JEM

Hazardous materials and emergency management: A primer on hazmat law

Joseph F. St. Cyr, MPA, JD, CEM

INTRODUCTION

The problem of hazardous materials management and the dangers posed by hazardous substances present complexities for emergency managers. In recent decades, the generation of various chemicals needed to support the technological societies of the world has increased at a rapid pace. A major concern regarding hazardous materials is that many of these substances are relatively new, and the potential effects that they could have on public health and the environment are still uncertain.[1]

Each year, over one billion tons of hazardous materials are produced in the United States and Canada alone.[2] Hazardous materials come in various forms, ranging from liquids and gases to solids. Each hazardous material poses its own unique dangers associated with its manufacture, storage, transportation, use, and disposal. Proper emergency planning for hazardous materials is necessary, especially as use and disposal needs increase on a transglobal level.

Continuing education of public officers, government officials, and the general public can reduce the potential damage that hazardous materials can present to life and property.

HAZARDOUS MATERIALS LAW

Within the field of hazardous materials management, various key terms abound, with occasional contradictions among them. In the United States, confusion can develop with regard to key terms associated with the management of hazardous materials. The US Department of Transportation defines a hazardous material as any material that poses an "unreasonable risk" to the health and safety of people and the overall environment if such a material is not properly controlled during manufacturing, processing, transportation, storage, use, or disposal.[2] The Comprehensive Environmental Response, Compensation, and Liability Act 42 U.S.C.A.§ 9601 et seq. defines a hazardous substance as any substance defined under Section 101(14) of the act; any biological or disease-causing agent defined in Section 104(a)(2) of the act; any substance listed by the US Department of Transportation as a hazardous material under Title 49 of the Code of Federal Regulations, Section 172.101; and hazardous waste.[2]

Under Title 29, Section 1910.1200 of the Code of Federal Regulations, the Occupational Safety and Health Administration defines a hazardous chemical as any chemical that presents a physical hazard or a health hazard to employees. Other federal agencies in the United States have also defined hazardous materials with terminology that can be rather confusing for the expert and the layperson alike. The terminology and definition problem is further expanded when key international treaties on the subject of hazardous materials apply terms that contradict legal terms used in the United States.

Hazardous materials, regardless of the definitions used, produce specific risks. Among other things, hazards include flammability, toxicity, reactivity, corrosiveness, and radioactivity. Some hazardous materials present multiple hazards, while some hazards are only manifested during certain periods of physical or chemical changes in the material (e.g., changes in temperature, storage, or mode of transportation).

The amount of hazardous materials, or volume, can also affect the degree of risk posed to human life and the environment. For example, polyvinyl chloride

is considered an extremely hazardous substance, with significant explosive potential, which increases with higher volume. Certain hazardous materials, such as ammonium nitrate and benzoyl peroxide, are oxidizers—substances that generate oxygen at room temperature or with the application of heat. Oxidizing agents are dangerous because oxygen is needed to support combustion, and when oxygen is produced in large quantities, disastrous fires can develop.

Some hazardous materials are flammable. Flammable materials are those that ignite readily and have a rapid burning rate when they are exposed to an ignition source that provides the appropriate temperature ranges for the combustion process to begin. Examples of flammable materials include certain hazardous solvents such as benzene and ethanol.[3]

White phosphorous is an example of a spontaneously ignitable material.[3] Hazardous materials that are spontaneously ignitable can ignite immediately upon the application of heat, without an ignition source present. Both oxidation and microbiological action can cause the increase of heat until the material reaches a temperature necessary for automatic combustion. Such hazardous materials present an ever-present danger during the transportation process, due to the changes that can occur in temperature at the time of transportation. If spontaneously ignitable materials are transported by air cargo, temperature changes present a risk, as the temperature fluctuates with the transporting aircraft's altitude.

Some hazardous materials are explosive, and thus present a danger of detonation. The process of detonation is usually a result of shock, heat, or any other mechanism that supports a rapid reaction process. Detonation causes intense pressure and shock waves, which can produce catastrophic results. Examples of explosive hazardous materials include trinitrotoluene (TNT) and certain rocket propellants.[4] Explosions are defined as rapid conversions of potential chemical energy into physical and kinetic energy. Such conversions occur via an increase in pressure, heat, or light as gases are produced or released (usually within a container of some kind).[5]

Some explosive hazardous materials can be susceptible to deflagration, a rapid oxidation that produces the evolution of heat, light, and a pressure wave that's less disruptive than the pressure wave from detonation. While a pressure wave from detonation can travel at speeds over 3,280 feet per second, a deflagration wave usually travels less than 3,200 feet per second.[5] Explosions are further classified as either high-order or low-order. High-order explosions cause the entire mass of the hazardous material to react almost immediately, while low-order explosions involve a slower period of reaction, with some remnants of the material's container remaining in the debris.[6]

At the present time, there are over 20 major federal statutes in the United States that address hazardous materials, with many of these laws employing a command and control form of regulation.[7] In addition to the Comprehensive Environmental Response, Compensation, and Liability Act, there are other important federal laws that are relevant to the study of hazardous materials. The Federal Hazardous Substances Act 15 U.S.C.A. § 1261 et seq. has established labeling requirements for specific substances that are most likely to be found in American households. To enforce the act, Congress designated the US Consumer Product Safety Commission (CPSC) as the regulatory and administrative body responsible for hazardous substance monitoring in industry. The CPSC has the authority to ban a hazardous substance if a product displays a hazard so extensive that a label would not best serve the interests of the public, thereby supporting the imposition of an outright ban.[3] As can be expected, few hazardous substances regulated by the Commission under the Federal Hazardous Substances Act are ever banned from production in the public marketplace.

Under the Federal Food, Drug, and Cosmetic Act 21 § 301 et seq., the US Food and Drug Administration is charged with the duty to ensure, as is reasonably possible, the safety of our nation's food products, pharmaceuticals, and cosmetic materials. It is the responsibility of the Food and Drug Administration (FDA) to maintain safe levels for food products in order to protect citizens at the time of consumption. Furthermore, the Administration is charged with supporting the development of new technologies for enhanced monitoring and for the creation and implementation of

education programs for the general public.[3] A key aspect of the Food, Drug, and Cosmetics Act is the "Delaney Clause," which prohibits the introduction of additives to a product that can increase toxicity levels beyond safe limits.[8]

The US Environmental Protection Agency (EPA) plays a prominent role in the management and regulation of hazardous materials (whether such materials are classified as substances or wastes). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C.A.§ 9601 et. seq. is a major piece of federal environmental legislation under the control of the EPA. This Act was established by Congress to address the problems posed by hazardous wastes. Under CERCLA, the EPA is authorized to remediate and mitigate past contamination that has occurred via the improper dumping of hazardous wastes. In order for CERCLA to have impact on such dumping of hazardous wastes, a present or potential threat to the health of persons or the environment, which can be reasonably identifiable through the implementation of reliable technology and investigation practices, must exist. To accomplish the requirements imposed by the Act, the EPA has several resources at their disposal.

A principal component in the EPA's arsenal is the imposition of strict liability under CERCLA Section-107. In its fundamental form, strict liability is legal liability imposed on a person, or other entity under the law, without fault. The legal rationale behind the imposition of strict liability is to discourage people from involving themselves in unreasonably dangerous activities that could manifest harmful, or potentially harmful, results upon the populous or property.

In addition to the ever-present threat of strict liability, CERCLA has also created what has been termed a "Superfund" of financial reserves, which can be used by the EPA to support cleanup costs associated with decontaminating hazardous waste sites. A national response team of environmental professionals is on standby 24 hours a day to respond to hazardous waste sites that require immediate decontamination. In addition to maintaining a response team, the EPA also conducts hazardous waste training for state and local governments.

To identify violators of CERCLA, the EPA has created an administrative system and computer technology that can identify violators based on the corporate records of hazardous materials manufacturers and distributors. To further the aim of CERCLA, both criminal and civil sanctions can be brought against violators. Once violators are identified by the EPA, they are required to compensate the government for all cleanup costs. In addition to government action, Section-310 of CERCLA provides for limited citizen enforcement under the discretion of the CERCLA and judicial interpretation.[8]

The Resource Conservation and Recovery Act 42 U.S.C.A. § 6901-6992(k) also holds vital importance in the protection of health and safety within the arena of hazardous materials management. As with CERCLA, the EPA is charged with enforcing the Resource Conservation and Recovery Act (RCRA). Under the RCRA, the EPA is directed by Congress to manage hazardous wastes throughout the lifecycle of the wastes (commonly known in environmental jurisprudence as the "cradle to grave" philosophy).[9]

In 1984, the RCRA was substantially amended by the Hazardous and Solid Waste Amendments of 1984, Pub. L. No. 98-616, 1984 U.S.C.C.A.N. (98 Stat.) 5576-5702. The amendments provided for the creation and implementation of new technology-based standards directed toward hazardous waste landfills and also created a phase-out period for land disposal of certain untreated wastes.

A key component of the RCRA is the authority given the EPA to invoke significant civil and criminal penalties against violators. The RCRA sets forth basic goals for ensuring the protection of health and safety.[10] First, the RCRA names the specific wastes to be managed and, second, develops a tracking system for locating hazardous wastes from points of generation to disposal. In essence, the RCRA can be conceptualized as a licensing and waste-tracking program.[11]

The 1984 amendments to the RCRA also significantly broadened its scope by creating over 70 additional provisions. Of significance is a "hammer provision," under which the EPA is obligated to create new rules for RCRA compliance by statutory deadlines. If the EPA cannot meet the deadlines for implementation of the rules, rigid, congressionally mandated regulations become effective.

Another major focus of the 1984 amendments to the RCRA are regulations pertaining to outdoor underground storage tanks. In the United States alone, there are countless underground tanks that fall under the regulations of the EPA via the RCRA. Due to the effects of corrosion on metal tanks and the various materials used to make the tanks, leakage is a common occurrence. To prevent newly installed tanks from causing damage to the environment from leakage, the EPA established standards that require "secondary containment" processes.[11] Secondary containment processes may include the installation of liners, double-walled protective layers, and other physical controls that can assist in the containment of a leaking tank.

Another principal environmental act under the authority of the EPA is the Toxic Substances and Control Act, 15 U.S.C.A. § 2601 et seq. (1976). Commonly known as TOSCA, this act regulates the manufacturers that develop and create hazardous substances and chemicals.[12] Under TOSCA, manufacturers are required to provide information about the hazardous effects of the substances they produce. Further, the EPA is charged with preventing substances that pose an unreasonable risk from entering into the stream of commerce.[8] Avenues afforded to the EPA to accomplish this task include the issuance of citations for violations in addition to criminal enforcement measures.

Principally, TOSCA is responsible for regulating hazardous chemicals that would be used within the borders of the United States. However, the act also addresses the exportation of hazardous substances. Under TOSCA, any persons or organizations that export or import hazardous substances regulated by the Act are to notify the EPA of their actions. If substances to be exported are manufactured in conformance with TOSCA requirements but pose an unreasonable risk to health and safety, the EPA may notify the recipient governments about the adverse effects of those substances.

With regard to importation, no person can bring into the United States hazardous substances that do not conform to TOSCA, with limited exceptions. Further, importers of hazardous substances must certify to the US government that those substances are in full conformance with TOSCA.[11] TOSCA establishes no threshold level of substance importation below which certification is not required. In essence, any substance or chemical constituent of a material must be revealed to the US government at time of importation.

The Emergency Planning and Community Right to Know Act (EPCRA), 42 U.S.C.A. § 1100 et seq. (1986) is also of vital importance in the realm of contingency planning and the environment. Created in 1986 as an amendment to CERCLA, EPCRA has increased the margin of community safety from risks posed by hazardous materials at the local level. Under EPCRA, owners and operators of facilities where hazardous materials are used must comply with stringent emergency planning requirements that are designed to protect the public. One such requirement mandates that hazardous materials facility owners and operators must provide information about their hazardous materials to state and local public safety officials, which will help emergency responders adequately assess the degree of danger they may face when responding to incidents. Section-303 of EPCRA requires that local governmental officials responsible for emergency management develop comprehensive plans for hazardous materials incidents. Local emergency planning committees must create plans that indicate the locations for hazardous materials facilities, identify the transportation routes for motor vehicles carrying hazardous materials, and develop emergency notification and evacuation procedures for persons that may be at risk for exposure.[11]

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C.A. § 135 et seq. (1972) serves as the main federal regulatory act protecting the public from the dangers of pesticides and other potentially dangerous chemical mixtures. The act requires that persons and other legal entities that distribute, sell, or transact in pesticides and other associated chemicals register their chemical mixtures with the EPA.[13] To register a chemical with the EPA, the registrant must demonstrate, among other things, that the chemical mixture is effective as claimed, that the labeling and chemical data meet federal standards, and that the chemical mixture

(e.g., a pesticide) will not cause unreasonable risks to humans, animals, or the environment. To measure risks associated with the registered mixtures, the EPA uses a cost-benefit analysis that measures the risk of the mixture to society against its potential benefits.[10]

CONCLUSION

With the increased risks associated with hazardous materials, it is paramount that emergency managers incorporate hazardous materials training into disaster preparedness. A large portion of the United States is served by major highways, rail, and aviation systems. Through these transportation arteries, communities can be placed at significant risk of catastrophic releases of hazardous materials, as a result of accidents or terrorist acts. Education and training in all phases of the integrated emergency management system can help prevent or control many of the dangers that hazardous material incidents pose.

Joseph F. St. Cyr, MPA, JD, CEM, Barry University, Winter Park, Florida.

REFERENCES

1. Caldwell LK: *International Environmental Policy: From the Twentieth to the Twenty-First Century*. 3rd ed. Durham: Duke University Press, 1996.
2. International Fire Service Training Association: *Hazardous Materials for First Responders*. 1st ed. Stillwater: Oklahoma State University Press, 1988.
3. Meyer E: *Chemistry of Hazardous Materials*. 2nd ed. Englewood Cliffs: Prentice Hall Publishers, 1989.
4. Stoffel J: *Explosives and Homemade Bombs*. Springfield: Charles C. Thomas Publishers, 1977.
5. DeHann J: *Kirk's Fire Investigation*. New York: Prentice-Hall Publishers, 1999.
6. Hammer W: *Occupational Safety Management And Engineering*. 3rd ed. Englewood Cliffs: Prentice-Hall, 1985.
7. Gunningham N, Grabosky P, et al.: *Smart Regulation: Designing Environmental Policy*. Oxford, England: Clarendon Press, 1998.
8. Plater ZJB, et al.: *Environmental Law and Policy: Nature, Law, and Society*. 2nd ed., St. Paul: West Publishing, 1998.
9. Buck SJ: *Understanding Environmental Administration and Law*. Washington, DC: Island Press, 1996.
10. Rodgers WH: *Environmental Law*. 2nd ed. St. Paul: West Publishing, 1994.
11. Vincoli JW: *Basic Guide to Environmental Compliance*. New York: Van Nostrand Reinhold, 1993.
12. Blumenthal DS, Ruttenber AJ: *Introduction to Environmental Health*. New York: Springer Publishing, 1995.
13. Burns ER, Burgess EE: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In Cox DB Jr. (ed.): *Handbook on Hazardous Materials Management*. Rockville: Institutes of Hazardous Materials Management, 1995.