

# EMERGENCY RESPONDERS

GUIDE FOR

# EMERGENCIES INVOLVING ELECTRICITY & GAS



# Table of Contents

<b>I. Introduction</b>	pg 2
a. Fire Academy	pg 2
<b>II. Electricity</b>	pg 3
a. Watch the Wires	pg 4
b. Electric Wire Hazards	pg 5
c. Extricating Electric Shock Victims	pg 5
d. Conductivity of Extinguishing Agents	pg 6
e. Fires in Structures	pg 6
f. Fires on Peco Energy Property	pg 7
g. Fires on Utility Poles	pg 8
h. Fires in Underground Electric Facilities	pg 8
i. Fires at Electric Substations	pg 9
j. Fires at Electric Generating Stations	pg 10
k. In Summary	pg 11
<b>III. Natural Gas</b>	pg 12
a. Natural Gas Introduction	pg 13
b. What to Do...First	pg 13
c. Escaping Natural Gas Outside a Building	pg 13
d. Burning Natural Gas Out of Doors	pg 13
e. Escaping Natural Gas in a Building	pg 14
f. Escaping Natural Gas Burning in Buildings	pg 14
g. Inside Natural Gas Piping Meters	pg 14
h. Appliance Fires	pg 14
i. Gas Detection	pg 14
j. Gas in Manholes, Vaults, Sewers	pg 14
k. Things Not to Do	pg 15
l. Carbon Monoxide	pg 15
m. Illustrations	pg 16,17
n. Compressed Natural Gas	pg 17,18

# Introduction

This booklet is designed as a guide for emergency responders who are called to handle fires and other emergencies where natural gas or electric utilities are involved.

It clarifies why PECO Energy believes it is vitally important to have its own specially trained employees at the scene of such emergencies as soon as possible.

Since the emergency responders usually arrive at the scene before PECO Energy, it is good to know how to eliminate or control potential hazards.

PECO Energy employees are not firefighting experts: but because of their training and day-to-day working knowledge of natural gas and electric utilities, they can provide vital input and give helpful information that can assist in emergency scene decision making and the development of strategies and tactics. Most importantly the PECO Employee can help ensure the SAFETY of the emergency responders.

PECO Energy appreciates the cooperation of the emergency responders during emergencies involving natural gas and electric utilities. PECO Energy also appreciates the careful handling of public information during such instances and in subsequent investigative proceedings.

SAFETY at all times is the watchword of the utility industry. This is certainly a major reason why it has earned an enviable position in safely delivering its product to its customers and helping the public enjoy the benefits of natural gas and electric appliances.

PECO Energy stands by its commitment to you the emergency responders and your SAFETY. This booklet summarizes concepts covered at the Fire Academy, during a full day program involving classroom presentations and “hands on training” given to emergency responders on how to handle utility emergencies.

PECO Energy stands ready to respond to emergencies involving natural gas and electric utility emergencies, 24 hours a day, seven days a week with the tools and training required to do the job safely.

Requests for PECO Energy assistance can be made through your local dispatch center.



**Energy Technician  
First Line Responders**

# Fire Academy

## **Excellence through Training**

The Fire Academy is dedicated to the training and education of the local emergency responders in the awareness of utility emergencies. The training prepares you for responding to emergency incidents involving utilities and operating them effectively and safely.

## **Staff Involvement**

The staff of the Fire Academy is here to help you, the emergency responders. If you have any questions, problems, or concerns, the Fire Academy Staff is part of the partnership between PECO Energy and the emergency responders.

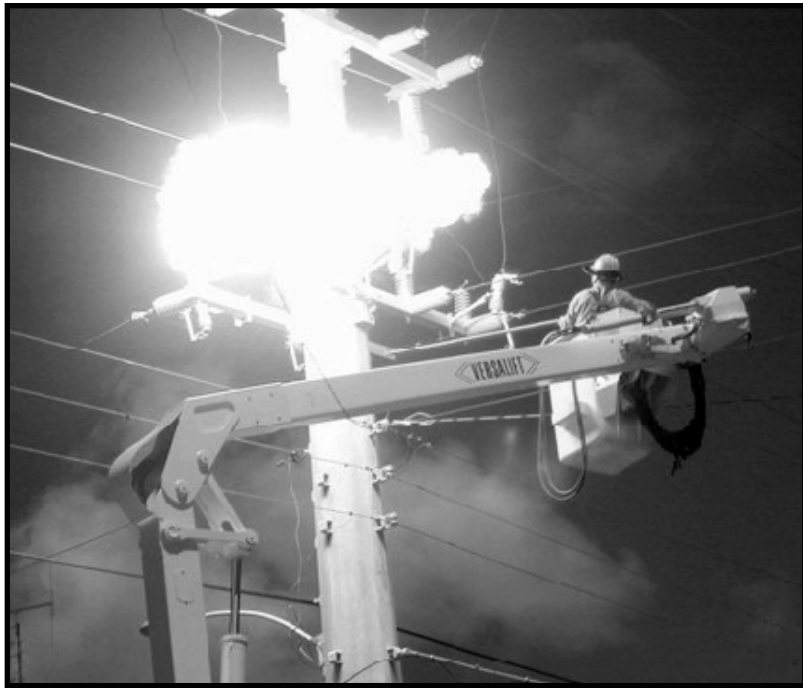
## **Fire Academy Staff will respond to the scene of:**

- Burning Natural Gas
- Utility fire or explosion
- Fire Officials request
- Local, County, State
- Energy Technicians Request
- Fatality
- Substantial damage

## **Fire School Contacts**

Bucks County	610-832-6461
Chester County	610-832-6463
Delaware County	610-832-6460
Montgomery County	610-832-6462

# *Electricity*



**“electricity (noun) 1. The flow of electric charge through a conductor placed between two objects having a difference in voltage.”**

There you have a dictionary-style definition. Electricity is the flow of electric charge through a light bulb element (“a conductor”) placed between an energized wire and a grounded wire. Electricity is also the flow of electric charge such as lightning that travels through the air (“a conductor”) placed between a charged thundercloud and the earth’s ground. Electricity is also the flow of electric charge through a person (“a conductor”) placed between an energized object and ground.

**CAUTION  
NEVER MAKE DIRECT CONTACT  
WITH ANY ENERGIZED OBJECT.**

**What is Energized?** Electricity, whether from a power line or from a thundercloud, is always trying to get to the earth, which is at ground voltage, also called zero voltage. Voltage is a measure of the “pressure that pushes electric charge through a conductor”. An object with any voltage above zero is called “energized.” Any energized object will produce a flow of electric charge through a conductor placed between it and the earth or any other object at ground voltage, such as a grounded wire. Since nearly all-common materials, including the human body, are conductors to some extent, the only way to keep the electricity where it belongs is to place some sort of insulator (non-conductor) between the energized object and the earth. Bare wires are supported on utility poles by such insulators.

**Beware of Low Voltage!** You can get just as “shocked” from you 120-volt house current as you can from a 500,000-volt power line! In fact, a high voltage shock, because of the clamping action it has on the heart (cardiac arrest), may prevent the deadly irregular beating of the heart (fibrillation) often associated with lower-voltage shocks. Cardiac-arrest victims often respond readily to artificial respiration and external heart massage; whereas a fibrillation victim may only respond to an electrical defibrillator device. A lower-voltage shock, may not have sufficient current to knock you out, but may have just enough current to set your muscles, so you can’t let go.

**CAUTION  
STAY CLEAR OF THE VICINITY OF  
ANY FAULTY ENERGIZED OBJECT.**

**Beware of Sparking!** You can be injured without touching an energized object. When an energized object is sparking, it emits excessive heat and ultraviolet rays. Such sparking occurs while trying to interrupt the flow of electric charge, such as when an energized wire is cut or when a fallen energized charge tries to maintain its flow through the air. This results in a flash, an electric arc. The heat energy from such a flash can burn human flesh several feet away.

**Protect Your Eyes.** The heat of an electric arc has been known to fuse contact lenses to the cornea of a person’s eyes. Ultraviolet rays emitted from an electric flash may also damage unprotected eyes. Eye injuries may not be immediately apparent; there may be no noticeable eye irritation for several hours after exposure. If your eyes are exposed to an electric arc, consult a doctor for proper treatment without delay. PECO Energy employees wear specially treated goggles to prevent ultraviolet ray damage whenever an electric arc may occur.

## WATCH THE WIRES

**CAUTION  
BE ALERT IN THE VICINITY OF ANY ENERGIZED OBJECTS.**

We have already emphasized the danger from contacting an energized object, or being in the vicinity of a faulty energized object, such as a fallen wire. It is just as important to be cautious in the vicinity of energized facilities that are operating properly. Most fire fighting is performed without de-energizing all electric facilities in the vicinity. In many cases, it is even advantageous to leave power on as long as possible. However, all emergency response personnel must continuously be alert. Don’t let the quiet “harmless” appearance lull you into a false sense of security.

**Never allow anyone on the ground to touch an aerial truck while the aerial device is being maneuvered in the vicinity of overhead wires.**

If the aerial device of an apparatus should contact an overhead wire while being maneuvered, a fire fighter who is entirely on the apparatus may be in a relatively safe position like a bird on a wire. Be aware there may be some hazardous sparking, or the wire may break and fall, or electricity may flow through anyone who simultaneously touches both the apparatus and the ground. The operator should immediately attempt to swing the device clear. Everyone in the area must be at a safe distance, in case the wire breaks as the device moves away. If the device remains in contact with the wire, the entire apparatus may be dangerously energized. There is no completely effective way to ground a truck, even when metal outriggers are in firm contact with the earth. A human body may provide an easier path for electricity to reach the ground. If the device cannot be cleared from the wire keep everyone away until a PECO Energy employee arrives and clears the contact or de-energizes the wire.

**Beware Covered Wires!** Many overhead wires are covered. The covering is often designed to protect the wire from the weather or tree contact, not to protect you from the wire. Never consider a covered wire any safer than a bare wire. Remember, most wires on utility poles are bare, even though they may appear to be covered when viewed from the ground.

**Beware “Telephone” Cables!** Telephone cables are rarely dangerous when accidentally contacted. Electric circuit cables operating at 34,000 volts may be attached below telephone cables on the same pole. And a fallen telephone cable may be contacting an electric circuit cable. Don’t assume that you can tell the difference between telephone cable and electric circuit cable that you would stake your life or the life of another on your assumption.

**Never rest ladders on wires or any other electric equipment.**

**Never drag hoses over wires.**

**Never come too close to wires – brushing against one can be fatal.**

**No Encores, Please!** You may have had previous experience where you contacted an energized facility without incident. You “got away with it” but it doesn’t guarantee you will “get away with it” again. Remember, higher-voltage facilities have much greater electrical pressure. Something you ‘got away’ with on 120-volt facilities can kill you if attempted on a 34,000-volt facility.

## ELECTRIC WIRE HAZARDS

**CAUTION  
ASSUME EVERY FALLEN WIRE  
IS ENERGIZED AND DANGEROUS.**



**Wire on Ground.** Some fallen wires snap and twist, bursting warning sparks. Others lie quietly and do not spark or provide other warnings that let you know it is energized. Both fallen wires are equally deadly. Also, automatic switching equipment may re-energize fallen wires. Always stay clear and keep everyone else clear until a PECO Energy employee arrives and clears the wire or de-energizes it. **NEVER** assume that a fallen wire is de-energized.

**Wire on Object.** If a wire is in contact with an object, fence, tree, car or person, that object in turn may be energized and deadly. Keep yourself and others away from metal highway dividers and metal fences that a fallen wire has contacted. A fallen wire draped over such dividers and fences can energize them for their entire length.

**Wire on Vehicle.** If anyone is in a vehicle that is in contact with a wire, the safest thing the occupant(s) can do is stay inside. If possible, the operator should drive the vehicle away from the contact. If the vehicle is on fire, tell the occupants to jump free with both hands and feet clear of the vehicle when the occupants hit the ground. At no time can the occupants simultaneously contact both the vehicle and the ground or any other object that is touching the ground, such as yourself. If simultaneous contact occurs, the occupants will become a path for the electricity flow to ground. Never board a vehicle that may be energized. A fog nozzle should be used to direct a fog stream onto a burning vehicle, even then, stay back as far as practicable (at least 10 feet). Whenever a wire is in contact with this vehicle the vehicle may be energized.

## EXTRICATING ELECTRIC CONTACT VICTIMS

**CAUTION  
USE APPROVED PROCEDURES AND EQUIPMENT  
IF YOU MUST WORK NEAR ENERGIZED FACILITIES.**

This applies whether or not a victim rescue is required. However, the presence of a victim requires you to be even more conscientious.

**Notify PECO Energy.** If you see no safe way of separating a victim from an energized object, request PECO Energy assistance. Your first consideration must be your own protection; you cannot help by becoming a victim yourself.

**Moving the Victim.** PECO Energy employees have specialized equipment that they can use to drag a victim clear of electric equipment. They can use other specialized equipment\* to keep the wire in contact with the ground while the victim is being dragged clear. This reduces the amount of electricity flowing through the victim and minimizes further injury from additional burns.

**Moving the Wire.** PECO Energy employees have specialized equipment\* that they can use to remove a wire from a victim. They can control the wire to prevent it from re-contacting the victim. PECO Energy employees will pull the wire toward themselves while walking away to reduce the danger to themselves in case the wire gets out of control. They can use other specialized equipment to keep wire in contact with the ground while moving it. This reduces the amount of electricity flowing through the victim and minimizes further injury from additional burns.

**Cutting the Wire.** If a victim is entangled with an electric wire, the wire on both sides of the victim must be cut to be certain that no source of electricity remains. Wire should only be cut by PECO Energy employees.

**First Aid.** A victim who has been separated from energized electric facilities does not retain an electric charge, so there is no danger in handling the victim, administering first aid, or applying artificial respiration. Electric burns, even if insignificant on the surface, may involve serious destruction of tissue and must receive expert medical treatment as soon as possible.

**Rescuing Pets.** A fire company is the first organization considered by many persons in any emergency, and frequent calls are received to rescue cats or other pets. However, an electrically-inexperienced individual endangers his own life if he attempts to rescue an animal that has climbed a utility pole or gotten into any PECO Energy facility. Forward pet rescue requests to PECO Energy.

**\*Specialized equipment.** *To separate a victim from electric facilities, a rescuer must use tools that are rated for use on the voltage level involved. The tools must be clean and dry, and they must provide adequate distance between the rescuer and the energized facilities. Specially treated goggles that prevent eye damage from electric arcs must be worn. Such "specialized equipment" is routinely used by PECO Energy – any other equipment can be extremely hazardous if used in the vicinity of energized facilities. In particular, the use of rubber gloves should be left to PECO Energy employees who use them daily. Severe injury can result from using rubber gloves that have deteriorated. Even a tiny pinhole is enough to permit a fatal charge to pass through to the wearer. Rubber gloves must be electrically tested periodically, and must be carefully stored and protected from damage, dirt, and excessive heat. Never stake your life on "borrowed" rubber gloves. And remember, your "running" gear and rubber boots are not designed to protect you against getting electrocuted.*

## CONDUCTIVITY OF EXTINGUISHING AGENTS

### CAUTION

#### AVOID USING HOSE STREAMS ON ENERGIZED FACILITIES.

**Water Conducts Electricity.** The application of water on electric facilities by hand-held hoses may carry the electricity back to the nozzle. This electricity might be sufficient to cause serious injury, or death. Published "safe distances" can be misleading, since water conductivity and nozzle design vary widely. The National Board of Fire Underwriters' Special Interest Bulletin No. 91 advises that for 120-volt facilities there is no danger unless the nozzle is brought within a few inches. However, we urge fire fighters to consider all electric facilities to be high voltage, because even low-voltage wires may inadvertently be crossed with high-voltage wires.

**Fog Streams Preferred.** For maximum safety to the fire fighter, when either intentional or unintentional application of water on energized facilities may occur, a fog nozzle should be used.

**Beware Run-off Water!** A dangerously energized puddle of water may be formed by water running off energized electric facilities.

**Beware Adjacent Equipment!** Take care not to damage electric facilities located near the incident. A porcelain insulator supporting energized facilities may arc and even explode, if hit by a water stream directed onto it.

***Wires may swing together, short-circuit, and burn down if hit by the force of a straight stream.***

**Other Extinguishing Agents.** Dry chemical and carbon dioxide are non-conductive and may be used around energized facilities. These may be used to extinguish a surface-type utility pole fire. Foam and the loaded-stream type are conductive and should not be used on fires around energized facilities.

## FIRES IN STRUCTURES

### CAUTION

#### BE EQUALLY ALERT INDOORS AS OUTDOORS.

**High-Voltage Installations.** (600 Volts to 13,000 volts or even higher!) do exist in many commercial, institutional, and industrial buildings. Do not enter any transformer room or open any electric switch without advice of an authorized individual. Besides the obvious electric hazard, privately owned transformers may be filled with combustible oil or with a non-flammable liquid such as askarel. Some askarel-filled equipment is not required to be isolated outdoors or in a fire resistant room and therefore may be located anywhere on the premises. The non-flammable liquid, while safe from a fire standpoint, may be caustic and may generate poisonous fumes. Call the site engineer to identify specific hazards and to de-energize facilities as needed.

**Low Voltage Installations.** (below 600 volts) exist in practically every building a fire fighter may enter and can be as dangerous as high-voltage facilities.

**Leave Power on as Long as Possible.** The power may be needed to operate pumps or other equipment, which, if stopped, would cause additional damage to the building or to any materials being produced in it. Also, fire fighters may be aided by having lights available as well as having any elevators operating for fire fighting and evacuation purposes. Once a fire company shuts off any power, PECO Energy may require the fire marshal's approval and an underwriters inspection certificate before PECO Energy will turn the power back on.

Nevertheless, whenever safe fire fighting requires the power to be shut off, use whichever of the following actions is appropriate and necessary.

**1. Remove Fuses or Open Circuit Breakers** to shut off an affected section.

**2. Open Main Switch** to shut off entire building when electric service is no longer useful. If you must stand in water or if the switch is wet, do not grasp the switch handle in the palm of your hand. Use dry equipment such as a piece of rope, pike pole, or handle of a fire axe to open the switch. Then attach a warning tag indicating that the power has been intentionally shut off.

**3. Cutting Wires** notify PECO Energy to have wires cut. This will use the training and experience of a PECO Energy Employee to get the area de-energized as quickly and safely as possible. This is a last resort if removing fuses, opening circuit breakers or opening a main switch is not possible.

**4. Pulling of Electric Meters -** **PECO Energy does not recommend the pulling of electric meters for your personal SAFETY in accordance with the Essentials of Firefighting.**

**Flammable Fumes.** Whenever flammable fumes may be present, avoid operating any electric switch within the area. Even a simple light switch can cause a spark that leads to an explosion.

**Palms Inward.** When walking through a building or any enclosure where visibility is poor, proceed with arms outstretched and the palms of the hands turned toward the face. In this way, if contact is made with an energized object the tendency for the muscles to contract may assist in getting free from the contact.



**Stay out, Stay Alive**

## FIRE ON PECO ENERGY PROPERTY

**CAUTION**  
**PROTECT PEOPLE AND PROPERTY IN SURROUNDING AREA.**

**CAUTION**  
**DON'T FIGHT FIRES ON ELECTRIC EQUIPMENT UNTIL A PECO ENERGY REPRESENTATIVE ARRIVES.**

Does this mean a fire company should stand by and let the electric company burn? Where only our electric power equipment is involved the answer is yes! It is better to wait than to act. Of course we appreciate any measures a fire company can take to extinguish fires at office buildings or any other property that is not used to house electric facilities. However, where electric power equipment is involved, wait for the PECO Energy representative and coordinate the fire-fighting operation with the PECO representative to ensure maximum effectiveness and safety. Cooperate with the requests because the representative knows what is necessary to fight fires on his equipment.

**Damage is Done.** Any electric equipment that has been involved in a fire will likely be replaced by PECO Energy. Therefore, it is unnecessary to try to prevent "further" damage to such equipment.

**Danger From Switches!** Never operate PECO Energy switches that are mounted on utility poles or located in manholes or within substation properties. Many of these switches are not intended to open and drop the electric load, and attempting such an operation could damage the switch or cause it to explode.

**Danger From Oil!** Combustible oil may be present in any pole mounted, underground or surface equipment, such as transformers. This oil will burn. Under the intense heat of a fire, the equipment may rupture and discharge its burning oil. This may be followed by the subsequent explosions caused by ignition of the mixture of air with hot oil vapor or with burning insulation vapor.

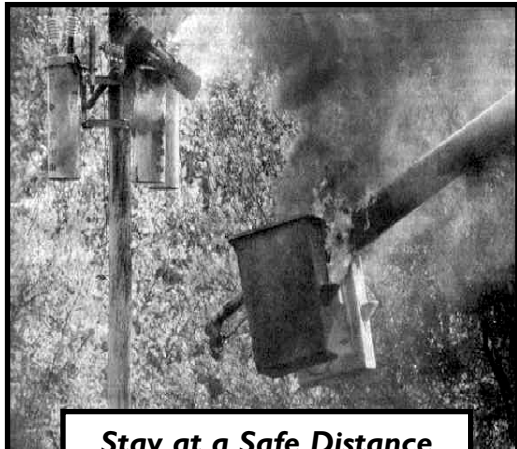
**Danger From Water!** Water greatly increases the danger of electrocution from energized facilities. Until it is confirmed that electric facilities are de-energized, use only dry chemical, carbon dioxide, Halon, or fog streams and even taking extreme care to avoid physical contact with energized facilities. Do not direct a straight stream onto uninvolved electric facilities nearby.



**Contain Liquids Leaking From Equipment!** Any liquid leaking from electrical equipment may be combustible oil or a non-flammable liquid such as askarel. Avoid contact with the liquids, they may be caustic and fumes may be irritating. After extinguishing the fire, try to contain any leaked liquid using an absorbent material. Do not wash it away with a hose stream; both types of liquids must be thoroughly cleaned up by PECO Energy to prevent environmental damage.

## FIRES ON UTILITY POLES

Burning brush, a nearby structure fire, or electric disturbances can start a fire on a utility pole. The dry wood of a utility pole is a relatively poor conductor – but when a fire burns the surface of the wood, the resultant charring creates a carbonized path that then becomes a relatively good conductor.



1. If the pole is burning near the bottom, such as from a grass fire, use standard fire fighting extinguishment techniques, and notify PECO Energy.
2. If the pole is burning near the top and it appears that it will cause no further damage, let it burn, and notify PECO Energy. Keep everyone, including fire fighters, clear of the area and from under adjacent wires that might drop to the ground.
3. If the pole is burning near the top and the fire must be attacked before a PECO Energy representative arrives, exercise maximum caution in using any extinguishing agent, especially water.

## FIRES IN UNDERGROUND ELECTRIC FACILITIES

### CAUTION

**HOSE STREAMS MAY BE MORE HAZARDOUS THAN HELPFUL UNTIL ANY UNDERGROUND FAULT IS DE-ENERGIZED.**

Electric facilities are installed underground in urban areas and new residential developments. Switching equipment and transformers are installed in manholes or in metal cabinets on the surface, and they are supplied electricity through an interconnected network of electric cables. The cables may be directly buried in two or three feet of earth, or installed in a duct. Voltages are both low and high.

The two major causes of fires are:

1. Cable faults that ignite the cable insulation, or the fiber duct or both.
2. Oil-filled manhole equipment that overheats and spills oil that ignites.

**Notify PECO Energy.** Specify location of all manholes involved. A cable fault usually clears itself, or it can be cleared manually by opening appropriate switches. Until the fault that caused the fires is de-energized, no attempt should be made to extinguish the fire. An electric arc that is sustaining the fire cannot be extinguished by fire suppression agents.

**Clear the Area.** Under normal conditions, the insulation and jacketing of underground cable provides adequate protection. However, an explosion or fire can remove these protective coverings and expose the energized conductors. Such a condition is a major life safety hazard, and fire fighters are cautioned to stay clear.

**Beware of Toxic or Explosive Gases!** Flammable vapors, which are not always detectable by your sense of smell, may be coming from nearby sewers, gas mains, buried gasoline or oil tanks, or smoldering insulation and fiber duct. Inside a duct, the vapor-air mixture may be too rich to ignite.

Upon reaching a source of fresh air, such as a manhole, the vapor-air mixture may fall within the explosive limits. The resulting explosions may be intermittent, with their frequency dependent on how fast the vapors are mixing with the air space. They may vary in intensity from a slight “puff” to an explosion of sufficient violence to blow a manhole cover high into the air. If the mixture becomes too rich to ignite within the confined space of a manhole, an explosion may occur when the manhole cover is removed, allowing the air to enter the space.

## Protect Adjacent Property

### Prepare to Assist PECO Energy Employees.

PECO Energy Company may discharge water into a duct line to cool it after the circuit has been de-energized. If the local fire company supplies a hose line, we prefer that PECO Energy employees handle the nozzle, using their approved rubber gloves for protection.

### Leave Manhole Covers as Found.

Only PECO Energy employees should remove manhole covers using hooks or long-handled tools and standing safely to one side. And everyone must be kept a reasonable distance back to avoid injury. Removing manhole covers may help to ventilate the system and pin down the location of the fault. However, removing a manhole cover may re-ignite flammable vapors, or cause low-order explosions if the atmosphere was too rich to burn before the cover was removed.

**Check Nearby Building Basements** for smoke entering through duct lines.

**Never Direct Water into a Manhole** until requested by the PECO Energy representative. The source of the fire and any other facilities that might be damaged must be de-energized before water can be used safely and effectively.

## FIRES AT ELECTRIC SUBSTATIONS

### CAUTION

#### SUBSTATION FIRES ARE MAINLY OIL FIRES

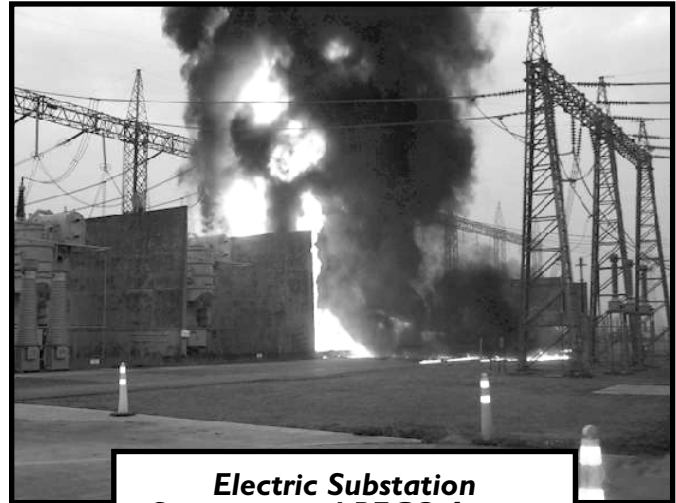
**Notify PECO Energy.** Specify location and name of substation involved. The name is usually posted on the main entrance gate or on the equipment itself. The assistance of PECO Energy employees is crucial. They can identify areas that are electrically safe for the fire fighter, and they have a limited amount of specialized fire-fighting equipment. PECO employees may be on duty, or the station may be unattended. The fire company must notify PECO Energy for assistance.

**Clear the Area.** Keep away from fences, which may become energized.

### Protect Adjacent Property.

#### Prepare to Assist PECO Energy Employees.

Prepare the fire ground for the suppression effort so that you are ready when PECO Energy employees arrive. **DO NOT** enter the substation or attempt to fight the fire until authorized by the PECO Energy representative.



**Electric Substation  
Stay out until PECO Arrives**

### When You are Permitted to Enter Substation Property:

#### 1. Be Prepared to fight an oil fire.

**Oil is the major fire-fighting concern** because it is combustible and present in large quantities. Under normal conditions it is a relatively safe liquid. Most oil in electric equipment has a flash point of nearly 300°F and its auto ignition point is over 650°F. Under electrical fault conditions, the heat energy produced by the electric arc is more than enough to ignite the oil.

**Extinguish oil fires** by using protein foam or water fog streams. Re-ignition within a transformer is not uncommon and the fire may continue to burn inside the transformer for an extended period of time.

**All ground fire** must be extinguished first to prevent it from re-igniting adjacent equipment. Never use a solid stream of water on an oil pool fire because of its possible conductivity and it can spread the fire.

**Beware: Explosions are possible** from the combustible oil vapors or from overheated oil-filled equipment!

#### 2. Verify exactly what is de-energized and what is energized.

**PECO Energy will de-energize** as many adjacent facilities as practicable before fire fighting commences. However, the fire itself may deny the operator access to de-energize some facilities. And it may be necessary to maintain some nearby facilities or bus-work in service.

**3. Determine if fire-fighting equipment is located near or in the substation.**

**Yard fire hydrants may be available**, as well as automatic water spray systems. Local water pressure may be improved by using the fire department connection.

**4. Bring in only the minimum amount of equipment and fire fighters necessary.**

**One hose line, with two fire fighters** may be sufficient. Avoid excessive personnel or equipment in the substation. It will reduce life safety hazards without impeding the fire fighting effort.

**Never drive beneath overhead construction** without specific authorization from the electric company. Watch radio antennas!

**5. Use only the minimum amount of water or foam necessary to extinguish the fire.**

**Never use water or foam on metal cabinets** that may contain electric equipment until you have been authorized by PECO Energy.

**Let natural ventilation cool the equipment** unless water is requested by PECO.

**6. Beware: Steel or aluminum structures may collapse!**

**The intense heat of the fire** can collapse steel framework and aluminum “bus work,” which is the electric conductor that looks like overhead piping in both outdoor and indoor substations. You may be requested to direct a fog stream against the steel or aluminum structures after it is verified that they are de-energized. If considerable steam is produced, caution is required. Continued application of water may be required to cool down the structure and prevent collapse.

**7. Beware: Porcelain insulators may rupture and send fragments flying!**

**The intense heat of the fire can cause this**, by sudden cooling, or by a hose stream directed against an insulator at close range (providing a momentary layer of water that causes a flashover). Wear safety goggles or face shield to protect your eyes.

**8. Beware: Yard stone may spall and send fragments flying!**

**Excessively heated yard stone** may spall and throw fragments with considerable force. The application of water may intensify this problem. Nevertheless, the ground fire must be extinguished first. Wear safety goggles or face shield to protect your eyes.

**9. Beware: Burning insulation may produce toxic fumes!**

Use meters to check the atmosphere.

**10. Beware: Batteries located in the substation’s control room may produce explosive hydrogen gas.**

## FIRES AT ELECTRIC GENERATING STATIONS

### CAUTION PRE-FIRE PLANNING IS IMPERATIVE FOR POWER PLANT FIRES.

The fire company and generating station employees should meet at every electric generating station within the service territory of their fire company. At such meetings, the fire fighters can become acquainted with the plant fire brigade and also with the location and type of fire protection equipment available to combat fire in each section of the plant in addition to the specific hazards within the facility.

**Generating Station Employees.** During a fire-fighting operation, plant employees will act as guides for fire fighters and will request whatever assistance the fire department requires. Generating station employees know how to fight fire safely within their generating station. They are familiar with the location and proper use of the fire-fighting equipment within the plant.

**Public Fire Fighters.** Public fire fighters’ special skills, experience and their special fire-fighting equipment can be extremely valuable to supplement the plant response personnel and equipment. For safety’s sake, the fire fighting operation must be coordinated with generating station fire response personnel to ensure maximum effectiveness and life safety.

## IN SUMMARY...

### WHEN A FIRE OR OTHER EMERGENCY INVOLVES ELECTRIC FACILITIES:

- C**lear everyone, including fire fighters, from any energized object;
- A**ssume every fallen wire is energized and dangerous;
- U**se approved procedures and equipment near energized facilities;
- T**ackle surrounding fires;
- I**gnore fires on our electric equipment until our representative arrives;
- O**nly de-energize electric facilities to protect life;
- N**otify PECO Energy Immediately.

*PECO Energy thanks you for your vigilance and cooperation.*

## ANATOMY OF ELECTRIC SHOCK

Definition of Millampere: 1 Millampere equals one thousandth (.001) of an ampere. An ampere is a measure of electric current.

Formula for finding Amperes:

$$\frac{\text{Voltage}}{\text{Resistance}} = \text{Ampere}$$

Effects of Current on the Body:

### Millamperes

1 or less	Tingling sensation
1-10	Sensation of shock
5-24	Painful shock
Over 25	Severe muscular contractions
Over 50	Ventricular fibrillation
Over 200	Severe burns and muscular contraction

# ***Natural Gas***



## INTRODUCTION ON NATURAL GAS

Natural gas originates in most underground deposits located along the Gulf Coast of the United States or as a by-product of oil wells and waste refuge sites. Transmission pipelines transport the natural gas at high pressures (up to 1,000 PSI) throughout the country to local natural gas utilities. The local natural gas utility purchases the gas and distributes it to the customer through the utility's distribution piping system. The PECO Energy distribution system consists of mains, services, valves and meters and operates at pressures ranging from ¼ psi to 99 psi.

Most of PECO's underground gas pipelines run along public rights-of-way, streets and sidewalks – these are usually called our “gas mains”. Gas service lines run from the mains across the lawn into your house or commercial building. On rare occasion, some cross private property.

Interstate gas pipelines and PECO's transmission pipelines are marked by aboveground signs, either on white and yellow posts or yellow markers on the roadway.

The markers are standard where ever you may go and were developed by the natural gas industry, later incorporated into federal law. Line markers, also known as right-of-way markers, are placed at most public road crossings.

Natural gas is predominately methane. It is colorless, tasteless, and in its natural state odorless. The transmission pipeline company and PECO Energy add odorant to the natural gas. It is non-toxic and considered a simple asphyxiant. Natural gas has a lower explosion limit (LEL/LFL) of 4% and an upper explosion limit (UEL/UFL) of 14%.

Installation of natural gas transmission and distribution piping systems must conform to rigid construction requirements set forth in the ANSI B31.8, “Gas Transmission and Distribution Piping System Standard”. Requirements for the installation of natural gas piping and appliances inside buildings are found in the NFPA 54. Natural Fuel Gas Code.

The federal government's Department of Transportation has jurisdiction over transmission pipelines. PECO Energy's distribution system must also comply with federal Department of Transportation regulations and requirements set forth by the Pennsylvania Public Utility Commission.

PECO Energy ensures the integrity of its natural gas distribution system through a comprehensive safety program that involves surveying, monitoring, maintenance, and testing. PECO Energy is responsible for the distribution system up to and including the natural gas meter. The property owner is responsible for all natural gas piping in the building that is downstream of the meter.

## WHAT TO DO...FIRST

Immediately notify PECO Energy once you have determined that the incident involves natural gas.

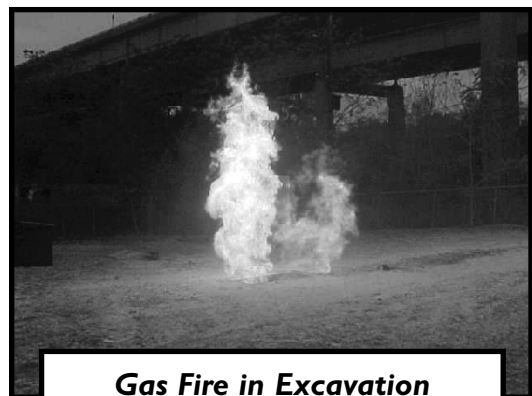
Upon arrival PECO Energy personnel are instructed to report to the Incident Commander at the scene. PECO Energy can assist in the evaluation of the problem, recommend actions to take, and request additional PECO Energy services.

## ESCAPING NATURAL GAS OUTSIDE A BUILDING

**NOTIFY PECO ENERGY IMMEDIATELY** if un-ignited natural gas is escaping from the ground, from an excavation or from an open pipe outside a building. Establish a hot zone around the location of the leak. Extinguish all flame and other ignition sources. Check surrounding buildings, cellars in particular, for any presence of natural gas odors. Restrict or re-route all traffic until PECO Energy personnel can bring the natural gas flow under control.

## BURNING NATURAL GAS OUT-OF-DOORS

The best method of controlling an outdoor natural gas fire is to shut off the natural gas flow. In most cases, the emergency responder should not attempt to put out the fire while natural gas is still escaping. Establish a hot zone. If it is necessary to extinguish the natural gas fire before gas flow can be stopped, then use dry chemical. If the natural gas fire has spread to exposed combustibles then use a fire hose stream to extinguish the exposed fires. **DO NOT** fill the excavation with water.



**Gas Fire in Excavation**



**Downed electric lines that ruptured a gas line and caused a fire**

**NOTIFY PECO ENERGY IMMEDIATELY** when natural gas is burning. Valves on mains shall only be operated by PECO Energy personnel. Curb valves on natural gas services may be closed by emergency responders who have been trained in the use of curb keys. Valves and curb valves should never be turned on again by emergency responders. Turning the wrong valve or opening a closed valve could further endanger life or property.

## ESCAPING NATURAL GAS IN A BUILDING

**NOTIFY PECO ENERGY IMMEDIATELY** when escaping natural gas is found in buildings. The Incident Commander should determine if the natural gas could be shut off inside the building, or at the outdoor meter, which is equipped with a valve and that can be shut off with a wrench. Ventilate the building by opening the doors and windows. Do not operate electrical switches. Clear the building of occupants if natural gas is escaping in any quantity.

## ESCAPING NATURAL GAS BURNING IN BUILDINGS

**NOTIFY PECO ENERGY IMMEDIATELY** when escaping natural gas is burning in buildings. The Incident Commander should determine if natural gas could be shut off inside the building, or at the outdoor meter, which is equipped with a valve and can be shut off with a wrench.

In certain industrial or commercial buildings turning off the natural gas might seriously interrupt important and costly processes, or create further hazards. Reliance on PECO Energy to help evaluate the proper action is the best procedure. If the natural gas supply cannot be safely shut off, prevent fire extension by wetting surrounding combustibles with a fog stream until PECO Energy emergency crews can control the flowing natural gas.

**NEVER TURN A VALVE LOCATED INSIDE A BUILDING ON AGAIN. LEAVE THIS TO PECO ENERGY PERSONNEL**

## INDOOR NATURAL GAS PIPING OR METERS

**NOTIFY PECO ENERGY IMMEDIATELY** when it appears the fire endangers the indoor natural gas piping or meter. PECO is best equipped to shut off the supply of natural gas. The Incident Commander based at the situation may elect to shut off the supply at an inside valve.

## APPLIANCE FIRES

In some rare cases natural gas may burn out of control at an appliance. **NOTIFY PECO Energy** when a natural gas fueled appliance is involved in fire, the fire can be controlled by shutting off the flow of gas at the appliance shut off valve or at the meter valve. **DO NOT TURN ON THE APPLIANCE OR METER VALVE ONCE HAVING SHUT IT OFF.**

## GAS DETECTION

**NOTIFY PECO ENERGY IMMEDIATELY** when you are dispatched to investigate an odor of gas. PECO employees are trained and equipped with gas detecting instruments and will provide assistance. Odors can come from many causes including petroleum products such as gasoline, marsh gas, sewer gas, industrial gases and the like. Natural gas has a distinctive odor added by the utility company and can be recognized by smell.

## GAS IN MANHOLES, VAULTS, SEWERS

- 1. NOTIFY PECO ENERGY IMMEDIATELY** to assist in the identification of the type of gas involved, such as gasoline vapors, sewer gas, cable-burnout gases, etc., and to trace its source.
2. Do not attempt to extinguish flames if gas becomes ignited.
3. Establish a hot zone around the opening. Keep bystanders away. Prohibit smoking, etc.
4. Always test the atmosphere of a manhole, vault or sewer, first with a gas detector and then for oxygen deficiency, carbon monoxide, and hydrogen sulfide, before anyone enters.

# Natural Gas

5. Do not enter manholes, vaults or sewers if dangerous concentration of gases or vapors are known or suspected to be present.
6. Do not enter manholes, vaults or sewers under any condition without standby assistance.
7. Temporarily vent a manhole by removing its cover and the covers on either side until you reach manholes free of gas. Precaution should be taken to prevent a spark. Wet manhole cover and rim before removing cover.
8. When fire personnel are required to enter manholes, vaults or sewers for rescue operations, the following safety precautions should be followed:
  - a. All emergency responder personnel should use self-contained breathing apparatus and have all confined space rescue equipment in place during entry.
  - b. Personnel should operate in pairs.
  - c. A stand-by group similarly equipped should be maintained at the scene of the alert.
  - d. Charged hose lines equipped with fog nozzles should be placed on stand-by alert at the scene.
9. Check the basements of adjoining buildings for any evidence of gas intrusion. If found, ventilate by opening windows and doors. Shut off open flame devices and do not operate electrical switches. If natural gas is involved, handle as suggested in, "Escaping Gas in Buildings."

## HERE ARE SOME QUICK "DON'TS" WHEN NATURAL GAS IS INVOLVED:

### ***DON'T...***

***forget to Notify PECO Energy IMMEDIATELY.***

### ***DON'T...***

***turn on the appliance or meter valve once having shut it off.***

### ***DON'T...***

***allow open flames, smoking, or spark-producing devices in either open or closed areas – if the presence of unignited combustible gas is suspected.***

### ***DON'T...***

***ring doorbells, operate electrical switches or use the telephone in areas where the presence of unignited combustible gas is suspected.***

***With the exception of saving a life... DON'T... make any effort to extinguish flames of escaping burning gas. (Use spray only to protect surrounding exposure).***

### ***DON'T...***

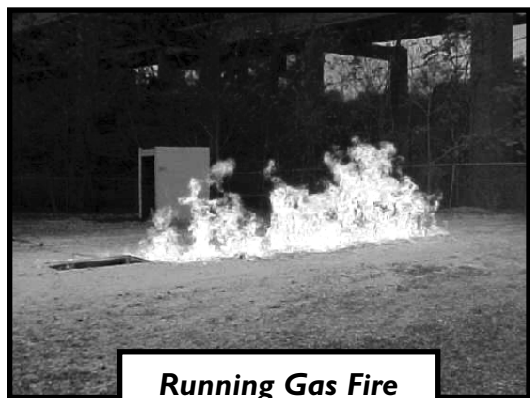
***fill the excavation with water.***

## CARBON MONOXIDE

Carbon Monoxide, also known as (CO), is the result of incomplete combustion of solid, liquid or gaseous fuel.

CO is colorless, odorless, and tasteless. CO is lighter than air, toxic, and an asphyxiant.

PECO Energy responds to approximately 2,000 calls a year for CO and has instruments to meter the levels inside a building.



***Running Gas Fire***



# Natural Gas

## SOURCES OF CO PRODUCTION

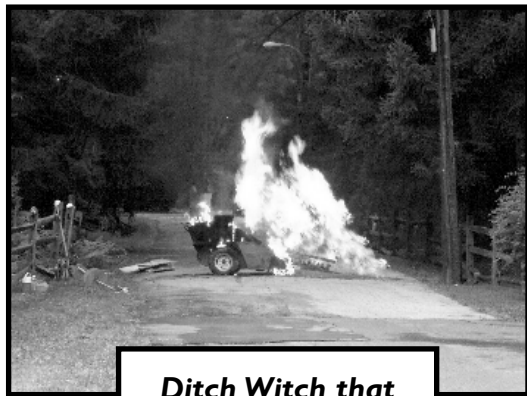
Fireplaces  
Running Vehicle  
Furnaces  
Hot water heaters  
Gas Fired space heaters  
Grills (Charcoal and Gas)  
Gas Ranges  
Coal and Wood stoves

## CAUSES OF BUILDUP

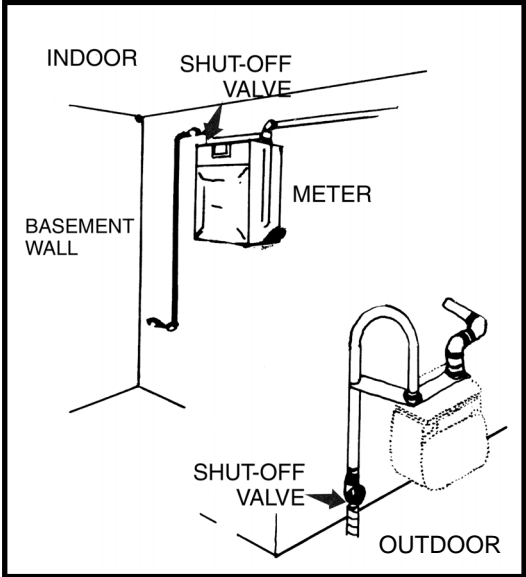
Blocked Chimney  
Defective flue pipe  
Malfunctioning appliance  
Chimney downdraft  
Cracked heat exchanger  
Vehicles running in a garage  
Kerosene Heaters

**\*\*All fossil-fueled appliances are a potential source of CO.**

**CO is the silent killer, DON'T let it get you.**



**Ditch Witch that Ruptured Gas Line**



## LOW-PRESSURE SERVICE SINGLE METER INSTALLATION

Typical service and meter facility on a low-pressure system (approximately 1/4 (PSI)).

Most commonly found for household usage. Meter is usually located in cellar near service entrance. In some localities because of cellar conditions the meter may be located in a utility room, etc. Shutting off the meter would control the natural gas supply to the appliances.

## SOME ILLUSTRATIONS FOR YOUR CONVENIENCE

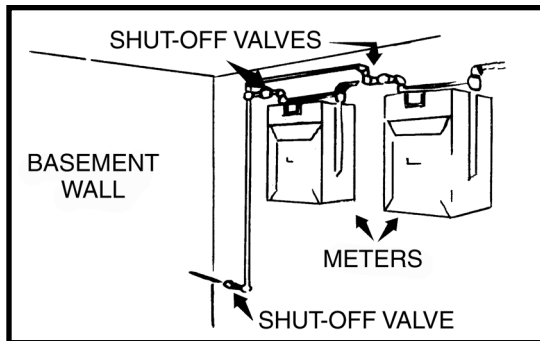
The diagrams on the following pages illustrate various types of piping, meters and regulators that are most common in natural gas service facilities with the usual location of appropriate inside shut-off valves designated by arrows.

It should also be noted that there are rural and suburban areas where the gas utility does not distribute natural gas. Here the gas service may be bottled gas such as liquid propane gas (LPG). The information contained in this booklet is not applicable to LPG.

This booklet also does not attempt to cover problems that might arise from the facilities of transmission natural gas pipeline companies. These companies welcome coordination with emergency response units and they have their own special equipment and service to place at the disposal of the fire company.

**REMEMBER...  
GAS UNDER CONTROL  
IS HARMLESS**

# Natural Gas

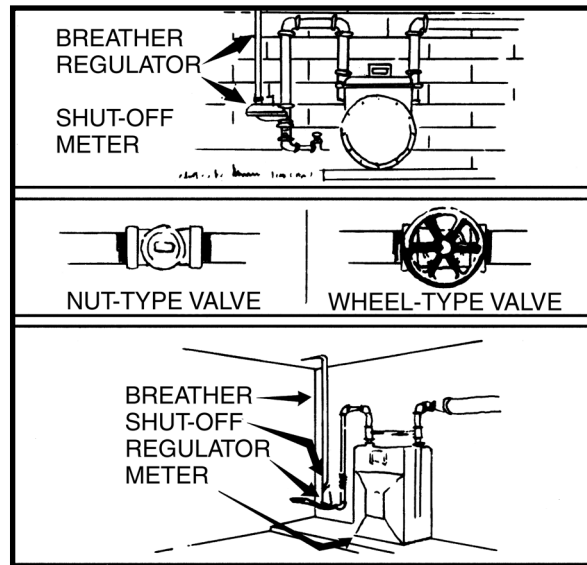


## LOW-PRESSURE SERVICE MULTIPLE METER INSTALLATION

Typical service and meter facility on a low-pressure system (approximately  $\frac{1}{4}$  (PSI)).

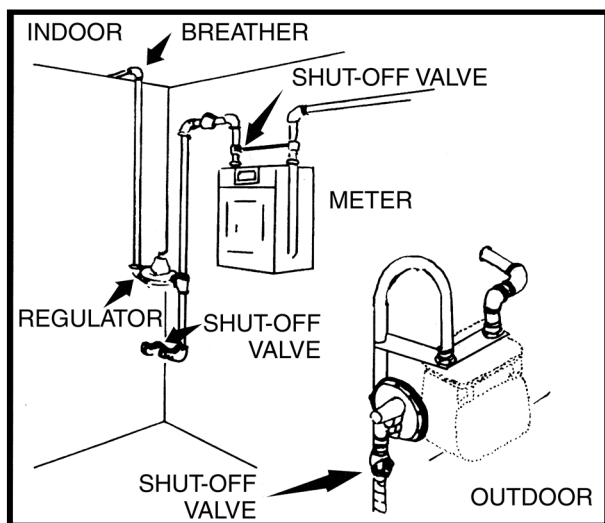
Most commonly found in multiple household dwellings. In some locations the meters may be located in a utility room. Shutting off the meter would control the natural gas supply to the appliances only in the apartment served by the meter. The meter valve at each meter should be closed to control the natural gas supply to the individual meters or the building as a whole.

*Note: Low-pressure services do not have curb valves.*



## TYPICAL INDUSTRIAL METER INSTALLATION

Some large commercial or industrial users may have a separate room or even a separate building for the meter room. A regulator preceding the meter indicates that the service is elevated pressure and shows the valve to be shut at the inlet to the regulator. In the case of a low-pressure service, no regulator would be used and the valve to be closed is shown at the inlet in the meter.



## ELEVATED PRESSURE SERVICES WITH SINGLE METER INSTALLATION AND HOUSE REGULATOR

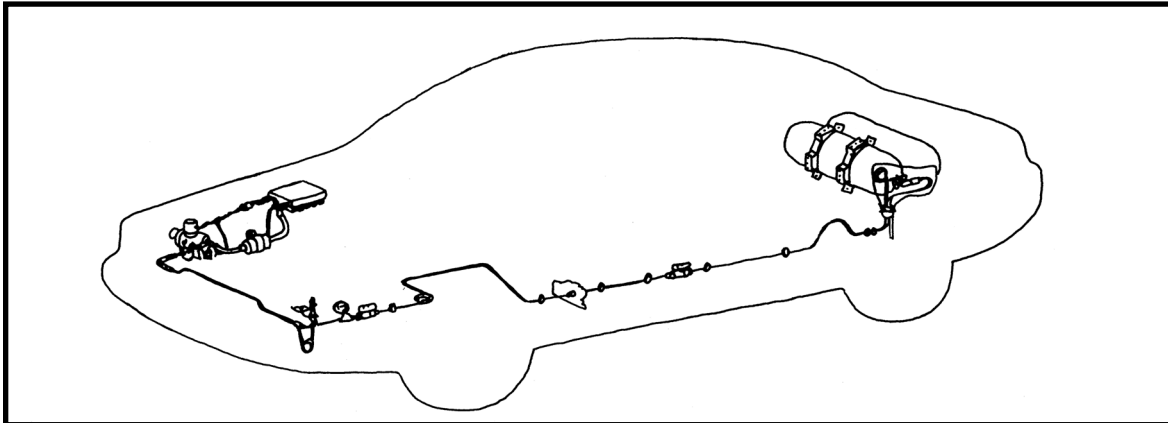
In this type of service, natural gas enters the cellar at elevated pressure. It goes through a regulator that reduces and regulates the pressure entering the house piping to approximately  $\frac{1}{4}$  PSI and then goes through the natural gas meter prior to entering the rest of the house piping to appliances.

## COMPRESSED NATURAL GAS

Compressed Natural Gas (CNG) is natural gas compressed into cylinders used in natural gas fueled vehicles. The size, number and location of cylinders may be customized depending on the vehicle. The cylinders are pressurized which require a relief device on the cylinder to empty the contents in the event of over pressurization. The fuel is in a gaseous form that eliminates a BLEVE hazard. There are manual shut off valves on the cylinder(s) and the fuel line.

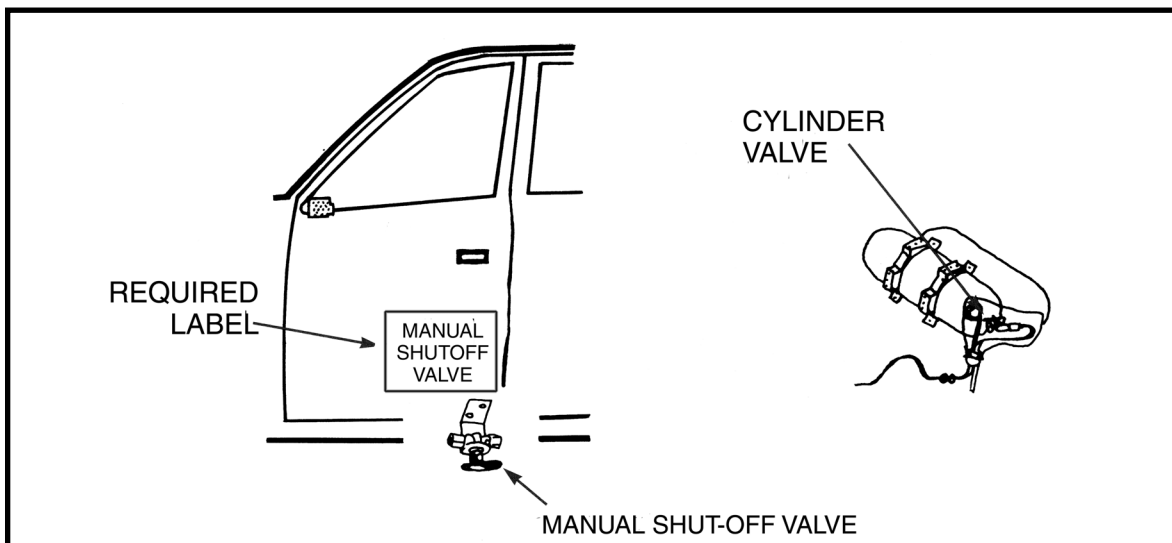
## CNG COMPONENTS

### Fuel Storage Cylinder Fuel Lines



## LOCATION OF MANUAL SHUT OFF VALVES

If a vehicle has an electric lock off on the tank valve, the vehicle will not have a manual shut off valve. If the vehicle does not have an electric shut off valve, the vehicle will have a manual shut off valve and it must be labeled.



# For More Information...

## PECO Fire Academy

Montgomery County (610) 832-6462  
Chester County (610) 832-6463  
Delaware County (610) 832-6463  
Bucks County (610) 832-6460

## PECO Energy Customer Service

1-800-494-4000

## Emergencies:

1-800-841-4141  
[www.pecosafety.com](http://www.pecosafety.com)

<http://www.culverco.com/peco/consumersafety>

## PA One Call:

[www.paonecall.com](http://www.paonecall.com)  
1-800-242-1776

## U.S. Department of Transportation – Dig Safely

<http://ops.dot.gov/damage.htm>

## National Pipeline Mapping System

<http://www.npms.rspa.dot.gov/>



## Notes

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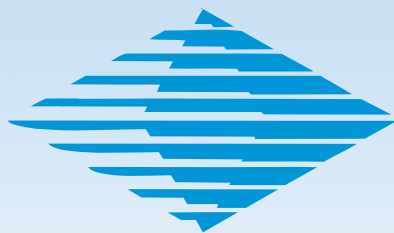
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