

Manhattan Fire Protection District

Standard Operating Procedure	Section: RESCUE OPERATIONS	Page 1 of 5
	Subject: Response to Carbon Monoxide Alarms	Date 1/27/97 <i>Revised 1/1/11</i> SOP# 890-1

PURPOSE:

This procedure is established to ensure proper detection and mitigation of carbon monoxide alarms and emergencies, and to provide a standard of response to the same.

SCOPE:

The Manhattan Fire Protection District has established the following procedure regarding the response to and detection of carbon monoxide (CO) alarms and emergencies. This procedure shall apply to all personnel operating at the scene of a carbon monoxide emergency incident.

ENFORCEMENT:

The primary responsibility for adherence to this procedure rests with each individual. Company Officers are responsible for enforcement of this procedure.

APPLICATION:

A carbon monoxide problem or alarm sounding in a structure of the district will require an Engine and Ambulance response of the appropriate still district at a minimum.

Characteristics of Carbon Monoxide (CO):

1. Carbon Monoxide is an odorless, tasteless, colorless gas that can be deadly in relatively low concentrations. It is a by-product of incomplete combustion originating from fuels such as wood, oil, propane, coal, gas, kerosene or charcoal. These types of fuels can be found to be used in appliances such as furnaces, grills, dryers, fireplaces, ranges, water heaters, and autos. When a faulty device, or condition exists, carbon monoxide may be vented into areas where humans are present causing carbon monoxide poisoning.
2. Carbon monoxide has a specific gravity of .97, which causes the gas to be distributed evenly from floor to ceiling. Carbon monoxide has a lower explosive limit (LEL) of 12.5% and an upper explosive limit (UEL) of 74.2%. Ignition temperature of carbon monoxide is 1,128 degrees Fahrenheit.
3. The greatest danger of carbon monoxide is its attraction to the hemoglobin in the bloodstream. CO is inhaled through the lungs and bonds with the hemoglobin in the blood displacing the oxygen that the body needs to function. CO accumulates in the bloodstream forming a toxic compound, this compound called carboxy hemoglobin (CO poisoning) may cause the following symptoms:
 - Beginning stages: head pressure, weakness in the knees, confusion, nausea, and ringing in ears.
 - Ending stages: increasing weakness and confusion, severe frontal headache, dizziness, inability to think clearly, vomiting, loss of consciousness, drop in blood pressure, pulled reflexes, convulsions, loss of muscular control, shallow to absent respirations, death.

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Detector Parameters and Alarm Settings:

Underwriters Laboratories' standard for residential carbon monoxide detectors require them to alarm prior to:

1. 400 PPM in 15 minutes
2. 200 PPM in 35 minutes
3. 100 PPM in 90 minutes

Types of residential carbon monoxide detectors and different methods of reading each type:

1. The typical 110V detector plugs directly into a household outlet. These detectors have lights and audible warning tones:
 - Green light – indicates the unit is receiving power.
 - Flashing yellow light – indicates a warning alarm, this flashing light will be accompanied with 3 to 5 beeps every 5 minutes.
 - Red light – indicates a full alarm and is accompanied with a constant alarm.
2. The typical battery
3. The digital readout detectors are usually 110V monitors that plug directly into household outlets. These detectors have audible warning tones, but instead of a light they have a screen that displays the Parts Per Million being read by the detector. There are also combination smoke/CO detectors that are hardwired with a battery back-up.
4. The performance of all detectors may be affected by a number of contaminants which may produce false alarms, while others may delay the onset of an alarm or damage the sensor. Some of these contaminants include:
 - Hair spray
 - Alcohol fumes
 - Ammonia fumes
 - Perfume
 - Paint or thinners
 - Cleaning products
 - Steam or humidity
 - Silicone sprays (will damage most sensors)
 - Charging of lead acid batteries.

Responding to Carbon Monoxide Alarms:

There are two types of carbon monoxide calls, those where the occupants are experiencing symptoms of CO poisoning and those where the occupants are not having symptoms. Although the assessment of these situations will be the same, the responses will differ.

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CO ALARM WITHOUT SYMPTOMS:

1. Engine and Ambulance shall respond non emergency to all reported CO alarms.
2. Once units have arrived on the scene and evaluate the situation, additional equipment may be requested. The response status (emergency vs. non-emergency) of any additional equipment shall be determined by the Officer/firefighter in-charge on the scene.

CO ALARM WITH SYMPTOMS:

1. Engine and Ambulance from both stations shall respond immediately in emergency mode to CO alarms when occupants are experiencing symptoms of CO poisoning.
2. Additional units will respond per SOP# 401-1b

Conducting an Assessment for Carbon Monoxide:

The following procedures shall be followed for all CO alarms regardless of whether or not occupants are experiencing symptoms:

1. When arriving at the scene normal procedures shall be followed for equipment placement, keeping in mind the possible response of additional equipment.
2. An interview shall be conducted by the Officer/firefighter in-charge with the occupant to determine the level of risk to personnel. If anyone is experiencing signs or symptoms of CO poisoning, appropriate actions shall be taken to treat any victims.
3. All personnel entering the structure shall be in full Personal Protective Equipment (PPE) with SCBA on but not breathing air.
4. The monitor shall be turned on and “zeroed” outside and away from the origin of the alarm and away from any responding equipment. This shall be done in an area assumed to be free of carbon monoxide.
5. Monitoring shall begin as personnel enter the structure. Test “open-air” throughout the structure at eye level; unlike natural gas, carbon monoxide is slightly lighter than air and minimal circulation is needed to keep it diffused throughout the room. If an immediate open-air reading of 35 PPM or greater is received, the following shall be immediately initiated:
 - All personnel shall be in full PPE and breathing air.
 - All occupants shall be evacuated.
 - Ventilation shall be initiated until the occupants are evacuated. Ventilation shall stop once occupants have been evacuated (to assist in finding source of CO), unless levels are above 100 PPM.
 - Officer/firefighter in-charge shall determine if further resources are needed to stabilize the incident.
6. Operate all fuel-burning appliances in structure approximately 5 minutes, move at a walking pace towards the most likely source. Using the following procedures and the CO Checklist, systematically assess the structure documenting readings along the way.

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Gas Furnace and Water Heater:

- With monitor check ambient air around the appliance.
- Visually inspect venting pipes and draft hoods for gaps, leaks or clogs which could prevent exhaust products from venting properly.
- With monitor, check the same area taking samples at each elbow and around draft hood.
- Visually inspect the combustion chamber, checking for an access panel and a pure blue flame, without any discoloration or damage to this area. Test around this area with monitor.

Gas Clothes Dryer:

- With monitor check ambient air around the appliance.
- Visually inspect vent piping for crimping and observe whether the appliance is too close to the wall.
- With monitor, sample around the door to check the seal and at the access panel or combustion chamber.
- Check for a pure blue flame and confirm no CO is escaping from an inadequate pilot.

Space Heaters/Gas Logs:

- With monitor check ambient air around the appliance.
- Visually check the area around the pilot and combustion chamber. Repeat this process with monitor.
- Check prior to and during operation for any escaping CO.

Fireplace:

- Check for a damaged, inadequate, clogged or obstructed chimney and flue.
- If in use, check with monitor for proper venting and possible backdrafting.

Gas Range/Oven:

- With monitor check ambient air around the appliance.
- Visually inspect access panels and vent piping for soot build-up or clogs. Check for a pure blue pilot light and with monitor, for any escaping CO from the combustion chamber.
- With monitor check inside of oven for any CO.
- With monitor check around burners for CO.

Attached Garage:

- With monitor check ambient air in garage.
- Check around autos and other fuel powered equipment and heaters.

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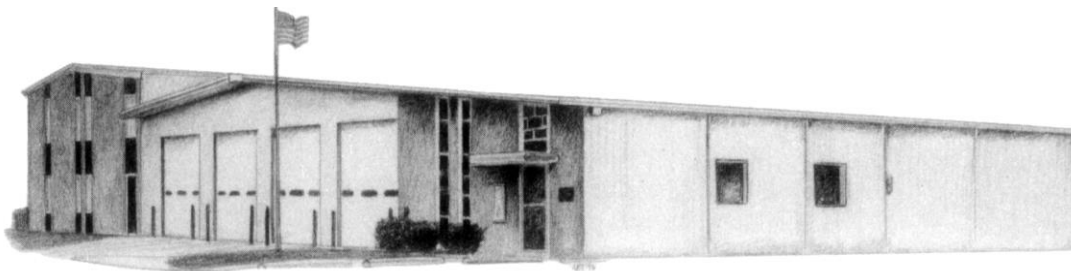
7. If an appliance is found to be the source, the appliance and its fuel source shall be shut off, ventilate the structure until the “open-air” in the structure returns to a safe level. Officer/firefighter in-charge shall notify the gas company and advise the homeowner of problem and suggest a corrective action. **NO MEMBER SHALL ATTEMPT TO RE-LIGHT A PILOT OR RE-START/REPAIR ANY APPLIANCE/DEVICE.**
8. If the source cannot be found, you may contact the homeowners gas/LP company to assist personnel in locating the source.
9. Once the “open-air” spaces in the structure have returned to a safe level, the structure may be re-entered at the discretion of the incident commander, utility representative and the occupants.

10. Advise the owner/occupant of any actions taken, and repairs/problems that need corrected. Officer/firefighter in-charge shall fill out a Carbon Monoxide follow up letter and review it with the owner/occupant.

Use of the RAD 57:

The RAD 57 shall be used on each occupant of the structure and any firefighter that was inside of the structure to verify findings of CO in the structure. If the RAD 57 detects a SpCO reading greater than 10 or the the occupant is showing signs and symptoms of CO poisoning, you must treat and transport occupant per EMS protocol. For structures with high occupancy EMS triage protocols shall apply.

Approved by Chief Daniel Forsythe Date 1/1/11



Manhattan Fire and Ambulance District

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Dear Resident,

Carbon Monoxide (CO) 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 the Flu, result in 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, it may not always be detectable.

Carbon Monoxide () was () was not found by our instruments. This does not mean that this was a false alarm. Our instruments found the highest average interior level of CO to be _____ Parts Per Million (PPM).

WHAT DOES THIS READING MEAN?

9 PPM or less: Our instruments did not detect elevated levels **at this time**. 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 Gas Company or appliance repair company as an added precaution.

10 PPM to 35 PPM: Our instruments have detected potentially dangerous levels of Carbon Monoxide. We have shut down the affected appliance and recommend that you not use it until it has been repaired. As an added precaution you may wish to call the Gas Company.

36 PPM to 99 PPM: This exceeds the maximum allowable concentration for continuous exposure in any 8-hour period according to OSHA (for an adult). Concentrations at this level require immediate action including evacuation of the premises, ventilation, shutting down affected appliances and fuel sources, and notification of Gas Company.

100 PPM or greater: We have detected a potentially lethal level of Carbon Monoxide in your home. We have shut off all fuel sources and requested that you leave your building immediately and not return until repairs are made and tested by the Gas Company. A licensed technician should make repairs.

After repairs are made, replace or reset your Carbon Monoxide detector according to the manufacturers specifications.