
Ames Fire Department Standard Operating Guidelines

Book: 3 – Emergency Operations

Section: IX – Hazardous Materials Incidents

Chapter: 1 – **Carbon Monoxide Responses**

Date Approved: 10-12-2007 Revision No.:2 Approved by: 

PURPOSE:

To serve as a model for responding to carbon monoxide (CO) detector activation and related CO incidents in residences.

POLICY:

The intent of this policy is to aid Ames Fire Department (AFD) personnel with:

- Rescue/removal of individuals from hazards
- Evacuation assistance
- Rendering medical care (if required)
- Advising occupants of findings
- Issuing a Notice of Findings Form

PROCEDURES:

Carbon monoxide is an extremely hazardous product. AFD personnel are responsible only for investigating reported carbon monoxide problems or detector activations, evacuation, rendering first aid, and advising occupants. Emergency responders are not on scene to correct the cause of the problem.

CO Incident Response

- Engine/Truck company response will be made to any reported CO incidents with the potential for multiple victims or where the severity of symptoms is unknown.
- CO checks with no detector activation where CO symptoms are reported, the appropriate rescue unit should be immediately dispatched with the air monitoring equipment with CO detection.
- CO checks and rechecks with no symptoms, the appropriate rescue unit should be dispatched at the earliest mutually convenient time with the air monitoring equipment with CO detection.
- CO checks are conducted only when there is a reason to suspect the presence of carbon monoxide. Commercial resources are available for carbon monoxide tests where no reason to suspect a hazard exists.

Conducting CO Investigations

- Upon arrival any unit encountering confirmed or potential CO victims should activate EMS as deemed appropriate.
- For CO readings found in the following ranges:
 - >9 to <50 ppm at any time during CO monitoring - limit exposure time in the residence to less than one hour.

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- >50 to <100 ppm at any time during CO monitoring - limit exposure time in the residence to less than thirty minutes.
- Members with CO exposure to environments >50 ppm shall not be dispatched to any further CO checks within 48 hours of the exposure.
- AFD members shall utilize SCBAs in atmospheres that are in excess of 100 ppm. Backup personnel with SCBA shall be present when entry is made to atmospheres in excess of 100 ppm.

Additional Documents

- Internal use
 - Operator's instructions will be specific to the type of CO detector used and kept at each station.
- External Releases
 - A Carbon Monoxide Notice of Finding, Ames Fire Department form will be used at each CO incidents. One copy will be left with the person who signed the form, the other returned to station and submitted with the incident report.
 - An Ames Fire Department Carbon Monoxide (CO) Checklist may be used when:
 - CO is present and a single source cannot readily be identified
 - Multiple sources are present
 - Whenever the incident commander deems necessary
 - The Ames Fire Department Carbon Monoxide Information Sheet may be given to anyone requesting information concerning carbon monoxide hazards.

CARBON MONOXIDE - NOTICE OF FINDINGS

Ames Fire Department

Carbon Monoxide is an odorless, tasteless, colorless gas that is DEADLY. It is a by-product of a fuel burning process. It can cause symptoms that can mimic flu, unconsciousness and even death. Many appliances around the home are capable of producing Carbon Monoxide when a faulty or unusual condition exists. **Since the source may be transient in nature, the source may not always be detectable.**

The Ames Fire Department responded to investigate a possible carbon monoxide problem.

Incident #: _____ Time: _____ Date: _____

Location: _____ Issued By: _____

Barometer: _____ Humidity: _____ Wind: _____ Temp: _____

Carbon Monoxide: was found _____ was not found _____

If found our instruments found the highest interior level of carbon monoxide to be:
_____ ppm (parts per million).

The results of this short term air monitoring test may be different under various atmospheric and household conditions. Our findings are based only on a brief air sampling. Medical Blood testing is a more definitive determination of carbon monoxide exposure.

What does this reading mean?

<u>9 PPM or less:</u>	Our instruments did not detect elevated levels at this time. However, this does not mean that higher levels did not exist prior to our arrival nor that higher levels will not accumulate after our departure. Check your carbon monoxide detector per the manufacturer's recommendations. Call the manufacturer for additional information (number may be on back of unit). Replace or reset detector as directed by the manufacturer's specifications.
<u>More than 9 PPM:</u>	Our instruments have detected elevated levels of carbon monoxide. We recommend that you consider leaving this building. We feel that it may be unsafe to re-occupy this building until the Carbon Monoxide source is identified and corrections made. Residences with young, elderly, and pregnant occupants are at higher risk.
<u>15-20 PPM:</u>	Impaired decision-making process. Reduced oxygen levels to the heart. Exceeds EPA yearly concentration for eight hour period.
<u>100 PPM or greater:</u>	We have detected a potentially lethal level of carbon monoxide in your home. Leave your building immediately! It is not safe until repairs are made or the source is found and corrected. Have your sources of carbon monoxide examined and if necessary repaired by a qualified repair technician. Replace or reset your detector according to manufacturer's specifications.

Carbon monoxide affects individuals differently depending on size, age, and medical history of the occupant(s). Therefore families with young children, members with medical conditions, aged individuals, and pregnant women should take extra precautions in the event that carbon monoxide is detected.

Received by: _____ Date: _____

NOTE: This is a sample based on the knowledge of CO and CO detectors at that time. It may not reflect the current state of knowledge, and is not necessarily completely accurate.

WHITE COPY: Fire Department YELLOW COPY: Owner/Occupant

**AMES FIRE DEPARTMENT
CARBON MONOXIDE (CO) CHECKLIST**

Incident #: _____ Date: _____ Time: _____

CO Meter Zeroed Outside: ()Yes ()No PPM Inside entry door: _____

INVESTIGATE:

First turn on all exhaust fans to create possible backdraft situation. Done ()
(Range Hoods, Bathroom Vent, Attic Fans, Clothes Dryer)

Operate all combustion appliances for about ten minutes. Done ()

If car is in attached garage, run it with the overhead garage door open. Done ()

Furnace: Present () Not Present ()

Look for gaps, corrosion, soot, rust, duct to chimney connection ()OK () Not OK

Pilot Light () Not Visible () Visible with blue flame () Visible no blue flame

Monitor around burners _____ PPM

CO reading at the heat-outlet for forced air furnaces _____ PPM

Water Heater: Present () Not Present ()

Look for gaps, corrosion, soot, rust, duct to chimney connection ()OK () Not OK

Pilot Light () Not Visible () Visible with blue flame () Visible no blue flame

Monitor around burners _____ PPM

Monitor around vent pipe _____ PPM

Smoke test for draft () OK--good draft () Not OK -- Insufficient or backdraft

Gas Clothes Dryer: Present () Not Present ()

Monitor around vent tubing: _____ PPM Check vent tubing for kinks/blockage.

Pilot Light () Not Visible () Visible with blue flame () Visible no blue flame

Monitor around burners _____ PPM

Fuel Generated Space and Wall heaters: Present () Not Present ()

Pilot Light () Not Visible () Visible with blue flame () Visible no blue flame

Monitor around heaters _____ PPM

Vented Properly ()Yes ()No

Gas Fireplace: Present () Not Present ()

Pilot Light () Not Visible () Visible with blue flame () Visible no blue flame

Monitor around fireplace during and after warmed up _____ PPM

Fuel Burning Fireplace: Present () Not Present ()

Vented properly? ()Yes ()No

Creating backdraft for other appliances ()Yes ()No

Flue Clear ()Yes ()No Damper Open ()Yes ()No

PPM around fireplace _____

Intake open on models that use outside air ()Yes ()No

Cooking Stove -- Non Electric: Present () Not Present ()

Monitor inside after warmup _____ PPM _____

Monitor 2 feet above burners after on high for several minutes PPM _____

Pilot Light () Not Visible () Visible with blue flame () Visible no blue flame

Attached Garage Passage Door: Present () Not Present ()

Monitor around interior entry door, passage into house PPM _____

Person Completing Check Sheet _____ Time _____

Ames Fire Department

Carbon Monoxide Information Sheet

The products of combustion can be divided into four categories:

1. Fire Gases
2. Flame
3. Heat
4. Smoke

These products have a variety of physiological effects on humans, the most important being burns and the toxic effects, which result from the inhalation of heated air and gases.

Carbon Monoxide

Carbon Monoxide (the chief danger in most fire gases) is not the most toxic of fire gases, but is always one of the most abundant. Under controlled burning conditions, the carbon of most organic materials can be oxidized completely to Carbon Dioxide by supplying an excess of Oxygen. In the uncontrolled burning of an accidental fire however, the availability of Oxygen is never ideal; some of the carbon is incompletely oxidized to Carbon Monoxide. Thus, in a confined smoldering fire the ratio of Carbon Monoxide to Carbon Dioxide is usually greater than in a well-ventilated brightly burning fire.

Carbon Monoxide – Poisons by Asphyxiation

Carbon Monoxide combines with hemoglobin (an Oxygen carrying constituent of blood) to form Carboxyhemoglobin 210 times more readily than Oxygen does. Thus, Carbon Monoxide rapidly robs the blood of the Oxygen needed by the body. Simultaneously, Carbon Monoxide prevents the blood from disposing of the waste Carbon Dioxide it normally brings back to the lungs.

Measurements of Carbon Monoxide concentrations in air are not the best way to predict rapid physiological effects, because the actual reaction is from the concentration of Carboxyhemoglobin in the blood, causing Oxygen starvation. High Oxygen users such as the heart and brain are damaged early. The combination of Carbon Monoxide with the blood will be greater when the concentration in air is greater. An individual's general physical condition, age, degree of physical activity, and the length of exposure all affect the actual Carboxyhemoglobin level in the blood.