

Gas safety training exercises

National Grid Group Training Exercise #4

This training reflects industry best practices but does not replace your organization's SOPs/SOGs. This material can be utilized to provide a perspective as you reflect on emergency operations and can be collaboratively incorporated into your operating procedures as they are updated.

Training Officer:

Print pages 4 and 5 and hand them out to all participants so they can follow along for the discussion.

Carbon Monoxide Poisoning

Residents overcome by carbon monoxide

An ambulance crew has been dispatched to 432 Bridge Road, Apartment #3, for a 40-year-old male feeling ill with flu-like symptoms. Ten minutes after arrival, the ambulance crew calls the dispatch center and indicates that the carbon monoxide (CO) alarm on the medical kit that they took into the home has gone into alarm and a police officer who responded with the ambulance feels ill. You are alerted to respond to this incident and provide support to the ambulance crew. You initiate a response with a single engine containing a three-person crew.

As a crew, please work together to address the following response-related questions. Upon arrival, you encounter the situation displayed in the photo.



Training Officer Guidance | Questions and Answers

Relevant sections of the *National Grid Natural Gas Safety Training Certification Program* are listed below the answers where appropriate. Answers without a corresponding reference reflect fire service best practices or are derived from National Grid internal response protocols.

Initial response questions to consider

1. What should the ambulance crew do prior to your arrival?

If you suspect CO poisoning, evacuate the building and make sure victims get fresh air and seek immediate medical attention. If the building uses natural gas, notify National Grid or the local natural gas utility as soon as possible through your dispatcher. The ambulance crew should rapidly remove the patient and themselves from the structure and relocate treatment of both the patient and the ill police officer to the ambulance. Transport of these two patients to the hospital should not be delayed.

Please see Module 3, Poisoning symptoms

2. What are the characteristics of carbon monoxide?

CO is a colorless, odorless and poisonous gas that displaces oxygen in a person's bloodstream and therefore can cause asphyxia. CO is produced when combustion of any fuel—such as heating oil, gasoline, diesel fuel, propane, kerosene, natural gas, coal, charcoal or wood—takes place without sufficient oxygen. Each year approximately 430 people in the U.S. die from non-fire-related CO poisoning, making it the leading cause of accidental poisoning deaths.

With a specific gravity of 0.967, CO is slightly lighter than air. If you are using a CO meter to detect CO, be sure to move the probe up and down to various levels. Some CO may rise to the top of a room.

When inhaled, CO is extremely toxic because it displaces oxygen in the blood. CO is also flammable, and will ignite when its concentration in the air is between 12 and 74 percent.

Please See Module 3, Characteristics

3. What are potential sources of CO?

CO is generated by incomplete or inefficient combustion and can be produced by a variety of hydrocarbon-based sources including, heaters, fireplaces, gas appliances, vehicle exhaust and generators (a common issue during power outages). Personnel in full PPE should be utilized to initiate air monitoring. If air monitoring reveals a concentration of natural gas, additional precautions should be implemented.

Please See Module 3, Characteristics

4. What are the symptoms of CO exposure?

CO exposure typically has three levels of severity. The initial symptoms of CO poisoning can look a lot like the flu. The signs include flu-like symptoms such as headache, tiredness, dizziness, confusion and nausea. But these symptoms are just the minor ones. Exposure to high concentrations of CO can cause unconsciousness, convulsions, cardiac or respiratory failure, and even death.

These poisoning symptoms may not appear right away. Unless there is an extremely high concentration of CO in the air, symptoms of CO poisoning make take time to surface. It is important to be aware of the progression of these symptoms and to be alert to any physical changes that victims might exhibit. If you suspect CO poisoning, evacuate the building and make sure victims get fresh air and seek immediate medical attention. If the building uses natural gas, notify National Grid as soon as possible through your dispatcher.

Please see, Module 3, Poisoning symptoms

5. Should National Grid be notified and asked to respond to this event?

If there is a natural gas service in the structure where CO is suspected, National Grid should be notified and asked to respond. If a natural gas appliance is not involved, National Grid can provide you with valuable technical assistance in the determination of the actual cause of the CO release into the structure.

Please see Module 4, When to call

6. During response, how do you prepare yourself and your crew for the situation?

As your crew moves toward the incident scene, updates on the situation should be shared with all crew members and the officer should assign personnel to tasks that he/she anticipates. You should make it clear that priority for action includes firefighter safety followed by the rescue of others.

Please see Module 4, Universal response tactics, Arriving on the scene, Parking, Evacuation

Additional information

As you arrive on the incident scene, the ambulance crew reports that they have evacuated the patient they were treating. The ambulance crew also reports that a police officer who arrived and entered the structure before they were on scene is in the back of the ambulance and is feeling ill. The ambulance crew is unsure if any other occupants are in the structure. A RAD 57 oxygen/CO meter has confirmed a high level of CO in the bloodstream of the patient and a moderate level of CO in the bloodstream of the police officer. The ambulance crew informs you that they are not sure of where the CO is coming from but note that the patient said his furnace was serviced two days ago. In the next few minutes, the ambulance will be leaving the scene and transporting both patients to the hospital.

Questions as your crew arrives on the incident scene

1. Based on the incident description, what is your size up of this situation?

Based on the information provided it appears that CO has accumulated within the structure. Considering the characteristics of CO, the entire structure should be considered an immediately dangerous to life and health (IDLH) environment. All occupants are in grave danger, and must be evacuated and medically evaluated. Any personnel entering the structure should only do so with monitoring equipment, full PPE and SCBA.

Please see Module 2, Characteristics

2. Using your knowledge of the characteristics of CO, where will this gas collect within the structure?

As CO is odorless and colorless it may accumulate unnoticed within any confined space. Because CO is lighter than air, it can rise and travel throughout a structure; thus, all spaces should be considered to have an IDLH environment until monitoring proves otherwise.

Please see Module 2, Characteristics

3. What are your priorities for action?

The priority is life safety, starting with the life safety of your crew. All spaces should be considered to have an IDLH environment until monitoring proves otherwise. Any personnel entering the structure should only do so with monitoring equipment, full PPE and SCBA. A minimum of four responders should be present on the scene when personnel in teams of two enter the structure.

Please see module 4, Outdoor leak response

4. Can your crew handle this situation without additional assistance?

No, given the scope of the incident at least one additional ambulance should be requested to evaluate occupants and provide medical monitoring of personnel. And an additional fire suppression unit should be requested so that at least four personnel with full PPE and SCBA are available in case a crew on the interior requires rescue. At least two personnel should remain on the exterior and be ready to affect the rescue of other crewmembers. Based on the size of the structure and the number of occupants, additional resources more than those listed may be required.

5. How would you deploy your crew and other responding resources?

As you and your crew arrive on the incident scene, the following tactical priorities should be pursued:

- Instruct the driver to stage apparatus past the structure so that you can observe three sides of the building.
- Assume command and develop a unified command structure with police and EMS personnel.
- Initiate search and rescue operations in full PPE with SCBA.

- Beware that occupants affected by CO may require assistance and not understand the danger that they are in.
- Initiate monitoring of the area with multiple CO meters and CGIs.
- Secure the gas service.
- Be alert for other sources of CO and shut those devices down as you come across them.
- Verify that all occupants of the structure and/or area impacted by the presence of CO have been evacuated.

Please see Module 4, Arriving on the scene, Parking, Evacuation, Safeguards

6. What actions do you take prior to the arrival of National Grid personnel?

Prior to the arrival of National Grid, you should request the response of sufficient resources; enter, search and evacuate the structure; and secure utilities and potential sources of CO. Then you should initiate air monitoring for both CO and combustible gas.

7. What impact could weather have upon this event?

Weather may impact the event, as CO poisoning is more prevalent in structures that are secured due to cold temperatures. In addition, the buildup of leaves or snow, or presence of sustained heavy winds or fog may inhibit venting and cause CO to enter the structure.

Additional information

Your investigation finds condensation on the inside of multiple windows, which can be a sign of a CO problem. Air monitoring indicates that the CO seems to be entering the structure from the gas heater flue, which has developed a large opening based on corrosion in the pipe.

Questions regarding working with National Grid

1. What can you expect from National Grid?

Upon arrival on the scene, National Grid personnel will report to the incident commander. Personnel will work within the command structure to coordinate actions and render the area safe. National Grid personnel will perform air monitoring but not

enter into an IDLH environment. They will secure the gas service or other National Grid utilities as requested by the incident commander and they will test all gas appliances to help determine the source of CO. If an appliance is found to be emitting CO it will be removed from service.

Questions regarding incident termination

1. How do you secure the scene prior to terminating the incident?

Prior to leaving the scene, the source of CO should be located and taken out of service. All areas of the structure

should be monitored and ventilated until the hazard has been mitigated. Once the structure is rendered safe and appliances emitting CO have been tagged and taken out of service, control can be transferred to the residents.

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1. What should the ambulance crew do prior to your arrival?
2. What are the characteristics of CO?
3. What are potential sources of CO?
4. What are the symptoms of CO exposure?
5. Should National Grid be notified and asked to respond to this event?
6. During response, how do you prepare yourself and your crew for the situation?

Additional information

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