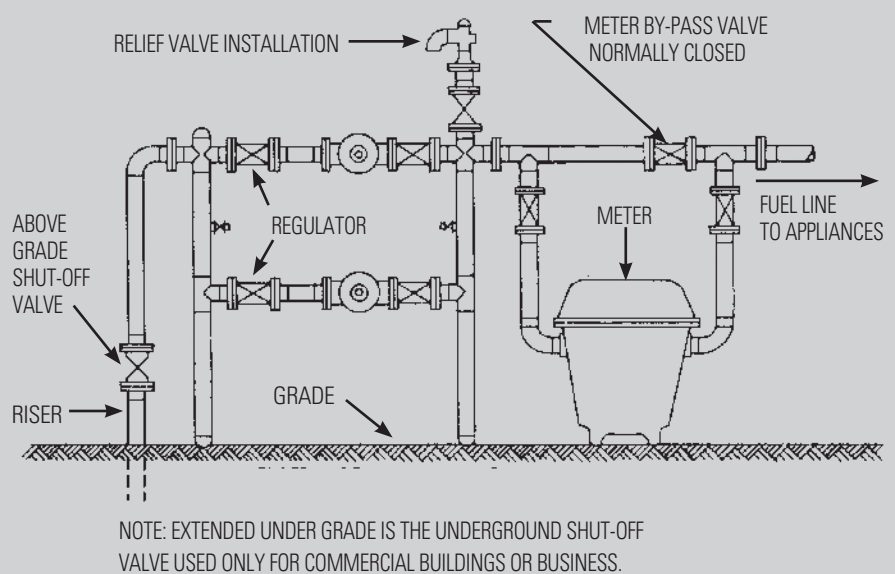
On larger natural gas shut-off valves, the valve head is usually square requiring a large, adjustable wrench to operate.

Large buildings may have more than one service lateral. In an emergency, each service lateral may need to be shut off.



TYPICAL INDUSTRIAL METER INSTALLATION

- 1 Some large commercial or industrial natural gas customers may have a separate building or room apart from the main building for the meter installation.
- 2 This drawing shows an industrial meter installation with a regulator ahead of the meter. The shut-off valve is located ahead of the regulator.
- 3 Service laterals supplying natural gas to commercial or industrial buildings are generally equipped with an underground shut-off valve installed in a box or vault.



GENERAL PRECAUTIONS

General precautions to consider when a natural gas leak is known or suspected

- Use natural gas detection instruments, if available, to determine if natural gas is present.
- If your instrument shows that any measurable quantities of natural gas are present, evacuate the area.
- If an instrument is not available and you smell natural gas, use the most cautious choice available to you and assume there is an ignitable mixture present. Evacuate the area.



CAUTION: Eliminating ignition sources, ventilating the hazard area from outside and shutting off the natural gas supply at outside meter unit valves are effective means of minimizing hazards associated with natural gas leaks and accumulations. Take these actions only when they can be done safely.

In addition:

- Keep people and vehicles away from the hazard area.
- Do not allow anyone to enter or remain in buildings where natural gas is present.
- Do not smoke, ring doorbells, operate electric light switches, use phones, ventilation fans or elevators. A single spark could be an ignition source.
- Do not plug electric fans into house electrical outlets. They could be an ignition source.
- Use Positive Pressure Ventilation (PPV) and remember to keep the PPV itself out of any area where natural gas is present. A remote exhaust hose should be used to prevent carbon monoxide accumulation.
- Do not open stoves, ovens, furnaces, or other appliances.
- Do not open natural gas valves that have been closed. Call We Energies to re-establish natural gas service after a natural gas valve has been closed.

SPECIFIC EMERGENCY ACTIONS

In all cases, remember your emergency priorities; protect people by immediate evacuation, protect property only if it can be done safely and call We Energies for assistance.

Natural Gas Escaping Inside

- Evacuate the building.
- Eliminate ignition sources and keep people from operating electrical devices.
- Shut off natural gas at the source. An outside meter service valve is the best choice if available. An appliance valve or inside meter service valve also can be considered if it is safe to do so.



CAUTION: Natural gas instruments can tell you if it is safe to be in an area where you suspect natural gas is leaking or where you smell natural gas. If it is not safe, evacuate the building, keep people away, check neighboring homes for natural gas migration and wait for the utility to shut off the natural gas.

Natural Gas Escaping and Burning Inside

- Evacuate the building and keep people out.
- Protect interior exposures and combustibles using hose streams and water spray.
- Shut off natural gas at the source.
- Extinguish any remaining fires.



CAUTION: If you extinguish the fire before the natural gas is shut off, an explosion may occur as the accumulating natural gas is ignited by nearby ignition sources. If you must extinguish the fire to perform a rescue, do so as part of a coordinated effort of extinguishment and natural gas shutdown. Watch for re-ignition.

Natural Gas Escaping Outside

- Approach the area from upwind (wind at your back).
- Keep vehicles and people out of the area where natural gas is leaking.
- Remove or eliminate all ignition sources.
- Check nearby buildings and structures for natural gas. Natural gas can migrate long distances under pavement or through telephone and electric ducts or sewer lines.
- Use fog spray to move escaping natural gas away from hazard areas such as roads or buildings where the natural gas could ignite.
- If possible, keep water out of excavations where natural gas is blowing.
- Do not enter any excavation or confined vault or pit where natural gas is blowing to stop the flow of natural gas. Natural gas may exclude oxygen in these areas. In addition, static electricity may accumulate on plastic pipe, creating an ignition hazard if you were to enter such an area.
- Protect people and adjacent buildings and call We Energies to make any needed repairs or remotely shut off the natural gas.



CAUTION: Use the wind to your advantage at outside natural gas incidents. In order to maintain a safe work zone around your equipment and to avoid other ignition sources, position vehicles upwind or outside the plume of the natural gas leak. This will prevent intake of natural gas into the vehicle combustion system which may ignite the natural gas. If you smell natural gas, you need to move to a safer location. Watch out for wind shifts throughout the incident.

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NATURAL GAS HAZARDS

Emergency Response

Natural Gas Burning Outside

- Keep people away from the area.
- Protect exposures with water spray.
- Let the natural gas burn unless an above-ground valve can be used to shut off the source. If rescue is needed in the fire area, extinguish the fire using dry chemical extinguishers and fog spray to dissipate the leaking natural gas until We Energies can shut off the natural gas supply.
- Check nearby buildings and structures for natural gas. Even when natural gas is burning, some of the natural gas can migrate long distances under pavement, through telephone and electric ducts, or through sewer lines.
- Wait for We Energies to shut off the natural gas using emergency valves or other remote shut-off means. Remember that underground valves or valves inside fenced-in areas at regulator or gate stations should only be operated by We Energies.



CAUTION:

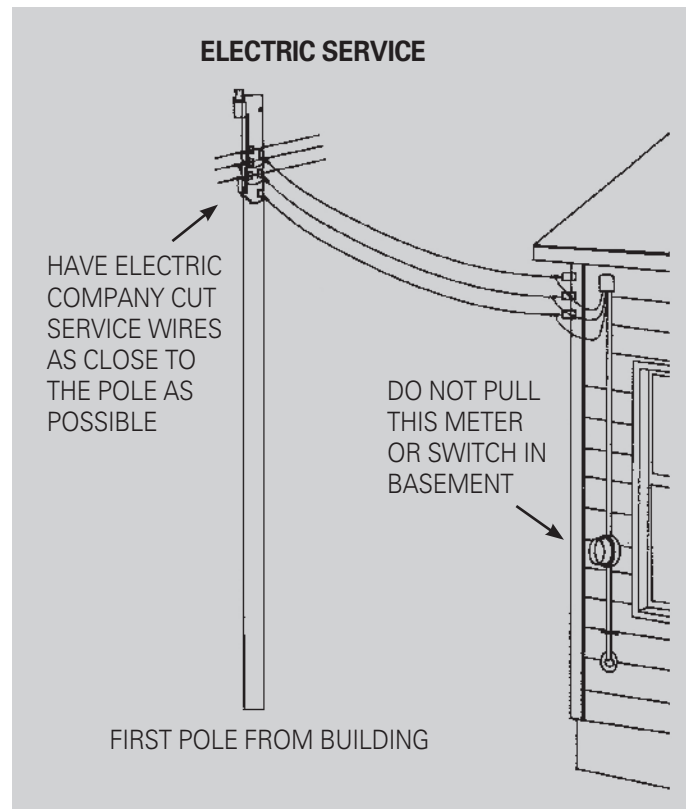
Water spray in a fog pattern is an effective tool to minimize hazards until the natural gas can be shut off.

SOURCES OF IGNITION

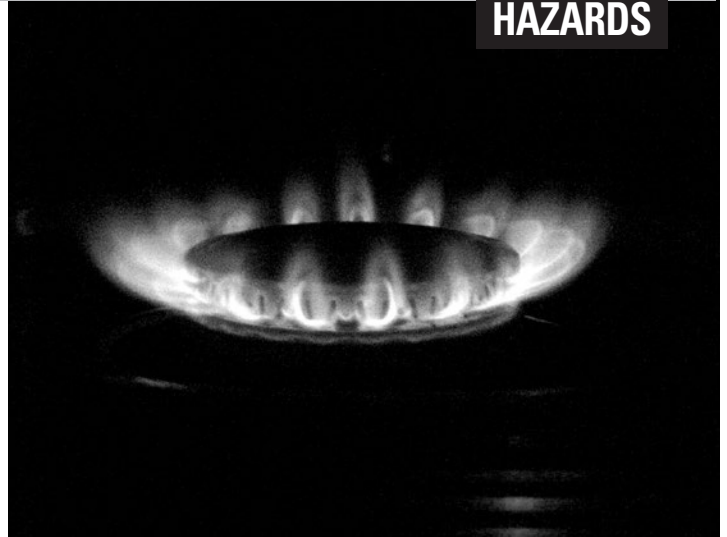
There are many ignition sources that must be considered when natural gas is leaking. If there is an ignitable mixture of natural gas present, (about 4 percent to 15 percent gas in air), elimination of ignition sources needs to be the first priority. Common ignition sources are pilot lights, spark ignitors, electrical switches and disconnects, and any other source over about 900° F. Other ignition sources not always considered are door bells, security systems, non-rated flashlights, pagers, radios and static electricity. Eliminate all ignition sources.

If you need electricity disconnected to the building because of natural gas accumulation, do not shut off circuit breakers or pull the electric meter. The act of pulling the meter may cause an arc or spark that could ignite the natural gas. Call the local electric utility to have the electric service disconnected at the pole.

Consider the possibility that the building could be served by an automatic source of backup power, such as a generator fueled by diesel or natural gas.



If there is no hazard of natural gas accumulating, an electrical disconnect could be used to shut off the alternate power source. Another option may be to shut off the natural gas or diesel fuel line to the generator. In the case of natural gas generators, shutting off the natural gas supply may cause the generator to try to restart, creating an ignition source hazard in the area of the generator. For this reason, we do not recommend that you operate any switch or ignition source if there is a danger of accumulating natural gas being ignited. It may be better to keep people away, including firefighters, until the natural gas hazard has been dissipated by shut-off or ventilation.



INCOMPLETE COMBUSTION AND CARBON MONOXIDE

Incomplete combustion of natural gas or other fossil fuels can produce carbon monoxide (CO). This odorless, colorless gas is toxic and flammable. The health effects of carbon monoxide are serious and may be fatal.

Incomplete combustion may occur in an over-gassed, under-gassed or unvented appliance. It also can be caused by a flame supplied with insufficient oxygen. A broken or plugged appliance or furnace vent, or a plugged chimney, may allow CO to be present in living quarters. Carbon monoxide poisoning also can be caused by automobile exhausts, charcoal or gas grills and paint thinners.

Signs of carbon monoxide poisoning are: headache, vomiting, dizziness, burning eyes, drowsiness, faintness, insomnia, irritability and coughing. Sometimes these symptoms are mistaken for the flu.

We Energies has information for fire departments and emergency personnel on how to respond to carbon monoxide customer calls. We will assist fire service officials if called. We will make the situation safe by shutting off the natural gas supply to the appliance or home. If carbon monoxide is suspected, evacuate people from the contaminated area and, if needed, call We Energies.

SUMMARY

If you suspect a natural gas leak, take the following steps:

1. Call We Energies immediately from a phone outside the building. We will send a radio-dispatched crew to the area to investigate the problem.
2. Clear the building of all occupants.
3. Keep all sources of flame and sparks away from the suspected natural gas leak area. Don't smoke, use a light switch, flashlight, elevator, phone or matches. Eliminate all ignition sources.
4. If it can be done safely, ventilate the building by opening windows and doors to permit the natural gas to escape.
5. Attempt to locate and shut off the above-ground natural gas meter valve.
6. Stand by for assistance from We Energies at a safe distance.

TAKE CONTROL

- Establish a safety zone of 25 to 30 feet around the scene of an electrical emergency. Prevent all unauthorized persons from approaching the scene.
- Continue to guard the scene until relieved by an authorized utility representative.

**Public Safety Agency
dedicated phone lines**

888-296-4937

or

800-292-7098

BE AWARE OF ELECTRIC HAZARDS

- Use extreme caution when approaching the scene of an electrical emergency, especially at night.
- Treat all wires as dangerous and energized at high voltage.
- Do not attempt to move downed power lines.
- Do not spray water on downed lines, transformers or other electrical equipment.
- Do not cut into locked cabinets. Cutting tools could make contact with energized equipment inside the cabinet.

MAKE THE RIGHT CALL

- Call the local power company.
- Be specific as to the nature of the emergency, location and type of assistance you require.
- Provide contact info for your on-site personnel and location of incident command post.

Natural Gas Emergency Response Guidelines

These are guidelines only. Your resources and training should guide your actions.



TAKE CONTROL

Outside Natural Gas Leaks

- Establish a safety zone, keeping the wind at your back.
- Shut off natural gas if you can do so safely.
- Eliminate ignition sources, including vehicle engines or power equipment.
- Check adjoining buildings for natural gas.
- Use water spray to direct the natural gas from hazard areas.

Inside Natural Gas Leaks

- Evacuate the area.
- Do not use electrical devices such as phones, doorbells or other ignition sources.
- Shut off natural gas if you can do so safely.
- Ventilate the area by opening windows or leaving doors open as you go.

Public Safety Agency
dedicated phone lines

888-296-4937

or

800-292-7098

BE AWARE OF NATURAL GAS HAZARDS

Use Your Nose

- If you do not have a natural gas detection instrument, check for natural gas odor using your nose as you enter the area.
- If you smell natural gas, assume natural gas is leaking and take the most cautious actions available to you.

Use a Natural Gas Detection Instrument

- If you have a natural gas detection instrument, turn the instrument on in clear air.
- Sample near the ceiling as you enter. If the detector shows more than a trace of natural gas, then assume natural gas is leaking.

Check for Natural Gas Outside

- At manholes, sewer openings and storm drains.
- Alongside building walls at the ground.
- At door and window cracks if you can't get in the building or home.

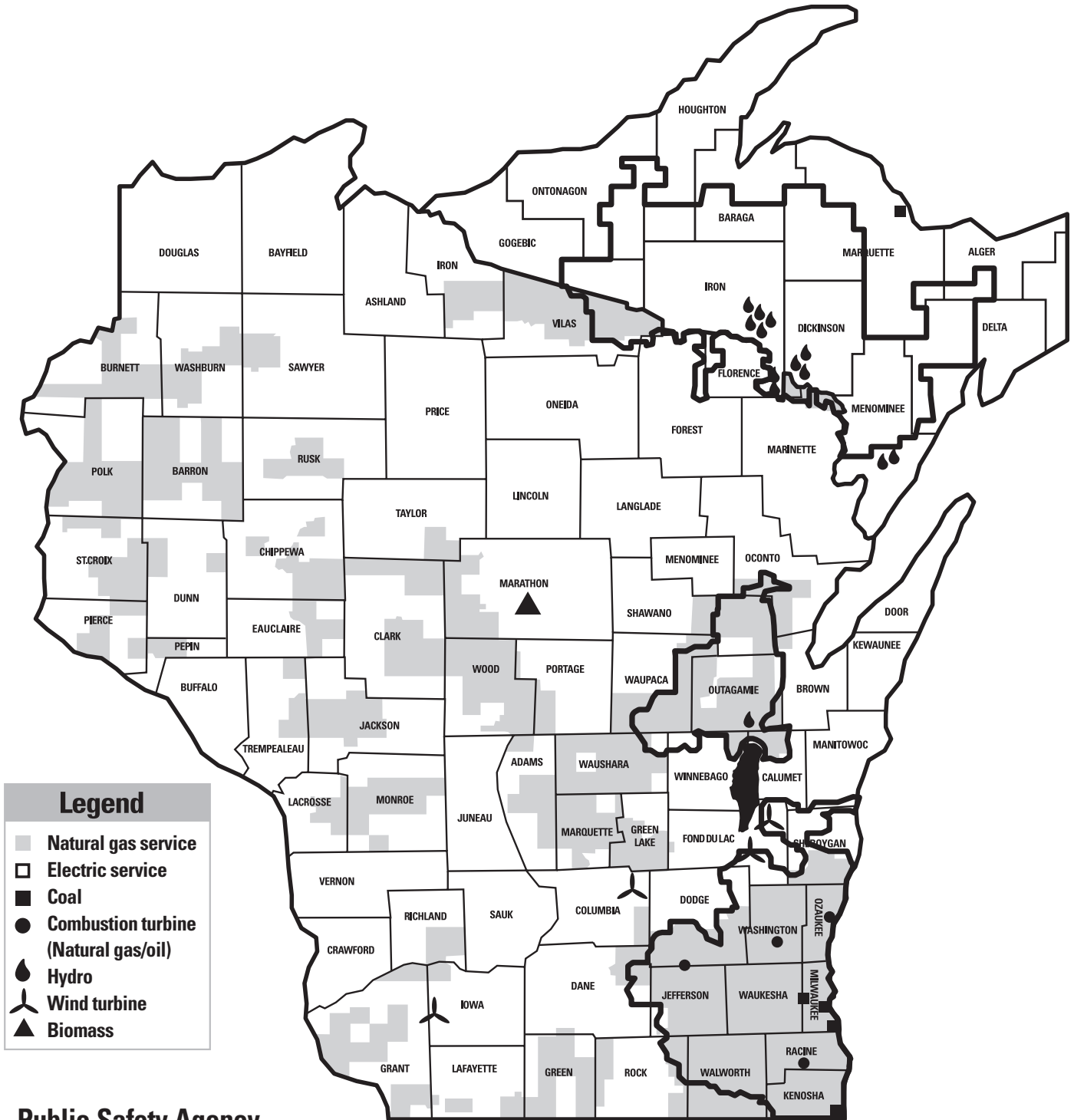
Check for Natural Gas Inside

- In upper areas of rooms and buildings as you enter.
- In basement drains and sewer openings.
- Where the natural gas pipe enters the building.

MAKE THE RIGHT CALL

- Call the local natural gas company.
- Be specific as to the nature of the emergency when calling for assistance.

We Energies Service Area Map



Legend

- Natural gas service
- Electric service
- Coal
- Combustion turbine (Natural gas/oil)
- Hydro
- ⚙ Wind turbine
- ▲ Biomass

Public Safety Agency
dedicated phone lines

888-296-4937

or

800-292-7098

We Energies Contact Information

24-HOUR ASSISTANCE FOR POLICE AND FIRE DEPARTMENT EMERGENCY USE ONLY.

Please do not release these numbers to the public.

888-296-4937

or

800-292-7098

So we can quickly and effectively respond to an emergency, always provide the following information when you call:

- **Exact location of the emergency** (municipality, fire number and the street address)
- **Type of emergency** (natural gas or electric)
- **Nature of emergency** (fire, explosion, natural gas leak)
- **Number of emergency personnel at the emergency location**

Website:

www.we-energies.com/firstresponders

Public Contact Information

24-hour lights out and electric emergency

800-662-4797

Natural gas emergency

800-261-5325

Customer service and billing questions

800-242-9137

Diggers Hotline (Wisconsin)

811 or 800-242-8511

Miss Dig (Michigan)

811 or 800-482-7171

Wisconsin Telecommunications Relay System

800-947-3529

Utility Safety Pre-Test Answers

1. F	5. T	9. F	13. F	17. F
2. F	6. F	10. F	14. T	18. T
3. T	7. T	11. T	15. F	19. T
4. F	8. F	12. F	16. F	20. T

