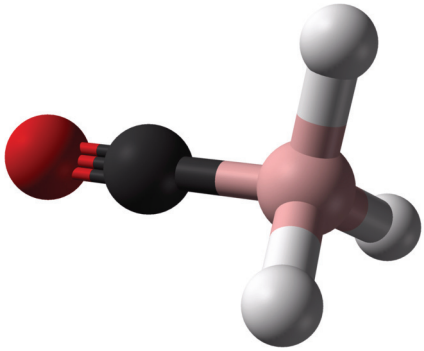
National Hazardous Materials Fusion Center



Training Package Carbon Monoxide Release

Instructor Guide

v. 3.23.10

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

National Hazardous Materials Fusion Center: Training Package Carbon Monoxide Release

Instructor Guide

Copyright Information

Instructor Guide

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The safety statements, procedures, and guidelines contained in this guide are current as of the publication date. Prior to using the safety statements, procedures, and guidelines contained in the guide, it is advised that you confirm the currency of these statements, procedures, and guidelines with the appropriate controlling authorities.

The development of this training program was supported by a grant awarded to the International Association of Fire Chiefs (IAFC) by the United States Department of Transportation (USDOT). The IAFC wishes to thank the USDOT for its ongoing commitment to the health and safety of hazardous materials first responders.

Table of Contents

Module 0: Introduction

Module Time: 5–10 minutes

Course Goal

This training course is designed to enhance hazardous materials (hazmat) responder safety and improve decision making for the prevention and mitigation of hazmat incidents. This course has been developed as part of the National Hazardous Materials Fusion Center (NHMFC).

National Hazardous Materials Fusion Center (NHMFC)

NHMFC is the focus of a cooperative agreement between the U.S. Department of Transportation's (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) and the International Association of Fire Chiefs (IAFC).

NHMFC provides a secure, web-based portal that serves as a data and information network for hazmat teams; first responders; federal, state, and local agencies; and the private sector. Through this portal, they will share critical information to enhance hazmat responder safety and improve decision making for the prevention and mitigation of hazmat incidents. NHMFC will provide a systematic approach to:

- information and data collection,
- information and data analysis, and
- information and data dissemination.

Regional Incident Survey Teams (RIST) gather information for NHMFC. RISTs are composed of individuals from around the country who are skilled and experienced in hazmat response or experienced in the hazmat industry. RIST members are part of a team invited by a local jurisdiction or state authority to respond to unique hazmat incidents for information gathering.

The information will be analyzed in order to develop safe hazmat response techniques, lessons learned, and smart practices that will be shared with hazmat teams and emergency responders. In no case will the data be used to criticize or condemn response actions.

For more information on NHMFC visit: ***http://www.hazmatfc.com/***

Or send an e-mail: ***hazmatfusion@iafc.org***

Conducting National Hazardous Materials Fusion Center (NHMFC) Training Courses

All of the information contained in this course is from an actual hazmat event. A RIST gathered all the information.

This training activity can be conducted using a large class discussion or by dividing the participants into three to four small groups. The benefit of using small groups is to allow greater participant interaction and to draw out differences in opinion for discussion. The instructor should decide which method will work best for the number and type of participants in the class.

This course is designed to be taught as it is in approximately 2 hours; however we encourage you to use this in a manner that best suits your training needs. For example, this material can be covered and expanded on in a single, longer session or over the course of several training sessions.

Administrative Information

Before conducting the class ensure that participants know the location of exits and any emergency procedures unique to the training area. Remind participants that this information is presented to enhance future response efforts and is not to be used to criticize or condemn response actions contained herein.

Module 1: The Incident

Module Time: 10–15 minutes

Note: All pictures in this course are copyrighted and are used with permission.

Initial Dispatch Information

Instructor Note:

1. *Have participants read the initial dispatch information.*
2. *Ask participants what they would expect to find if they were en route to this scene in regard to:*
   - *Location (business, people, and traffic)*
   - *Presence of hazardous materials*
   - *Any unique response considerations*

Incident time: 0905

Location: Single family residence

- A 9-1-1 caller reported a victim lying on the floor in the bathroom.
- The victim was believed to be suffering from a cardiac arrest.
- The dispatcher provided Cardiopulmonary Resuscitation (CPR) assistance.
- An engine company of three personnel was dispatched (a captain, an engineer, and a firefighter) who all happened to be trained as hazardous materials (hazmat) technicians.
- An Advanced Life Support (ALS) medic unit from a private ambulance company was also dispatched.

Initial Incident Size Up

Instructor Note:

1. *Have participants read the initial size-up information.*
2. *Ask participants if this additional information is significantly different from what they were expecting based on the initial dispatch information.*
3. *Based only on the information given, ask participants to discuss response considerations including:*
   - *Conditions*
   - *Location*
   - *Time of day*
   - *Initial reports and information*
4. *Ask, what (if any) type of hazardous material might be present.*
5. *Ask, if a hazardous material is present at this time what type of preparations would these responders most likely be making?*

This is the scene as the original responders found it upon their initial arrival and before any actions took place:

- The engine company arrived on scene first and observed the 9-1-1 caller standing outside on the porch, holding a porch post in a near-fainting, lethargic condition. The engineer was assigned to check her.
- Upon entry, the captain and firefighter noticed an odor of exhaust but dismissed it as perhaps coming from another property.
- An adult male (the victim's father) directed them to the 43-year-old female victim who was unconscious, apneic, and pulseless.
- Conditions:
  - 52° F, clear with 87 percent relative humidity
  - Wind NW @ 1 mile per hour

Additional Scene Information

- While the engine company was responding, a police officer on patrol received information from a different source about a possible death at the same address due to a "generator accident." This information was not passed on to the responding engine company.
- The ALS unit arrived on scene with one paramedic and one Emergency Medical Technician (EMT) and noticed a strong exhaust smell.
- Witnesses in the house noticed that the firefighter, who was performing CPR on the victim, looked fatigued. He stood and stumbled out the front door, "going down" on the porch.

Instructor Note:
1. *Ask participants if this additional information changes the scene.* 2. *If so, how and why?*

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Module 2: Incident Response

Module Time: 30 minutes

Response Narrative

Instructor Note:

1. *Allow participants time to read the narrative of the response.*
2. *After participants have read the narrative, conduct a discussion based on the items in the "Hazardous Materials Behavior" and "Incident Response" sections. The "Hazardous Materials Behavior" section focuses on the hazardous material itself, while the "Incident Response" section focuses on responders, strategies, and tactics.*
3. *The PowerPoint slides for this module contain all of the pictures that go along with the narrative.*
4. *After participants have read the narrative you should show each of the slides so they can see the pictures in greater detail and discuss any elements of interest in more depth.*

This is the full account of the response narrative compiled from the Regional Incident Survey Team (RIST) interviews of the responders involved.

The first 9-1-1 caller reported the victim lying on the floor in the bathroom and it was unknown if the victim was breathing. Engine company 7 (E7), staffed with three people, all trained as hazmat technicians, was sent to respond while dispatch personnel began providing Emergency Medical Dispatch (EMD) instructions to the caller. The fire and Emergency Medical Services (EMS) dispatcher center are co-located in the same facility but staffed with different dispatch personnel.

The caller initially sounded emotionally upset but as time passed, she began speaking in shorter sentences with labored breathing. At one point, she indicated that she was "about to pass out." She then passed the phone to a gentleman who spoke with the dispatcher briefly. At this time,

E7 arrived on scene and the dispatcher ended the phone call. Neither caller provided additional information about the circumstances of the situation.

While E7 was responding, a police officer on patrol in the southeast district of the city had received information from a different source about a possible death at this address. At 0906, he inquired via radio to police dispatch, asking if there was an incident at the same address. He indicated that "somebody died over there by an accident." The officer requested the dispatcher to "start a call; relatives are on their way over to that address, something about a generator accident." The officer relayed to the police dispatcher that he was told that "somebody died over there from a generator accident –do you know anything about that?" The dispatcher he contacted checked with another police department dispatcher responsible for the southwest district near the address. That second police dispatcher made a call at 0910 over to the fire/EMS dispatch asking if they had an incident on this street, asking "Is it like a generator accident?" The fire/EMS dispatcher confirmed they had a "cardiac arrest" incident there, without acknowledging or answering the question about a generator.

Information provided to the first responders only indicated that this was a routine medical aid call. There was no information passed on to E7 or the medic unit about a "generator accident."

E7 arrived on scene 3 minutes and 18 seconds after being dispatched and observed a female adult (the 9-1-1 caller and victim's friend) standing outside on the front porch, holding onto a post and in a near-fainting, lethargic condition. E7-engineer was assigned to check her while E7-captain and E7-firefighter went inside.

Figure 1 Incident Scene

Immediately upon entry they noticed an odor of exhaust, but observed no evidence of its source and did not hear any engine noise. E7-captain noticed the back door open and dismissed the odor as having probably drifted in from an outside source perhaps from another property.

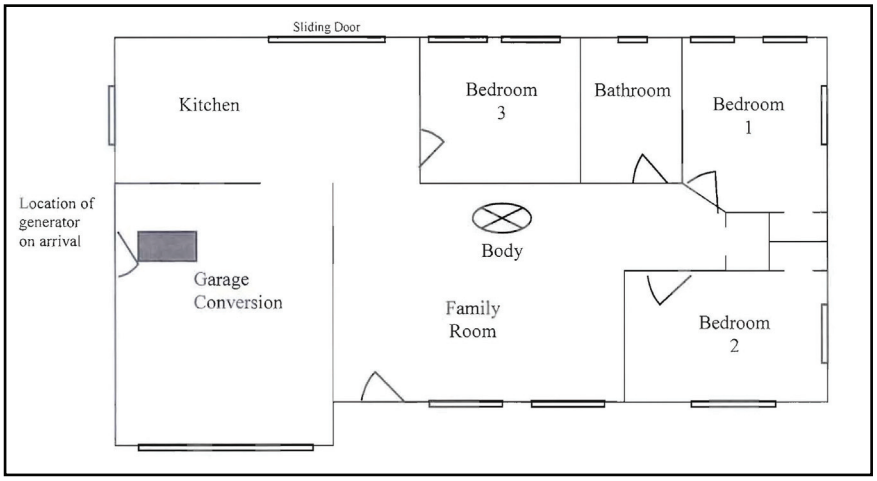

Figure 2 Incident Scene Map

A male adult (the victim's father) directed them through the living room to the bathroom where they located the victim, a 43-year-old female adult, lying prone, unconscious, apneic, and pulseless. The father was distraught, but otherwise did not exhibit symptoms of exposure of any kind. The individuals present did not provide any additional information to the responders.

The E7-firefighter and E7-captain proceeded to move the victim into the living room for more working space. Meanwhile, E7-engineer had completed assessing the woman on the porch, determining she was a delayed status patient, and came into the living room to assist. CPR was initiated, with E7-firefighter doing compressions and E7-engineer administering oxygen while E7-captain started opening windows throughout the house for natural ventilation.

During this same period, the medic unit (M144), staffed with one paramedic and one EMT, arrived. M144-paramedic stopped at the porch to assess the female victim, while M144-EMT entered the front door and immediately noticed the exhaust smell. He glanced at the kitchen stove and confirmed that all knobs were in the "off" position. Several times he voiced a suggestion to E7 personnel performing CPR that they all needed to get outside, but they did not acknowledge his requests and remained focused on their tasks. M144-EMT made patient contact and attempted to insert an oral-pharyngeal airway, finding it difficult due to some apparent rigor mortis.

E7-firefighter was experiencing difficulty in delivering effective chest compressions, and E7-engineer noticed that he looked sweaty and tired. E7-engineer asked him if he wanted to switch positions, and he agreed to do so but did not make the move. Instead, E7-firefighter got up and starting walking toward the open front door, stumbling into walls on the way. E7-firefighter had reported that he knew something was wrong but could not put any thoughts into words or actions.

E7-captain returned to the room about this time, and they all heard the victim's father call out from the porch that a firefighter was "going down." E7-captain directed all personnel to evacuate immediately, which they did, leaving the victim on the floor in the living room. E7-engineer recognized they were probably dealing with carbon monoxide, and realizing that the E7 apparatus was an auxiliary component of the hazmat team, knew it had a four-gas monitor onboard. Holding his breath, the E7-engineer returned to the front door with the monitor. The four-gas monitor immediately went into alarm for high carbon monoxide, so the E7-engineer set it on the couch and then exited. At this point, there was still no known source of the carbon monoxide.

At 0914, E7-captain got on the radio and requested a "special call" for an additional truck (T3) and two additional ambulances, Code 3, due to "firefighters down." He also requested police department Code 3. Fire dispatch asked E7 to "confirm there is violence on the scene." E7 indicated that there was not but still needed the police. Several department members who heard his radio transmission reported that he did not sound like his usual self. The closest battalion chief, B2, heard the radio request from E7 and requested a situational update. The E7-captain indicated that there was "exhaust from a generator, one member performing CPR was nauseated and started to pass out. Requesting the truck for ventilation and the ambulances for bystanders." B2 requested fire dispatch to put him on the call.

At 0917, E7-captain requested that hazmat response (hazmat response: HM1, T1, E1—seven members) be added to the incident. B4 contacted dispatch and requested to be added to the call to serve as the Public Information Officer (PIO).

At the scene, the focus shifted to treating the affected firefighters and venting the structure. When T3 arrived at 09:20:07, T3-engineer (a former paramedic) was assigned to initial triage

and treatment of E7's crew while T3-captain and T3-firefighter started Positive Pressure Ventilation (PPV) with a gas blower at the front door. T3-engineer found that E7-firefighter was on 6 liters of oxygen via cannula and changed this to a non-rebreather mask for better delivery. T3-captain looked around the outside of the structure and physically discovered a portable generator sitting just outside the side door of the garage. He felt for heat and confirmed that it had been running recently. An additional observation was that the electric meter was "blanked" indicating that power had been shut off by the utility company.

This was the first discovery of the source of the carbon monoxide by any responder, approximately thirty minutes into the response. It was later determined that the victim's father, after forcing entry into the house, found the generator running inside the house and shut it down, then moved it to this location. He never told anyone about this, nor did the initial responders know that the power had been shut off to the house. Neither the generator nor the meter was visible from the front of the house.

B2 arrived at 09:20:06 and assumed Incident Commander (IC) and requested police for traffic control. He indicated locations for the officers to control via radio and advised the problem was isolated to the home. B4 arrived on-scene to serve as PIO. Two additional ambulances arrived and took over treatment of the firefighters from E7. The hazmat unit (HM1) arrived at 09:30:04 and was assigned air monitoring. The following four paragraphs describe somewhat concurrent events.

The victim's friend and father both declined treatment and transport, Against Medical Advice (AMA). After some delay at the scene, all three crew members from E7 were eventually transported to the Regional Medical Center (RMC), which serves as the primary trauma center and is equipped with a burn center. The initial ambulance crew members were not treated at the scene and were directed by their supervisor to drive to another medical facility for evaluation.

HM1 personnel entered the structure, wearing structural fire fighting protective clothing (full turnouts) with Self-Contained Breathing Apparatus (SCBA). They brought in a four-gas monitor (Lower Explosive Limit [LEL], oxygen [O_2], hydrogen sulfide [H_2S], and carbon monoxide) and additionally had taped pH paper to their turnouts. At this point, the structure had been under

PPV for approximately thirty minutes. Readings in the living room area were still near the National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL) of 35 parts per million (ppm). As they moved into other rooms, they found exceedingly high concentrations still present, in the range of 12,000 to 14,000 ppm (field estimates), accompanied by decreased O_2 values near 19.5 percent. This was particularly true in areas least affected by the PPV such as closets. HM1-captain recommended to T3 that they switch to electric blowers to eliminate the introduction of new CO into the structure, and this was implemented. PPV continued for approximately another hour until monitoring indicated a safe atmosphere throughout (in other words, below the REL), after which the coroner was permitted to enter.

Recognizing the complexities of this incident, B2 decided to establish Unified Command (UC) with the police, medical supervisor, and the county EMS director. Since there was no direct radio contact with police, they apparently were unaware that UC was in place and did not send a representative to the Incident Command Post (ICP). Over time, a significant crowd from the neighborhood had gathered, and concern grew about perimeter security as their collective mood grew increasingly hostile. The UC made contact with a police captain who was asked to be a liaison with the crowd and attempt to explain what was going on. The contentious crowd observed that there were a lot of first responders outside, with some being treated, while the victim still lay inside the house unattended. The situation remained tense, but no further escalation occurred.

Serving as the PIO for this incident, B4 recognized the significance of the incident, both as a potential flashpoint of misunderstanding and anger among neighbors at the scene and as an opportunity to convey valuable life-saving information through the media to the public at large. He made contact with a police sergeant and this resulted in the police captain joining the command structure where he was briefed on the situation to help deal with the perception problem developing among bystanders. B4 also suggested that the Trauma Intervention Program (TIP) volunteers be brought in to provide depth to this effort. In speaking to the media, the PIO stressed several key points, such as:

- how this incident could have been prevented, through proper use of appliances that can produce carbon monoxide;
- having the utility company check appliances to ensure proper operation; and
- how this incident caused injury to responders and a significant commitment of additional resources that results in a reduction of service delivery to broad areas.

At the RMC, the crew members from E7 were being evaluated in the Emergency Department (ED). They had blood drawn and were receiving chest x-rays and Electrocardiogram (ECG) scans. The fire chief was there and he inquired as to when his personnel would begin receiving Hyperbaric Oxygen Therapy (HBO). The ED physician indicated that it may take as long as a day for them to determine whether this was necessary. The fire chief made a strong suggestion that this process be expedited by transferring the personnel to the burn center and his request was honored.

The burn center physician quickly recognized the health threats presented and ordered the most affected individual (E7-firefighter) to begin HBO. Blood gas analysis indicated his current carboxyhemoglobin level was 17 percent (after approximately 30–40 minutes of O_2 via non-rebreather mask), and he was admitted and eventually given three, 20-minute sessions in the chamber. The other crew members were given two, 20-minute sessions each and released without being admitted. B4 went to the hospital and checked on the condition of the E7 crew members, offering Critical Incident Stress Debriefing (CISD) that was declined.

The initial ambulance personnel went to another medical facility, where they were evaluated and released with no treatment administered or follow-up recommended. The burn center Registered Nurse (RN) had contacted their supervisor and recommended they be seen at the RMC burn center, however, this did not occur.

E7 crew members were removed from duty for the remainder of that shift and the next, with a set of four scheduled days off following. Upon return to duty for the next tour, E7-captain and E7-engineer felt fine; however E7-firefighter said he still felt "terrible" so the officer took the engine to the RMC for this individual to be further evaluated. Though he has been released back to full duty, ongoing follow-up evaluation is continuing for E7-firefighter, for one year from the date of exposure.

Hazardous Material Behavior

Instructor Note:

1. *Conduct a discussion based on the items in the "Hazardous Materials Behavior" section.*
2. *This section focuses on the hazardous material in this incident, so keep the discussion centered on the hazardous material and its container.*

1. Did the hazardous material involved behave as expected in this situation? Why or why not?
2. Did the hazardous material and container behave as predicted?
3. Are the behaviors happening out of the predicted order?
4. Are the behaviors happening differently than anticipated?
5. What were the initial response objectives? Were they appropriate? Why or why not?
6. Was there anything else significant about the material or container involved in this incident?

Incident Response

Instructor Note:

1. *Conduct a discussion based on the items in the "Incident Response" section.*
2. *This section focuses on the response efforts, so keep the discussion centered on the responders, strategies, and tactics.*

1. Were the strategies and tactics appropriate? Why or why not?
2. Were there any unforeseen issues that played a part in this incident or response (for example, weather, unexpected material behavior, bystanders)?
3. Were there any injuries to responders? If so, what were the causative factors? Could this have been avoided? If so, how?
4. Was there an impact to the environment? If so, what were the causative factors? Could this have been avoided? If so, how?
5. Was there any significant equipment damaged? If so, what were the causative factors? Could this have been avoided? If so, how?
6. Discuss the risks versus benefits in this incident.
7. List any response issues related to:
   - Response time
   - Personnel
   - Personal Protective Equipment (PPE)
   - Established control zones
   - Safety measures
   - Mutual aid

- Communications
- Resources
- Decontamination

Module 3: Lessons Learned

Module Time: 15 minutes

Lessons Learned

These are the lessons learned as stated by the responders to the incident.

Instructor Note:

1. *Have participants read through the list of lessons learned.*
2. *Ask them to pick out two or three and discuss those that are unique, innovative, potentially dangerous, or most relevant to them and their jurisdictions.*

- Acute exposure to high levels of carbon monoxide may not manifest the same signs and symptoms as with exposures to lower doses.
- Communication between agencies and resources within the same agency should include sufficient unit-to-unit tactical contact to provide progress reports.
- Information exchange between dispatch centers must be acknowledged and received in its entirety. It must also be passed on to responders without modifying or deleting details that may prove to be critical.
- If a determination is made for responders to evacuate from a hazardous atmosphere while engaged in treating a patient, they should also consider the removal of the victim so that treatment can be continued.
- All personnel potentially exposed to a hazardous atmosphere should receive a medical evaluation.
- All responders should wear Personal Protective Equipment (PPE) when entering a potential Immediately Dangerous to Life and Health (IDLH) atmosphere, including

respiratory protection per current National Institute for Occupational Safety and Health (NIOSH) standards and Occupational Safety and Health Administration (OSHA) requirements.

Smart Practices/Response Considerations

These are practices and considerations developed by the Regional Incident Survey Team (RIST) following analysis of the incident.

Instructor Note:

1. *Have participants read through the list of smart practices/response considerations.*
2. *Ask them to pick out two or three and discuss those that are unique, innovative, or most relevant to them and their jurisdictions.*

- Early access to a carbon monoxide monitor may be a key factor in recognizing potential exposure hazards before becoming incapacitated or overcome.
- When a critical incident occurs and valuable lessons are learned, it is a good practice to have a process in place to share this information with other responders.
- Critical incidents may present opportunities to deliver public safety messages through the media interest generated.
- Establishing a Unified Command (UC) should include bringing together representatives of all agencies at one location (for instance, the Incident Command Post [ICP]).
- Interoperable communications between law enforcement, fire, and Emergency Medical Services (EMS) are essential to the effective command and coordination while operating at a shared incident scene.
- Response agencies should know the location of hospitals with specialized abilities and develop a supportive relationship with those facilities.

To read about how one department had implemented a carbon monoxide meter program go to the following Web site:
http://www.emsresponder.com/publication/article.jsp?pubId=1&id=8396&submit_comment=y#commentform

Hazardous Material Information

This section is provided to give responders a very brief overview of information about the hazardous material involved in this incident. This section is not comprehensive but points out some of the more notable hazards and chemical characteristics.

Carbon Monoxide

- How quickly carboxyhemoglobin builds up is a factor of the concentration of the gas being inhaled (measured in parts per million or ppm) and the duration of exposure.
- The half-life of carboxyhemoglobin is approximately 5 hours. This means that for a given exposure level, it will take about 5 hours for the level of carboxyhemoglobin in the blood to drop to half its current level after the exposure is terminated.
- Carbon monoxide binds readily to muscle and brain tissue, and this cannot be measured.
- Effects of damage to muscle and brain tissue generally are manifested much later and are likely irreversible.
- As carbon monoxide binds to hemoglobin, it inhibits the release of oxygen.
- Hemoglobin binds with *carbon monoxide* 240 times more readily than with oxygen. The presence of carbon monoxide on one of the four heme sites causes the oxygen on the other heme sites to bind with greater affinity. This makes it difficult for the hemoglobin to release the oxygen to the tissues. With an increased level of carbon monoxide, a person can suffer from severe hypoxemia while maintaining a normal partial pressure of O_2.

- Blood gases alone should not serve as the criterion for going into a hyperbaric chamber. Other factors must be considered (for example, physical exertion levels during exposure, general fitness/metabolic rate). These factors may contribute to the binding of carbon monoxide to muscle and brain tissue.
- Treatment by O_2 via non-rebreather mask requires about 4 hours. The same benefit is derived from a 20 minute session in the hyperbaric chamber.
- The hyperbaric chamber raises the partial pressure of O_2 to help "force out" carbon monoxide.
- Consider getting hyperbaric oxygen therapy treatment if in doubt.
- The symptoms associated with carbon monoxide intoxication probably lead to a gross underestimation of its incidence. The most common misdiagnosis is a flu-like viral illness because of symptoms of headache, dizziness, nausea, vomiting, and shortness of breath.
- Pulse oximetry may be misleading during carbon monoxide poisoning because the oximeter does not differentiate between oxyhemoglobin and carboxyhemoglobin.

Symptoms Associated with a Given Concentration of Carboxyhemoglobin (COHb)	
% COHb	**Symptoms and Medical Consequences**
10	No symptoms; heavy smokers can have as much as 9% COHb
15	Mild headache
25	Nausea and serious headache; fairly quick recovery after treatment with oxygen and/or fresh air
30	Symptoms intensify; potential for long-term effects especially in the case of infants, children, the elderly, victims of heart disease, and pregnant women
45	Unconsciousness
50+	Death

Since one cannot easily measure carboxyhemoglobin levels outside of a medical environment, carbon monoxide toxicity levels are usually expressed in airborne concentration levels (ppm) and duration of exposure. Expressed in this way, symptoms of exposure can be stated as follows:

Symptoms Associated with a Given Concentration of Carbon Monoxide (CO) Over Time		
ppm CO	**Time**	**Symptoms**
35	8 hours	Maximum exposure allowed by OSHA in the workplace over an 8-hour period
200	2–3 hours	Mild headache, fatigue, nausea, and dizziness
400	1–2 hours	Serious headache and other symptoms intensify; life-threatening after 3 hours
800	45 minutes	Dizziness, nausea, and convulsions; unconscious ≤ 2 hours; death ≤ 2-3 hours
1,600	20 minutes	Headache, dizziness, and nausea; death ≤ 1 hour
3,200	5–10 minutes	Headache, dizziness, and nausea; death ≤ 1 hour
6,400	1–2 minutes	Headache, dizziness, and nausea; death ≤ 25–30 minutes
12,800	1–3 minutes	Death

Works Cited

- Bryson, P.D. (1996). *Comprehensive Review in Toxicology for Emergency Clinicians (Third Edition)*. Washington, DC: Taylor & Francis.
- Kampschmidt, J. Regional Medical Center Burn Unit. Fresno, CA
- The Effects of Carbon Monoxide. Retrieved October 29, 2009, from http://biology.about.com/library/blco.htm
- Oxygen-Haemoglobin Dissociation Curve. (2009). Retrieved October 29, 2009, from http://en.wikipedia.org/wiki/Oxygen-haemoglobin_dissociation_curve

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Module 4: Moving Forward/Planning Ahead

Module Time: 30 minutes

Planning Activity

Instructor Note:

1. *The planning worksheet is designed to take the information the participants have discussed about the specific hazardous materials (hazmat) incident and allow them to think of ways to incorporate knowledge and lessons learned in terms of their own jurisdiction and response efforts.*
2. *Try to have participants focus on what they have learned from this incident and how they might respond in similar incidents.*
3. *Some of the areas below might not be applicable in all cases.*
4. *Allow the participants about 15 minutes to make notes on the worksheet either individually or in their groups.*
5. *Call time and hold a class discussion covering the items on the worksheet.*

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Planning Worksheet

How can we incorporate what we have learned from this specific hazardous materials (hazmat) incident to improve our future responses? In particular the areas of:

Surveying the incident: _____

_____

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Container identification/markings: _____

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Monitoring equipment: _____

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Response objectives: _____

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Incident command: _____

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Communication: _____

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Personal Protective Equipment (PPE): _____

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Decontamination: _____

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Policies and procedures: _____

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Mutual aid: _____

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Training: _____

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Resources: _____

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Risk versus benefit analysis: _____

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What are some smart practices we can take away from this incident? _____

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