CHAPTER 1

SCOPE OF EMERGENCY RESPONSE

INTRODUCTION

Emergency response is an integral component of routine corporate management that, while directly influenced by diverse regulations at all levels of government, is also influenced by nonregulatory considerations, including (a) obligations imposed by corporate insurance policies, (b) corporate and stakeholder concerns over tort liability, and (c) the demands of both *ad hoc* and formal in-plant safety committees. At the municipal level, emergency response planning and management have become increasingly complex tasks that, despite a long and distinguished historical development, are continually compounded by social, technical, and political developments, including (a) jurisdictional confusion among federal, regional, state, county, and municipal authorities, (b) the economic burden of maintaining adequately staffed, trained, and provisioned emergency response teams, (c) the sheer structural and operational complexity of modern municipalities, (d) the proliferation of sources and agents of potent public hazard, and, most recently, (e) widespread anxiety regarding the terrorist acts of politically motivated groups, as well as otherwise motivated individuals.

In the United States, the primary Federal influence on corporate emergency response planning is through legislation governing the workplace generation of hazardous waste (Resource Conservation and Recovery Act; RCRA) and activities associated with uncontrolled hazardous waste sites [Comprehensive Emergency Response, Compensation and Liability Act (CERCLA, also known as *Superfund*) and the Superfund Amendments and Reauthorization Act (SARA)], although other legislation and regulations also establish emergency response requirements, including the Clean Water Act (CWA), the Hazardous Material Transportation Act (HMTA), and the Chemical Process Safety Regulations (29 CFR 1910.119).

TABLE 1.1 Key OSHA Standards Related to Emergency Response (CFR: U.S. Code of Federal Regulations)

Reference	Topic
29 CFR 1910	Table of contents
29 CFR 1910.119	Process safety management of highly hazardous chemicals
29 CFR 1910.119 App C	Compliance guidelines and recommendations
29 CFR 1910.119 App D	Sources of further information; non-mandatory
29 CFR 1910.120	Hazardous waste operations and emergency response
29 CFR 1910.120 App A	Personal protective equipment test methods
29 CFR 1910.120 App C	Compliance guidelines
29 CFR 1910.120 App D	References
29 CFR 1910.120 App E	Training curriculum guidelines; non-mandatory
29 CFR 1910.1027 App B	Substances technical guidelines for cadmium
29 CFR 1910.1051	1,3-Butadiene
29 CFR 1910.1052	Methylene chloride
29 CFR 1926	Table of contents
29 CFR 1926.64	Process safety management of highly hazardous chemicals
29 CFR 1926.64 App C	Compliance guidelines and recommendations
29 CFR 1926.64 App D	Sources of further information; non-mandatory
29 CFR 1926.65	Hazardous waste operations and emergency response
29 CFR 1926.65 App A	Personal protective equipment test methods
29 CFR 1926.65 App C	Compliance guidelines
29 CFR 1926.65 App D	References
29 CFR 1926.65 App E	Training curriculum guidelines; non-mandatory

With respect to the health and safety of American workers involved in emergency response (Tables 1.1, 1.2, 1.3), key baseline regulations include 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response) and 29 CFR 1910.38 (Employee Emergency Plans), which contain appropriate cross-references to additional regulatory requirements (e.g., respiratory protection, alarm systems, eye and foot protection). Under 29 CFR 1910.120, a written *emergency response plan* must describe how an actual emergency will be handled to minimize risks to three groups of personnel:

1. employees engaged in cleanups at uncontrolled hazardous waste sites,
2. employees engaged in routine operations and corrective actions at RCRA facilities, and
3. employees engaged in emergency response without regard to location.

If an employer does not allow employees to respond to an emergency in any manner except by evacuating premises, that employer must develop a

TABLE 1.2 Key OSHA Standards Related to Protection of Personnel (CFR: U.S. Code of Federal Regulations)

Reference	Topic
29 CFR 1910 Subpart I App B	Non-mandatory compliance guidelines
29 CFR 1910.120	Hazardous waste operations and emergency response
29 CFR 1910.120 App A	Personal protective equipment test methods
29 CFR 1910.120 App B	General description and discussion
29 CFR 1910.120 App C	Compliance guidelines
29 CFR 1910.120 App E	Training curriculum guidelines; non-mandatory
29 CFR 1910.132	General requirements
29 CFR 1910.183	Helicopters
29 CFR 1910.261	Pulp, paper, and paperboard mills
29 CFR 1910.266	Logging operations
29 CFR 1910.268	Telecommunications
29 CFR 1910.269	Electric power generation, transmission, and distribution
29 CFR 1910.335	Safeguards for personnel protection
29 CFR 1910.1001 App H	Medical surveillance guidelines for asbestos
29 CFR 1910.1027	Cadmium
29 CFR 1910.1030	Bloodborne pathogens
29 CFR 1910.1047	Ethylene oxide
29 CFR 1910.1048	Formaldehyde
29 CFR 1910.1050	Methylenedianiline
29 CFR 1910.1052	Methylene chloride
29 CFR 1915	Table of contents/authority for 1915
29 CFR 1915 Subpart I App A	Non-mandatory guidelines
29 CFR 1915.12	Precautions and the order of testing
29 CFR 1915.1001 App I	Medical surveillance guidelines for asbestos
29 CFR 1926	Table of contents
29 CFR 1926.28	Personal protective equipment
29 CFR 1926.60	Methylenedianiline
29 CFR 1926.65	Hazardous waste operations and emergency response
29 CFR 1926.65 App A	Personal protective equipment test methods
29 CFR 1926.65 App B	General description and discussion
29 CFR 1926.65 App C	Compliance guidelines
29 CFR 1926.65 App E	Training curriculum guidelines; non-mandatory
29 CFR 1926.95	Criteria for personal protective equipment
29 CFR 1926.300	General requirements
29 CFR 1926.302	Power-operated hand tools
29 CFR 1926.551	Helicopters
29 CFR 1926.1101	Asbestos
29 CFR 1926.1101 App I	Medical surveillance guidelines for asbestos
29 CFR 1926.1127	Cadmium

TABLE 1.3 Key OSHA Standards Related to Medical Surveillance of Personnel (CFR: U.S. Code of Federal Regulations)

Reference	Topic
29 CFR 1910.120	Hazardous waste operations and emergency response
29 CFR 1910.120 App E	Training curriculum guidelines; non-mandatory
29 CFR 1910.1001	Asbestos
29 CFR 1910.1001 App H	Medical surveillance guidelines for asbestos
29 CFR 1915.1001 App I	Medical surveillance guidelines for asbestos
29 CFR 1910.1003	13 Carcinogens (4-nitrobiphenyl, etc.)
29 CFR 1910.1018 App C	Medical surveillance guidelines
29 CFR 1910.1025	Lead
29 CFR 1910.1025 App B	Employee standard summary
29 CFR 1910.1025 App C	Medical surveillance guidelines
29 CFR 1910.1027	Cadmium
29 CFR 1910.1027 App A	Substance safety data sheet for cadmium
29 CFR 1910.1028 App C	Medical surveillance guidelines for benzene
29 CFR 1910.1043	Cotton dust
29 CFR 1910.1044	1,2-dibromo-3-chloropropane (DBCP)
29 CFR 1910.1044 App C	Medical surveillance guidelines for DBCP
29 CFR 1910.1045	Acrylonitrile
29 CFR 1910.1045 App C	Medical surveillance guidelines for acrylonitrile
29 CFR 1910.1047 App C	Medical surveillance guidelines for ethylene oxide
29 CFR 1910.1048	Formaldehyde
29 CFR 1910.1048 App A	Substance technical guidelines for formaldehyde
29 CFR 1910.1048 App C	Medical surveillance for formaldehyde
29 CFR 1910.1050	Methylenedianiline (MDA)
29 CFR 1910.1050 App C	Medical surveillance guidelines for MDA
29 CFR 1910.1052	Methylene Chloride
29 CFR 1910.1052 App B	Medical surveillance for methylene chloride
29 CFR 1926.60	Methylenedianiline (MDA)
29 CFR 1926.60 App C	Medical surveillance guidelines for MDA
29 CFR 1926.62	Lead
29 CFR 1926.62 App B	Employee standard summary
29 CFR 1926.62 App C	Medical surveillance guidelines
29 CFR 1926.65	Hazardous waste operations and emergency response
29 CFR 1926.65 App C	Compliance guidelines
29 CFR 1926.65 App E	Training curriculum guidelines; non-mandatory
29 CFR 1926.1101	Asbestos
29 CFR 1926.1101 App I	Medical surveillance guidelines for asbestos
29 CFR 1926.1127	Cadmium
29 CFR 1990.151	Model standard
29 CFR 1990.152	Model emergency temporary standard

written emergency action plan, which (in compliance with 29 CFR 1910.39) includes the following minimum elements:

- emergency escape procedures and routes
- procedures to be followed by employees who remain to operate critical plant operations before they evacuate
- procedures to account for all employees after emergency evacuation has been completed
- rescue and medical duties for those employees who are to perform them
- the preferred means of reporting fires and other emergencies
- names or job titles of personas or departments who can be contacted for further information or explanation of duties associated with emergency response

Depending on relevant regulatory requirements, the overall in-plant responsibility for emergency response planning and implementation may be assigned to the "primary emergency response coordinator" (i.e., under RCRA regulations), the "site safety and health supervisor" (i.e., under 29 CFR 1910.120), or to any number of variously titled personnel having specialized knowledge and experience (Tables 1.4, 1.5, 1.6, 1.7). In many facilities, the facility manager or operations manager assumes all responsibility for emergency response activities. The key regulatory objective in assigning overall responsibility is to ensure that corporate authority is in fact commensurate with that responsibility—a requirement that is increasingly reflected in the consolidation of emergency response management duties within a corporate executive level function.

At the broad level of the American Community and reflecting the consistent and widespread concern of the American public regarding chemical hazards, The Federal Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA; SARA Title III) requires municipal authorities to:

1. prepare for emergency releases of hazardous substances by appointing a Local Emergency Planning Committee (LEPC),
2. immediately notify the LEPC of any release of hazardous substances in quantities greater than prescribed levels,
3. prepare an inventory of hazardous substances to be submitted to the LEPC, and
4. prepare an annual report detailing the amounts of hazardous substances released to the environment or transported as waste.

Under EPCRA, the LEPC must include, at the minimum, elected state and local officials, police, fire, civil defense, public health professionals, environmental, hospital, and transportation officials as well as representatives of facilities subject to emergency planning requirements, community groups,

TABLE 1.4 Essential On-Site Emergency Response Personnel (Adapted from NIOSH, USCG, and EPA, 1985: Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities)

Title	General Description	Specific Responsibilities
Project Team Leader	Reports to upper-level management; has authority to direct response operations; assumes total control over site activities.	• Prepares and organizes the background review of the situation, the Work Plan, the Site Safety Plan, and the field team. • Obtains permission for site access and coordinates activities with appropriate officials. • Ensures that the Work Plan is completed and on schedule. • Briefs the field teams on their specific assignments. • Uses the Site Safety and Health Officer to ensure that safety and health requirements are met. • Prepares the final report and support files on the response activities. • Serves as the liaison with public officials.
Site Safety and Health Officer	Advises the Project Team Leader on all aspects of health and safety on site; recommends stopping work if any operation threatens worker or public health or safety.	• Selects protective clothing and equipment. • Periodically inspects protective clothing and equipment. • Ensures that protective clothing and equipment are properly stored and maintained. • Controls entry and exit at the Access Control Points. • Coordinates safety and health program activities with the Scientific Advisor. • Confirms each team member's suitability for work based on a physician's recommendation. • Monitors the work parties for signs of stress, such as cold exposure, heat stress, and fatigue. • Monitors on-site hazards and conditions. • Participates in the preparation of and implements the Site Safety Plan. • Conducts periodic inspections to determine if the Site Safety Plan is being followed. • Enforces the "buddy" system. • Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department. • Notifies, when necessary, local public emergency officials. • Coordinates emergency medical care.
Field Team Leader	May be the same person as the Project Team Leader and may be a member of the work party; responsible for field team operations and safety.	• Manages field operations. • Executes the Work Plan and schedule. • Enforces safety procedures. • Coordinates with the Site Safety Officer in determining protection level. • Enforces site control. • Documents field activities and sample collection. • Serves as a liaison with public officials.

continues

and the media. A primary responsibility of the LEPC is to develop an *emergency response plan* that:

1. identifies facilities and transportation routes involved in the storage, use, or transport of specified hazardous substances,

TABLE 1.4—*continued*

Title	General Description	Specific Responsibilities
Command Post Supervisor	May be the same person as the Field Team Leader; responsible for communications and emergency assistance.	• Notifies emergency response personnel by telephone or radio in the event of an emergency. • Assists the Site Safety officer in a rescue, if necessary. • Maintains a log of communication and site activities. • Assists other field team members in the clean areas, as needed. • Maintains line-of-sight and communication contact with the work parties via walkie-talkies, signal horns, or other means.
Decontamination Station Officer(s)	Responsible for decontamination procedures, equipment, and supplies.	• Sets up decontamination lines and the decontamination solutions appropriate for the type of chemical contamination on site. • Controls the decontamination of all equipment, personnel, and samples from the contaminated areas. • Assists in the disposal of contaminated clothing and materials. • Ensures that all required equipment is available. • Advises medical personnel of potential exposures and consequences.
Rescue Team	Used primarily on large sites with multiple work parties in the contaminated area.	• Stands by, partially dressed in protective gear, near hazardous work areas. • Rescues any worker whose health or safety is endangered.
Work Party	Depending on the size of the field team, any or all of the field team may be in the Work Party, but the Work Party should consist of at least two people.	• Safely completes the onsite tasks required to fulfill the Work Plan. • Complies with Site Safety Plan. • Notifies Site Safety Officer or supervisor of unsafe conditions.

2. describes comprehensive emergency response procedures to be implemented both on- and off-site of any emergency incident,
3. designates a community coordinator and facility coordinator to implement the plan,
4. outlines emergency notification procedures,
5. describes methods for determining the occurrence of a release and the probable affected area and population,
6. describes community- and industry-owned emergency equipment and facilities and identifies persons responsible for these resources,
7. outlines evacuation plans,
8. describes a training program for emergency response personnel, and
9. presents methods and schedules for exercising emergency response plans.

The promulgation of Federal requirements under EPCRA, which effectively extends a National concern and responsibility down to local

TABLE 1.5 Optional On-Site Emergency Response Personnel (Adapted from NIOSH, USCG, and EPA, 1985: Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities)

Title	Specific Responsibilities
Scientific Advisor	• Provides advice for field monitoring, sample collection, sample analysis, scientific studies, data interpretation, and remedial plans.
Logistics Officer	• Plans and mobilizes the facilities, materials, and personnel required for the response.
Photographer	• Photographs site conditions. • Archives photographs.
Financial/Contracting Officer	• Provides financial and contractual support.
Public Information Officer	• Releases information to the news media and the public concerning site activities.
Security Officer	• Manages site security.
Recordkeeper	• Maintains the official records of site activities.

communities and, at that level, promotes an integration of regional and local governmental as well as private resources toward the objective of emergency planning and response, clearly reflects an on-going change in paradigm regarding historical distinctions between Federal and local interests and also between "natural" disasters and "human-made" emergencies (Fig. 1.1). Whereas the Federal Emergency Management Agency (FEMA) is most commonly known for its responsibility as the lead Federal agency within a consortium (National Emergency Management System) of 27 Federal agencies (and the American Red Cross) devoted to providing aid and assistance after major natural disasters (e.g., floods, storms, earthquakes), FEMA is today probably best understood as a key partner in the National Mitigation Strategy—a Federal programmatic initiative devoted to the development of additional partnerships among Federal, state, and local governments and private sector constituents, including the general public, for the express purpose of promoting local community safety. While the focus is still directed at so-called natural hazards, FEMA is also the lead agency of the National Arson Prevention Initiative (NAPI), a partnership that also includes the U.S. Department of Housing and Urban Development, the U.S. Department of Justice, and the U.S. Department

TABLE 1.6 Off-Site Emergency Response Personnel (Adapted from NIOSH, USCG, and EPA, 1985: Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities)

Title	General Description	Specific Responsibilities
Senior Level Management	Responsible for defining project objectives, allocating resources, determining the chain-of-command, and evaluating program outcome.	• Provide the necessary facilities, equipment, and money. • Provide adequate personnel and time resources to conduct activities safely. • Support the efforts of on-site management. • Provide appropriate disciplinary action when unsafe acts or practices occur.
Multi-Disciplinary Advisors	Includes representatives from upper-level management and onsite management, a field team member, and experts in such fields as: • Chemistry • Engineering • Industrial hygiene • Information/public relations • Law • Medicine • Pharmacology • Physiology • Radiation health physics • Toxicology	• Provide advice on the design of the Work Plan and the Site Safety Plan.
Medical Support	Consulting physicians	• Become familiar with the types of materials on site, the potential for worker exposures, and recommend the medical program for the site.
	Medical personnel at local hospitals and clinics	• Provide emergency treatment and decontamination procedures for the specific type of exposures that may occur at the site; obtain special drugs, equipment, or supplies necessary to treat such exposures.
	Ambulance personnel	• Provide emergency treatment procedures appropriate to the hazards on site.

of the Treasury. The objectives of NAPI are to increase public awareness regarding practical means for preventing arson and to provide appropriate resources to individuals and communities throughout the nation.

While there can be no doubt that emergency-related "partnerships" between diverse governmental agencies are sometimes the result of the need for coordinated intelligence gathering—as, for example, in a case of international terrorism, which may require the coordination of efforts of personnel from the Federal Bureau of Investigation (FBI), National Security Agency (NSA), Central Intelligence Agency (CIA), and various other U.S. Departments (e.g., Defense, Treasury, Transportation)—other factors also promote intergovernmental coordination as well as governmental and private sector partnerships. For example, "Civil Emergency Planning" (CEP), though long

TABLE 1.7 Additional Personnel That May Be Needed for Hazardous Waste Operations (Adapted from NIOSH, USCG, and EPA, 1985: Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities)

Title	General Description	Specific Responsibilities
Bomb Squad Explosion Experts		• Advise on methods of handling explosive materials • Assist in safely detonating or disposing of explosive materials
Communication Personnel	Civil Defense organizations; local radio and television stations; local emergency service networks	• Provide communication to the public in the event of an emergency • Provide communication links for mutual aid
Environmental Scientists	Consultants from industry, government, universities, or other groups	• Predict the movement of released hazardous materials through the atmosphere, soil, and water resources • Assess the effect of this movement on air, groundwater and surface water quality • Predict the exposure of people and the ecosystem to the materials
Evacuation Personnel	Federal, state, and local public safety organizations	• Help plan for public evacuation • Mobilize transit equipment • Assist in public evacuation
Firefighters		• Respond to fires that occur on site • Stand by for response to potential fires • Perform rescue
Hazardous Chemical Experts	Consultants from industry, government, universities, or other groups	• Advise on the properties of the materials on site • Advise on contaminant control methods • Advise on the dangers of chemical mixtures that may result from site activities • Provide immediate advice to those at the scene of a chemical-related emergency
Health Physicists	Experts in radiation health from industry, government, universities, or other groups	• Evaluate radiation health hazards and recommend appropriate action
Industrial Hygienists	Consultants from industry, government, universities, or other groups	• Conduct health hazard assessments • Advise on adequate health protection • Conduct monitoring tests to determine worker exposures to hazardous substances
Meteorologists	Consultants from government or other local organizations	• Provide meteorological information
Public Safety Personnel	County Sheriff, industrial security forces, National Guard, police, etc.	• Control access to the site
Toxicologists	Consultants from industry, government, universities, or other groups	• Advise on toxicological properties and health effects of substances on site • Provide recommendations on protection of worker health

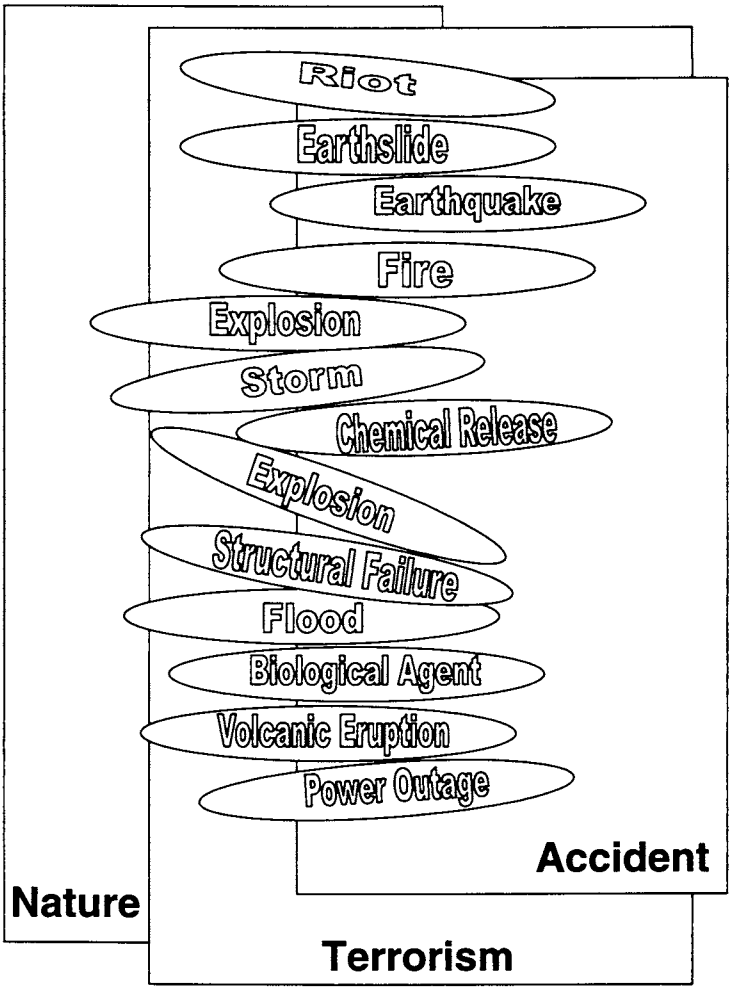

FIGURE 1.1 Basic dimensions and components of emergencies. Note that natural and human-caused emergencies can exacerbate one another.

an integral (albeit little noticed) part of the capability of the North Atlantic Treaty Organization (NATO), has emerged as an increasingly important resource for NATO partners in their effort to prevent human-made disasters, mitigate the consequences of natural calamities, and protect the population, national wealth, and environment.

The rapidly expansive trend in the United States to conceptualize emergency response in terms of the requirements for practical prevention,

efficient response, and effective mitigation, rather than in terms of type or source of threat (e.g., natural vs human-made hazards) or jurisdictional mandate (e.g., national, regional, local) is clearly paralleled in European, Pacific rim, and other nations as well as international organizations.

KEY FACTORS INFLUENCING PROGRAMMATIC EMERGENCY RESPONSE PROGRAMS

Essentially synonymous with "crisis management," "disaster planning and management," "civil emergency response," and "contingency planning," emergency response (which is inclusive of planning, management, and response functions) is subject to a wide range of social, economic, and technical factors. In most recent years, perhaps the more significant of these factors include: (a) public concern over hazardous chemicals, (b) international and domestic terrorism, (c) on-going development of a global economy, and (d) rapid developments in electronic communications.

Hazardous Chemicals

Of approximately 16 million known chemical substances (including naturally occurring and human-made chemicals), about 60,000 are in daily commercial use in any technologically developed country. Until the mid 1970s, primary concern was focused on only a small number of these chemicals—specifically, on petrochemicals—even though the Federal Water Pollution Control Act (1974) did establish clear federal concern regarding the discharge of environmentally hazardous substances into the nation's waterways. In 1975, Congress enacted the Federal Hazardous Materials Transportation Act (HMTA), which was the first comprehensive attempt to regulate the transport of hazardous chemicals, following in 1976 with the Resource Conservation and Recovery Act (RCRA), which established a strong federal initiative to exert "cradle-to-grave" management of hazardous wastes. Within 2 years of the enactment of RCRA, the public became fully aware of the potential risks of hazardous wastes through the incident at Love Canal (Niagara Falls, New York), where residents finally had to be evacuated from houses built over an abandoned dumping ground used from 1947 to 1953 to bury industrial chemical wastes. In response to this incident, Congress enacted the Comprehensive Emergency Response, Compensation and Liability Act of 1980 (CERCLA; "Superfund"). Unlike RCRA, which focuses on waste management by existent facilities, CERCLA deals with chemically contaminated sites that are abandoned.

While the governmental and public consciousness of the potential risks of chemicals, whether those chemicals were of commercial value and legally defined as "materials" or had no commercial value and were defined as "wastes," expanded greatly between 1975 and 1980, that consciousness was

> confined primarily to the cleanup of hazardous waste sites and to determining the long-term effects of exposure to hazardous wastes. That changed on December 3, 1984, when a cloud of methyl isocyanate from a Union Carbide manufacturing plant in Bhopal, India, killed more than 2,500 and injured an estimated 200,000 people. When the Bhopal tragedy was followed by an accidental chemical release on August 11, 1985, at another Union Carbide plant at Institute, West Virginia, public concern turned to alarm. Although the West Virginia release was not serious, it underscored for many Americans the lack of information about hazardous substances in their communities and about the health hazards associated with exposure. It also focused attention on the inadequacies of emergency response capabilities.
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> —(Firefighter Safety Study Act Working Group, 1992)

In 1986, as a direct result of the Bhopal incident, Congress passed the Emergency Planning and Community Right-To-Know Act (Sara Title III; EPCRA) which, for the first time, raised emergency response to chemical release to national as well as local preeminence. It should also be noted, moreover, that the Occupational Safety and Health Administration (established in 1972) was at the same time beginning to raise the consciousness of industry regarding the vital importance of integrating in-plant emergency response programs with concerns about chemical health and safety through specific regulations, especially regulations related to Hazardous Waste Operations and Emergency Operations (29 CFR 1910.120) and Employee Emergency Plans (29 CFR 1910.38)—a trend that is manifest in OSHA regulations throughout the past 20 years, including OSHA's Laboratory Standard (29 CFR 1910.1450), Respiratory Protection regulations (29 CFR 1910.134), and Chemical Process Safety regulations (29 CFR 1910.119).

Terrorism

Historically, the word terrorism was typically restricted to acts of violence committed by politically motivated groups or foreign national agents, as in the destruction of the U.S. Marine barracks in Beirut (1983) or the bombing of Pan Am Flight 103 over Lockerbie, Scotland (1988). Until 1993, most Americans perceived terrorism as something to worry about only when traveling in other countries. However, with the February 1993 bombing of the World Trade Center in New York City, it was clear that terrorism had arrived in America. With the 1995 bombing of the Federal building in Oklahoma City, it became equally evident that not only could terrorism

occur in America, but that it could be carried out by Americans on each other—a fact underscored in 1996 by the apprehension of the "Unabomber" who, over a period of 17 years, had carried out his own brand of domestic terrorism.

Today, terrorism is recognized more by its immediate consequences than by any specific intent of its perpetrators. After all, the motivation of the perpetrator of any terrorist act is absolutely irrelevant to the dead or to their survivors. Whether committed with political intent, out of personal rage, revenge, psychopathic pleasure, or any other dimension of depravity, terrorism is premeditated, covert violence against an unknowing, unprepared, and unnumbered public.

While "home-grown extremists" have been categorized in terms made all too familiar by the mass media (e.g., white supremacist skinheads, neonazis, tax protesters, crazed constitutionalists, Ku Klux Klanners, militias, environmental anarchists), it must be understood that such categories by no means exhaust the possibilities. The simple fact is that the physical wherewithal for achieving widespread public harm and injury is increasingly available to more and more people. If, historically, it has been the bomb in the hands of a political extremist that served as the primordial image of the terrorist, that image is already supplanted by that of a canister of nerve gas in the hands of a religious zealot—which, in turn, will probably be soon supplanted by that of a piece of software in the hands of a disgruntled but highly knowledgeable employee.

Global Economy

Traditionally, and despite the variability inherent in the political pluralism of individual societies, health and safety standards have been essentially the province of the nation. However, with the advent of a global economy and its consequent emphasis on an integrated paradigm of environmental quality and human health, national standards can be expected to become increasingly influenced by the realities of international business. Perhaps of particular relevance is the growing body of international manufacturing standards that encompass concern not only for quality assurance of products and services, but also for the impact of industrial processes and products on environmental quality and human health.

The broad goal of the International Standards Organization (ISO) is to promote the development of standardization and related activities in the world with a view to facilitating international exchange of goods and services, and to develop cooperation in the sphere of intellectual, scientific, technological, and economic activity.

In essence, the clear intent of ISO is to provision a company's entry into international trade on the basis of a facility audit, external confirmation of broad compliance with environmental quality and human health standards, and the public disclosure of managerial failings.

Typically known within the internal community as the *harmonizing of international environmental quality criteria,* this objective can be expected to provide a major impetus to the examination and reevaluation of traditional paradigms that underlie conventional business, legal institutions, and contemporary national approaches to the management of health, safety, and the environment. Already there is significant international movement to (a) consider health, safety, and environment (HSE) as a holistic and integral component of *Total Quality Management,* (b) reexamine the constraints imposed upon the English common law (and its diverse, global legal progeny) by the now historically dated agricultural and early industrial preoccupation with questions of property, possession, and fault, (c) recast the goal of short-term profit to one of long-term sustainability, and (d) accomplish the wholesale expansion of the public's right of access to all information that impacts human health. It cannot be expected that, in light of such considerations, either the substance or the philosophy of the health and safety standards of any individual nation will long remain unaffected.

Electronic Communication

The constantly expanding availability and affordability of sophisticated electronic communication and analytical devices present new opportunities as well as challenges to emergency management. At the level of in-plant prevention, computerized unit-process control and alarm systems are effective means for keeping dangerous production processes within safe operational limits and for providing both in-plant and community-wide emergency services with early warning of potential danger. During an actual emergency incident, these devices can play a key role in all phases of incident response, facilitating effective evacuation, on-site management of response personnel as well as off-cite backup services, and essential data retrieval and processing, including the use of expert computer programs for forecasting the air/ground/water transport of released chemicals and for the deployment of search and rescue personnel.

While the potential value of sophisticated electronic devices for both emergency planning and response cannot be overemphasized, all of it is to no avail if industry does not employ it or train plant personnel in its effective use, or if community emergency services are not provided the appropriate hardware and software or sufficient funds for personnel training and equipment maintenance and upgrade.

While there are notable exceptions, it is fair to say that the members of a local fire department, for example, have greater access to the most advanced electronic data processing devices and techniques at home than they do within their department. It is also obvious that the greatest know-how and capability are in industry which, while being the very source of the vast majority of community-wide emergency incidents, continues to focus that know-how and capability on plant productivity, with too little attention given the role of electronic information processing to on-site emergency prevention and containment.

A corollary to the value of modern electronic information processing to emergency planning and response is, of course, the misuse of that capability, whether by accident (as when a computerized process control and alarm system is mistakenly deactivated in the process of routine electrical work by a contractor) or on purpose.

In 1992, the U.S. OSHA implemented its final rule that is most often referred to as the *Chemical Process Safety Regulation,* which is a much abridged name for the more formal appellation, "Process Safety Management of Highly Hazardous Chemicals, Explosives and Blasting Agents." The final rule actually consists of two major sets of regulations: one dealing with the management of explosive and blasting agents (29 CFR 1910.109), the other with the management of highly hazardous chemicals (29 CFR 1910.119). Section (1) of 29 CFR 1910.119 defines the objective of *Management of Change* (MOC).

Those companies that handle any of more than 135 listed chemicals at or above so-called threshold quantities (pounds of chemical) must comply with the provisions of 29 CFR 1910.119. However, even a company that does not fall within the regulatory purview of the process safety regulations is well advised to consider the development of a management of change program—especially if it employs electronic or computerized means for controlling or alarming dangerous production processes.

The basic objective of any management of change program is to ensure that good engineering principles and practices are always used when designing, constructing, operating, and maintaining facilities. This objective requires the recognition that even relatively small and seemingly innocuous changes associated with facility design, construction, operations, and maintenance may actually result in unacceptable health and safety hazards. The various techniques employed in a management of change program are basically those used in any hazard assessment and are crucial to ensuring the proper use and maintenance of electronically controlled and alarmed production processes.

The practical implementation of a MOC program requires clear criteria for distinguishing between those changes in plant operations, design, and features that have no reasonable likelihood of resulting in a threat to health and safety and those that do.

Under 29 CFR 1910.119, specific exemption from MOC requirements is granted any change that is a *replacement in kind,* which is any replacement of a part (i.e., equipment, machinery, or material) or procedures that satisfies ongoing design specifications that pertain to the performance or role of that part or procedure in plant processes involving regulated chemicals. Within the limited context of this regulatory authority, MOC procedures must address the following issues with regard to any change that is not a replacement in kind:

- the technical basis for the proposed change
- the impact of the change on safety and health
- modification of operating procedures appropriate to the change and its related risks
- the time period required for preparing and implementing the change
- authorization requirements attendant to the change

The usual means for addressing these issues is the integration of MOC procedures with existing in-plant approval and authorization procedures, especially standard internal work request and work order procedures. This approach is eminently practical whether a company falls within the jurisdictional purview of 29 CFR 1910.119 or, if not subject to these regulations, simply chooses to implement an MOC policy as one component of a comprehensive health and safety program, an option that is increasingly exercised by companies in the United States and elsewhere. In fact, MOC is widely recognized as a state-of-the-art business management practice regardless of legal authority.

Where MOC is practiced routinely and regardless of regulatory jurisdiction, corporate decision-making procedures involving work requests and work orders provide specific lines of authority and responsibility for all potential changes, including those involving replace in kind (most often called *change in kind*) as well as *changes not in kind.* The typology of changes, inclusive of some range of changes from negligible to severe risk to health and safety, is precisely reflected by the increased level of authority required to implement the change.

For example, Fig. 1.2 is an overview of an MOC procedure that provides for three basic types of changes, each type being defined essentially by the level of authority required to implement it:

- Level 1: a change that may be authorized solely by the department supervisor who, on the basis of written criteria provided by the company, determines that the change is change in kind and thereby presents negligible hazard or risk.
- Level 2: a change that does not meet the criteria for a Level 1 change and which, with the concurrence of the corporate safety officer, may be implemented by the department manager only after completion of a management

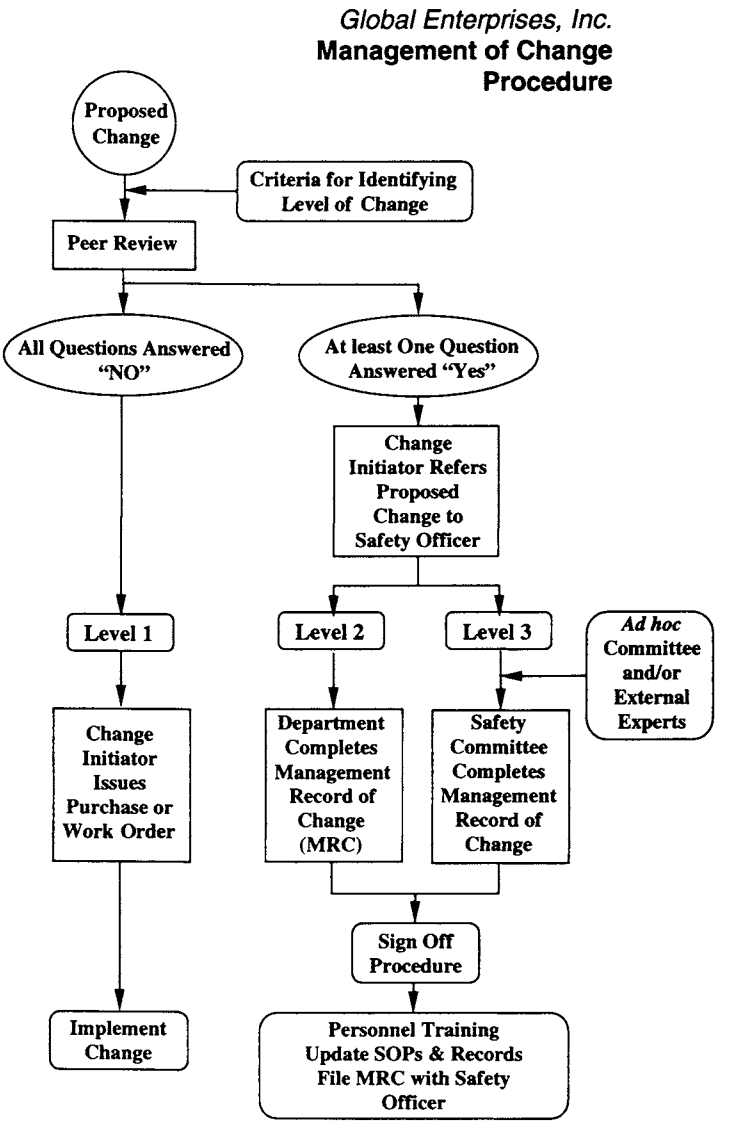

FIGURE 1.2 Example of industrial management of change procedure. A Level 1 change is a "change in kind"; Level 2 and Level 3 changes involve increasing risk due to "changes not in kind" and require higher managerial authority to implement.

record of change, which is essentially a checklist that directs the manager's assessment of the change and its implementation; in this case, a Level 2 change is known to present more than a negligible health and safety risk, but one that is relatively uncomplicated and easily controlled.

- Level 3: a change that does not meet the criteria for a Level 1 change and that, by its nature or complexity, is judged to require the attention of the highest corporate authority, including the safety officer, the safety committee, the facility manager and other selected corporate personnel, and, possibly, external consultants and experts.

The criteria for identifying levels of change in Fig. 1.2 are included in Figs. 1.3 and 1.4.

EXTENDED PARTNERSHIP

Historically, the first line of defense against community disaster was the local fire brigade. Most often, it still is, and those paramount virtues of the fire fighter—bravery and self sacrifice—are among the most treasured values in any society. But, of course, modern societies are evermore becoming increasingly complex and the range of potential emergencies correspondingly expands, forcing greater specialization and bureaucratic compartmentalization within the traditional armoratoreum of emergency response. Today, no one group or organization is equipped by training, experience, knowledge, equipment, and legal mandate to deal with every type of emergency. Even though still the pivotal organization in most all emergencies, the fire department is but one member of an extended partnership (Fig. 1.5) that, despite historic distinctions between natural and human-made disaster, between local, state, Federal and even national jurisdictional authority, between public and private economic sectors, and between governmental and personal responsibility, must function as a smoothly integrated, albeit multifaceted, enterprise. The objectives of this extended partnership are, simply, to prevent, to prepare for, and to respond to situations that present serious risk to human health and safety.

While Federal, state, and local authorities (as well as certain international authorities) have made significant advances in promoting cross-jurisdictional partnerships, it is regrettably true that, by and large, industry has maintained a "not my job" mentality regarding emergency response—despite the fact that, under regulations pursuant to the Resource Conservation and Recovery Act of 1976, hazardous waste generators must prepare *contingency plans*. In the more than 22 years since then, contingency planning has, of course, been continually expanded under various OSHA regulations, but it would appear that industry has typically substituted a rather

Global Enterprises, Inc.

For Safety Officer's Use Only

Log Number ____

Process Code ____

Management of Change
Request & Determination of Level

Name of Person Initiating Change ____

Description of Proposed Change ____

Individuals Consulted

Name	Department

I certify that I have consulted with the above individuals for the purpose of completing the reverse side of this form. On the basis of the information included on this form, I determine that the proposed change described above ...

☐ Is a Level 1 Change

☐ Must be referred to the Global Safety Officer for his determination

Signature of Change Initiator ____ **Date** ____

I certify that I have reviewed this determination and hereby agree with the above determination.

Signature of Authorized Person ____ **Date** ____

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FIGURE 1.3 Example of a management of change form (request and determination of level).

Global Enterprises, Inc.

Management of Change Request & Determination of Level

The supervisor or manager of the department responsible for carrying out the proposed change must complete this form and submit the completed form to the Global Safety Officer

If the answer to each of the following questions is "no," the proposed change is a Level 1 change. If the answer to *any* question is "yes," the proposed change must be referred to the Global Safety Officer (or his designate).

Will the Proposed Change ...

	YES	NO
1. Require any modification of any of the following Global Programs:		
• Lockout/Tagout	☐	☐
• Confined Space Entry	☐	☐
• Hot Work Permit	☐	☐
• Respiratory Protection	☐	☐
• Bloodborne Pathogens	☐	☐
• Hazard Communication	☐	☐
• Laboratory Standard	☐	☐
• Electrical Safety	☐	☐
• Hazardous Waste Contingency Plan	☐	☐
• Hearing Conservation Program	☐	☐
• Process Safety Management	☐	☐
• Ergonomic Safety	☐	☐
• Good Manufacturing Processes	☐	☐
• Personal Protective Clothing & Equipment	☐	☐
• Stormwater Pollution Prevention	☐	☐
2. Require more than routine coordination with other departments	☐	☐
3. Result in any change in equipment or piping	☐	☐
4. Result in any change in structural design or physical layout	☐	☐
5. Result in any change in raw materials or by-products	☐	☐
6. Result in a significant change in energy consumption	☐	☐
7. Result in any interruption of automatic or manual signaling devices or alarms, automatic process controls, alarms or instrumentation	☐	☐
8. Interfere with the normal functioning of any safety or emergency equipment (e.g., sprinklers, ventilation, emergency lighting)	☐	☐
9. Significantly affect the routine on-site work of external contractors or consultants	☐	☐
10. Result in a significant change in operating procedures or process directions	☐	☐
11. Result in a change in process parameters (e.g., temperature, pressure) beyond documented operational limits	☐	☐

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FIGURE 1.4 Example of a management of change form (criteria for determination of level). This is a continuation of the form depicted in Fig. 1.3.

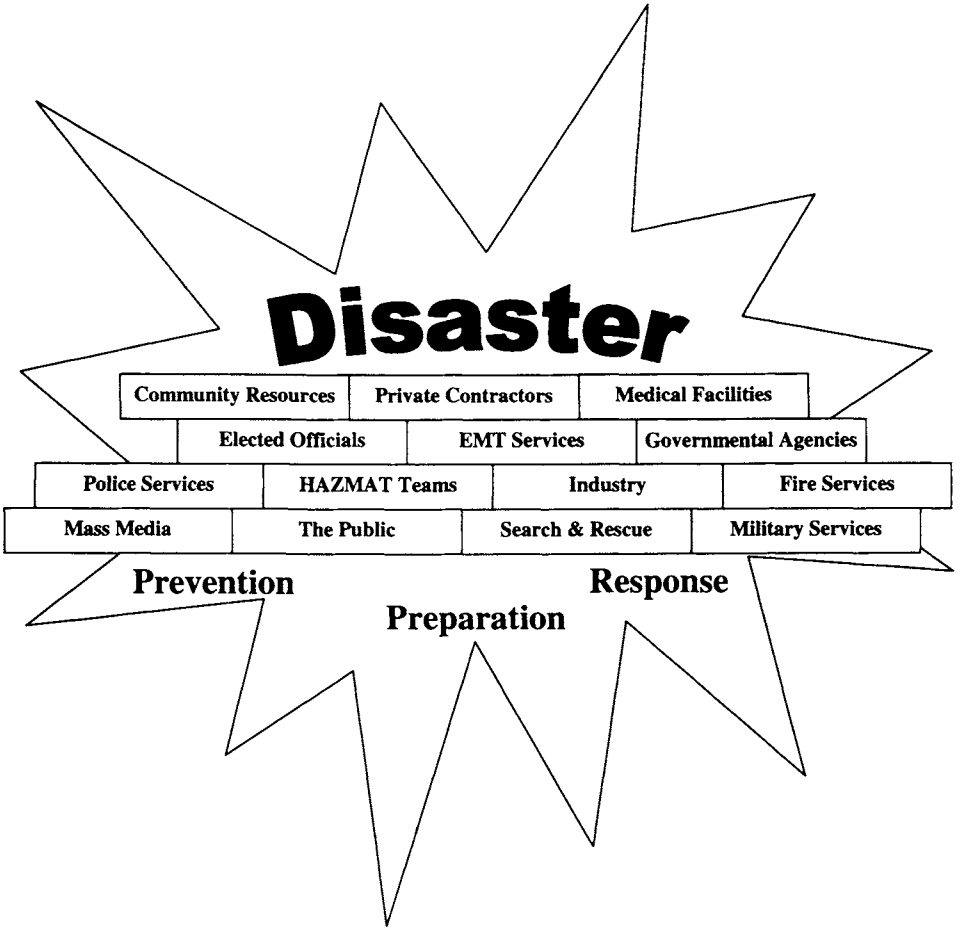

FIGURE 1.5 Emergency response capability results from effective partnerships among public and private sector organizations.

complacent "paper-compliance" with these regulations in place of substantial commitment to the social objectives they represent.

The rather dismal performance of industry at large is best highlighted by those companies that stand out as state-of-the-art companies regarding commitment to employee and community health and safety. Acting well beyond the literal requirements of specific regulations, such companies:

1. Coordinate directly with local fire departments, ambulance and EMT services, and hazardous chemical specialists in the design and imple-

mentation of their in-plant emergency response plans. This coordination includes on-site inspections, the sharing of pertinent information regarding chemical inventories and hazardous in-plant operations and areas, and practice plant evacuations.

2. Review equipment and other material needs of local fire departments, with special emphasis on inadequacies due to specialized plant operations and hazardous materials. Where inadequacies are noted, such companies have actually provided local authorities with the specialized equipment (e.g., computers, radio communication devices, specialized protective clothing) and other materials.

3. Volunteer plant facilities and resources for training exercises conducted by local fire departments and other authorities, and jointly sponsor table-top exercises in which such authorities work directly with in-plant emergency response personnel in designing a coordinated response to mock emergencies.

4. Invite all community partners in emergency planning and response to plant-sponsored workshops and seminars that relate directly to health and safety issues of interest to the community at large.

5. Maintain contracts with private contractors, service providers, and vendors for 24-hour availability of specialized equipment, materials, and services that may be needed in case of a plant-related emergency.

6. Ensure by means of appropriate engineering controls and security measures that all sensitive hazardous operations and materials are fully safeguarded against unauthorized use or entry.

7. Actively encourage, promote, and reward the participation of facility employees in community-based emergency response activities.

Such actions reflect, of course, serious commitments of time and possibly of money. However, any state-of-the-art company fully recognizes that any investment in the prevention of or timely response to an industrial emergency is minuscule relative to the very real benefits to be realized both by the corporation and by the community in which it functions.

PROACTIVE AND REACTIVE DIMENSIONS

The on-going switch in paradigm of emergency response being solely the jurisdictional province of a particular agency to being the responsibility of an amalgam of governmental and private sector partnerships clearly reflects a growing realization that any emergency, whether natural or human-made, is not simply an event, but a societal phenomenon—not simply an isolated incident, but a product of social circumstance. From this perspective, a flood (for example) is not an emergency. A flood becomes an emergency

only in terms of the devastation it causes in terms of human life and property. Moreover, key factors that influence the degree of human risk are not simply hydrological and meteorological variables, which are beyond human control, but also those political, economic, and social variables that influence the location of dwellings within flood plains and land use policies that can dramatically affect runoff storage capacity . . . variables that are subject to human control.

As long as the focus of emergency response is only on the "incident" as opposed to the "circumstance" in which the emergency occurs, emergency response must be viewed as an essentially reactive exercise—an unacceptable approach that relegates a certain number of human deaths per year and certain degrees of human misery per community to essentially an act of God. However, if the focus is in fact more on the circumstances of an emergency than on the incident itself, emergency response is seen to encompass both proactive and reactive strategies that, in combination, can effectively reduce the needless loss of human life and all its attendant trauma.

Over the last three decades of the 20th century, there has been significant and steady progress in the long historical effort to transform emergency response into a combined proactive and reactive endeavor and, in combination with the new emphasis on intergovernmental and governmental and private sector partnerships, to imbue that endeavor with practical planning, managerial, legal, and enforcement tools. There can be no question that this progress has occurred as a result of what some see as an erosion, and others see as an on-going maturation of traditional western values regarding property and personal rights. Whether at the national or international level, it is not likely that such contrary perceptions will soon (or ever can) be resolved. Meanwhile, there is everywhere a growing understanding that the continually expanding complexity and interconnectiveness of the social milieu in which we all live requires a significantly more holistic approach to emergency response than has previously been the case. Simply put, even the most rigid attitudes and philosophies tend to change in the midst of disaster.