HAZMATOLOGY

THE SCIENCE OF HAZARDOUS MATERIALS

VOLUME II

STANDARD OF CARE AND HAZMAT PLANNING

ROBERT A. BURKE

CRC Press
Taylor & Francis Group

Hazmatology
The Science of Hazardous Materials

Hazmatology: The Science of Hazardous Materials, Five-Volume Set
9781138316072

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9781138316096

Volume Two - Standard of Care and Hazmat Planning
9781138316768

Volume Three - Applied Chemistry and Physics
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Volume Four - Common Sense Emergency Response
9781138316782

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9781138316812

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CRC Press
Taylor & Francis Group
Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

Printed on acid-free paper

International Standard Book Number-13: 978-1-138-31676-8 (Hardback)

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Dedication

Volume Two

Max McRae

Max McRae, like Ron Gore, was not the one who thought of starting a hazmat team. However, he is the father of hazmat response in Houston. According to retired hazmat team member Bill Hand, "District Chief McRae was happy at Station 28. However, Chief McRae was the type of guy that would do what asked and do it to the best he could." McRae was the early force who brought the Houston hazmat team together and was there when the team was first placed in service. McRae became the first team coordinator, a position he retained until his retirement in August of 1994 after 40 years of service. Chief McRae has since passed away. In spite of their reluctance and apprehensions in the beginning, Chief McRae and Hand went on to do an outstanding job for the Houston hazmat team and had the respect and admiration of hazmat personnel throughout the United States and beyond.

Contents

Preface

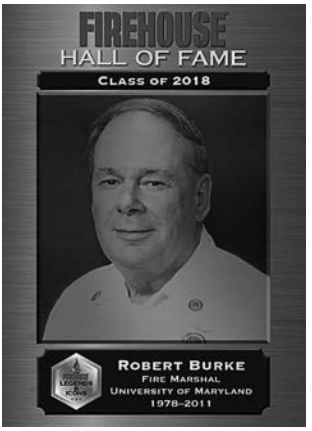
Standards of care are nothing new to emergency response. Emergency medical personnel are bound by a standard of care based upon their level of training. It is enforced in local laws by the Emergency Medical Agency providing the care and by the medical director of that agency. Primary caregivers are emergency medical technicians (EMTs) and paramedics. Some additional responsibilities are given to EMTs if properly trained. However, both levels are allowed to only practice based upon the Standard of Care, which is largely based upon the amount of training and certification of the Emergency Medical Service (EMS) personnel. EMTs are limited on the level of life support they can give. Even if they know how to perform a procedure, such as cutting an opening in the throat to ventilate a choking victim, the Standard of Care prevents them from doing it. So, in some cases, a person may die if the proper level of life support is not available.

Emergency responders are also required to operate within a Standard of Care for response to hazardous materials and Weapons of Mass Destruction (WMD) incidents. It is based upon federal law, federal regulations, and consensus standards. It is also based upon lessons learned from previous incidents. Chemicals and compounds have been known to exist for centuries. Emergency responders have dealt with them for many years and often referred to them as chemicals or by their common chemical names, if known, such as gasoline, propane, ammonium nitrate, chlorine, and ammonia, to name a few. Initially, most of the knowledge gained about chemical responses came from experience, some good and some bad. Incidents have occurred over the years that resulted in the deaths and injuries of emergency response personnel operating at the scenes of chemical incidents—Texas City, TX (ammonium nitrate); Crescent City, IL (propane); Waverly, TN (liquefied petroleum gas); Kingman, AZ (propane); Kansas City, MO (gasoline); West, TX (ammonium nitrate); and many others. Once we have the appropriate level of hazmat training for the job we are being asked to do, we need to become familiar with the common hazardous materials in our communities that have historically killed emergency responders. Not every community will have all of them, but most will have some.

We should know as much as we can find out about historically dangerous common hazardous materials and their containers, and be familiar with the locations they are stored and used in our communities; perhaps we can prevent firefighter deaths and injuries resulting from these chemicals. Other chemicals will be present in many communities, most fairly common. Responders need to take the time to identify all of the major hazardous materials they may face in a local incident. Commodity flow studies can be conducted to determine which hazardous materials are shipped through our jurisdictions. Knowing all of them will be almost impossible. Statistically, the chances are relatively remote that any one community will experience a major hazmat incident from a transient hazardous material.

Planning is one of the most important tasks in all of hazmat response and community protection. Several types of plans will be discussed in Volume 2, including the site-specific plan, LEPC plan, your own hazmat response plan, and on-scene planning. Knowing your plans will help to more efficiently deal with any hazardous materials incident when and if one occurs. One of the most important aspects of the planning process is identifying what the hazardous materials in your community are, then how are they going to affect the community and emergency responders if they escape their containers, and finally, how are responders going to deal with the materials and bring the community back to normal again.

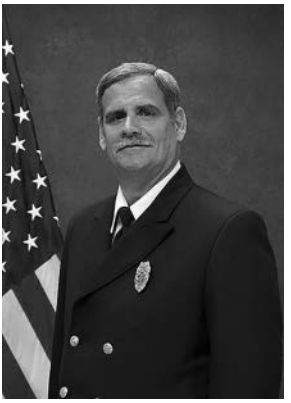
Acknowledgements



I thank the many fire departments and members across the United States and Canada that I have visited and became friends with during my visits to their departments over the years. I also thank the firefighters from classes I have attended as a student and taught for the National Fire Academy, Maryland Fire and Rescue Institute and Community College of Baltimore County since 1988. Learning is a two-way street, and I have learned much from the students as well. I thank the many friends I have met during the 40 plus years in the fire, EMS, hazardous materials and emergency management fields. There are those who I have not seen for a while; some are no longer with us, but once a friend, always a friend.

I express my thanks to *Firehouse Magazine* for allowing me to write stories about hazardous materials for 33 years and counting. During those years, I have had the pleasure of writing under every editor of the magazine including founder Dennis Smith who gave me the chance to be published for the first time. I also thank Firehouse editors, Janet Kimmerly, Barbara Dunleavy, Jeff Barrington, Harvey Eisner, Tim Sendelbach and Peter Mathews for their support over the years. When I read my first copy of *Firehouse Magazine* in the late 1970s, I was hooked. My dream was to someday go to Baltimore to attend a Firehouse Expo. Never did I dream I would not only attend an expo but teach at numerous expos, write for the magazine and in 2018 be inducted into the Firehouse Hall of Fame. To be placed in a fraternity with sixteen of the people who had an enormous impact on the fire service and who I looked up to my entire career was very humbling.

Several people have been my mentors and have impacted my life and career. When I worked with the State Fire Marshall of Nebraska, Wally Barnett allowed me to accomplish things in the State Fire Marshal's Office



Brent Boydston, Chief Bentonville, AR Fire Department.

that I otherwise would not have. Because of his ability to let his employees reach their potential, I was able to write for *Firehouse Magazine*, become a contributing editor, teach for the National Fire Academy and other things too numerous to mention. He was proud when I gave him a copy of my first book. I owe much of my success in the fire service to the opportunities Wally gave me. Jan Kuczma and Chris Waters at the National Fire Academy have been mentors to me over the years. Ron Gore, retired Captain from the Jacksonville, FL Fire Department and Owner of Safety Systems, has had a large impact on my life and career. The Jacksonville Hazmat Team was the first emergency services Hazmat Team in the United States. Ron Gore is the God Father of Hazmat response in the United States.

Former student of mine and current Chief of the Bentonville, AR Fire Department Brent Boydston has been a great friend to me and my family over the years. Rudy Rinas, Gene Ryan and John Eversole of the Chicago Fire Department have been fellow classmates and students. Mike Roeshman and Bill Doty of the Philadelphia Fire Department are both former students of mine and are now retired as Hazmat Chief Officers have remained friends. I used to ride with Bill and together we had some great adventures. Mike showed me Philadelphia historical areas, like the spot where Ben Franklin flew his kite and his post office, which is so obscure today in downtown Philadelphia. I also stood on the spot where Rocky stood at the top of the steps in the movie. These adventures enjoyed in Philadelphia would not have happened without Bill and Mike.

Mike Roeshman Retired Hazmat Chief Philadelphia Fire Department.

Just outside of Philadelphia in Delaware County, Tom Micozzie, Hazmat Coordinator for Delaware County, was also a former student and a great friend. We had many adventures together, and I will never forget his introduction to me of the Galati at Rita's Italian Ice! Rita's Italian Ice was started by a retired Philadelphia firefighter and not long ago one opened up in Lincoln, NE.

Thanks to Richmond In Fire Chief Jerry Purcell, who I met during a visit to Richmond to do a Firehouse story on their 1968 explosion in downtown. As a result of

William, "Bill" Doty retired Hazmat Chief Philadelphia Fire Department.

the Richmond story being published I was able to locate and become friends with blast survivor Jack Bales. More recently I visited to do another story on their hazmat team and propane training. Thanks to new friend Ron Huffman who traveled to Richmond to conduct the propane training utilizing water injection to control liquid propane leaks. The article appeared in the September 2019 *Firehouse Magazine*.

Thanks to Tod Allen, Fire Chief in Crete Nebraska who I met when I was researching a train derailment in Crete for another friend Kent Anderson. We have become good friends. Tod is the apparatus operator on Truck one at Station 1 for the Lincoln Nebraska Fire Department. He invited me to come and ride with him, and many adventures later I still go there on a regular basis. I thank all of my friends past and present on "B" Shift at Station 1 for making me feel at home and showing me a good time whenever I am there. Thanks to friend Captain Mark Majors for sharing his experiences with Nebraska Task Force 1 Urban Search and Rescue Team (USAR) and Captain Francisco Martinez assigned to Station 14 Lincoln Hazmathas been a great help with gathering information and taking photos for me. Finally, I thank Chief Michael Despain and assistant Chief Patrick Borer for their friendship and hospitality while visiting the Lincoln Fire Department on many occasions. This is only the short list—I would have to write a separate book to thank all of you I have met and for the impact you have had on my life over the past 40+ years. You know who you are; I appreciate your friendship and assistance and consider your selves thanked again.

Chief Jerry Purcell Richmond, IN Fire Department.

During my year-long book writing adventure that led to *Hazmatology: The Science of Hazardous Materials*, I met and spoke to many people and made new friends. I thank my cousin Dustin Schroeder, Senior Captain at Houston Station 68, the firefighters and others I met while in Houston. I also thank Kevin Okonski, Hazmat at Houston Station 22; Ludwig Benner, former NTSB Investigator and developer of several incident management models; Bill Hand, Houston; Richard Arwood; Charles Smith,

Memphis; Kevin Saunders, Motivator; Chief Jeff Miller, Butte, MT; and all of the Nebraska Regional Team leaders and members.

I express my thanks to my cousin Jeanene and her husband Randy for coming all the way from Montana to be with me at the Firehouse Hall of Fame induction. I am also grateful to Brent Boydston, James Rey Milwaukee, Wilbur Hueser and Saskatoon in Canada for the hospitality and tour, and Captain Oscar Robles, Imperial, CA. The list just goes on and on, and there is not room here to name everyone, but the rest of you know who you are and I want you to know how much your assistance is appreciated. You are all considered friends, and I hope we will talk and or meet again. Finally, thanks to librarians and historians across the country for your assistance in research, thanks for the memories!

Robert Burke

Author

Robert A. Burke was born in Beatrice and grew up in Lincoln, NE; graduated from high school in Dundee, IL; and earned an AA in fire protection technology from Catonsville Community College, Baltimore County, MD (now Community College of Baltimore County) and a BS in fire administration from the University of Maryland. He has also completed his graduation in public administration at the University of Baltimore. Mr Burke has attended numerous classes at the National Fire Academy in Emmitsburg, MD, and additional classes on firefighting, hazardous materials, and weapons of mass destruction at Oklahoma State University; Maryland Fire and Rescue Institute; Texas A&M University, College Station, TX; the Center for Domestic Preparedness in Anniston, AL; and others.

Mr. Burke has over 40 years' experience in the emergency services as a career and volunteer firefighter. He has served as a Lieutenant for the Anne Arundel County, Maryland Fire Department; an assistant fire chief for the Verdigris Fire Protection District in Claremore, OK; Deputy State Fire Marshal in the State of Nebraska; a private fire protection and hazardous materials consultant; and an exercise and training officer for the Chemical Stockpile Emergency Preparedness Program (CSEPP) for the Maryland Emergency Management Agency; and retired as the Fire Marshal for the University of Maryland. He has served on several volunteer fire companies, including West Dundee, IL; Carpentersville, IL; Sierra Volunteer Fire Department, Chaves County, NM; Ord, NE; and Earleigh Heights Volunteer Fire Company in Severna Park, MD, which is a part of the Anne Arundel County, MD, Fire Department.

Mr. Burke has been a Certified Hazardous Materials Specialist (CFPS) by the National Fire Protection Association (NFPA) and certified by the National Board on Fire Service Professional Qualifications as a Fire

Instructor III, Hazardous Materials Incident Commander, Fire Inspector III, and Plans Examiner II. He served on the NFPA technical committee for NFPA 45 Fire Protection for Laboratories Using Chemicals for 10 years. He has been qualified as an expert witness for arson trials as well.

Mr. Burke retired as an adjunct instructor at the National Fire Academy in Emmitsburg, MD, in April 2018 after 30 years. He taught hazardous materials, weapons of mass destruction, and fire protection curriculums. He taught at his Alma Mater Community College of Baltimore County, Catonsville Campus, and Howard Community College in Maryland. He has had articles published in various fire service trade magazines for the past 31 years. Mr. Burke is currently a contributing editor for *Firehouse Magazine*, with a bimonthly column titled "Hazmat Studies," and he has had numerous articles published in *Firehouse, Fire Chief*, *Fire Engineering*, and *Nebraska Smoke Eater* magazines. He was inducted into the Firehouse Hall of Fame in October 2018 in Nashville, TN. Mr Burke has also been recognized as a subject matter specialist for hazardous materials and been interviewed by newspapers, radio, and television about incidents that have occurred in local communities including Fox Television in New York City live during a tank farm fire on Staten Island.

Mr. Burke has been a presenter at Firehouse Expo in Baltimore, MD, and Nashville, TN, numerous times, most recently in 2017. He gave a presentation at the EPA Region III SERC/LEPC Conference in Norfolk, VA, in November 1994, and a presentation at the 1996 Environmental and Industrial Fire Safety Seminar, Baltimore, MD, on DOT ERG. He was a speaker at the 1996 International Hazardous Materials Spills Conference, on June 26, 1996, in New Orleans, LA; a speaker at the 5th Annual 1996 Environmental and Industrial Fire Safety Seminar in Baltimore, MD, sponsored by Baltimore City Fire Department; and at Local Emergency Planning Committee (LEPC), an instructor for hazmat Chemistry, August 1999, at Hazmat Expo 2000 in Las Vegas, NV. He gave a keynote presentation at the Western Canadian Hazardous Materials Symposium Saskatoon, Saskatchewan, Canada, in 2008.

Mr. Burke has developed several CD-ROM-based training programs, including the Emergency Response Guide Book, Hazardous Materials and Terrorism Awareness for Dispatchers and 911 Operators, Hazardous Materials and Terrorism Awareness for Law Enforcement, Chemistry of Hazardous Materials Course, Chemistry of Hazardous Materials Refresher, Understanding Ethanol, Understanding Liquefied Petroleum Gases, Understanding Cryogenic Liquids, Understanding Chlorine, and Understanding Anhydrous Ammonia. He has also developed the "Burke Placard Hazard Chart." He has published seven additional books titled *Hazardous Materials Chemistry for Emergency Responders* (first, second, and third editions); *Counterterrorism for Emergency Responders* (first, second and third editions); and *Fire Protection: Systems and Response and Hazmat Teams across America.*

Currently, Mr. Burke serves on the Homestead LEPC in Southeast Nebraska. He manages a Hazardous Materials section at the Nebraska Firefighters Museum and periodically rides with friends on "B" shift at Station 1, Lincoln Fire Department. He can be reached via email at robert.burke@windstream.net, on Facebook at https://www.facebook.com/RobertAb8731, and through his website: www.hazardousmaterialspage.com.

Volume Two

Standard of Care and Hazmat Planning

Hazards Defined

Statistics and details for fixed site and rail transportation incidents involving chemicals go back to the mid-1800s. Hundreds of people died in rail accidents in the 1800s and early 1900s. None of them involved chemicals; they all died in derailments of passenger trains. Not until 1959 was the first recorded derailment involving the release of hazardous materials, where liquefied petroleum gas (LPG) (one of the common chemicals) escaped from its container and killed 23 civilians in Meldrim, GA. This incident is also known as the "Meldrim trestle disaster." Since that time, the Interstate Commerce Commission and its predecessor, the National Transportation Safety Board (NTSB), have reported just 44 train derailments where chemicals escaped their containers. Not much data is available outside of searching news clippings on fixed facility chemical releases. Newspaper research for *Hazmatology: The Science of Hazardous Materials* has revealed some interesting statistics. My first discovery of a chemical incident that involved an explosion occurred in 1841 in Syracuse, NY. Twenty-five kegs of black powder exploded, killing over 30 civilians and injuring over 50. Explosives were typical sources of deaths among civilians and firefighters through the 1800s well into the 1900s. Explosive incidents increased in times of war as ammunition plants geared up production to meet the war needs. These incidents were noticed around the Civil War, World War I and World War II.

Dover, NJ, July 10, 1926, Picatinny Arsenal Munitions Explosion

On July 10, 1926, an explosion occurred at DNASD that killed nearly two dozen people, shaking the U.S. military to its core (Figure 2.1). The cause was not mechanical failure, human error, or sabotage; but it was Mother Nature. A single lightning strike during a thunderstorm was the likely source. Shortly after 5:00 in the evening, the thunderstorm produced a bolt of lightning that struck the storage depot at Picatinny Arsenal. More than 600,000 tons of explosives stored inside the depot detonated, resulting in

Figure 2.1 On July 10, 1926, an explosion occurred at DNASD that killed nearly two dozen people, shaking the U.S. military to its core.

one of the most catastrophic explosions in the United States. The blast completely destroyed nearly 200 buildings in a 1/2-mile radius, resulting in $47 million in damages (more than $631 million today), 21 deaths and dozens more injuries. The explosion was so powerful that people reported finding debris nearly 22 miles away.

The incident at the Picatinny Arsenal prompted the U.S. government to get serious about explosives safety. Shortly after the explosion, Congress created the Department of Defense Explosives Safety Board, a board that exists to "provide oversight of the development, manufacture, testing, maintenance, demilitarization, handling, transportation and storage of "explosives" within the military." The board exists to this day.

Late in the 1860s, oil was discovered in Pennsylvania which brought a new source of death and destruction. From then on, it was mostly oil and explosives that caused death and injury. In those days, there was little if any regulation of chemicals or zoning requirements. Explosives use, storage and manufacturer could be found in residential neighborhoods and main street business districts. Televisions and radios did not exist and traveling performers were scarce. Citizens flocked to fires to socialize and be entertained. Unfortunately, many explosions happened after the fire department and crowds were at the scene of a fire. Explosions and chemical incidents involved common materials in place at the time. History seems to have repeated itself over the years since 1841.

Medical care is likely another reason why so many civilians and firefighters died in fires and explosions from 1841 until the mid-1900s. Not

every community had access to a hospital. Even when they did, hospitals in those days did not have mass casualty plans. Doctors were in short supply in many communities, and on-scene emergency medical care was still over a hundred years away. Undertakers had the closest thing to an ambulance, and that continued into the 1960s in some areas of the United States.

> ***Author's Note:*** *Just out of high school, one of my jobs was working for a furniture store doing odd jobs and delivering furniture. For reasons unknown to me, it was not uncommon for undertakers to also own a furniture store. This furniture store in Davenport, Nebraska, was owned by the undertaker. When I was hired, he found out I had been a volunteer firefighter for a couple of years. After that it was my job to drive the ambulance when it was requested. The Cadillac hearse was turned into an ambulance by simply installing a light into a custom bracket on top of the vehicle. The siren was hidden under the hood, and switches for each were installed on the dash board. My only training was Boy Scout First Aid, and my only proof my merit badge. Emergency medical technicians wouldn't be invented for another 5 years in 1973 when I first became an Emergency Medical Technician (EMT). So, for now it was load and go.*

Local, state and federal laws and regulations were slow coming, which eventually helped curb the numbers of explosions involving explosives in manufacture, transportation and storage. Zoning took even longer. Following the evolution of unions, in addition to pay issues, they also were concerned about worker safety. Although their only tool to make progress in safety issues was work stoppages, which often became violent in nature, companies would hire private security firms like Pinkerton's for strike busting purposes.

After the discovery of oil, it wasn't long before the invention of vehicles powered by engines utilizing petroleum-based fuels, including the motorization of many fire departments (Figure 2.2). Now in addition to railroads, another form of transportation was evolving. Prior to hazardous materials regulations, there were a number of transportation accidents on the road and the rail, and fixed facilities that killed firefighters into the 1980s. Railroads began policing themselves and developing safety devices to make railroad transportation of hazardous materials safer. Creation of the U.S. Department of Transportation (DOT) resulted in tools for emergency responders to help identify containers and hazards of chemicals.

Following the chemical release in Bhopal, India, mandated training and response regulations in the United States made hazardous materials response safer and more efficient. Since the formation of the Chemical Safety Board (CSB) in 1998, there have been 133 major incidents involving escaping or exploding chemicals at fixed facilities. Highway transportation

Figure 2.2 After the discovery of oil, it wasn't long before the invention of vehicles powered by engines utilizing petroleum-based fuels, including the motorization of many fire departments. (Courtesy of Beatrice NE Fire Department.)

Figure 2.3 Highway transportation incidents occur more frequently than rail or fixed facility incidents, and some very serious ones have killed firefighters. (Courtesy of Marshalls Creek Fire Department.)

incidents occur more frequently than rail or fixed facility incidents, and some very serious ones have killed firefighters (Figure 2.3). However, the vast majority of them are handled successfully by firefighters and hazardous materials responders.

The modern-day coinage of the term "hazardous material" occurred in the mid-1970s, when the DOT established a definition of hazardous

Figure 2.4 The modern-day coinage of the term "hazardous material" occurred in the mid-1970s, when the DOT established a definition of hazardous material. (From DOT.)

material (Figure 2.4). The term "dangerous goods," which means the same thing, is used outside the United States. DOT began the first major regulation of hazardous materials in transportation, including a hazard-class and placard and label system for identifying hazardous materials. As other federal agencies began developing regulations dealing with hazardous materials storage and use, different names were also created. The U.S. Occupational Safety and Health Administration (OSHA) and the U.S. Environmental Protection Agency (EPA) both refer to hazardous materials as "hazardous substances." The EPA also regulates chemicals that no longer have a commercial value.

When chemicals are no longer useful for their intended purpose, they become hazardous waste. Hazardous waste is regulated in the workplaces where it is generated, during transportation to a disposal site and when it is disposed of. For example, gasoline (Figure 2.5), when transported, is a hazardous material regulated by the DOT. When a tanker offloads gasoline into an underground storage tank at a gasoline station, it becomes a hazardous substance regulated by the EPA and OSHA. If any gasoline is spilled on the ground during the offloading, it would become hazardous waste, regulated by OSHA, EPA and DOT. There are different names for the same gasoline, depending on whether it was transported, in fixed storage or spilled. For the purposes of this column, we will use the term "hazardous material" interchangeably with all other agency terminologies.

After the Bhopal incident, the U.S. Congress passed the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), also known as the Superfund Amendments and Reauthorization Act (SARA). Congress was concerned that such an incident could happen here.

Figure 2.5 Gasoline, when transported, is a hazardous material regulated by the DOT.

Additionally, Congress was also concerned about the level of preparedness and training available to deal with an incident of the magnitude of Bhopal. With the passage of this important legislation, the federal government for the first time mandated levels of training and competency for emergency responders to hazardous materials releases.

Development of Hazmat Laws and Regulations

How Legislative and Regulatory Process Works

Laws are enacted by a legislative body, such as Congress, state legislatures, county governing boards and local city councils and boards. These legislative bodies have no means to enforce the laws they pass. If laws must be enforced, that task is passed on to an enforcement or regulatory agency that forms procedures or regulations to implement the law. On the federal level, laws that concern hazardous materials are generally passed on to the U.S. Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) or Department of Transportation (DOT).

When the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) was passed by Congress, OSHA and EPA were tasked with developing regulations to implement the requirements of the act. OSHA 1910:120 and EPA 40 CFR 311 are identical regulations dictated by federal laws that apply to emergency responders that may respond to hazmat incidents.

In simple terms, the regulations determine what emergency responders are allowed to do and what they are not. Some states have a delegated authority to enforce OSHA regulations. In those states, hazmat regulations are enforced by the state OSHA. In states that do not have a state OSHA, the EPA regulations are enforced. So, whether responders are in an OSHA state or a non-OSHA state, they are covered by the federal regulations for hazmat responses.

National Fire Protection Association (NFPA) standards, while they are not laws, are consensus standards developed by committees that determine what is appropriate for each level of hazmat response and what is not. A jurisdiction may implement NFPA standards, which makes them required in that jurisdiction, much like a regulation. While NFPA standards are not laws, they are the recognized way of addressing issues that face the fire service and other organizations today, including hazmat responses. Hazmat first responders may include fire, police, EMS, public works industrial personnel and other public and private workers.

OSHA and EPA regulations governing training requirements for hazmat responses establish five levels of competency for hazardous materials responders. According to OSHA 1810.120, "competent" means possessing the skills, knowledge, experience and judgment to perform assigned tasks or activities satisfactorily as determined by the employer. All responders must be trained specifically for the level at which they are expected to perform by their employers. Employers are charged with the responsibility of determining the level of response and what training is required for that level, and developing standard operating procedures (SOPs) or standard operating guidelines (SOGs) for hazmat responses in their jurisdictions.

There are five levels of hazardous materials responder training:

- First responder awareness
- First responder operations
- Technician
- Specialist
- Incident commander

These five levels are also used in the NFPA 472 Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents. The NFPA standard provides much more detail than does OSHA 1910.120. Additional competencies for emergency medical personnel are outlined in NFPA 473. Each level of response has associated with it certain competencies and limitations placed upon emergency responders for their safety. Along with the legislation and standards mentioned above comes an implied "Standard of Care" associated with responses to hazardous materials incidents. A Standard of Care is the level of competence

anticipated or mandated during the performance of a service or duty. A Standard of Care is not static but constantly changing, influenced by laws, regulations, consensus standards, knowledge and experience. Standards of Care are not new to emergency response personnel.

Hazmat response personnel have limitations on what functions they can perform at the scene of a hazardous materials incident. Limitations are based upon the level of knowledge, experience, training and the availability of personnel protective equipment (PPE) and supplies. Awareness, operations, technician, specialist and incident command personnel may also have limitations, based upon the jurisdiction with which they belong. Recognition of the existence of hazardous materials is the single most important task any emergency responder can do upon arrival at an incident scene. Generally, hazardous materials scenes are divided into zones for the safety of personnel. These may include "cold," "warm" and "hot" zones (Figure 2.6). The hot zone is where the hazardous materials are located, and the greatest danger exists for response personnel. The "warm" zone is where decontamination takes place. The "cold" zone is everywhere else and should not present an immediate danger to personnel.

According to OSHA, awareness-level personnel are those who, in the course of their normal duties, could encounter an emergency involving hazardous materials and who are expected to recognize the presence of the hazardous materials, protect themselves, call for trained personnel and secure the area. An example would be department of roads or public works, law enforcement and utilities personnel. When emergency response organizations respond to a hazmat incident, OSHA has said in a formal interpretation (July 25, 2007) that those responders should be operations-level personnel who first arrive at the scene of the incident. Operations-level personnel are those who respond to a hazmat incident for the purpose of protecting nearby persons, the environment or property from the effects of the release. Operations-level personnel are required to

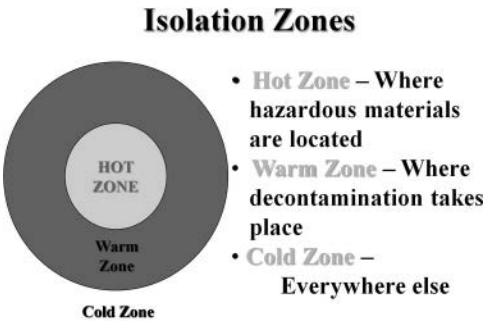


Figure 2.6 Generally, hazardous materials scenes are divided into zones for the safety of personnel. These may include "cold," "warm" and "hot" zones.

have awareness training as well as an additional 8 h of operations-level training. Awareness- and operations-level personnel do not enter the hot zone.

Technician-level responders are members of organized hazmat response teams (Figure 2.7). They may enter the hot zone and work in close proximity to hazardous materials if they have the proper chemical protective clothing, respiratory protection, mitigation equipment and training. Specialist personnel are those who are trained to the technician level and have additional training in an area of expertise such as rail cars or particular chemicals. The incident commander level requires training to a minimum of the awareness and operations levels (minimum 24 hours) and competencies outlined in OSHA 1910.120 and NFPA 472 for that position (Figure 2.8).

NFPA 472 identifies the incident commander as the person responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources. OSHA philosophy on dealing with hazardous materials is actually quite simple—they want employers to train and equip their employees for the jobs they are called upon to do. Some response organizations, because of reduced staffing levels, use operations-level personnel to conduct decontamination.

Figure 2.7 Technician-level responders are members of organized hazmat response teams. (From U.S. Coast Guard Atlantic Strike Team.)

Figure 2.8 The incident commander level requires training to a minimum of the awareness and operations levels (minimum 24 h).

These personnel are not technicians but rather trained and equipped operations-level personnel. This is an acceptable practice because operations-level personnel are trained and equipped to do decontamination (OSHA, NFPA).

Legal Ramifications

In today's litigious society, even emergency responders and response organizations can be sued for not following a Standard of Care (Figure 2.9). Several legal terms should be known by responders and response organizations. The first term is liability, which is defined as owing a responsibility

Figure 2.9 In today's litigious society, even emergency responders and organizations can be sued for not following a Standard of Care.