I. PURPOSE

This order establishes a procedure for the response to reports of carbon monoxide (CO) incidents. It is the policy of the Troy Fire Department to have the EMS provider respond as the first responder to reports of carbon monoxide alarms. Fire Department resources will respond to assist, or in the event that EMS is unavailable to respond, or as indicated later in this plan.

The Fire Department will respond to CO incidents only when requested by the EMS provider, on in instances where the EMS provider has no units available to respond. All Fire Department responses to CO incidents will be **"Code 2",** unless either dispatch or EMS determines that victims are incapacitated and unable to leave the structure.

II. GENERAL

Carbon monoxide is an odorless, tasteless, colorless gas that is deadly. It is a byproduct of a fuel burning process. Many appliances such as furnaces, kitchen stoves, water heaters, automobiles, etc., can produce carbon monoxide. When a faulty or unusual condition exists, carbon monoxide may be vented into areas where people are present.

Carbon monoxide poisoning may be difficult to diagnose. Its symptoms are similar to the flu, which may include headache, nausea, fatigue and dizziness.

According to the U.S. Consumer Product Safety Commission, there is no U.S. federal government standard that sets an allowable *residential indoor level* for carbon monoxide. There are industry standards, however, for allowable CO emissions from individual indoor appliances such as furnaces or ovens. The Occupational Safety and Health Administration has established a maximum safe working level for carbon monoxide at 35 parts per million (ppm) over an 8 hour period, *in the general work place*.

Exposure to carbon monoxide replaces the oxygen in the blood and has various effects depending upon the amount of CO, length of exposure, overall health and age of the person, and how physically active the person is at the time of exposure.

III. PROCEDURES

A. Issuance and maintenance of meters:

1. The Troy Fire Department will issue a carbon monoxide meter and advisory cards to each fire station and to the EMS provider. The meter and advisory cards shall be kept on the engines and the EMS Medical First Responder (MFR) units.
2. This meter shall be used to monitor the atmosphere during any suspected carbon monoxide investigation.
3. Station officers shall see that their assigned meter is stored in a secure location on their apparatus. EMS shall see that their assigned meters are stored in a secure location on the MFR units.

B. Responding to incidents involving CO or the potential for CO:

1. The first arriving unit shall establish scene control as per the Troy Fire Department Incident Command system tactical plan.

2. For activated CO alarms, verification shall be made if the alarm is coming from a smoke detector or a carbon monoxide detector. The cause of the alarm shall be determined, i.e. true alarm, low battery indication, poor location of device, etc.

    a. If it is a smoke detector:
        1) investigate the cause of the alarm
        2) take the necessary action to mitigate the situation
        3) advise Troy Fire of the situation

    b. If it is a CO detector:
        1) determine if anyone is exhibiting any symptoms of possible carbon monoxide poisoning; if so, immediately evacuate and ventilate the premises
        2) request necessary EMS and/or Fire response
        3) begin the investigative procedure

    c. If no one exhibits any symptoms of carbon monoxide poisoning, it will not be necessary to evacuate or ventilate the premises **unless a level of over 30 ppm** is detected by a meter as described below.

d. The homeowner shall be instructed to call Consumers Energy or a licensed heating contractor if:

1) a CO level of over 30 ppm is indicated on their meter in a residence; or
2) the responding unit shuts off a gas appliance; or
3) someone is showing signs of being ill due to carbon monoxide; or
4) a CO level of over 35 ppm is indicated on their meter in a commercial or industrial establishment.

C. Carbon Monoxide Investigation Procedure

1. Zero the meter in fresh air and comply with all start up procedures as recommended by the manufacturer of the metering equipment. In some rare instances the meter may not zero in fresh air. That means that the outside air has a measurable amount of CO in it. When this happens, the initial reading from outside the structure will have to be subtracted from the inside reading to get a true part per million (ppm) measurement. The end result is a net measurement of CO in the structure.

2. Initiate a survey of the premises to determine if there are any amounts above 30 ppm of carbon monoxide. The survey shall consist of testing air in the room at head height. Tests should be taken in all rooms, near heat ducts, and in the basement and utility room.

3. All members shall make complete use of the SCBA in any atmosphere that is in excess of 150 ppm of CO.

4. Refer to CO Investigation Chart on Page 5.

5. Reading of 30 ppm or less:

a) Inform the occupants of what level of CO was detected, if any.
b) Recommend that the occupant check their CO detector per manufacturer recommendations.
c) Attempt to reset the detector.
d) Inform occupants that if it activates again, call 9-1-1.

e) Review advisory card with occupant. Fill in the level of CO detected on the appropriate line. Have the occupant sign the card and provide the occupant with a copy. Forward a copy of the card to the fire department administrative offices and/or fax a copy to the fire department administrative offices.

6. Readings of more than 30 ppm but less than 70 ppm:

a) Occupants shall be informed that a potentially harmful level of CO was detected.
b) Recommend that all persons leave the premises then begin ventilation.
c) If it is determined that an appliance is malfunctioning and thereby producing CO, it shall be shut down.
d) Once the premises have been reduced to an acceptable level of CO, the premises may be occupied at the discretion of the occupant.
e) Attempt to reset the detector.
f) Inform occupants that if it activates again, call 9-1-1.
g) The occupants shall be informed of the actions that have taken place and that they should call a licensed heating contractor or Consumers Energy to investigate the source of CO. There is a service charge by both for these follow-up investigations.
h) Review advisory card with occupant. Fill in the level of CO detected on the appropriate line. Have the occupant sign the card and provide the occupant with a copy.
i) Forward a copy of the card to the fire department administrative offices and/or fax a copy to the fire department administrative offices.

7. Readings of 70 ppm or Greater:

a) Inform the occupants that we have detected a potentially harmful level of CO was detected.
b) Order the occupants to leave the premises immediately.
c) If it is determined that an appliance is malfunctioning and thereby producing CO, it shall be shut down.
d) Once the premise has been reduced to an acceptable level of CO, the premises may be occupied at the discretion of the occupant.
e) Attempt shall be made to reset the detector.

f) Inform occupants that if it activates again to call 9-1-1.
g) The occupants shall be informed of the actions that have taken place and that they should call a licensed heating contractor or Consumers Energy to investigate the source of CO. There is a service charge by both for these investigations.
h) Review advisory card with occupant. Fill in the level of CO detected on the appropriate line. Have the occupant sign the card and provide the occupant with a copy. Forward a copy of the card to the fire department administrative offices and/or fax a copy to the fire department administrative offices.

INVESTIGATION CHART

1. Check for CO outside of the building by taking a “free air” reading.

2. Check for CO when entering the building and in each room.

3. Recreate the situation by turning on all fuel burning appliances that may have been operating at time of CO buildup. Do not operate whole house (attic) fan unless it was operating when CO was reported.

4. Observe flame color and operating characteristics of gas fired appliances such as the water heater/hot water tank.

5. Check venting of appliance. Observe condition of chimney and cap for any signs of blockage.

6. Test near burners, draft diverters, and fire doors on furnace. Test approximately 3' from range after oven has cycled.

7. Test air in rooms at various heights and at hot air registers.

8. Look for occupant practices that may cause CO. (i.e. car running, fireplace flue closed, barbecue grills in garage or house, space heaters, whole house attic fan, etc.)

NOTE: 70 ppm for three hours; 150 ppm for 50 minutes; or 400 ppm for approximately 15 minutes are benchmarks built into industry standards for when CO alarms must sound.[1] At

[1] U.S. Consumer Product Safety Commission

levels less than 30 ppm, it is unlikely that adverse effects will occur in healthy adults. 35 ppm is considered acceptable in work places.[2] The meter is preset to alarm at 200 ppm.

Symptoms

CO concentration (parts per million)

50 No adverse effects with 8 hours of exposure.
200 Mild headache after 2-3 hours of exposure.
400 Headache and nausea after 1-2 hours of exposure.
800 Headache, nausea, and dizziness after 45 minutes; collapse and unconsciousness after 1 hour of exposure.
1,000 Loss of consciousness after 1 hour of exposure.
1,600 Headache, nausea, and dizziness after 20 minutes of exposure.
3,200 Headache, nausea, and dizziness after 5-10 minutes; collapse and unconsciousness after 30 minutes of exposure.
6,400 Headache and dizziness after 1-2 minutes; unconsciousness and danger of death after 10-15 minutes of exposure.
12,800 Immediate physiological effects, unconsciousness and danger of death after 1-3 minutes of exposure.

The concentration of CO, measured in parts per million (ppm) is a determining factor in the symptoms for an average, healthy adult.

Source: NFPA Fire Protection Handbook, 19th Edition.

[2] Occupational Safety and Health Administration