Policy Procedure Guideline - Bristol Fire Department		
Subject: Carbon Monoxide (CO) Detector Activation		00.000
Section: Deployment and Safety		
Date Authorized: 11/01/2020	Authorized by: Chief J. Brett LaRose	
Date Reviewed: 03/01/2021		

1.0 PURPOSE:

To establish a standard method of responding to incidents where a Carbon Monoxide (CO) detector has been activated or an occupant suspects there is a dangerous level of CO inside a structure. To accomplish safe investigation and mitigation of CO incidents this operational guideline is established.

2.0 SCOPE:

It is the responsibility of all department personnel to know and implement as appropriate this operational guideline. Authority to deviate rests solely with the Incident Commander, who bears full responsibility for any deviation.

2.1 The Fire Department is primarily responsible for confirming a CO problem exists. The Fire Department is not there to repair the problem, but rather to provide rescue, ensure emergency medical care is provided and advise the occupant of the nature of the problem.

3.0 DEFINITIONS/ACRONYMS:

3.1 CO - Carbon Monoxide
3.2 FAS - Fresh Air Setup
3.3 IC - Incident Commander
3.4 IDLH - Immediately Dangerous to Life and Health
3.5 LEL - Lower Explosive Limit
3.6 MGD - Multi Gas Detector
3.7 NFIRS- National Fire Incident Reporting System
3.8 OIC - Officer-In-Charge
3.9 RIC - Rapid Intervention Crew
3.10 SCBA - Self-Contained Breathing Apparatus
3.11 SCC - Shelburne Communications Center

4.0 REFERENCES: None

5.0 POLICY

5.1 Response

5.1.1 <u>CO Detector Sounding with No Symptoms:</u>

5.1.1.1 For incidents where a CO detector is sounding and SCC has determined that no one in the structure is feeling ill, at a minimum Engine 1 will respond, non-emergency mode, with a minimum of two firefighters (must be SCBA qualified).

5.1.2 <u>CO Poisoning and Detector Sounding with Symptoms:</u>

5.1.2.1 Upon receipt of any report of a CO incident where the occupants of the structure are reported as ill, or any reported CO poisoning, Engine 1 will respond emergency mode, with a minimum of four firefighters (must be SCBA qualified) and EMS will be dispatched.

5.2 When CO levels are 35 ppm or greater, firefighters shall wear Turnout Gear and Self-Contained Breathing Apparatus (SCBA) on-air until such time as the level decreases below 35 ppm.

5.3 When operating inside a structure with CO readings greater than 35 ppm, a Rapid Intervention Crew (RIC) shall be assembled to comply with the OSHA 2-in/2-out requirement for operations in an IDLH atmosphere.

5.4 All persons complaining of any discomfort or illness shall be evaluated for possible CO poisoning and treated according to EMS protocols. Signs and symptoms of CO poisoning or exposure include, but are not limited to:

- Flu-like symptoms
- Headache
- Nausea
- Dizziness
- Light-headedness
- Convulsions
- Unconsciousness

6.0 PROCEDURE

6.1 On scene, complete CO INCIDENT NOTICE OF FINDINGS form, sign, have owner/occupant sign. Retain original and give copy to owner/occupant.

6.2 On the National Fire Incident Reporting System (NFIRS) use the following codes for type of situation found:

- Carbon monoxide incident = code 424
- CO detector activation, malfunction = code 736
- Carbon monoxide detector activation, no CO = code 746

7.0 GUIDELINE

7.1 Arrival

7.1.1 Upon arrival, the OIC will give a size-up, establish fire command and declare operational strategy.

7.1.2 Interview occupant/caller: Why were we called? Obtain as detailed a complaint as possible.

7.1.3 If anyone present displays symptoms of CO poisoning, they shall be immediately evaluated and provided with medical care according to EMS protocols.

7.1.4 Firefighters shall run the MGD through a FAS and Bump Test prior to use. A firefighter will proceed a distance away from apparatus, to a fresh air environment, and perform a FAS.

7.1.5 Evacuate all remaining occupants if necessary.

7.1.6 Institute primary search if necessary.

7.1.7 Upgrade response if necessary.

7.1.8 Observe and complete a complete check around structure for signs of improper conditions which could be causing problem (e.g. blocked vent).
Note: This task may be completed by an Exterior Firefighter in proper PPE.

7.1.9 Use **Investigation Group Guide** while conducting investigation.

7.2 Entering the structure:

7.2.1 No one shall enter the structure until the **CO level has been checked just inside the door.** Besides being toxic, CO is also flammable. When high CO readings are obtained it is possible that a LEL reading may exist therefore, we want to limit the amount of oxygen introduced to the environment.

7.2.1.1 Open door 6" - 8" inches and place MGD on floor, close door and wait approximately 1-minute. If no LEL exists proceed with entry.

7.2.2 Sample air at ground level, mid-height and ceiling height. Monitor all levels-basement, first floor, second floor, and any additional floors.

7.2.2.1 Measure each air sample for a minimum of 15-seconds.

7.2.3 When entering the structure firefighters shall have donned SCBA.

- If CO reading is less than 35 ppm, going on-air not required.
- If CO reading is 35 ppm or greater, going on-air required.
- If CO reading over 100 ppm it shall be considered an IDLH situation and a rescue mode shall exist.

7.3 Upon completion of any necessary rescue, attempt to duplicate conditions which existed prior to alarm activation or suspicion of CO present. Use **Investigation Group Guide**. Check those areas related to the suspected source.

7.3.1 Check all gas-fired appliances:

- Check all furnaces, boilers, space heaters (installed or portable):
- Inspect to ensure flue is connected.
- Hold meter near furnace and flue and take readings.
- Obtain readings while furnace is fired, and furnace blower is operating.
- Ensure flue is unobstructed from exterior-check flue cap. High efficiency furnaces have PVC vents at grade level that can easily be obstructed by drifting snow or animals building nest in intake or exhaust pipes.

7.3.2 Check gas hot water heater:

- Inspect to ensure flue is connected.
- Hold meter near flue and take readings.
- Obtain readings while hot water heater is fired.
- To fire hot water heater advance thermostat control or run hot water to deplete tank.

7.3.3 Check gas clothes dryer:

- Inspect to ensure flue is connected.
- Hold meter near flue and take readings.
- Obtain readings while dryer is operating.

7.3.4 Check fireplace:
- Hold meter in front of hearth and take reading.
- Ensure flue is drafting.
- If wood-burning extinguish fire.
- If gas-log, shut off gas.
- Inspect chimney to ensure it is unobstructed.

7.3.5 Ensure improper conditions do not exist:
- Building is too air-tight/over sealed, such as plastic over windows/doors, new energy-efficient features installed, such as windows, doors, furnace.
- Barbecuing indoors, including in a garage, on a porch, or adjacent to a window/door.
- Gasoline or diesel engine operating in a garage or adjacent to a window/door.

7.3.6 If CO is detected on an abnormally cold day the furnace may be taxed and producing CO.

7.3.7 Besides being toxic, CO is also flammable. When high CO readings are obtained it is possible that a LEL reading may also be obtained.

7.4 CO Reading Greater Than 9 PPM:

7.4.1 Any reading above 9 PPM shall be considered above normal levels.

7.4.2 Inform the occupants and responsible party that the detected CO level is potentially dangerous.

7.4.3 If the CO level is above 9 PPM, but below 35 PPM, all occupants shall be recommended to leave the premise.

7.4.4 If the CO level is above 35 PPM, all occupants shall be ordered to leave the building immediately. No one shall be allowed back into the building without Turnout Gear and SCBA (on-air) until the CO level is below 35 PPM and the oxygen level is greater than 20%.

7.4.5 If the source of the CO can be easily identified:
- Shut off fuel supply.
- Ventilate the building as necessary.

7.4.6 If the source of the CO cannot be easily identified, or is not easily rendered harmless, LPG shall be turned off, and the building ventilated as necessary.

7.4.7 Once ventilation has started, take readings every 5 minutes and document the CO levels found. Continue ventilation until the CO level is dissipated. Cease ventilation when a safe CO level is achieved.

7.4.8 Re-sample the air 5 minutes after ventilation has ceased to ensure the CO level remains safe.

7.4.9 Once the building has been reduced to a safe level of CO, the premise may be occupied at the discretion of the occupants.

7.4.10 Ask the occupant or responsible party to reset CO detector (FD may perform reset).

7.4.11 Inform occupants to call 9-1-1 if the detector activates again, or if they have further concerns.

7.4.12 If the property is a rental property, the name, phone number, address, and other pertinent information about the property owner shall be obtained if possible. The IC or his/her designee shall contact the property owner as soon as possible to ensure that he/she is aware of the situation.

7.4.13 Upon departure from the scene, the IC will inform the occupants of what the fire department found, and the actions taken by the fire department.

- If indicated, advise them to pursue a new detector that meets the most current UL 2034 Standard.
- Advise them to contact a qualified individual to examine and repair any suspect appliance.
- Advise them to call 9-1-1 immediately if the CO detector activates again and to evacuate the building and wait for the arrival of the fire department.
- If gas company has been notified and why.
- If source unfounded and levels remain elevated even after attempts at ventilation advise occupants to not occupy structure.

7.5 CO Reading Less Than 9 PPM:

7.5.1 Inform the occupants and responsible party that the fire department MGD did not detect any elevated CO level. Note that this does not necessarily indicate that CO was not present at the time the detector sounded, but that the CO may have dissipated before the fire department arrived. It is also possible that the detector malfunctioned or is not working properly.

7.5.2 Recommend that the occupants and the responsible party check their CO detector per manufacturer recommendations. CO detectors have a lifespan of 5 to 10 years. If the detector is older than that, recommend that the occupants replace the CO detector.

7.5.3 Check the location of the CO detector. CO detectors should be mounted least 15 feet away from fuel-burning appliances. Recommend that the occupant relocate the detector if it is too close to CO producing sources.

7.5.4 Ask the occupant or responsible party to reset CO detector (FD may perform reset).

7.5.5 Inform the occupants or responsible party to call 9-1-1 immediately if the detector activates again, or if they have further concerns.

8.0 APPENDIX:

8.1 Investigation Group Guide

9.0 FORMS:

9.1 CO Incident Notice of Findings

Approved: *J. Brett LaRose*, Fire Chief

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INVESTIGATION GROUP GUIDE
CARBON MONOXIDE (CO) INVESTIGATION

Questions to ask occupants:

- Are any members of the household feeling ill?
  - ✓ Headache?
  - ✓ Nausea?
  - ✓ Shortness of Breath?
  - ✓ Fatigue?
  - ✓ Dizziness?
  - ✓ Confusion?
  - ✓ Other complaints?
- Do you feel better when away from the house?
- What appliances were on at the time of the activation?
- What appliances were in use during the last 24 hours?

Areas that may need to be checked:

- Outside house
- Upon entering
- Garage
- Space heater
- Furnace
- Water heater
- Chimney
- Fireplace
- Ash Bucket
- Gas refrigerator
- Gas dryer
- Stove / over
- BBQ grill
- Sump pump pits
- Sump pump battery packs (for false readings)
- At CO detector

Carbon Monoxide Levels and their Symptoms

Note: These limits are for healthy adults, not children or older adults or those of any age with underlying medical conditions.

CO Level	Health Effects
9 PPM	Maximum indoor CO level. Maximum outdoor CO level in 8-hour exposure.
10-24 PPM	Possible health effects if exposed for a long period of time
50 PPM	Maximum exposure allowed in the workplace
100 PPM	Slight headache after 1-2 hours of exposure
200 PPM	Fatigue, headaches, and dizziness may occur after 2-3 of exposure
400 PPM	Nausea, dizziness, and headaches after 1-2 hours of exposure. May be life threatening at approximately 3 hours of exposure
800 PPM	Headaches, dizziness, and nausea after 45 minutes of exposure. Unconsciousness after 1 hour of exposure
1000 PPM	Loss of consciousness in 1 hour of exposure
1600 PPM	Death within 1-2 hours of exposure
3200 PPM	Death within 1 hour of exposure
6400 PPM	Death within 30 minutes of exposure
12,800 PPM	Physiological effects; Death within 1-3 minutes after exposure

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Bristol Fire Department
Carbon Monoxide Incident - Notice of Findings

Carbon Monoxide (CO) is an odorless, tasteless, colorless gas that is DEADLY. It is a byproduct of combustion or fuel burning process. It can cause symptoms that can mimic the flu and proceed to unconsciousness and even death. Many appliances around the home can produce Carbon Monoxide when a fault or unusual condition exists. Since the source may be transient in nature, the source may not always be detectable.

The Bristol Fire Department responded to your building/home at:

_____ on _____ at _____ a.m. p.m.
(Address) (Date) (Time)

CO Level Detected Parts Per Million (PPM)	**FD Shutdown Fuel Source**	**FD advised property owner not to restart appliance(s)**	**FD advised property owner to contact fuel service provider and/or appliance technician for assistance.**
_____	YES / NO	YES / NO	YES / NO

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 manufacturer's specifications.

Issued by:_____ **Date:**_____

Received by:_____ **Date:**_____

Bristol Fire Department
P.O. Box 249 – Bristol, VT 05443 - 802-453-3201 (non-emergency)