Center for Domestic Preparedness

Law Enforcement Protective Measures for CBRNE Incidents

FEMA

The U.S. Department of Homeland Security is responsible for enhancing the capabilities of jurisdictions to prevent, deter, respond to, and recover from all-hazards incidents. A part of this mission is to increase these jurisdictional abilities by providing training opportunities.

The Center for Domestic Preparedness (CDP), a federal training facility located in Anniston, Alabama, is dedicated to the mission of training and preparing America's emergency responders by offering programs that are nationally recognized for providing progressive training that enhances the capability of the emergency response community.

Contents

Law Enforcement Protective Measures for CBRNE Incidents

Student Guide

Law Enforcement Protective Measures for CBRNE Incidents
PER-264

Student Guide

Administrative 1
Course Introduction and Overview

BODY

1. **Course Purpose.** The purpose of this course is to provide responders with the ability to identify threats, protect themselves, operate, and perform essential law enforcement skills in a chemical, biological, radiological, nuclear, or explosive (CBRNE) hazard environment.

2. **Course Overview**

   a. Immediately following this overview, we will administer a brief Pre-Test. The results from this examination will assist us in determining existing knowledge and allow us to better facilitate the class' specific learning needs.

   b. Module 1: Identification of Terrorist and Extremist Behavior addresses the current national terrorist and extremist threat and methods for assessing potential terrorist or extremist actions.

   c. Module 2: CBRNE Incident Operations addresses the organization and control of a CBRNE incident site and the essential law enforcement functions in response to a CBRNE incident (e.g., providing security, evidence preservation, and basic sampling).

   d. Module 3: Personal Protective Equipment and Decontamination provides an overview of the purpose, selection criteria, and types of personal protective equipment and considerations for operating in PPE. Additionally the lesson addresses the purpose, types, basic procedures, and law enforcement specific considerations for decontamination.

   e. Experiential Learning Activity (ELA): Law Enforcement Techniques in Personal Protective Equipment provides an opportunity to receive demonstrations and conduct practical application of the law enforcement skills required to operate in a CBRNE incident environment.

   f. The Post-Test is conducted to assess your comprehension of the course content and determine achievement of the learning objectives.

3. **Course Graduation Criteria.** To successfully complete the course, you must accomplish each of the following:

   a. Achieve a 70% or higher on the Post-Test;

   b. Participate in all learning activities for ELA1: Law Enforcement Techniques in PPE; and

   c. Complete and submit an end of course evaluation. This evaluation has been provided and you are encouraged to provide your assessment, comments, and remarks as we proceed through the course. The evaluation will be collected at the end of the day.

4. **Facilities Orientation and Key Policies and Procedures**

   a. Classroom(s)

   b. Training Area(s)

   c. Restrooms

d. **Dining Facility**

e. **Breaks and Timely Return to Class Considerations**

f. **Smoking and Smokeless Tobacco Area(s)**

g. **Smoking Policy**

h. **Cell Phone and Pager Policy and Courtesy Considerations**

i. **Evening Lecture Series**

j. **Meet and Greet**

5. **Tablet and Student Materials.** Student materials for this course are provided using a tablet computer.

   a. **Operation**

      Are there any questions about operating the tablet or using the student materials?

   b. **E-mailing Student Materials.** At the conclusion of the class, you may e-mail your student materials along with your notes.

   c. **Downloading Student Materials.** Using your Federal Emergency Management Agency (FEMA) student identification (SID) number, you may log into CTAS at https://cdp.dhs.gov/ctas/LogIn/tabid/74/Default.aspx?returnurl=%2fctas%2f and download current student materials.

6. **CDP Information.** If you would like additional information about the CDP or our courses, you may want to:

   a. **Web.** Check us out on the web at http://cdp.dhs.gov/

   b. **Facebook®.** Follow us on Facebook® at https://www.facebook.com/CDPFEMA

   c. **Twitter®.** Join us on Twitter® at https://twitter.com/cdpfema

7. **Staff Introductions**

8. **Student Introductions**

SUMMARY

Summary. Are there any questions before we begin administration of the Pre-Test?

REFERENCES

Center for Domestic Preparedness. (2013). *Tobacco, Smokeless Tobacco and Electronic Cigarette Use*. Directive Number 066-7-01.

Law Enforcement Protective Measures for CBRNE Incidents
PER-264

Student Guide

Module 1
Identification of Terrorist and Extremist Behavior

Learning Objectives

a. Terminal Learning Objective. Given a situation, assess terrorist and extremist actions in accordance with *The Domestic Terrorist Threat: Background and Issues for Congress* and *Community Preparedness Guide 201: Threat and Hazard Identification and Risk Assessment Guide*. (LE-0009)

b. Enabling Learning Objectives

(1) Given a requirement, define terrorism and extremism in accordance with *Counterterrorism Analytical Lexicon*. (LE-0009a)

(2) Given a requirement, identify terrorist and extremist trends in accordance with *The Domestic Terrorist Threat: Background and Issues for Congress and Country Reports on Terrorism 2011*. (LE-0009b)

(3) Given a situation, identify indicators of terrorist and extremist activity in accordance with *8 Signs of Terrorism*. (LE-0009c)

(4) Given a situation, identify threats and hazards in accordance with C*ommunity Preparedness Guide 201: Threat and Hazard Identification and Risk Assessment Guide*. (LE-0009d)

(5) Given a situation, identify community-based policing techniques for the prevention of terrorism and extremism in accordance with *Policing Terrorism: An Executive's Guide*. (LE-0009e)

BODY

1. **Terrorism and Extremism Defined.** Terrorism is the unlawful use or threat of violence in furtherance of political, religious, ideological or social goals that are intended to evoke fear, intimidate, or coerce a civilian population or any segmented thereof; influence the policy of a government by intimidation or coercion (U.S. Department of Justice [DOJ], Federal Bureau of Investigation [FBI], n.d.). Violent Extremism is any ideology that encourages, endorses, condones, justifies, or supports the commission of a violent act or crime against the United States, its government, citizens, or allies in order to achieve political, social, or economic changes, or against individuals or groups who hold contrary opinions (DOJ, FBI, n.d.).

2. **International Terrorism and Extremism**

a. Increasingly, international terrorism is recognized as a threat to the United States because of terrorists' avowed goal of overthrowing secular or Western-allied regimes in certain countries with large domestic security, both timing and target selection by terrorists can affect U.S. interests in areas ranging from preservation of commerce, to nuclear nonproliferation, to the Middle East peace process. Such groups are seen as a particular threat to U.S. foreign policy objectives (Perl, 2007).

b. International terrorist groups occur primarily outside the territorial jurisdiction of the United States (Crimes and Criminal Procedures, 18 *United States Code* [U.S.C.] § 2331, 2012).

c. Formal international terrorist organizations continue to pose a domestic terrorist threat (U.S. Department of State, 2011). A few examples of such terrorist groups include the following:

(1) Al-Qaeda

(a) Since 1980, has financed, recruited, transported, and trained Sunni Islam extremists for the Afghan resistance.

(b) Became a direct threat to the United States in 1998 in a series of showdowns between the United States and Iraq over United Nations weapons inspections.

(c) To date, responsible for the worst terrorist attacks in American history (September 11, 2001 attacks). The terrorist attacks on September 11, 2001 resulted in the collapse of the World Trade Center towers, significant damage to the Pentagon the downing of United Flight 93 and more than 2,800 deaths.

(d) Still in existence today and has a number of regional affiliates (U.S. Department of State, 2011).

(2) Lashkar-e-Taiba

(a) Formed in the 1980s

(b) Financed, recruited, transported, and trained Sunni Islam extremists for the Afghan resistance.

(c) A formidable and highly adaptable adversary with genuine global reach, the most dangerous terrorist group operating in South Asia today, after Al-Qaeda.

(d) Possesses growing capabilities and enjoys relatively robust sanctuary in Pakistan.

(e) Tends to forge coalitions with like-minded groups such as Al-Qaeda.

(f) Still in existence today - a large and proficient militant group (U.S. Department of State, 2011).

(3) Hezbollah

(a) Closely allied with Iran and supports them with funds and arms.

(b) Has carried out numerous anti-U.S. attacks overseas.

(c) Involved in a 33-day military conflict in Lebanon and northern Israel, known as the Summer War of 2006.

(d) Transformed itself from a militant group to the preeminent political and military force in Lebanon (U.S. Department of State, 2011).

3. Domestic Terrorism and Extremism

a. Many people believe that the majority of terrorists in the United States come from the Middle East and are radical Muslims. The fact is the majority of terrorists are home-grown, originating with American citizens with extreme left- or right-wing views.

(1) Homegrown extremists are a significant concern. A homegrown violent extremist is a person who rejects the cultural values, beliefs, and environment of the United States and intends to commit terrorism inside the United States without direct support from a foreign organization. Homegrown terrorists are harder to detect, easily able to connect with other extremists and in some instances highly capable operationally. (*Protecting the Nation in Today's Complex Threat Environment*, 2013).

(2) Lone terrorists “commit terrorist acts alone, and without the witting support from others.” In 2012, numerous acts of terrorism and violence were committed by lone offenders (*The Domestic Terrorism Threat*, 2012).

(a) In 2011, a 26-year-old man was arrested for planning to destroy the Pentagon and U.S. Capitol using large remote controlled aircraft filled with explosives (U.S. Attorney’s Office, 2011a).

(b) In 2011, four members of a militia in Georgia were arrested for planning to acquire explosives, silencer and to manufacture a biological toxin to use against various U.S. government targets (U.S. Attorney’s Office, 2011b).

(c) In 2012, the FBI dismantled an anarchist extremist cell in Cleveland, Ohio who planned to blow up a bridge in that city (*The Domestic Terrorism Threat*, 2012).

(d) In 2012, there were multiple lone-offender shootings: a movie theater in Aurora, Colorado; a Sikh temple in Oak Creek, Wisconsin; Family Research Council headquarters in Washington, DC; and Sandy Hook Elementary School in Newtown, Connecticut (*The Domestic Terrorism Threat*, 2012).

(3) Domestic extremists are likely to continue to pose a persistent threat involving smaller-scale bombings and assaults (*The Domestic Terrorism Threat*, 2012). According to the FBI, extremist types, within the U.S. include the following:

(a) Animal Rights Extremists and Environmental Extremists—The term "animal rights extremism" covers criminal acts committed in the name of animal rights.

(b) Environmental extremism—Most often referred to as "Eco-terrorism"-includes criminal acts committed in the name of the environment.

(c) Anarchist Extremists—Believe that individual autonomy and collective equality are fundamental and necessary for a functional, civilized society. [Anarchism] They resist the existing hierarchical structure of society that gives some people authority and control over others.

(d) White Supremacist Extremists—The term "white supremacist extremism" (WSE) describes people or groups who commit criminal acts in the name of white supremacist ideology.

(e) Anti-Government Extremists—Believe that even though they physically reside in this country, they are separate or 'sovereign' from the United States. The law enforcement agency noted such citizens believe they don't have to answer to any government authority, including courts, taxing entities, motor vehicle departments or police

(f) Jewish Defense League—protectionist of Jewish peoples

(g) Black Separatist Extremists—a movement to create separate institutions for black people in societies historically dominated by whites particularly in the United States.

(h) Anti-Abortion Extremists—The vast majority of anti-abortion activists engage in constitutionally protected activity. However, anti-abortion extremism involves crime committed in the name of the anti-abortion movement.

(4) Examples of Domestic Terrorism and Extremism

(a) On March 29, 2010, nine members of an extremist group were charged in Michigan with seditious conspiracy and attempted use of weapons of mass destruction in an alleged plot to attack law officers and rise up against the government. They tried to use bombs to attack a caravan of a funeral procession. Fortunately, the FBI and Michigan State Police intervened before their plot could be carried out (FBI, 2011).

(b) 2012, Daniel Andreas San Diego made the FBI's "Most Wanted Terrorists" watch list in 2009. Listed as "armed and dangerous," with a $250,000 price on his head, the Berkeley, California, native is only the second U.S. citizen to make this particular FBI list. San Diego is an animal rights zealot. He is under federal indictment for allegedly igniting explosive devices outside two Northern California firms—biotechnology giant Chiron and homecare-product manufacturer Shaklee—in 2003. The FBI says a potentially deadly second explosive at Shaklee, strapped with nails was likely targeted at first responders, was defused (Russell, 2012).

(c) 2013, the alleged Boston Marathon bombers, April 15, 2013, Tamerlan Tsarnaev, 26, and his 19-year-old brother, Dzhokhar, apparently came to identify closely with the cause of radical Islam, but that is not the whole story. These marathon terrorists were more like rampage killers who enter a school, cinema, or shopping mall and indiscriminately target anything that moves. Their motive for planting explosives near the finish line of the marathon seemed to be revenge. They apparently blamed the United States for wars in Afghanistan and Iraq, but they also seemed to blame everybody but themselves for their personal miseries (Levin, 2013).

b. Guided Discussion Question

(1) What known terrorist or extremist groups may operate in your local jurisdiction?

(2) What terrorist or extremist incidents have occurred in your jurisdictions?

(3) How have these incidents affected policing in your jurisdiction?

4. Terrorist and Extremist Trends

a. International Terrorist and Extremist Trends. Formal international terrorist organizations have their own infrastructures, financial arrangements, and training facilities such as Al-Qaeda, Lashkar, and Hezbollah and continue to plan and mount domestic and international terrorist campaigns (U.S. Department of State, 2011). Three trends include the following:

(1) The emergence of so-called "micro actors," spurred in part by U.S. and allied successes in isolating and killing much of Al Qaeda's leadership. The result is Al Qaeda is perceived as having a more subdued operational role, but assuming more of an ideological, motivational, and propaganda role.

(2) A trend toward "sophistication" (i.e., terrorists exploiting the global interchange of information, finance, and ideas to their benefit, often through the Internet).

(3) A growing overlap between terrorist activity and international crime, which may expose the terrorists to a broad range of law enforcement activities (Perl, 2007).

b. Domestic Terrorist Trends. A 2013 Congressional Research Service report (focused on domestic terrorism) discusses five current trends or issues.

(1) The Level of Activity-Domestic. Terrorist have been responsible for more than two-dozen incidents since September 11, 2001 and the number of anti-government extremists has grown significantly since then.

(2) Use of Nontraditional Tactics. A large number of domestic terrorists do not necessarily use tactics such as suicide bombings or airplane hijackings. They have been known to engage in activities such as vandalism, arson, shootings, trespassing, and tax fraud, to achieve their goals.

(3) Exploitation of the Internet. Domestic terrorists—much like their jihadist analogues—are often Internet savvy and use the medium as a resource for their operations.

(4) Decentralized Nature of the Threat. Many domestic terrorists rely on the concept of leaderless resistance. This involves two levels of activity. Operationally, militant, underground, idealist cells or individuals engage in illegal activity without traditional leadership. On the above-ground public face, (the “political wing”) focused on propaganda and the dissemination of ideology—engaging in protected speech.

(5) Prison Radicalization. Prison has been a place where terrorist thinking can bloom. Some prison gangs delve into radical or extremist ideologies that motivate domestic terrorists. However, even for gangs exhibiting these ideological dimensions, criminal enterprises such as drug trafficking—not radical beliefs—largely drive their activities (Bjelopera, 2013).

c. Guided Discussion Questions

(1) What do you see as the most likely threat(s) in your jurisdiction?

(2) What steps has your agency taken to prevent or mitigate terrorist or extremist activity?

5. Indicators of Terrorist and Extremist Activity

a. Eight Signs of Terrorism. Because terrorist acts are rarely spontaneous, law enforcement should learn to identify the eight signs of terrorism in order to mitigate or respond to terrorist or extremist acts. According to the Counterterrorism Education Learning Lab (2012), there are eight signs of terrorism.

(1) Surveillance—Attempts to monitor or record activities. For example, an individual observes the security measures outside a federal building or target facility to determine if those facilities or assets are secure.

(2) Elicitation—Attempts to gain information through inquiries. For example, an individual sits next to an employee of a targeted organization and politely and slowly gets to know the employee through general questions, then after gaining trusts asks more specific questions about the organization.

(3) Tests of Security—Attempts to measure reaction times by entering restricted areas. For example, three individuals try to enter into a secured nuclear facility in an attempt to determine how many minutes it takes for a certain presence of security to arrive, with the intention of entering a later time if they feel the security is not reacting sufficiently.

(4) Funding

(a) Suspicious transactions involving large cash payments, deposits, withdrawals, or transfers of money

(b) Bulk cash smuggling

(c) Suspected financial fraud

(d) Sale of counterfeit goods

(e) Misleading charities

(5) Acquiring Supplies—Attempting to obtain explosives, weapons, uniforms, badges, credentials, etc. For example, an individual or group enters a hospital to sneak out radiological material from a storage area.

(6) Impersonation—Suspicious people who just do not belong or are attempting to assume another person's actual or false identity to gain access to a site, information, etc. For example, an individual calls an employee of a sensitive facility impersonating someone from a government regulatory agency in order to gain security information or a person without the proper credentials uses a back story when stopped trying to gain access to a secure area.

(7) Rehearsal—Practicing to work out flaws and unanticipated problems. For example, a terrorist drives to a mall, simulates planting explosive devices at entry points and

leaves the area within a given timeframe to see if they can bypass security cameras and exit without being apprehended by law enforcement.

(8) Deployment—Positioning assets. For example, a team of terrorist drive to predetermined locations placing explosives, get-away vehicles, changes of clothing, and other supplies to conduct a terrorist attack.

Guided Discussion Questions

(1) Which signs of terrorism can be identified in the video?

(2) What critical infrastructure do the suspects seem to be targeting?

(3) What critical infrastructure or venues in your area might be a potential target for terrorists or extremists?

6. Threat and Hazard Identification

a. Targets are selected by terrorist organizations to generate fear, to have social impact, for political change, and to cause financial chaos (Federal Emergency Management Agency, 2011).

b. National Infrastructure Protection Plan. Revised in 2013 to reflect the evolution in the "critical infrastructure risk, policy, and operating environments, as well as experience gained and lessons learned since…2009" (U.S. Department of Homeland Security [DHS], 2013, p. 1).

(1) A comprehensive risk management framework that defines critical infrastructure, protection roles, and responsibilities of Federal, state, local, tribal, territorial, and private sector partners.

(2) Defines vulnerability as "the physical feature or operational attribute that renders an entity open to exploitation or susceptible to a given hazard" (DHS, 2013, p. 33). In calculating the risk of an intentional hazard, a common measure of vulnerability is the likelihood that an attack is successful, given that it is attempted.

(3) Protecting and ensuring resiliency of United States' critical infrastructure and key resources are essential. Critical infrastructure are the assets, systems, and networks, whether physical or virtual, so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof.

(4) Developing an effective strategy for critical infrastructure and key resources protection requires a clear understanding of potential threats.

(5) A convenient resource that you may find helpful is the DHS Daily Open Source Infrastructure Report.

(a) It is a non-commercial publication intended to educate and inform personnel engaged in infrastructure protection.

(b) It is a daily, Monday through Friday, summary of open-source published information concerning significant critical infrastructure issues.

(c) It is available on the web at http://www.dhs.gov/dhs-daily-open-source-infrastructure-report.

c. Threat and Hazard Identification and Risk Assessment (THIRA). It is important that every community understands and identifies the risks it may face. By understanding the risks, it allows the community to make informed decisions to manage risk, as well as develop needed capabilities. THIRA is a tool that allows a jurisdiction to understand its threats and hazards and how the impacts may vary according to time of occurrence, season, location, and other community factors.

(1) This knowledge helps a jurisdiction establish informed and defensible capability targets. The THIRA is intended to inform the whole community about its risks and capabilities needed to address those risks (DHS, 2012).

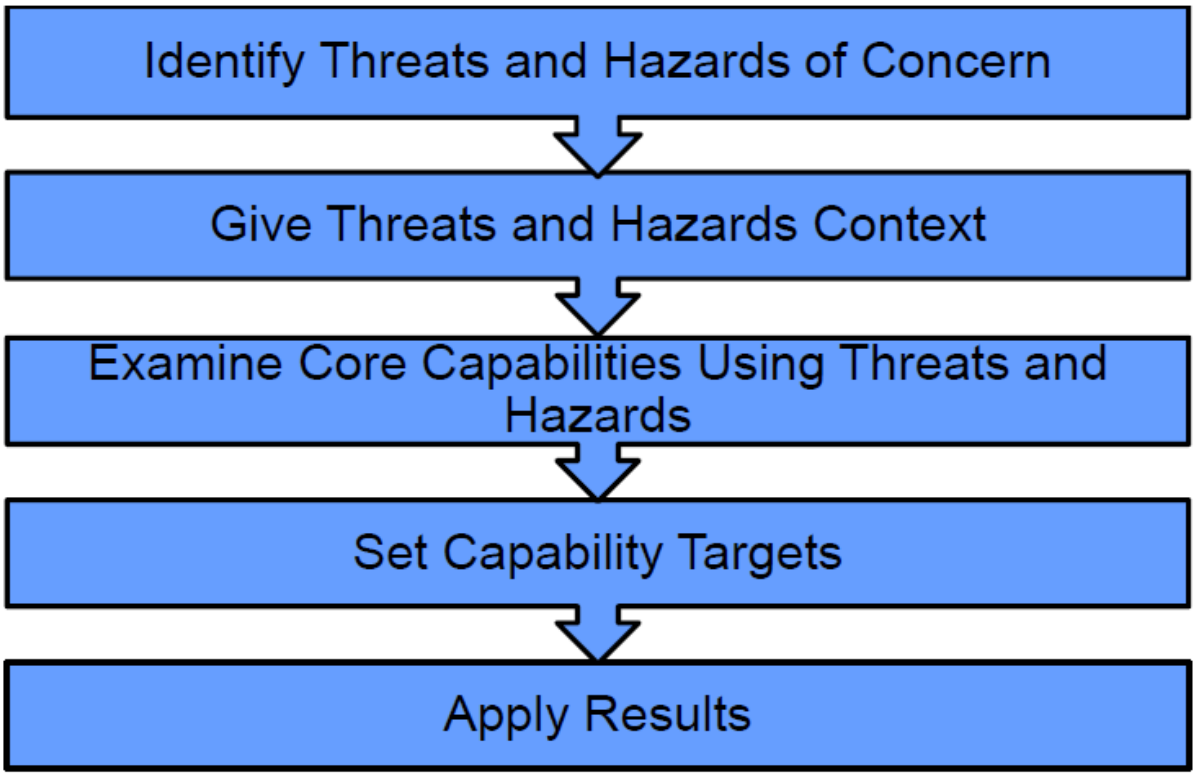

Figure 1. The THIRA Process

(2) The THIRA (DHS, 2012) process consists of the following five basic steps:

(a) Step 1: Identify the Threats and Hazards of Concern. Based on past experience, forecasting, expert judgment, and available resources; identify a list of the threats and hazards of concern to the community.

(b) Step 2: Give Threats and Hazards Context. Using the list of threats and hazards, develop context that shows how those threats and hazards may affect the community.

(c) Step 3: Examine the Core Capabilities. Using the threat and hazard context, identify impacts to the community through the lens of the core capabilities described in the Goal.

(d) Step 4: Set Capability Targets. Looking across the estimated impacts to the community, in the context of each core capability and coupled with a jurisdiction's desired outcomes, set capability targets.

(e) Step 5: Apply the Results. Plan for the ability to deliver the targeted level of capability with either community assets or through mutual aid, identify mitigation opportunities, and drive preparedness activities.

d. Community-Based Policing. Community-based policing is a philosophy that promotes organizational strategies, which support the systematic use of partnerships and problem-solving techniques, to proactively address the immediate conditions that give rise to public safety issues such as crime, social disorder, and fear of crime. (DOJ, Community Oriented Policing Services, n.d.)

(1) Community-based policing is a critical component of identifying threats and preventing them before they occur. It is identified by the President as a critical element in his national plan to combat violent extremism (Obama, 2011).

(2) Guided Discussion

(a) How have community-based policing initiatives been employed in your jurisdiction?

(b) What types of community partnerships have been established to mitigate extremism in your jurisdiction?

(c) What problem-solving mechanisms are used in your jurisdiction? How is information collected to enable problem solving?

(d) How have these initiatives aided in the deterrence or prevention of extremist actions or behavior in your jurisdiction?

SUMMARY

Summary. In this module, we defined terrorism and extremism; discussed international and domestic terrorism; reviewed terrorist and extremist trends and indicators of terrorism; discussed the eight signs of terrorism; and reviewed means to identify threats and hazards to the community. Are there any questions about what has been covered in this lesson?

REFERENCES

Bjelopera J. (2013). *The domestic terrorist threat: Background and issues for Congress.* Congressional Research Service.

Chapman, R., & Scheider, M. (2002). *Community policing: Now more than ever*. Office of Community Oriented Policing, U.S. Department of Justice, Washington, DC.

Counterterrorism Education Learning Lab. (Producer). (2012). *8 signs of terrorism* [Video]. Available from http://www.thecell.org/

Crimes and Criminal Procedures, 18 U.S.C. § 2331 (2012).

Federal Emergency Management Agency. (2011). *Are you ready? An in-depth guide to citizen preparedness.* Retrieved from http://www.ready.gov/document/are-you-ready-depth-guide-citizen-preparedness

Federal Bureau of Investigation. (2011). *Domestic terrorism focus on militia extremism.* Retrieved from http://www.fbi.gov/news/stories/2011/september/militia_092211

Levin, J. (2013). *Domestic terrorism: Myths and realities.* Retrieved from http://www:huffingtonpost.com/news/boston-marathon-bombing

Newman, G., & Clarke, R. (2007). *Policing terrorism: An executive's guide.* Center for Problem-Oriented Policing, U.S. Department of Justice: Washington, DC.

Obama, B. (2011) *Empowering local partners to prevent violent extremism in the United States.* Retrieved from http://www.whitehouse.gov/sites/default/files/empowering_local_partners.pdf

Perl, R. F. (2007). *International terrorism: Threat, policy, and response*. Retrieved from http://www.fas.org/crs/terror/RL33600.pdf

Protecting the nation in today's complex threat environment. Hearing before the House Appropriations Committee, Subcommittee on Commerce, Justice, Science, and Related Agencies, 113th Cong. (2013) (testimony of Robert S. Mueller).

Russell, S. (2012). When extreme animal rights activists attack. *Pacific Standard Magazine.* Retrieved from http://www.psmag.com/legal-affairs/when-extreme-animal-rights-activists-attack-40430/

The domestic terrorism threat: Hearing before the Senate Judiciary Committee, Subcommittee on the Constitution, Civil Rights, and Human Rights, 113th Cong. (2012) (testimony of Michael A. Claney)

U.S. Attorney's Office. (2011a). Massachusetts man charged with plotting attack on pentagon and U.S. Capitol and attempting to provide material support to a foreign terrorist organization. *FBI Press Release Boston Division.* Retrieved from http://www.fbi.gov/boston/press-releases/2011/massachusetts-man-charged-with-plotting-attack-on-pentagon-and-u.s.-capitol-and-attempting-to-provide-material-support-to-a-foreign-terrorist-organization

U.S. Attorney's Office. (2011b). North Georgia Men Arrested, Charged in Plots to Purchase Explosives, Silencer and to Manufacture a Biological Toxin. *FBI Press Release Atlanta Division.* Retrieved from http://www.fbi.gov/atlanta/press-releases/2011/north-georgia-men-arrested-charged-in-plots-to-purchase-explosives-silencer-and-to-manufacture-a-biological-toxin

U.S. Department of Homeland Security. (2011). *The strategic national risk assessment in support of PPD-8: A comprehensive risk-based approach toward a secure and resilient nation.* Retrieved from http://www.dhs.gov/xlibrary/assets/rma-strategic-national-risk-assessment-ppd8.pdf

U.S. Department of Homeland Security. (2012*). THIRA frequently asked questions FY 2012.* Retrieved from http://www.fema.gov/media-library/assets/documents/27775

U.S. Department of Homeland Security. (2012). *Community preparedness guide 201: Threat and hazard identification and risk assessment guide.* Retrieved from http://search.dhs.gov/search?query=Threat+and+Hazard+Identification+and+Risk+Assessment&op=Search&affiliate=dhs

U.S. Department of Homeland Security. (2013). *National infrastructure protection plan: Partnering to enhance protection and resiliency.* Retrieved from http://www.dhs.gov/sites/default/files/publications/NIPP%202013_Partnering%20for%20Critical%20Infrastructure%20Security%20and%20Resilience_508_0.pdf

U.S. Department of Justice, Community Oriented Policing Services. (n.d.). *Community policing defined.* Retrieved from http://www.cops.usdoj.gov/Default.asp?Item=36

U.S. Department of Justice, Federal Bureau of Investigation. (n.d.). *Counterterrorism analytical lexicon.* Retrieved from http://cryptocomb.org/FBI-Counter-Terrorism-Analytical-Lexicon.pdf

U.S. Department of State. (2011). *Country reports on terrorism 2011.* Retrieved from http://www.state.gov/j/ct/rls/crt/2011/index.htm

FIGURE LISTING

Law Enforcement Protective Measures for CBRNE Incidents
PER-264

Student Guide

Module 2
CBRNE Incident Operations

Learning Objectives

a. Terminal Learning Objectives

(1) Given a scenario, assume initial command of a CBRNE incident to establish and maintain command and control of the scene. (IC-0001)

(2) Given a CBRNE crime scene, preserve evidence in accordance with *The First Responder's Field Guide to HAZMAT and Terrorism Emergency Response*. (LE-0006)

(3) Given personal protective equipment (PPE) Level C and required materials, collect samples using Method A in accordance with ASTM International *E2458-10: Standard Practices for Bulk Sample Collection and Swab Sample Collection of Visible Powders Suspected of Being Bio-threat Agents from Nonporous Surfaces*. (HO-0001)

b. Enabling Learning Objectives

(1) Given a written examination, identify the roles of law enforcement personnel at a CBRNE incident in accordance with *Critical Incident Management: A Complete Response Guide*. (IC-0001a)

(2) Given a written examination, identify the purpose of the incident command system in accordance with the *National Incident Management System*. (IC-0001b)

(3) Given a written examination, identify hazard control zones in accordance with National Fire Protection Association® *National Fire Protection Association Publication 472, Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents (NFPA 472®)*. (IC-0001c)

(4) Given a written examination, compare traditional and CBRNE crime scenes in accordance with *Practical Crime Scene Investigations*. (LE-0006a)

(5) Given a written examination, identify resources provided to state, county, and municipal law enforcement agencies according to the Federal Bureau of Investigation. (LE-0006b)

(6) Given a written examination, identify guidelines for preserving evidence in accordance with *The First Responder's Field Guide to HAZMAT and Terrorism Emergency Response*. (LE-0006c)

(7) Given a written examination, identify the purpose of the Method A Bulk Sampling method in accordance with ASTM International *E2458-10: Standard Practices for Bulk Sample Collection and Swab Sample Collection of Visible Powders Suspected of Being Bio-threat Agents from Nonporous Surfaces*. (HO-0001a)

(8) Given a written examination, identify the purpose of the Method B Swab Sampling method in accordance with ASTM International *E2458-10: Standard Practices for Bulk Sample Collection and Swab Sample Collection of Visible Powders Suspected of Being Bio-threat Agents from Nonporous Surfaces*. (HO-0001b)

BODY

1. **Role of Law Enforcement at CBRNE Incident.** During a CBRNE incident, law enforcement first responders play a number of crucial roles. These roles may change as the incident progresses from initial response through termination.

   a. Initial Incident Response. The initial response phase typically occurs within the first hour of the incident. The effectiveness of the initial response is critical in beginning management of the scene and stabilizing and limiting growth of the incident. Most incidents begin and end locally (U.S. Department of Homeland Security [DHS], 2008). Because there is often no pre-warning of an incident, it is imperative that law enforcement officers, who are often the first to arrive at the scene, are prepared to assume command of a chemical, biological, radiological, nuclear, or explosive (CBRNE) incident. According to Faggaino, McNall, and Gillespie (2012) there are Seven Critical Tasks™ essential to managing the initial response to a CBRNE incident. These critical tasks are

   (1) Establish command and communications

   (2) Identify the hot zone

   (3) Establish the inner perimeter

   (4) Establish the outer perimeter

   (5) Establish the command post

   (6) Establish a staging area

   (7) Identify and request additional resources

   These tasks are covered in detail in *Law Enforcement Response Actions for CBRNE Incidents* later in the week.

   b. Incident Operations. After the initial response phase has concluded, law enforcement personnel play an essential role in the command and control of the incident. Depending upon the nature of the hazard and the duration of the incident, qualified law enforcement personnel may serve as incident commander for some or all operational periods. Other law enforcement personnel will

   (1) establish and maintain isolation perimeters to ensure the safety of responders and the public;

   (2) secure access control points into and out of the incident site;

   (3) search for, arrest and detain suspects; and

   (4) determine the existence of a crime scene and preserve evidence.

   c. Incident Termination. It may require days or weeks for an incident to terminate. During this phase, crime scene investigation will be the primary role for law enforcement personnel. This role includes

(1) maintaining an isolation perimeter around the incident site;

(2) preserving evidence; and

(3) collecting and processing evidence.

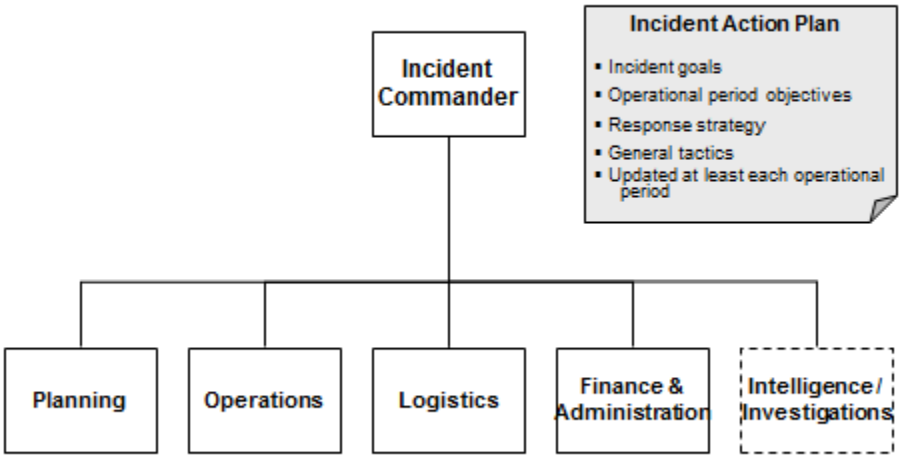

Figure 1. Incident Command System

2. **Incident Management.** After the initial response phase and if the incident requires further action, command will be transferred from the first arriving responder to an incident commander. The incident commander will assume ultimate responsibility for management of the incident in accordance with the Incident Command System (ICS).

   a. **Incident Command System.** The ICS is a standardized, on-scene, all-hazards incident management approach. It allows for the integration of facilities, equipment, personnel, procedures and communications operating within a common organizational structure. It enables a coordinated response among various jurisdictions and functional agencies, both public and private. It establishes common processes for planning and managing resources. The incident command system is flexible and can be used for incidents of any type, scope and complexity.

      (1) Incident Commander. The incident commander is responsible for overall management of the incident including: determining incident objectives, determining policies for ensuring the safety of citizens and first responders, reducing the effects of the hazards, site control, establishment of hazard control zones, handling of resources, staff assignments, etc.

      (2) The Incident Action Plan (IAP). The IAP is developed and it is the responsibility of the planning section. An ICP includes incident goals, operational period objectives, the response strategy defined by incident command, and general tactics to achieve goals and objectives within the overall strategy. The incident action plan also facilitates dissemination of critical information about the status of response assets.

Because incident parameters evolve, action plans must be revised on a regular basis (at least once per operational period) to maintain consistent, up-to-date guidance across the system.

(3) Organizational Structure. The organization structure for a typically incident command system consists of five major functional areas: command, operations, planning, logistics and finance/administration. All of the functional areas may or may not be used based upon incident needs. Intelligence and investigations is an optional sixth functional area that is activated on a case-by-case basis. Intelligence and investigations may be required if it is necessary to determine or apprehend those responsible or if information is needed to determine the cause, evaluate the potential spread or impact, or determine countermeasures for a given incident.

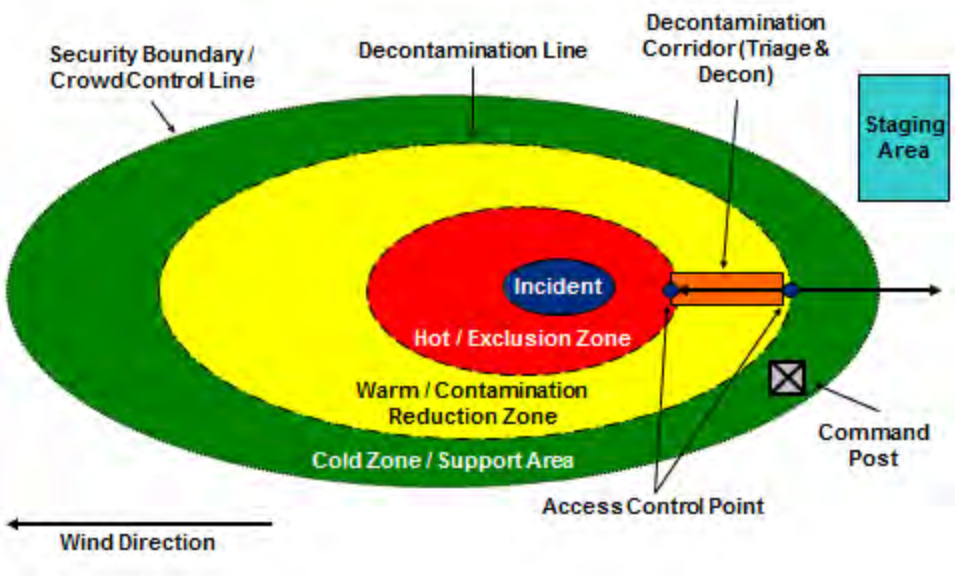

Figure 2. Graphic of Site Control and Hazard Control Zones

3. Site Control. The first act of the incident commander for a CBRNE incident must be to establish control of the site. A site must be controlled to prevent the avoidable spread of hazardous substances from contaminated areas to clean areas and maximize the safety of first responders and the public. The most common approach is to establish three distinct zones around the incident site. These zones are the hot/exclusion zone, the warm/contamination reduction zone, and the cold/support zone. These zones establish areas were critical response activities will occur. These zones will be established based upon the nature of the hazard, environmental conditions, and information available. These zones may change during the course of the incident and must be monitored routinely by qualified personnel using appropriate monitoring and sampling techniques.

a. Hot/Exclusion Zone. This zone is the area where the actual incident occurred and contamination exists.

(1) It extends far enough to prevent adverse effects from hazardous materials releases to personnel outside the zone.

(2) All individuals entering the hot/exclusion zone must wear the prescribed level of personal protective equipment established by the incident commander and be decontaminated before leaving the warm/contamination reduction zone.

(3) Entry and exit access control points will be established at the outer boundary of the hot/exclusion zone to regulate movement of personnel and equipment in and out.

(4) The outer boundary of the zone will initially be established based upon visual survey and information available. Technology will be used to determine more precise boundaries as additional support arrives.

(5) Once established, the boundary of the hot/exclusion zone should be clearly marked by placards, hazard tape, signs, or barriers to prevent unintentional entry.

b. Warm/Contamination Reduction Zone. The warm/contamination reduction zone is a transitional area between the hot/exclusion zone and the cold/support zone.

(1) This zone is designed to reduce the probability that the clean cold/support zone will become contaminated.

(2) Because this zone is less hazardous than the hot/exclusion zone, personnel operating in this zone can typically wear PPE one level below those working in the hot zone.

(3) Decontamination procedures take place in a designated area within this zone called the decontamination corridor. The corridor begins at the boundary of the hot/exclusion zone and extends to the outer boundary of the warm/contamination reduction zone. Responders are required to complete decontamination procedures before entering the cold/support area.

(4) Evidence collected at the scene may be packaged or decontaminated in this zone.

(5) Triage, tagging, and life-saving emergency care of victims may occur in this zone.

(6) Access to the warm zone is restricted through an access control point to regulate movement of personnel and equipment in and out. Primary purpose is to avoid contamination of the cold/support zone.

(7) The decontamination corridor and access control point(s) must be located up wind of the incident site to avoid cross-contamination.

(8) Once established, the boundary of the warm/contamination reduction zone should be clearly marked by placards, hazard tape, signs, or barriers to prevent unintentional entry.

c. Cold/Support Zone. The cold/support zone is the outermost part of the site and is considered free from contamination.

(1) Normal work clothes, rather than PPE, are acceptable in this area.

(2) The command post and support capabilities are established in the cold/support zone. These functions will be positioned upwind of the hot/exclusion zone and should have convenient access to roadways and communications.

(3) Rest and rehabilitation areas for responders will be established upwind of the hot/exclusion zone and in locations that would not interfere with the command post or the movement of personnel in and out of the warm zone access control point(s). Dependent upon the type and concentration of the CBRNE hazard, responders may be restricted to operating for only short periods even in PPE. This may require responders working in the hot and/or warm zones to periodically process through decontamination and into the cold/support zone to rehabilitate before reentering either zone. Rehabilitation periods will be determined by the situation and the incident commander.

(4) The press would typically be allowed within the cold/support zone.

d. Staging Area. A staging area is a designated location where personnel and equipment are positioned awaiting tasking. The staging area is located outside the cold/support zone but conveniently close to the scene. The staging area should be positioned in a location with good access to roadways and communications.

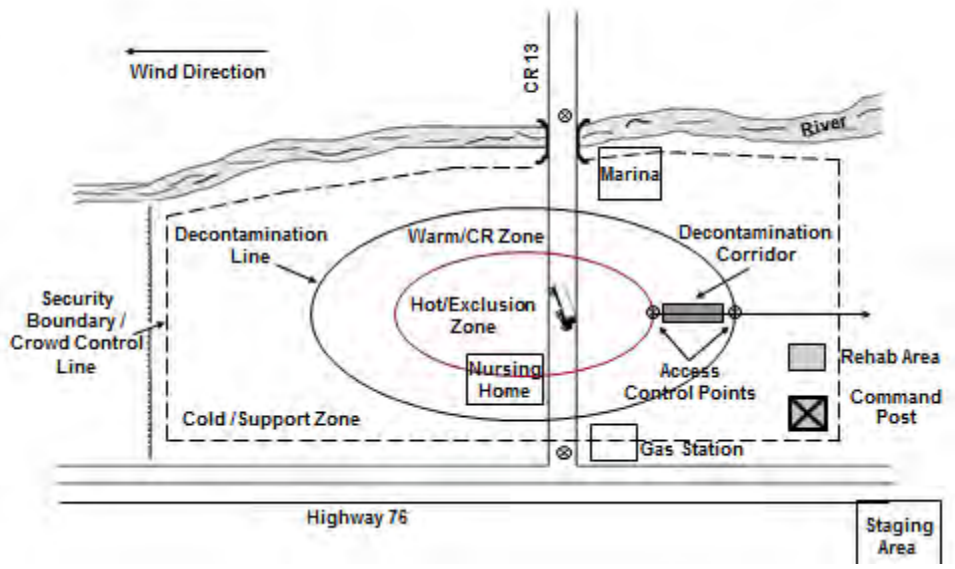

Figure 3. Incident Site Map

4. Incident Site Mapping. The incident commander must consider the actual location and surrounding areas of the hazard, and then use established procedures, techniques, and methods to mitigate the hazardous incident. Typically, the incident commander will create a site map to communicate the situation and facilitate command. A site map shows topographic features; prevailing wind direction; control zones; location of the command post, staging area, and rehabilitation area; the location of structures, drainage concerns, etc. (Noll, Hildebrand, & Yvorra, 2005). When creating a site map, using easily identifiable references such as roads, streets, organic barriers, buildings, etc. will help simplify command, control, and communication procedures during the incident response.

Figure 4. Traditional vs. CBRNE Crime Scene

5. **CBRNE Crime Scene versus Traditional Crime Scene.** Crime scene investigations involving CBRNE agents add additional complexities over traditional crime scene investigations. (Fish, Stout, & Wallace, 2011). The additional complexities include:

   a. **Crime Scene Contamination.** During a traditional investigation, the crime scene is roped off and secured to prevent contamination of evidence. At a CBRNE investigation, the crime scene may be contaminated by the hazard and first responders. For example during the Boston Marathon bombing in 2013, the explosions caused three deaths and more than 200 injuries. Responders and citizens aiding the victims undoubtedly altered the crime scene in a way that would not typically occur at a traditional scene that could be more realistically controlled.

   b. **Monitoring.** At a CBRNE crime scene continuous monitoring of the scene must be conducted by hazardous materials experts or crime scene investigators to ensure the safety of all personnel. Crime scene investigators require skills in hazardous materials handling, monitoring, and packaging in order to investigate the scene.

   c. **Collection Equipment.** Use of CBRNE sampling and monitoring methods are necessary to collect and to assess the nature and concentration of the hazardous evidence. At a CBRNE crime scene, evidence collection equipment may consist of biological sampling kits, chemical agent monitoring equipment, radiac meters, etc.

   d. **Crime Scene Documentation.** At a traditional crime scene, crime scene investigators use standard paper with pencil or pen to write notes, draw sketches, or prepare evidence and photo logs. At a CBRNE crime scene paper can be used. But, it would have to be sealed in plastic bags afterwards, and would pose storage hazards. Depending upon the scene, investigators may be required to communicate to another investigator outside the hot or warm hazard control zone to record scene details.

e. Packaging. At a traditional crime scene cardboard or paper packing is used to package evidence. However, these porous and breathable materials cannot be used at a CBRNE crime scene, since the agents would evaporate creating additional exposure to responders. At a CBRNE crime scene forensic evidence must be packaged in sterile glass and plastic jars, vacuum canisters, plastic bags or nylon/polyester heat-seal bags. Also, it is packaged at least twice and sometimes three times before it can be removed from the hot zone. Likewise, if it has to be transported to a laboratory for analysis it must be packaged again (over packing).

f. Decontamination. All physical evidence collected and packaged at the hot zone of a CBRNE crime scene must be safely decontaminated or properly packaged to avoid contamination of individuals or the environment.

g. Chain of Custody. At a CBRNE crime scene, evidence requires additional links in the chain of custody. Evidence may be packaged in the hot or warm zone, decontaminated in the warm zone, and then over-packed prior to transportation to a laboratory adding additional complexity and greater potential for a breach of the chain.

h. Work Time. At a traditional investigation, crime scene investigators may work at the scene until the final survey is completed. At a CBRNE crime scene, time available to work at the scene may be restricted based upon the nature and concentration of the hazard. In many cases, investigation of a CBRNE crime scene will require operating in PPE. Dependent upon the nature and concentration of the hazard, work time even in PPE may be restricted due to exposure limitations of the breathing apparatus, respirator, or ensemble. Additionally, working for prolonged periods in PPE may cause physiological and psychological stresses that further affect how long an investigator can work. The stressors of wearing PPE will be discussed further in the next module.

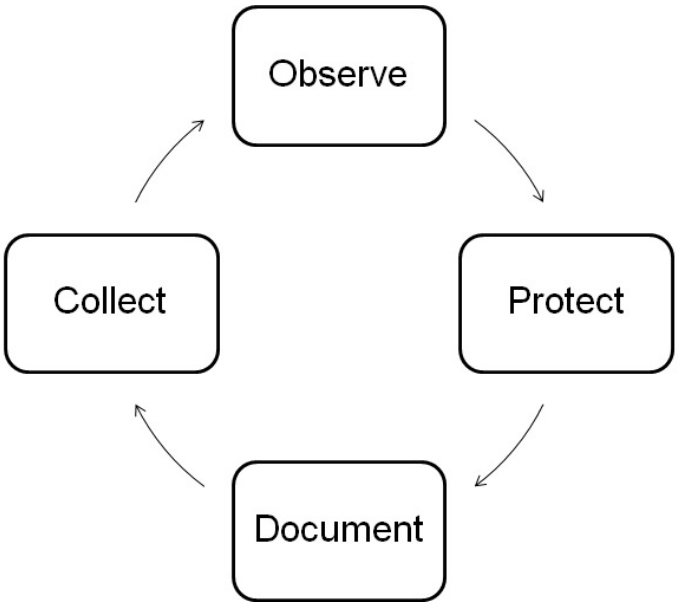

Figure 5. The Evidence Preseration Cycle

6. Evidence Preservation. Evidence preservation is critical for identifying, arresting, and convicting the perpetrator(s) and preventing further acts of terrorism or extremism. The

following is a summary of the guidelines for evidence preservation as listed in *The First Responder's Field Guide to HAZMAT and Terrorism Emergency Response (*Levy, 2010).

a. Observe. From the start to the end of the incident, continuously look for things of evidentiary value animate or inanimate that could have a connection to the crime scene.

(1) Be alert for evidence throughout the area, not just at the seat of the release or point of origin.

(2) Do not overlook trash containers and dumpsters. Perpetrators often leave valuable evidence in nearby trash containers.

(3) Take note of anything suspicious even though it may not be directly related to the incident.

(4) Look for blast patterns, debris fields, discolored foliage, sick or dead animals, and smoke or fog plumes.

b. Protect. Leave evidence alone unless it is necessary for the performance of duties or emergency operations. Obtain approval, if possible, prior to moving. Work with the fewest number of personnel possible (with due consideration for safety).

(1) Secure and isolate any areas where evidence is located and minimize the number of people allowed in the area.

(2) Secure and isolate any apparent source location.

(3) Touch as little as possible and do not disturb the scene more than is necessary to ensure safety and treat the injured.

(4) Leave fatalities and body parts where they are unless necessary to protect them from further damage.

(5) Flag evidence items with cones or other markers.

c. Document. A CBRNE incident will create enormous public pressure to apprehend and convict the perpetrators. Considerable scrutiny and concern over actions or inactions related to evidence preservation and collection should be expected. Therefore, it is important to take written notes describing what the crime scene looks like (e.g., location of potential evidence, its description). These notes will later be used as evidence and may be especially valuable in a situation where the crime scene was disrupted for lifesaving or safety considerations.

(1) Do not rely on memory; begin documenting the incident as soon as possible.

(2) Concentrate first on documenting things that may be moved or that could be lost or destroyed.

(3) Use multiple forms of documentation including written notes, voice recordings, photos, and video tape.

(4) Be sure documentation is clear, accurate, and specific.

d. Collect. At a CBRNE crime scene, small samples will be collected and packaged by crime scene investigators for later analysis at forensic laboratories, and evidence in court. Also, samples will be collect by a public safety sampling team to aid in identifying the appropriate medical treatment that exposed persons may require or to determine proper levels of PPE.

(1) In situations where biological threat agents are suspected, the item(s) should be field safety screened and immediately transported in law enforcement custody to an Laboratory Response Network (LRN) laboratory.

(a) Field safety screening should be limited to ruling out explosive devices, radiological materials, corrosive materials and volatile organic compounds.

(b) Additional field testing can mislead response efforts by providing incorrect or incomplete results, and destroy limited materials critical for definitive laboratory testing required to facilitate any appropriate public health and law enforcement response.

(2) Wear appropriate PPE.

(3) Use an organized search pattern to ensure nothing is missed.

(4) Pack each item separately.

(5) Maintain an unbroken chain of custody.

(6) Tag each item of evidence with the date, your name or initials, and a number that corresponds to the evidence log.

(6) Collect small samples; enough to be useful for laboratory analysis, or evidence in court but not enough to pose a hazard for others.

(a) Two examples of sampling methods that law enforcement may be required to perform are biological sampling method A and B. These two methods are recommended for sampling suspicious powders believed to be biological agents.

(b) Biological sampling method A and B are typically performed together to ensure that unadulterated samples are collected for public health and law enforcement officials for confirmatory and forensic analysis, while leaving enough sample for presumptive, on-site determination. Presumptive testing is conducted to locally determine if a substance is actually a threat and to inform further investigation. Confirmatory testing is required by most Federal agencies and to ensure validity of the sample as evidence.

1) Method A is the bulk collection and packaging of suspicious, visible powders. Bulk samples are collected and transported in a manner that permits public health and safety and law enforcement agencies to obtain uncompromised samples for confirmatory analysis and forensic testing. Method A, involves the bulk collection and packaging of the suspicious visible powders from solid nonporous surfaces. Bulk samples are collected using a sterile swab to push the powder onto a thin plastic card. The powder is then placed with the plastic card into sterile containers, sealed and transported to a public health

laboratory such as one of the Center for Disease Control's .LRN.) laboratories for analysis. If the source of the powder is a letter or small package, that item is also packaged in a manner that permits it to be safely transported to an LRN reference laboratory.

2) Method B is for nonporous surfaces from which a suspicious, visible bulk powder, a suspected biological agent, has previously been collected. It consists of simple swab sampling of residual suspicious powders for presumptive, on-site biological screening using an appropriate method. The surface is swabbed using a sterile, moistened swab to collect any residual powder. The sample may then be used in onsite biological assessment using biological assessment tools or through local laboratory testing.

7. CBRNE Crime Scene Authority. Because an act of terrorism is a Federal crime, the Secretary of the Department of Homeland Security (DHS), the Attorney General, and the FBI will likely have authority over a significant CBRNE crime scene. However, there are numerous CBRNE-related state and local crimes that do not fall under the purview of the Federal government and Federal law does not prohibit state and local law enforcement agencies from conducting parallel or independent criminal investigations and prosecutions (Fish, Stout, & Wallace, 2011). Additionally, the FBI has resources available to support state, local, and tribal law enforcement agencies in conducting CBRNE-related investigations.

a. Chemical, Biological, Radiological, and Nuclear Sciences Unit. Conducts forensic examinations of hazardous chemical, biological, radiological materials and all related evidence. Provides services to other government agencies including local and state authorities. The Chemical, Biological, Radiological, and Nuclear Sciences Unit currently has three case-working programs:

(1) The Chemistry Program addresses chemical warfare agents such as nerve, blood or blister agents, and other chemical hazards, including biological toxins and hazardous industrial chemicals that can be used as weapons.

(2) The Biology Program addresses hazardous biological materials used as weapons. Biological weapons include toxins and microbial agents such as bacteria, viruses, and fungi that can cause disease in humans, animals, and plants.

(3) The Radiological/Nuclear Program addresses radiological and nuclear materials with the potential to be used as weapons. These include materials which could be employed in a radioactive dispersal device or in an improvised nuclear device.

b. Hazardous Evidence Response Team Unit. The Hazardous Evidence Response Team Unit (HERTU) provides support to the U.S. government's response to weapons of mass destruction (WMD) incidents and threats. HERTU also supports the investigation of terrorist or criminal use of chemical, biological, radiological, or nuclear (CBRN) materials. The unit trains, equips, and manages the field HERT program. HERTU provides training, leadership, and subject matter expertise in hazardous evidence collection, as well as in the management and processing of forensic evidence in CBRN crime scenes.

SUMMARY

Summary. In this module, we reviewed the role of law enforcement in a CBRNE incident, incident management, site control, incident site mapping, CBRNE crime scene considerations, hazardous evidence preservation, and CBRNE crime scene authority. Are there any additional questions about the topics covered?

REFERENCES

ASTM International. (2010). E2458-10: *Standard practices for bulk sample collection and swab sample collection of visible powders suspected of being biothreat agents from nonporous surfaces.* West Conshohocken, PA: ASTM International.

Faggiano, V., McNall, J. & Gillespie, T. (2012). *Critical incident management: A complete response guide*. Boca Raton, FL: CRC Press.

Federal Bureau of Investigation. (2007). *Handbook of forensic services.* Retrieved from http://www.fbi.gov/about-us/lab/handbook-of-forensic-services-pdf

Federal Bureau of Investigation. (2013). *Chemical, biological, radiological, and nuclear services.* Retrieved from http://www.fbi.gov/about-us/lab/forensic-response

Federal Bureau of Investigation. (2013). *Hazardous evidence response.* Retrieved from http://www.fbi.gov/about-us/lab/forensic-response/hazardous-evidence-response

Fish, T., Stout, N., & Wallace, E. (2011). *Practical crime scene investigations for hot zones.* Boca Raton, FL: Tayler & Francis Group.

Levy, J. M. (2010). *The first responder's field guide to hazmat and terrorism emergency response.* Campbell, CA: Firebelle.

National Fire Protection Association. (2013). *NFPA 472, Standard for competence of responders to hazardous materials/weapons of mass destruction incidents*. Quincy, MA: Author

Noll, G. G., Hildebrand, M. S., & Yvorra, J. G. (2005). *Hazardous materials: Managing the incident* (3rd ed.). Chester, MD: Red Hat Publishing Co., Inc.

U.S. Department of Homeland Security. (2008). *National incident management system.*

FIGURE LISTING

Law Enforcement Protective Measures for CBRNE Incidents
PER-264

Student Guide

Module 3
Personal Protective Equipment and Decontamination

Learning Objectives

a. Terminal Learning Objectives

(1) Given a complete PPE Level C ensemble, don and doff PPE Level C in accordance with manufacturer specifications. (HO-0003)

(2) Given a weapon, suspect, and/or evidence while wearing PPE Level C, process through technical decontamination in accordance with National Fire Protection Association® *National Fire Protection Association Publication 472, Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents (NFPA 472®)*. (HO-0027)

b. Enabling Learning Objectives

(1) Given a scenario, identify the purpose of PPE in accordance with Hazardous Waste Operations and Emergency Response (HAZWOPER), 29 *Code of Federal Regulations* (C.F.R.) § 1910.120. (HO-0003a)

(2) Given a scenario, identify characteristics of the four levels of PPE according to HAZWOPER, 29 C.F.R. § 1910.120. (HO-0003b)

(3) Given a scenario, identify the stressors of wearing PPE in accordance with *Surviving Field Stress for First Responders*. (HO-0003c)

(4) Given a scenario, identify the equipment requirements for PPE Level C in accordance with *NFPA 472*. (HO-0003d)

(5) Given a scenario, identify the purpose of decontamination in accordance with *NFPA 472*. (HO-0027a).

(6) Given a scenario, identify the four types of decontamination in accordance with *NFPA 472*. (HO-0027b).

(7) Given a scenario, identify considerations for mass decontamination in accordance with *NFPA 472*. (HO-0027c).

(8) Given a scenario, identify considerations for emergency decontamination in accordance with *NFPA 472.* (HO-0027d)

(9) Given a scenario, identify considerations for gross decontamination in accordance with *NFPA 472*. (HO-0027e)

(10) Given a scenario, identify considerations for technical decontamination in accordance with *NFPA 472*. (HO-0027f)

BODY

1. **Purpose of PPE.** The purpose of PPE is to reduce exposure to hazards when engineering and administrative controls are not feasible or effective to reduce these risks to acceptable levels.

2. **Selection of Personal Protective Equipment.** The emergency responder must be provided with appropriate respiratory and dermal protection from suspect or known chemical, biological, radiological, or nuclear hazards. The amount of protection required is material and hazard specific. Physical and durability properties for personal protective equipment must meet or exceed minimum requirements for operations at a CBRN incident scene. The selection of appropriate PPE is typically the responsibility of the Incident Commander and/or the on-scene Safety Officer. Proper selection of PPE for individual responders must be based upon a careful assessment of the following two factors:

   a. The hazards anticipated to be present, or are present at the scene.

   b. The probable impact of those hazards, based upon the mission role of the individual.

3. **Levels of PPE for Hazardous Materials.** No single PPE ensemble can protect the wearer from exposure to all hazards. It is important that the appropriate combination of respirator, protective ensemble and other equipment be selected based on a conclusive hazard assessment at the scene. The Occupational Safety and Health Administration's (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) standard defines the protection levels as A, B, C or D as follows:

   a. Level A. This level is selected where the hazards are unknown or unquantifiable or when the greatest level of skin, respiratory and eye protection is required. Level A also provides the best protection during constant high concentration exposure to hazards.

   b. Level B. Selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is needed.

   c. Level C. Used when the concentration(s) and type(s) of airborne substances are known and the criteria for using air-purifying respirators are met.

   d. Level D. Necessary when concentration(s) and type(s) of hazards are known and do not warrant respiratory protection or skin protection greater than that typically provided by a responder's duty uniform.

Figure 1. Example of PPE Level A

4. Characteristics of the Four Levels of PPE

a. PPE Level A. Level A protection affords the responder the highest level of both respiratory and skin protection. It has sometimes been called a “moon suit” because of its encapsulating style. This level of PPE is vapor-tight and liquid-resistant.

(1) Ensemble requirements for Level A include

(a) A positive-pressure, full-facepiece, self-contained breathing apparatus or positive-pressure, supplied-air respirator with escape self-contained breathing apparatus approved by the National Institute for Occupational Safety and Health (NIOSH). NIOSH is a component of the Center for Disease Control and is responsible for conducting research and making recommendations for the prevention of work-related illnesses and injuries.

(b) Totally encapsulating chemical-protective suit;

(c) Outer chemical-resistant gloves;

(d) Inner chemical-resistant gloves;

(e) Chemical-resistant boots with steel toe and shank; and

(f) Head protection is optional.

(2) Limitations of PPE Level A. The limitations of Level A include

(a) Bulky

(b) Physically stressful to operating in; does not allow for cooling

(c) Psychologically stressful due to the confining nature of the encapsulating style

(d) Reduced mobility and dexterity; increases the time required to perform most tasks

(e) Difficult to don and doff

(f) Can make communication more difficult

(g) Cost

Figure 2. Example of PPE Level B

b. PPE Level B. PPE Level B is the lowest level of protection when entering an environment with an unknown hazard. It provides the responder with the highest level of respiratory protection but a lower level of skin protection because the ensemble is not completely encapsulated.

(1) Ensemble requirements for Level B include

(a) A positive-pressure, full-facepiece self-contained breathing apparatus, or positive-pressure supplied-air respirator with escape self-contained breathing apparatus;

(b) Hooded chemical-resistant clothing that may consist of an overall and long-sleeved jacket, coveralls, one-piece or two-piece chemical splash suit, or disposable chemical-resistant overalls;

(c) Outer chemical-resistant gloves;

(d) Inner chemical-resistant gloves; and

(e) Chemical-resistant boots with a steel toe and shank.

(2) Limitations of PPE Level B. The limitations of Level B include

(a) Not gas or vapor tight

(b) Not designed or tested to be used at scenes involving carcinogens or skin absorbable chemicals

Figure 3. Example of PPE Level C

c. PPE Level C. PPE Level C is for environments were the hazard(s) are well characterized and have been clearly measured. Contact between the hazard's vapors, liquid, or solid and exposed skin would not constitute a health hazard to the exposed individual and the criteria for using an air-purifying respirator are met. Level C may also provide effective protection against radiological particulate contamination and biological agents if appropriate air-purifying respirator filters are used. Level C is lighter, less confining, less costly, and, since a respirator is used, causes less respirator stress than Level A or B PPE.

(1) Ensemble requirements for Level C include

(a) Full-face or half-mask, air-purifying respirator approved by the NIOSH;

(b) Hooded, chemical-resistant clothing consisting of an overall, two-piece chemical splash suit, or disposable chemical-resistant coverall;

(c) Inner chemical-resistant gloves;

(d) Outer chemical-resistant gloves; and

(e) Outer chemical-resistant boots with steel toe and shank.

(2) Respirator Fit Testing. Prior to using a respirator, fit testing as defined by OSHA in HAZWOPER, 29 *Code of Federal Regulations* (C.F.R.) § 1910.134 Appendix A must be performed to ensure proper fit and safe function. Fit testing consists of a review of proper mask fit and donning, test fitting respirators to select one that provides appropriate fit and comfort, conducting user seal checks, and conducting test exercises consisting of normal breathing, deep breathing, turning the head side to side, moving the head up and down, and talking, grimace, bending over, and more normal breathing. Additionally either qualitative and/or quantitative fit testing protocols are conducted.

(a) Qualitative Fit Testing Protocols. In a qualitative respirator fit test, the test subject, while wearing a respirator with the proper cartridge(s) attached, is exposed to a challenge aerosol or vapor. If the challenge agent is not detected (i.e., smelled or tasted) by the test subject, the respirator is judged to fit adequately.

(b) Quantitative Fit Testing Protocols. In a quantitative fit test, the test subject is exposed to a challenge aerosol while wearing a respirator, but in this case a sample of the air inside the facepiece is analyzed for the challenge aerosol. The concentration inside the facepiece is compared to the challenge concentration outside the facepiece, and a numerical "fit factor" is obtained. A numerical value is obtained which indicates how well or how poorly a respirator fits the test subject. This protocol eliminates the sensory reliance of a qualitative fit test.

d. PPE Level D. Level D provides the least amount of skin protection and provides no respiratory protection. It is used when there is no known hazard in the atmosphere and work activities preclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous materials. Essentially there is no known emergency requiring greater protection. Typically ensemble requirements for Level D include

(1) Eye protection;

(2) Coveralls;

(3) Boots or shoes which are chemically resistant and steel-toed and shanked;

(4) Hard hat; and

(5) Gloves, when appropriate.

e. Escape Respirator. While not a designated level of PPE or approved for wear with level A, B, or C, escape respirators are an emerging trend for portable respiratory protection within the law enforcement community.

(1) Intended to provide short-term respiratory protection, usually 15 minutes, for responders to evacuate an area.
(2) The escape respirator may be attached to responder's duty belt, or otherwise conveniently carried.

(3) Once clear of the incident site, the responder would don the appropriate level of PPE before returning to the scene.

(4) An escape mask respirator should never be used to enter a CBRNE incident environment. These devices are only for use to escape a CBRNE environment (Mine Safety Appliances Company, 2006).

Question 1. If the hazard is unknown, what level of PPE would provide the highest level of protection?

Question 2. The hazard is known and has been measured, skin contact with hazard vapors, liquids, or solids is unlikely, respirator protection meets the requirements for an air-purifying respirator. What level of personal protective equipment is most appropriate?

5. Stressors Involved with Wearing PPE. Use of personal protective equipment causes both psychological and physiological stress to the wearer.

a. Stress as a Factor in PPE Selection and Rehabilitation. Stress is a key factor in choosing appropriate personal protective equipment. Given conditions, stress to the wearer, rather than duration of air supply or resistance to penetration by the hazard, may be a key limiting factor in how long a responder can work in an ensemble. The NIOSH has conducted studies of individuals wearing personal protective equipment and has found that even at low work intensities equivalent to walking at an average speed in moderate temperature and humidity conditions, worker tolerance time was reduced by as much as 56%. If responders are to operate for prolonged periods in personal protective equipment, a rehabilitation plan must be established consistent with conditions to allow responders to decontaminate, doff equipment, rest, rehydrate, and recover before returning to work in the hazard area.

b. Medical Screening Requirements. Because of the physical stresses involved, OSHA regulations require a medical surveillance program for those wearing personal protective equipment or respirators. A physician must certify that any particular worker may wear a

respirator. Common practice in the industrial and fire service hazardous materials response community is to check workers' respiration rate, pulse, and blood pressure when PPE is donned and prohibit workers from wearing personal protective equipment should vital signs vary greatly from the normal range. Some screening protocols also include core temperature and cardiac monitoring.

c. Signs of Physiological Stress. An individual's fitness level is a key factor in determining how effectively they will be able to operate in personal protective equipment. If you identify any of the following signs or symptoms of physiological stress in yourself or others, seek assistance immediately:

(1) Shortness of breath or panting

(2) Queasiness or nausea

(3) Vomiting

(4) Diarrhea

(5) Dry mouth

(6) Pale skin

(7) Excessively increased pulse rate

(8) Muscle twitches and/or shaking limbs

(9) Elevated blood pressure

d. Heat Stress. Heat stress and illness are a major concern when personnel are working in personal protective equipment. The body's principal means of cooling is through the evaporation of sweat. When personnel are working in protective suits, sweat is trapped inside the suit clothing and cannot evaporate. This raises the body's core temperature and can result in heat-related illness. Being in good physical condition, maintaining adequate hydration, allowing adequate cool down between work periods, and limiting the duration personnel work in personal protective equipment may reduce heat stress, as may the use of a cooling vest or other garment that slows the heating of the body using a circulating fluid or replaceable cold packs.

e. Psychological Stress. Wearing PPE affects the worker's attitude and ability to perform work. Personnel may feel claustrophobic when wearing personal protective garments or respiratory protection. The bulk of most ensembles will make movement more difficult. Multiple gloves will compromise manual dexterity. The facepiece of the breathing apparatus or respirator reduces peripheral vision, and fogging of the face piece may further impair vision. Given the ever present concern over potential exposure to the hazard, these conditions can cause frustration and may create addition emotional stress. Training and experience in donning and operating in personal protective equipment are a key factor in reducing psychological stress.

6. Purpose of Decontamination. Decontamination is the physical and/or chemical process of reducing and preventing the spread of contamination from people, animals, the environment, or equipment involved at hazardous materials or weapons of mass destruction incidents (NFPA, 2013).

7. Methods of Decontamination. All personnel, clothing, equipment, and samples leaving the hot/exclusion zone must be decontaminated to remove any harmful chemicals or infectious organisms that may have adhered to them. Decontamination methods include (1) physical removal of contaminates, (2) chemical removal of contaminates, and (3) removal of contaminates by a combination of both physical and chemical means.

a. Physical Removal of Contaminates. Contamination can be removed by physical means through dislodging, displacement, rinsing, wiping off, or evaporation.

(1) Contaminates that can be removed by physical means include:

(a) Loose Contaminates. Loose contaminates like dusts or vapors cling to equipment and personnel and can typically be removed by water or a liquid rinse.

(b) Adhering Contaminates. Adhering contaminates have adhesive properties other than electrostatic attraction that make them more difficult to remove. Adhering contaminates may include petroleum, toxic glues, contaminated mud, resins, etc. and may require scraping, brushing, and wiping to remove.

(c) Volatile Liquids. Volatile liquid contaminates can be removed from PPE and equipment by evaporation followed by a water rinse. Forced air may be used to expedite evaporation.

(2) For personnel, the most common form of decontamination through physical removal will be through a pressurized or gravity flow water rinse that may include scrubbing using brushes or sponges.

(3) It should however be noted that some chemicals are water reactive and water should never be used to remove these contaminates. If wetted, water-reactive chemicals may give off enough heat to ignite or give off toxic and/or flammable gases harmful to humans, animals, and the environment. The *Emergency Response Guide* is a readily available source for the identification of water-reactive chemicals and the proper procedures for handling, decontaminating, and treating victims.

b. Chemical Removal of Contaminates. Chemical removal of contaminates uses a chemical process to chemically degrade, sanitize, disinfect, neutralize, sterilize, or solidify a hazard. For example, bleach may be used on a bacterial or viral agent to kill the organisms and neutralize and/or sanitize tools and equipment. Household detergents may be used directly or mixed with water to chemically degrade petroleum-based contaminates and make them easier to remove, dilute, or absorb.

8. Categories of Personnel Decontamination. The four primary categories of decontamination are emergency, gross, mass, and technical. The category(ies) of decontamination used in a particular incident depends upon the nature of the hazard, resources available, and the situation.

a. Gross. Gross decontamination is the phase of the decontamination process during which the amount of surface contaminants is significantly reduced (NFPA, 2013). The goal of gross decontamination is to quickly remove the worst of the contamination from the victim. Emergency, the initial phase of technical, and most instances of mass decontamination are a form of gross decontamination.

(1) Resources Required. Typically quantities of water from a hose, safety shower, or other means.

(2) Typical Procedure

(a) The victim removes clothing. Dependent upon the hazard, removal of clothing can eliminate a significant percentage of contaminates.

(b) The victim is rinsed with quantities of water to remove the worst of contaminates.

(c) The victim is provided clothing or a covering and monitored for symptoms that may require secondary decontamination.

b. Emergency. Emergency decontamination is the physical process of immediately reducing contamination of an individual in a potentially life-threatening situation with or without the formal establishment of a decontamination corridor (NFPA, 2013). Emergency decontamination may be necessary for both victims and responders. For example, it may be required due to a failure of PPE, accidental contamination of a responder, heat or other injury suffered by a responder in the hot zone, or the requirement to provide immediate medical attention to a victim. Removal of all contaminates is not typically practical through emergency decontamination and a more thorough decontamination will be required once the immediate life-threatening issue is addressed.

(1) Resources Required

(a) Quantities of water

(b) Cutting tools to aid in quickly removing clothing or PPE

(2) Typical Procedure

(a) Remove the victim from the contaminated area, if practical.

(b) Wash immediately any exposed body parts with flooding quantities of water.

(c) Remove the victim's clothing and/or PPE as quickly as possible. Cut from the top down in a manner that minimizes further contamination.

(d) Wash the individual from head to toe with water.

(e) Provide life-saving treatment as necessary until the individual can be transferred to medical personnel.

(f) Provide medical personnel with as much information possible regarding the hazard, decontamination procedures performed, and the nature of the individual's injury.

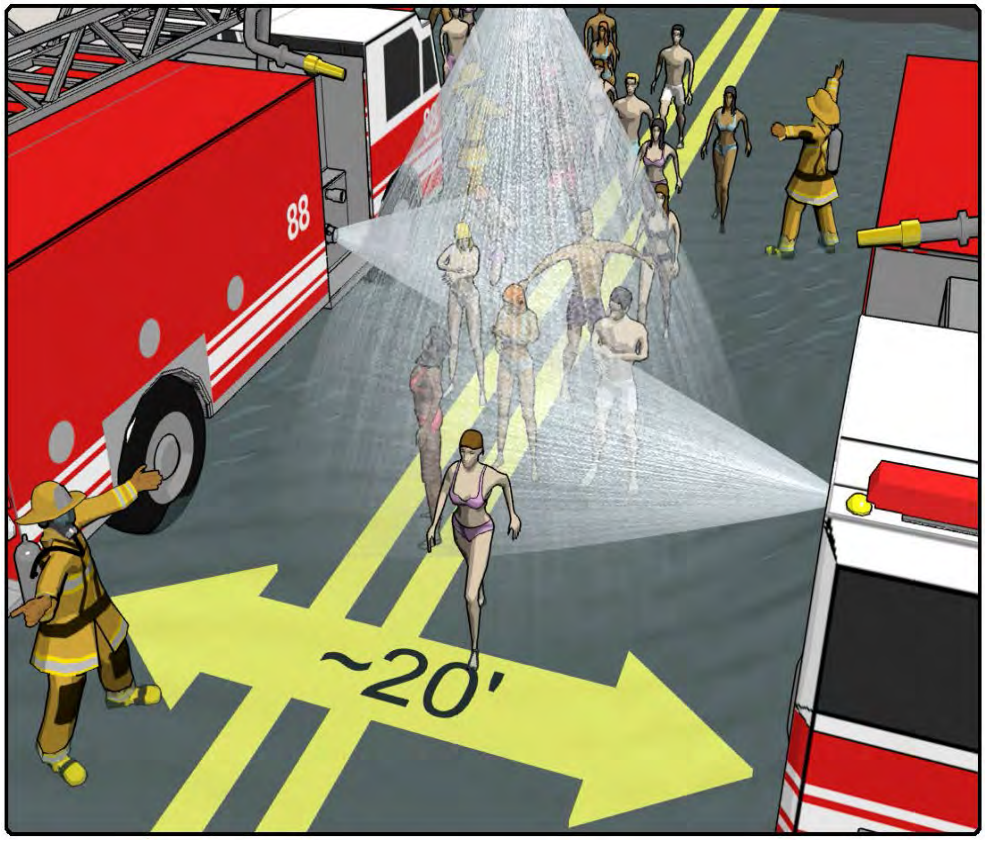

Figure 4. Example of Mass Decontamination

c. Mass. The physical process of reducing or removing surface contaminants from large numbers of victims in potentially life-threatening situations in the fastest time possible (NFPA, 2013). Mass decontamination may be conducted with or without a formal decontamination corridor and is initiated when the number of victims and time constraints make a more thorough decontamination process impractical.

(1) Resources Required. High volume, low pressure water provided through hose lines or a ladder pipe decontamination system most typical

(2) Typical Procedure. In accordance with the guidelines produced by the U.S. Army Edgewood Chemical Biological Center (2009), the essential process for conducting a typical mass decontamination is:

(a) Triage victims to determine those requiring immediate medical treatment or alternative means of decontamination based upon injury, symptoms, risk factors, functional needs, etc.

(b) Direct victims determined to be capable of enduring the remaining steps of this process to remove clothing. Removing clothing is the single most critical step in mass decontamination and may remove 80% to 90% of physical contamination. Modesty concerns may need to be considered based upon sex, culture, religion, etc.

(c) For temperatures 36° Fahrenheit and above, rinse victims with high volume, low pressure water. Wash time should be between 30 seconds and three minutes depending upon the hazard and situation. For temperatures 35° Fahrenheit and below, removal of clothing and a “dry” decontamination method for removal of liquid contamination may be used outdoors, such as blotting with paper towel or application of a decontamination solution, followed by a high-volume, low-pressure water shower at a heated facility to prevent the potential for hypothermia.

(d) When the contamination involves chemical vapors, biological or radiological material, using gentle friction, such as rubbing with hands, cloth or sponges is recommended to aid in removal of the contamination. Rubbing should start with the head and proceed down the body to the feet.

(e) Provide a covering, if available, and move victims to a safe area for observation.

(f) Observe victims to monitor for signs of delayed symptoms or evidence of residual contamination.

(g) Perform a more thorough secondary decontamination if symptoms are observed and/or residual contamination exists.

(h) Provide and/or seek medical treatment for victims with persistent symptoms.

d. Technical. The planned and systematic process of reducing contamination to a level that is as low as reasonably achievable (NFPA, 2013). Technical decontamination is a thorough decontamination process that includes gross decontamination as its first phase.

(1) Resources Required

(a) Water hoses

(b) Hose nozzles and wands

(c) Buckets

(d) Scrub brushes

(e) Sponges

(f) Pools/Water collection devices

(g) Tarps or sheeting

(h) Water manifold

(i) Water pressure reducer

(j) Trash bags

(k) Detergent or solutions

(l) Garbage cans or barrels

(m) Etc.

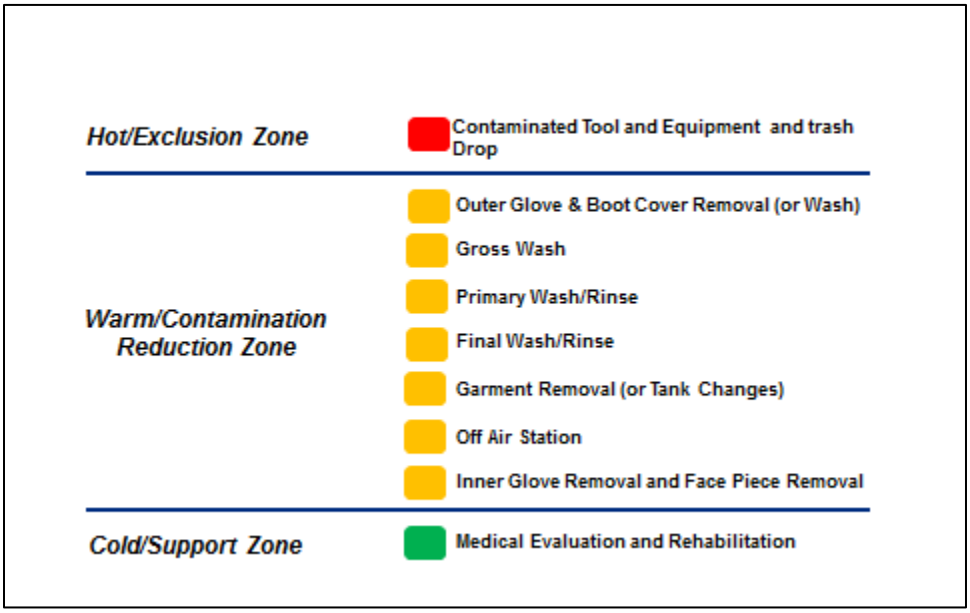

Figure 5. Explanation of Technical Decontamination Corridor

(2) Typical Procedure

(a) Prior to crossing the hot line into the warm/contamination reduction zone, contaminated tools and equipment are dropped on tarps or sheeting for reuse in the hot/exclusion zone or for later decontamination.

(b) Prior to crossing the hot line, contaminated trash is deposited into containers for decontamination or later disposal.

(c) After entering into the warm/contamination reduction zone, a head to toe wash/rinse of the entire PPE ensemble is conducted.

1) The individual being decontaminated continues breath through their self-contained breathing apparatus or air-purifying respirator until step 6 of the process.

2) For liquid contaminates, detergent or other appropriate solution may be used to aid in removing adhering agents.

(d) Remove outer garment and outer gloves. Disposable items are deposited into containers or bags, as appropriate.

(e) A head to toe wash/rinse of the inner garments, inner gloves and self-contained breathing apparatus or air-purifying respirator is conducted.

(f) Given the decontamination steps taken to this point in the process, it is now safe to remove the self-contained breathing apparatus or air-purifying respirator. Boots are also removed at the stage.

(g) Because all contaminated items have been removed or decontaminated at this point, it is now safe to remove and dispose of the inner gloves.

(h) The individual removes all clothing, showers thoroughly, and dresses in fresh clothing or a covering to complete technical decontamination. A medical evaluation should be ensue or rehabilitation if necessary.

e. Medical Evaluation Following Entry Into a Contaminated Area. All responders should receive a medical evaluation following entry into a contaminated area. During this checkup

(1) Vital signs should be checked against baselines.

(2) Any injuries, open wounds, or sores should be reported, examined, and treated, as appropriate.

(3) Secondary decontamination in some cases may be required to further reduce contaminates.

(4) Dependent upon circumstances, treatment for exposure to the hazard may be initiated.

9. Processing of Weapons, Equipment, and Evidence Into and Suspects or Uncooperative Victims Through Decontamination

a. Weapons and Equipment. Officers operating in the hot or warm zone in PPE will not be able to take their weapon(s) and equipment into the cold zone until they have been properly decontaminated. Dependent upon the nature of the hazard, these items may be contaminated to the extent that they must be disposed of as hazardous waste. Officers must relinquish their weapon(s) prior to undergoing decontamination.

(1) Handguns should be left in the holster and removed from the officer by a decontamination team member familiar with weapons.

(2) Rifles and shotguns should be relinquished to a decontamination team member familiar with weapons.

(3) The decontamination team member should place a weapon in a clear plastic bag labeled with the officer's name and department.

(4) The officer's gun belt and any other equipment worn outside of the PPE ensemble should be placed in a clear plastic bag and labeled with the officer's name and department.

(5) As the officer progresses through decontamination and is required to remove the bulletproof vest, the vest should be placed in a clear plastic bag and labeled with the officer's name and department.

(6) As collected, weapons and ammunition should be placed in appropriate locked containers and monitored to mitigate security and safety concerns.

(7) The law enforcement agency is typically responsible for the decontamination weapons and associated equipment. Once released from the scene, the items should be decontaminated in a manner appropriate to the hazard and in accordance with manufacturer guidelines and departmental protocols.

b. Evidence. The entire scene associated with a CBRNE hazard is a crime scene.

(1) Substances absorbed into clothing or that are undetectable to the eye may constitute evidence. Because of this reality, investigators will document, screen, collect, process, and package the clothing and possibly collect evidence from the clothing of victims and suspects (Fish, Stout, & Wallace, 2011). In most decontamination situations, this can be accomplished at the clothing drop prior to gross decontamination. Clothing and suspected evidence will also need to be collected from non-ambulatory individuals and the deceased.

(2) According to Fish, Stout, and Wallace, 2011, typically crime scene investigators will establish an evidence and equipment decontamination station in the decontamination corridor parallel to technical decontamination. Evidence being removed from and monitoring and detection equipment being used in the hot/exclusion zone by responders or investigators is dropped off at the evidence and equipment decontamination station. At the station,

(a) Evidence is inventories and logged. A chain of custody form is completed by an evidence decontamination team member to include their name and the name of the individual dropping off the item.

(b) Evidence is then assessed to determine what items can be decontaminated and the order in which items should be decontaminated.

(c) Using appropriate decontamination procedures such as a series of soap and water washes and uncontaminated water rinses, each item is decontaminated. Each item is processed as aseptically as possible to prevent cross-contamination or compromise of evidence.

(d) Once decontamination is completed, instruments are used to detect the presence of residual contamination. If contamination is detected, the item is again processed through decontamination.

(e) Once the process is complete, the item is properly packaged and labeled or made available for reuse.

c. Suspects or Uncooperative Victims. The safety of responders and the public are paramount during the processing of suspects and uncooperative victims through decontamination during a CBRNE incident. Consistent with use of force guidelines, all appropriate measures may be used to secure a suspect and/or uncooperative victim and process them through decontamination.

(1) If practical, suspects or uncooperative victims should be escorted through decontamination by officers of the same sex.

(2) Hands of suspects should be restrained with flex cuffs.

(3) Hands of uncooperative victims should be restrained consistent with their behavior and use of force guidelines. In a criminal incident, keep in mind that those responsible may masquerade as victims to exit the scene and avoid apprehension. An uncooperative victim could be cognitively impaired, in shock, hysterical, or a suspect attempting to avoid detection.

(4) Dependent upon behavior and use of force guidelines, it may be necessary to restrain the legs with flex cuffs.

(5) After gross decontamination, a decontamination team member may cut the individual out of their close to continue the decontamination process.

(6) At some point during the process, it will be necessary for the individual to be transitioned to another officer or officers. The suspect or uncooperative victim should remain under the direct control of an officer or officers at all times during the process.

Summary. During this lesson, we discussed the purpose, levels, selection criteria, characteristics, and stressors of PPE. Additionally, we discussed the purpose, methods, categories, and unique law enforcement considerations for decontamination. Are there any questions regarding anything that we have covered in this lesson?

REFERENCES

Agency for Toxic Substances and Disease Registry. (2005). *Surviving field stress for first responders*. Retrieved from http://www.atsdr.cdc.gov/emes/surviving_stress/index.html

Canadian Centre for Occupational Health and Safety. (2002). *OSHA answers: Confined space—Introduction*. Retrieved from http://www.ccohs.ca/oshanswers/hsprograms/confinedspace_intro.html

Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. (n.d.). *Certified equipment list: Definitions of terms*. Retrieved from http://www2.cdc.gov/drds/cel/def.htm

Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. (2003). *NIOSH update: Workplace preparedness against terrorism is strengthened by new tools, methods from NIOSH*. Retrieved from http://www.cdc.gov/niosh/updates/emeraccom.html

Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. (2008). *Guidance on emergency responder personal protective equipment (PPE) for response to CBRN terrorism incidents*. Washington, DC: Department of Health and Human Services.

Fish, T., Stout, N., & Wallace, E. (2011). *Practical crime scene investigations for hot zones*. Boca Raton, FL: Tayler & Francis Group.

International Fire Service Training Association. (2004). *Hazardous materials for first responders*. Stillwater, OK: Fire Protection Publications, Oklahoma State University.

Mine Safety Appliances Company. (2006). *Safe Escape™ respirator air-purifying escape-only NIOSH CBRN 15 respirator: Operation and instructions.* Retrieved from http://media.msanet.com/NA/USA/APR/EscapeRespiratorsAirPurifying/SafeEscape/10026891.pdf

National Fire Protection Association. (2013). *NFPA 472: Standard for competence of responders to hazardous materials/weapons of mass destruction incidents.* Quincy, MA: Author.

Noll, G. G., Hildebrand, M. S., & Yvorra, J. G. (2005). *Hazardous materials: Managing the incident* (3rd ed.). Chester, MD: Red Hat Publishing Co., Inc.

Hazardous Waste Operations and Emergency Response, 29 C.F.R. § 1910.120 (2013).

Respiratory Protection, 29 C.F.R. § 1910.134 (2013).

Trauma Center at Justice Resource Institute. (2003). *First responders and traumatic events: Normal distress and stress disorders.* Retrieved from http://media.msanet.com/NA/USA/APR/EscapeRespiratorsAirPurifying/SafeEscape/10026891.pdf

U.S. Army Edgewood Chemical Biological Center (2009). *Guidelines for mass casualty decontamination during a HAZMAT/weapon of mass destruction incident volumes I and II.* Aberdeen Proving Ground, MD: Technical Releases Office.

U.S. Army Soldier and Biological Chemical Command (SBCCOM). (2003). Guidelines for use of personal protective equipment by law enforcement during a terrorist chemical agent incident. *Memorial Institute for the Prevention of Terrorism.* Retrieved from http://www.nlecbrne.com/pdf/guidelines_personal_protective_equipment.pdf

U.S. Department of Transportation. (2012). *Emergency response guidebook*. Chicago: Labelmaster.

FIGURE LISTING