The Heat is on

Think Safety!

A Publication Of The West Virginia Propane Gas Association

Winter 2008

Carbon Monoxide: The dangers, The Causes

Winter, is the most active season of the year for propane marketers. Unfortunately, increased activity also brings an increase in potential dangers.

This issue of *Think Safety* will address an often overlooked danger –carbon monoxide poisoning.

We will discuss ways to identify potential producers of the poisonous gas, its harmful effects, and some potential causes of elevated carbon monoxide.

Allowable CO Levels:

Each year, according to CPSC, there are more than 200 carbon monoxide deaths related to the use of all types of combustion appliances in the home. Exposure to carbon monoxide reduces the blood's ability to carry oxygen. Often a person or an entire family may not recognize that carbon monoxide is poisoning them. The chemical is odorless and some of the symptoms are similar to common illnesses. This is particularly dangerous because carbon monoxide's deadly effects will not be recognized until it is too late to take action against them.

Carbon monoxide exposures especially affect unborn babies, infants, and people with anemia or a history of heart disease. Breathing low levels of the chemical can cause fatigue and increase chest pain in people with chronic heart disease. Breathing higher levels of carbon monoxide causes symptoms such as headaches, dizziness, and weakness in healthy people. Carbon monoxide also causes sleepiness, nausea, vomiting, confusion, and disorientation. At very high levels it causes loss of consciousness and death.

Characteristics:

- Often goes long undetected
- Masquerades as flu, fatigue, etc.
- Often many people "sick" simultaneously
- May go away upon leaving poisoning site (to work, on vacation, etc.)
- Nearly always misdiagnosed by physicians
- May involve pets "sick", dead at same time
- Rarely involves sinus congestion, cough (when present, it may be due to other compounds {eg. NO_x, SO_2} in exhaust gases)

Clues to Discovery:

- Lethargy, headache, etc. of long duration
- Long-standing "illness" intractable to medical solutions
- Multiple cases of similar illness at one location
- "Illness" that may suddenly improve when leaving site
- "Illness" that improves when combustion device(s) is turned off or taken away
- Morbidity / mortality of pets
- CO alarm sounding, once or repeatedly
- Presence of malfunctioning furnace, water heater, etc.

Inside . . .

Avoid the Following Dangerous Situations:

Carbon monoxide accidents can be avoided with a little care and advice from propane professionals.

For instance, a gas range should never be used for heat, and a propane grill should never be used indoors. The gas range is not equipped with an ODS pilot and open burners are often dirty which contributes to the production of carbon monoxide. Likewise, propane grills are not equipped with an ODS and often don't have a clean burn.

An oversized ventfree propane heater can cause carbon monoxide problems for two reasons. A lack of sufficient oxygen could produce an incomplete burn and thus elevated levels of carbon monoxide. Also, an oversized heater could short-cycle.

Never alter or otherwise disable an ODS pilot on a ventfree heating appliance. ODS pilots come preset from the factory to shutoff if oxygen depletion reaches an unsafe level. Moving thermocouples or air shudders could disable the oxygen depletion function of the pilot. If the manufacture suggests the alteration of the pilot system, always attain written permission to do so.

Vented appliances are a frequent source of excess carbon monoxide. Blocked or corroded exhaust flues and vents from furnaces and water heaters can force carbon monoxide back into the building.

Conditions that produce "down drafting" or "back drafting" of furnaces or other vented heaters can pull exiting carbon monoxide back into the home.

Specific venting instructions can be found in NFPA 54.

As a trained propane professional, be on guard for conditions that can place customers in dangerous situations. Though carbon monoxide cannot be detected by sight or smell, the producers of carbon monoxide can sometimes be identified. Be alert for customer symptoms of carbon monoxide poisoning.

Rust is a dead giveaway to improper venting. It indicates moisture from trapped flue gases. Watch for rusty or improperly installed vents. Look for flues or chimneys that lack termination caps.

Never, ever disable vent safety equipment on a vented heater. **Doing so places the lives of the occupants in your hands. If the device is faulty, replace it.**

Evidence of flue gas spillage may be easy to spot, especially with gas-fired equipment. For example, the rust on the top of gas-fired heating boiler pictured above was from a long history of spillage from the boiler's draft hood. The flue gases were spilling out of the draft hood because the chimney was blocked by fallen bricks which had jammed up in the flue right above the thimble for the boiler. Signs of potential carbon monoxide poisoning may include rust, soot, loose connections, water streaks on venting systems or moisture on the inside of windows.

CO in air	Inhalation time and toxic developed
50 parts per million	Safety level as specified by the Health and Safety Executive
200 PPM	Slight headache within 2-3 hours
400 PPM	Frontal headache within 1-2 hours, becoming widespread in 3 hours
800 PPM	Dizziness, nausea, convulsions within 45 minutes, insensible in 2 hours

The Heat is on! West Virginia Propane Gas Association

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Combustion Appliances & Potential Problems:

Central Furnaces, Room Heaters, Fireplaces: Natural or Liquefied Petroleum Gas. Cracked heat exchanger; Not enough air to burn fuel properly; Defective/blocked flue; Maladjusted burner.

Water Heaters: Natural or Liquefied Petroleum Gas. Not enough air to burn fuel properly; Defective/blocked flue; Maladjusted burner.

Ranges; Ovens: Natural or Liquefied Petroleum Gas. Not enough air to burn fuel properly; Maladjusted burner; Misuse as a room heater

Appliance Inspection And Maintenance Frequency

Gas Hot Air Heating System: Air Filters - Clean/change filter - Monthly As needed; Look at flues for rust and soot - Yearly. Qualified person check/clean chimney, clean/adjust burners, check heat exchanger and operation - Yearly (at start of heating season).

Gas/Oil Water/Steam Heating Systems and Water Heaters: Look at flues for rust and soot - Yearly. Qualified person check/clean chimney, clean combustion chamber, adjust burners, check operation - Yearly (at start of heating season).

Carbon Monoxide Information:

Carbon Monoxide is produced by the incomplete combustion of the fossil fuels - gas, oil, coal and wood used in boilers, engines, oil burners, gas fires, water heaters, solid fuel appliances and open fires.

Dangerous amounts of CO can accumulate when as a result of poor installation, poor maintenance or failure or damage to an appliance in service, the fuel is not burned properly, or when rooms are poorly ventilated and the Carbon Monoxide is unable to escape.

Having no smell, taste or color, in today's world of improved insulation and double glazing, it has become increasing important to have good ventilation and to maintain all appliances regularly. An absolutely reliable detector, installed properly which gives both a visual and audible warming immediately when there is a build up of CO to dangerous levels, may also be considered.

What are the effects of Carbon Monoxide? Carbon Monoxide produces the following physiological effects on people exposed:

- 50 parts per million (ppm)Safety level as specified by the Health and Safety Executive.
- 200 PPM Slight headache within 2-3 hours.
- 400 PPM Frontal headache within 1-2 hours, becoming widespread in 3 hours.
- 800 PPM Dizziness, nausea, convulsions within 45 minutes, insensible in 2 hours.

Carbon Monoxide poisons by entering the lungs via the normal breathing mechanism and displacing oxygen from the bloodstream. Interruption of the normal supply of oxygen puts at risk the functions of the heart, brain and other vital functions of the body.

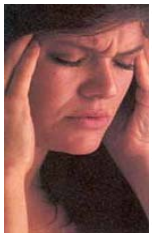
The affective levels of CO mentioned are for a healthy adult. Persons suffering from heart or respiratory health problems, infants and small children, unborn children, expectant mothers and pets can be affected by CO poisoning more quickly than others in the household and may be the first to show symptoms.

The Carbon Monoxide Poisoning Syndrome:

Category Symptoms

Somatic/Physical Symptoms: headache nausea, vomiting muscle pain, joint pain, chronic fatigue, dizziness, vertigo, numbness, tingling, paresthesias.

Cognitive/Memory Impairments: **executive functioning deficits**, attention-concentration problems, multi-tasking problems, verbal and/or visual deficits, word-finding problems, word order problems, short-term memory problems, loss of intellectual capacity, slowed cognitive processing.



Affective Disorders-(Emotional/Personality effects): mood changes irritability depression, anxiety, tearfulness, apathy, lack of motivation, loss of interest, anger, temper, social relationship problems, sleep disturbance, personality change (eg. psychosis, schizophrenia)

Sensory & Motor Disorders (Visual, Auditory, etc.): blurry vision, double vision (diplopia), accommodation problems, etc., etc. tinnitus (buzzing in ear), loss of hearing hypersensitivity to chemicals, etc. (ie. MCS)slowed fine motor speed, coordination decreased, gross motor strength, speaking, eating, swallowing disorders.

Gross Neurological Disorders : seizures, aphasia (can't speak), gait (walking) disturbances, balance problems, tremor. **See Min, 1986 Study.**

** It is also frequently seen in acute, higher-level CO poisoning.*

Chronic CO Poisoning:

Chronic CO poisoning is, in fact, difficult to diagnose by those not skilled in its presentation. It is often mistaken for chronic fatigue syndrome, viral or bacterial pulmonary or gastrointestinal infection, excessive heat, etc. Similar symptoms seen simultaneously in more than one person, and which decrease upon removal from an environment are tip-offs that CO is involved. COHb is usually not

excessively elevated. More often than not, by the time air CO or blood CO levels are measured, the presence of CO in the environment has been corrected, making measurement impossible. Computed tomography (CT) and magnetic resonance imaging (MRI) generally show no lesion, even when neuropsychological and/or neurologic evaluations may detect functional deficits.

Detectors:

Carbon monoxide detectors or alarms can help prevent CO poisoning though their effectiveness is often debated and the level of functionality varies greatly from model to model and usually by cost.

In using an alarm there are several factors in choosing the one to use:

- Reasonable in price but more expensive can be better
- Ease of use, installation & replacement
- Self-calibrating and self-zeroing
- Provides protection from acute, lethal CO exposure
- Provides protection from chronic, low level CO exposure (most today do not)
- Easy to understand operating manual (many today are not)
- Long working life
- Minimal interference by other pollutants, commonly used chemicals, etc.
- Memory capability for past events (some have today)
- Digital readout of CO concentrations (many do not have today)
- Accurate measurement of CO
- Small size and lightness of weight, allowing portability
- Clear instructions and warning tags on the unit itself
- Low incidence of false positives
- Low incidence of false negatives

Placement of the CO alarms is also important.

- **PUT** - near a bedroom, or other room (livingroom, main hallway) where people spend most of their time.
- **PUT** - where its alarm can be heard.
- **PUT** - where the alarm can be easily seen.
- **READ** the instructions that come with your Alarm. If you have questions, consult COHQ
- **DO NOT PUT** - in garage, furnace room, near cooking stove, etc.
- **DO NOT PUT** - in dead air space, corner of room, near floor, in peak of vaulted ceiling. CO does not fall or rise in the air column.
- **DO NOT PUT** - near open windows or doors.
- **DO NOT PUT** - in excessively hot or cold areas, or excessively damp or dry areas.
- **DO NOT PUT** - a cloth or plastic cover over the detector.

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Training Quiz

Name_____ Social Security Number_____

1. Each year, according to CPSC, there are more than ____ carbon monoxide deaths related to the use of all types of com -bustion appliances in the home.
   A. 20 B. 10 C. 100 D. 200

2. Carbon Monoxide is odorless and some of the symptoms are similar to common illnesses.
   A. True B. False

3. Carbon monoxide exposures especially affect unborn babies, infants, and people with anemia or a history of heart disease.
   A. True B. False

4. Breathing low levels of carbon monoxide can cause fatigue and increase chest pain in people with chronic heart disease.
   A. True B. False

5. Carbon monoxide causes sleepiness, nausea, vomiting, confusion, and disorientation.
   A. True B. False

6. A gas range should never be used for heat
   A. True B. False

7. An oversized ventfree propane heater can cause carbon monoxide problems
   A. True B. False

8. Never alter or otherwise disable an ODS pilot on a ventfree heating appliance.
   A. True B. False

9. Blocked or corroded exhaust flues and vents from furnaces and water heaters can force carbon monoxide back into the building.
   A. True B. False

10. Which of the following indicates a possible carbon monoxide-producing vent?
    A. Rusty B. Improperly installed C. Lacking termination cap D. A,B, and C

11. Never, ever disable vent safety equipment on a vented heater.
    A. True B. False

12. Furnace filters should be changed or cleaned _____.
    A. Monthly B. Weekly C. Yearly D. Semi-annually

13. Flues should be checked for rust or soot ___.
    A. Monthly B. Weekly C. Yearly D. Semi-annually

14. Similar symptoms seen simultaneously in more than one person, and which decrease upon removal from an environ -ment are tip-offs that CO is involved.
    A. True B. False

Training Quiz Answers

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