THEORETICAL ASPECTS ON EMERGENCY PLANNING IN THE SITE OF AN ACCIDENT: SURVEILLANCE OF THE SITE

Rodolfo Arias

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INTRODUCTION

The theoretical foundations of emergency planning are designed to assist industry as well as public and private institutions in planning their response to emergencies through the identification of potential and natural hazards, in addition to any others that may have an impact on the community. Data of importance for planning are available.

A series of activities must be carried out in the design of an emergency response plan. The first stage is organization, which involves policy-making, coordination, risk assessment, legal aspects, roles and responsibilities, available resources, and additional aids.

The second is known as emergency response, which includes activation, notification, mobilization of resources, appropriate response, command at the site of the accident, and assessment of damages.

The third stage, administration, is essentially aimed at providing training and information on the plan at all levels.

Prevention in planning for emergencies is of the utmost importance in providing an effective response. It is well known that human activities can cause emergencies, and therefore sound risk assessment and information on losses or damage incurred in past emergencies should be accorded due importance in emergency preparedness planning.

Experience often shows that the initial decisions in the early stages of an emergency are often made with a high degree of uncertainty, thereby endangering not only those directly involved, but third parties as well. This is because the magnitude of an emergency usually increases during this first stage. Emergency response plans should therefore take all stages of an emergency into account in order to reduce its overall impact.

Communication and coordination between industry and public institutions is essential, since each responds differently to emergencies.

A coordinated response requires that all those directly involved be familiar with their roles and responsibilities. The complexity of the emergency response plans will thus depend on the nature and magnitude of the emergency in question.

The plan should be concise and well-organized, with sufficient detail to ensure its effectiveness. The amount of information included in the plan should be determined by the potential risk identified. Wherever possible, the policy should be "small problems demand only small solutions."

From a conceptual standpoint an emergency response plan should:

- Ensure the health and safety of both the workers responding to the emergency and the general public.
- Reduce the potential for the destruction of property or goods.
- Reduce the magnitude of the environmental impact.
- Ensure a rapid medical response.
- Reduce response times.

- Communicate the response plan to all levels

A good response plan should identify what kinds of emergencies could occur and devise systems to respond to them appropriately.

PLANNING PRINCIPLES FOR CHEMICAL EMERGENCIES

The theoretical principles employed in emergency planning constitute the elements of the contingency plan and should be considered in the design of response plans for emergencies involving hazardous materials.

A very important element in emergency planning is achieving a degree of preparedness that will provide an adequate response to the management of chemical accidents, diminishing the harmful effects of materials hazardous to health, the environment, and the community, and reducing the costs from damage to property and installations and from clean-up operations at the accident site.

The elements discussed below constitute the bases for good design of a contingency or emergency response plan, applicable to any accident caused by a spill, explosion, or release of hazardous substances during production, consumption, storage, or transportation activities.

CONTENTS OF AN EMERGENCY RESPONSE PLAN

It is important to point out that when we speak of an emergency response plan we are equating it with the concept of a contingency plan, which may be defined as a series of planned activities and sequential actions that can be launched immediately to deal with a chemical accident or event involving hazardous substances--that is, one that **might** but not necessarily **will** occur. Thus, we are speaking of a potential risk that is likely to cause an accident and all the negative consequences that it entails.

The theoretical aspects that should be considered in planning an on-site emergency response should include:

- Scope and introduction
- Notification and warning measures
- Responsibilities of the commander at the site of the accident
- Control and decontamination techniques.
- Elimination of contaminants
- Restoration methods at the site of the accident.
- Inventory of resources
- Public relations

Scope and Introduction

The terms of reference of the emergency response plan should include the following concepts:

- Objective of the plan
- Geographical and physical location of the site
- List of organizations and support groups with responsibility under the terms of the plan

Notification and Warning Measures

In the event or notification of a chemical accident, a warning system should go into operation to alert the population and those involved. The system should include:

Internal measures, whereby personnel report an accident to the people in charge, who, in turn, will implement specific measures within their companies or organizations.

External measures, in which the person in charge reports the accident to government authorities, in compliance with the regulations in force.

Responsibilities of the Commander at the Site of the Accident

The commander at the site of the accident may be a representative of industry or government. This person should make decisions, be a good communicator, possess leadership qualities, and make efficient use of time. He should be trained to organize work teams, maintain flexibility at all times, and modify the plan as the emergency evolves and more information becomes available. How he manages time in implementing the plan will be decisive for the outcome of the operation.

The response activities carried out within the first hours of notification of an accident have been shown to effect the final outcome.

Control and Decontamination Techniques

Effective evaluation of an accident involving hazardous substances is necessary before implementing control and clean-up operations at the site of the accident. Adequate information must be available before mobilizing resources. The minimum information required is:

- The type and amount of the hazardous substance involved
- The means for containment
- Potential dangers to health and the environment
- Description of the accident site

It often happens during the initial phase of an emergency response that all of this information is not available. Nonetheless, decisions must still be made.

The kinds of control measures included in emergency plans, like those designed for industry, have a very specific purpose and are usually adapted to the characteristics of the installations, the particular process involved, and the kind of product being manufactured, stored, or transported. Industrial contingency plans should include the measures necessary responding to accidents of any magnitude.

Government response plans usually tend to include more general purposes and objectives, with emphasis on regulatory aspects. Such plans are usually designed for very large-scale emergencies that, in principle, are beyond the control of the individual or entity that cause the accident and involve enormous harm to the population and material goods.

Elimination of Contaminants

Emergency response plans should include ecologically acceptable sites for the disposal of all types of hazardous materials or waste involved in the accident, in addition to suitable disposal techniques for handling the situations covered by the emergency plan. Waste disposal techniques such as burning, burial, and recycling should be specified in detail in the plan, since they constitute a serious problem and demand close collaboration between industry and the government.

Restoration Methods at the Site of the Accident

"Restoration" is understood as leaving the emergency site in the same condition that it was prior to the accident. The originator of the accident assumes responsibility for restoring the site to the degree prescribed under the existing regulations. A few examples of restoration appear below:

- Replacement of contaminated sand on beaches, planting of grass, or elimination of saturated soil
- Replenishment of lakes and streams
- Elimination of contaminated waste

Inventory of Resources

This item, as well as the previous one, is of the utmost importance in the design of the plan and should at the very least include the following:

- Necessary and additional equipment
- Human resources
- Contractors
- Experts and consultants
- Communications equipment
- Mass media, radio, television, etc.

The inventory should list contacts that may be needed for obtaining resources outside the scope of the contingency plan.

Public Relations

Public relations should be an integral part of the overall emergency plan, since failure to furnish adequate information as rapidly as possible to the public and the communications media leads to unnecessary complications in the management of the accident and frequently hinders the work of the technical personnel in charge of response, control, and clean-up at the site.

PLANNING PRINCIPLES FOR EMERGENCIES

The purpose of this section is to establish planning principles for emergency response operations through an analysis of certain concepts, such as the principles of managing emergencies, the types of

operations involved, the management of the operations at the site of emergencies, and the organization of command at the site.

One of the key purposes of emergency response is to protect and safeguard the lives of all those involved and to reduce the loss of public and private property. One of the main challenges to those responsible for designing emergency response plans is, what should be addressed first--the cause or its effects?

Three elements significantly influence the success of any emergency response plan:

- Resources: appropriate personnel and equipment
- Strategies, techniques, and plan of action
- Management of the response: leadership, cooperation, and communication

FIELD OF APPLICATION

It is most important for everyone involved in an emergency to have a clear idea of what is to be accomplished. A precise understanding of the purpose and the field of application of the response to an emergency is considered to be the most important principle involved.

The basic elements of the problem to be solved by the response operations constitute the objectives of the plan. Before attending to any emergency, those responsible must agree to work together in a coordinated manner and reach a consensus on the best means to deal with it in order to save lives and preserve property. Inability to come to an agreement on these particulars may result in failure.

KNOWLEDGE OF THE AVAILABLE RESOURCES

For good planning, complete knowledge of the available resources, both human and material, is of vital importance, and familiarity with the emergency site and the amount of resources assigned to it is key to an appropriate response. An awareness of deficiencies in and access to resources is of the utmost importance to good organization.

It is well known that the most important resources in emergency response are human resources. Response teams work under extremely demanding conditions that lead to severe stress. It is therefore essential to keep morale high, and this depends to a great extent on the knowledge, confidence, and ability of the response teams to perform their assigned tasks under the plan. It is therefore imperative to meet their training and information needs and to provide them with personal protection equipment appropriate for their assigned tasks.

ACCESS TO INFORMATION

It is impossible to prepare a plan without obtaining certain essential information, such as the characteristics of the site, climatological conditions, access routes, population distribution at the site of the accident, and the nature and amount of the hazardous substances involved. Even negative information may be useful.

It is important to have all the necessary information and to organize and evaluate it so as to minimize confusion, rumor, and exaggeration. Such efforts, however, are limited by the time and the resources available. Obtaining timely and updated information is a dynamic process that continues throughout the operation, and receiving such information opportunely is the best way to provide feedback for the plan.

THE IMPORTANCE OF COMMUNICATION

Communication can mean the difference between a successful or a failed operation. Communication problems lie mainly in the content of the messages, the means of transmission, and the interpretation given the message by those receiving it.

The emergency response plan should include procedures to forestall any communication problems that may arise. Internal communications systems are equipped to handle a specific amount of information. It may not be possible to augment the response force to a degree commensurate with the magnitude of a particular emergency; moreover, its communications systems may prove unable to handle the work load, thereby slowing down the entire communications process.

Communications between private and government sectors may break down due to the incompatibility and amount of each sector's equipment. Communications between agencies during an emergency often fail to function smoothly under pressure. This means that a comprehensive plan should be considered that regulates communications between the agencies involved.

COORDINATION AMONG AUTHORITIES

Every response plan should lay down a line of authority at the site of an emergency to be recognized from the very outset. Designation of the authority should be clearly enunciated and included in the emergency plan. All agencies participating in the emergency response should clearly understand this line of authority, and all those participating in the response should have clearly defined limits to their authority and control. The actions of a individual or a group of individuals acting without authorization should not be permitted to jeopardize the entire response to the emergency.

Legal norms govern policy, controlling and defining the actions and authority of emergency response organizations. It is therefore important in planning to clearly identify the applicable legal norms--the regulations, codes, and standards--in order to establish action parameters for the person responsible for the emergency response at the site of the accident, without losing sight of other legally constituted authorities within the government services, such as the armed forces, police, fire-fighters, and civil servants.

The person in charge (the site commander) should therefore be cognizant of these services' authority to take action.

Past experience indicates that the site commander may be faced with four different problems in dealing with an emergency response:

- There is a tendency, especially at the higher levels, for emergency response providers to work too long. This has two consequences: first, overtired personnel become inefficient; and

second, when a new team takes over, the replacements often do not receive enough information, since important information remains in the heads of a few people, is not written down and, therefore, not passed on.

- Almost inevitably the question is raised about who has the authority to take charge of unusual tasks associated with disasters or emergencies, such as mass burials, large-scale searches for victims, or rescue operations. This should be resolved by assigning specific responsibilities in the emergency response plan.

- Conflicts between the agencies and private or outside groups inevitably arise over traditional jobs, such as maintaining security in an emergency zone, which is normally a function of the police. There may be problems, however, if the local or federal police, or even the armed forces, all attempt to ensure security at the same time. Once more, it is of the utmost importance to anticipate these problems and deal with them when designing the plan.

- Disasters frequently cut across jurisdictional barriers, creating potential conflicts. Under normal conditions areas of responsibility are frequently unknown or overlap. During disasters or emergencies these conflicts tend to intensify.

SETTING PRIORITIES

There is usually a shortage of personnel and materials at the beginning of an emergency response operation, and consequently, setting priorities for the use of resources is very important, particularly since those who must respond to the emergency arrive at the site of the accident with minimum resources. Imaginative use of resources saves time and effort; if the priorities are clearly defined it will be all the more easy to achieve proper coordination.

At the accident site, the commander should be able to rapidly switch priorities in order to deal with changing or unexpected situations. More than anything else, this requires flexibility in decision-making.

COOPERATION AND COORDINATION

All the agencies involved in an emergency response should make a supreme efforts to achieve cooperation, Good will and the desire to cooperate are essential at all levels, given the growing interdependence of all organizations and agencies.

Emergencies are occurring more and more frequently, and thus, a variety of institutions or agencies unexpectedly find themselves working side by side. In many cases, for example, urban growth has led to a shifting of responsibilities, either physically or administratively. If agencies encounter difficulties in coordinating and cooperating with one another in their routine work, imagine what happens in an emergency.

All the emergency response agencies are in agreement, at least on paper, that coordination is necessary in emergencies or disaster situations. However, the means of achieving coordination are not well defined, nor does any one agency usually have a clear notion of what the others do.

Coordination is viewed as an informal arrangement with other groups working in the same field as a particular group, or else as the centralization of decision-making by a particular agency or group. It is not surprising, then, that problems crop up even though agreements have been reached prior to the drafting of an emergency response plan.

As the number of emergencies or the groups responding to them increases, so does the problem of coordination. In order to prevent this problem, it is recommended that a previously agreed upon emergency management technique be employed at the site of the accident. This helps agencies to work as a team and share the available resources for their mutual benefit.

The site commander should make effective use of the skills and knowledge of the different agencies involved in the emergency response. For example, in a flood, coordination may be required of the police to monitor the area, special groups to locate victims or survivors, fire-fighters to undertake difficult rescue operations and fight fires, and land and air ambulances to evacuate the wounded, in addition to social services volunteers, and transportation.

RESTORATION OPERATIONS

These kinds of operations are aimed at complete recovery and a return to normality. The following minimal operations should be considered after the emergency:

- Restoration of communications channels (roads, streets, telephones, etc).
- Collection of rubble
- Damage control
- Elimination of health hazards
- Recovery of essential services (water, electric power, etc).

The site commander is not usually very concerned with the operations listed above; however, it is important for him to facilitate these tasks before ending his work, when the potential risk has ended and decontamination and clean-up operations have begun.

Emergencies involving hazardous substances, by their very nature, happen suddenly, and when they occur in transit it may not be possible to pinpoint their exact location as in emergencies at chemical plants or in floods.

Emergencies, however, may arise without any warning, signifying a true emergency only when their magnitude increases. A leaking tank truck in itself does not necessarily pose a major threat, but if combustion occurs or the leak assumes major proportions, the nature of the situation changes from a minor emergency to a major one.

ON-SITE EMERGENCY OPERATIONS (COMMAND POST)

Emergency operations at the site of an accident, regardless of its nature, and the operations being carried out, should be performed in a manner that ensures that resources are used effectively and rapidly. The process may be divided into the following stages:

- On-site deployment and organization

- Control of emergencies
- Restoration

ON-SITE DEPLOYMENT AND ORGANIZATION

This stage develops rapidly through several concurrent activities, beginning with a warning notification phase and followed by a control phase carried out by the first-response teams and subsequently by additional teams. At this point the response of the first three groups (police, fire-fighters, and ambulance services) should be coordinated through effective on-site response management.

It is very important to establish warning procedures and other procedures required for effective on-site management of emergencies, as in the case of major accidents or those occurring in densely populated areas.

If time permits, police, fire-fighters, and ambulance services should be well apprised of the situation and keep the specialized groups apprised of the current situation; thus, the first to respond will cope with the emergency with the resources it has available, respecting the coordination activities provided for in the plan.

When the commander arrives, his first act should be to evaluate the magnitude of the situation and establish its perimeters, the principal rescue areas, and the center of operations for the emergency. The information provided to the first group responding to an emergency constitutes a substantial portion of the response, since the first group is the best source of information available at the time.

Having detailed information about the site of the accident is another important element, since it is used to determine the critical points, the extent of the damage, and the kind of specific response required. At this point the commander can select the tactics required for coordinating operations.

ORGANIZATION OF THE SITE

During the initial response phase, certain activities not requiring coordination are carried out. The assignment of a response commander to the accident site indicates that controlled and coordinated responses are already under way. Improvement and control of access routes and identification of areas for different activities must be accomplished as early as possible to avoid confusion.

Additional resources, such as heavy-duty rescue equipment, should be available if needed. The gathering and deployment of all resources available on-site will ensure a viable operation; on-site deployment varies for each emergency response situation, but the organization follows the same sequence.

COMMAND HEADQUARTERS

One of the most important considerations in responding to an emergency is the location of command headquarters. It is suggested that whenever possible it be located at the center of the activities so that the commander is able to coordinate and control activities while observing all access routes.

In order to provide such control, the commander, if possible, should be able to communicate easily with senior officials from all the key agencies involved in the emergency response and with other kinds of agencies, groups, or organizations whose assistance may be required.

The command post should be clearly marked, immediately recognizable, and easily accessible. The agencies involved will normally designate their own control officer who will establish contact with the command post.

SECURITY

Security at the site of the accident is the responsibility of the police, and in major emergencies two perimeters should be established: an inner perimeter that includes the immediate emergency area, to which access should be limited to essential teams and equipment; and an outer perimeter around the inner perimeter that includes the area assigned for the arrival of personnel and equipment, the temporary storage of bodies, and the information center.

All those involved in the emergency response will set up their base of operations in the area between these two perimeters, where all preparations for responding efficiently to the emergency will be carried out.

It is also recommended that access to the area bounded by the outer perimeter be strictly controlled, with entry by a single access route, although a second route may be maintained to facilitate the entry of personnel and emergency equipment if time and wind conditions so permit. The outer perimeter should be patrolled and guarded to ensure that unauthorized persons and spectators are denied entry. The outer boundary line should be sufficiently distant from the site of the emergency that there is no interference with emergency response activities and that new hazards, such as explosions, the collapse of buildings, and the spread of radioactive materials or gases do not affect the crowds.

Police officers should make sure that all equipment and personnel involved in the response have easy access and are assigned suitable locations. This means that they should be informed of the location of the command posts and operation areas. Security personnel must also direct the representatives of the communications media and special visitors to the areas authorized for their activities.

AGENCIES INVOLVED IN THE RESPONSE

Appropriate management at the accident site should be guided by a thorough understanding of the operational responsibilities of the three main response agencies taking part in the operation. The responsibilities of the police, fire fighters, and medical services at the site of the accident are as follows:

Police

- Protection of life and property
- Control of traffic and crowds
- Guarding of bodies
- Evacuation

- Protection of the perimeter surrounding the site
- Cooperation with and assistance to other agencies
- Setting up of a control post at the site of the emergency

Fire-fighters

- Prevention and control of fire
- Containment of incidents involving hazardous substances
- Prevention of structural collapse
- Search and salvage
- Provision of basic emergency care while awaiting the arrival of ambulances or medical services
- Assistance to other agencies, upon request
- Establishment of a command control post
- Appointment of an officer to take charge of the management of the site, if so requested
- Activation of mutual assistance, if required.

Ambulances/Medical Services

- First aid for and diagnosis of victims
- Essential emergency medical care
- Request for medical personnel at the site, when necessary
- Removal of patients from the emergency site to the hospital
- Provision of assistance to other agencies, upon request
- Establishment of a command post
- Activation of mutual assistance, if required.

ASSISTANCE BY TEAMS OF SPECIALISTS

Depending on the nature of the emergency and its impact, teams of specialists may be called to the site to provide assistance or assume responsibility for controlling a specific action that may be of key importance to the success of the operation; consequently, their specialized knowledge and counsel should be taken into account whenever possible. The teams of specialists trained in industry to handle hazardous materials (HAZMAT) are fully conversant with the products that may be involved in a particular emergency and are experienced in handling these substances and the special equipment required for such tasks.

RESTORATION ACTIVITIES

An emergency operation does not conclude when the cause of the accident is eliminated or when the activities to safeguard human lives come to an end. The restoration stage should begin a the same time as the measures to control the emergency. It is most likely at this stage that the commander will select an expert from the first three response agencies to provide information and support.

EMERGENCY RESPONSE PLANS - COMMAND HEADQUARTERS

Introduction

The number of people required for emergency response activities in the event of an accident involving hazardous materials may vary widely, but whether numerous or few, there is no question that they should be organized. Without coordinated and organized effort, the main goal of the response may not be met--that is, protecting public health, the environment, and property.

Every accident involving hazardous substances is unique. The materials involved, their effects, and the operations (activities) required to avoid or mitigate these effects are specific to the accident. Nevertheless, all accidents share the common denominator of requiring planning, organization, the location of resources (personnel, equipment, and funds) and the implementation of response operations.

When an accident involving hazardous substances occurs or when any kind of natural or man-made disaster takes place, people in the affected area will attempt to contain and alleviate the situation, and consequently they will coalesce into some kind of organization. However, their ability to contain the situation effectively may be severely limited, since personnel with experience, equipment, and other necessary resources may not be available on short notice, which will cause a delay in the rapid response required to alleviate the situation.

The lack of an organized emergency response plan in a given community reduces the capacity to control crises effectively. There may be cases in which a considerable length of time elapses before the situation is controlled and returns to some semblance of normality. Time is lost in characterizing the problem, organizing personnel, locating resources, and reacting. These obstacles hinder immediate response activities, creating additional problems that could have been avoided if the response activities had been initiated immediately.

The existence of an emergency plan can result in a more effective performance from all kinds of trained response personnel from local jurisdictions. Other accidents may require additional response personnel from state and federal agencies, as well as from private industry. Any of them, with a cohesive unit and a good response team, will be capable of taking whatever corrective measures are necessary.

Response plans exist at every level of government--local, state, and federal--to deal with emergencies caused by hazardous materials. Each plan prescribes how the particular governmental level is to react and establishes the organization of local and state responses for integrated action. It also contains provisions for the incorporation of local and state authorities into its emergency response organization and provides a mechanism to coordinate response activities at all government levels. Similarly, the state plans include roles and responsibilities related to emergency response activities.

Federal, state, and local response plans vary considerably in detail and scope. Local plans are usually more specific, whereas state and national plans tend to be less so. Typically, however, whatever the plan in effect, the organization prescribed is adapted and modified to meet the specific needs of the accident.

In order to function effectively, the organization established for an emergency should:

- Have a leader
- Establish authority
- Establish standards and procedures
- Determine objectives
- Assign responsibilities
- Administer the resources (financial, equipment, and personnel).
- Plan and direct operations
- Establish internal communications
- Establish communications with external organizations

In the absence of an emergency response plan, an ad hoc functional organization should be set up with the personnel available for the specific accident.

ORGANIZATIONAL CHART

Any organization that has more than a few people for response activities should draw up an organizational chart to map out the relationships between the various components (divisions, branches, or sections) of the organization. The chart should specify the chain of command and establish internal communication channels.

Example of an Organizational Chart

Organizational charts are supplemented by function descriptions that detail the authority, responsibilities, and duties of the organization's components. The type and complexity of the organizational chart and of the functional descriptions largely depend on the magnitude of the accident, the operations required, and the number of people or agencies involved in the operation.

The key aims of an organizational chart are to:

- Establish a chain of command
- Assign responsibilities and functions
- Specify personnel requirements
- Organize internal communications

KEY PERSONNEL AND THEIR FUNCTIONS

The response team consists of an organized group of people, each of whom has assigned tasks and responsibilities. The response plan normally specifies the key personnel and their functions. At operation start-up it may be a necessary to make adaptations to the programmed structure of the organization.

Unanticipated operations requiring additional organizational functions

The positions, functions, and responsibilities in accidents vary. Serious accidents require people with a wide variety of experience and skills. For less serious accidents, fewer people and resources are

necessary. Key personnel should be adaptable in order to meet the needs in an accident involving hazardous materials.

KEY PERSONNEL AND FUNCTIONS THAT MIGHT BE USEFUL

Site commanders and on-site coordinators or administrators, who have clearly defined authority and responsibilities to administer and direct all response operations.

Technical officers, who direct and coordinate scientific studies and perform other duties related to the acquisition, analysis, and interpretation of samples and observation in the field. They also recommend corrective measures and provide technical guidance to accident commanders in these areas.

Safety officers, who provide advisory services to the commander on all matters related to the health and safety of those participating in on-site operations, in addition to organizing and directing the safety program. They may halt operations when conditions are hazardous. They also coordinate activities with technical officers.

Field chiefs, who direct activities related to clean-up contractors and other personnel participating in emergency and long-term restoration activities.

Public information officers, who provide information to the media and news to the general public concerning activities at the accident site.

Security officers, who are in charge of physical safety at the site and coordinate with the departments in complying with the law and in directing fire-fighters. They also control access to the site.

Registrars, who maintain official registries of the activities taking place on-site.

Operations officers, who direct the activities of the team leaders and coordinate these activities with the technical and safety officers.

Sector chiefs, who direct specifically assigned tasks, such as:

- Initial entry team (8)
- Decontamination
- Sampling
- Observation
- Equipment
- Photography
- Communications

Finance officers, who provide financial and contractual backing.

Logistics officers, who provides necessary equipment and other supplies.

Medical officers, who provide medical support and act as coordinators with the medical community.

THE ACCIDENT COMMAND SYSTEM

The accident command system exemplifies an organization in which the criteria for organization, outlined above, are appropriately applied. It is an on-site command system used by fire-fighters in providing assistance in the event of fires, medical emergencies, rescue operations, accidents involving hazardous materials, and other emergencies. The system establishes a chain of command and draws up a list of key personnel and their functions. The command system is activated automatically when an accident occurs that requires fire brigades. The accident commander is the first officer to arrive on the scene, and he remains at his post throughout the accident, unless he is replaced by a higher ranking officer. The accident commander starts with the system in place and adapts it to create the administrative and organizational structure needed to control the situation.

THE ACCIDENT COMMAND. SAFETY, PARKING, INFORMATION, SECTOR COORDINATION

Command structure, particularly for minor response activities.

The magnitude of a given accident determines the size and complexity of the organization required. Smaller accidents require fewer response personnel and fewer activities.

Command structure for major response activities.

COMMAND PERSONNEL - RESPONSIBILITIES

Accident commanders, who are directly in charge of all accident activities. They determine the number of personnel and other resources required and also work out strategies to control the accident.

Operations officers, who are responsible for directing accident activities under the supervision of the accident commander. They supervise operations to combat the problem and furnish reports to the accident commander.

Safety officers, who are responsible for all safety activities. They identify hazardous situations and have emergency authority for operations or activities when conditions are hazardous.

Public information officers, who provide coordination between accident commanders, the press, the news media, and the public at large.

Resource officers, who are in charge of all resources required for controlling the accident. They compile and store information and prepare reports on the accident-related activities under way.

Water supply officers, who assess water needs and are in charge of maintaining adequate water supplies.

Medical officers, who are in charge of the necessary medical services. They provide priority coordination at the accident site, in addition to treatment, transportation to the hospital, and necessary medical services.

Coordination officers, who provide coordination between the accident commander and other governmental and private organizations.

Sector officers, who are the technical and supervisory managers of the various sectors (activities) that may be required, such as the taking of samples.

In cases where the fire-fighting services are not in charge of the accident--for example, a major natural disaster--the system, as a whole becomes part of the organization developed in the community disaster preparedness plan. Similarly, when an accident involving hazardous materials occurs, the fire department's hazardous materials team is integrated into the accident command system.

HAZARDOUS MATERIAL RESPONSE TEAM

At the local level, the hazardous material response team is usually associated with the fire-fighting service. It may consist of a team whose sole purpose is to respond to accidents involving hazardous materials, but it often has other related and specialized functions, e.g., large-scale salvage operations. Depending on the accident, the team may be the only fire-fighting unit present on site. In that case, the team commander may also be the accident commander. If other units are involved or if a large-scale accident is involved, the team becomes part of the general organization of the system as one of the sectors on the organizational chart.

The emergency response team, as an entity separate from the system, should be organized so that it can act effectively to control and restore the situation. The team requires an organizational chart and a description of job functions that parallels the lines of the command structure of the system.

Regarding the implementation of hazardous material response operations, the possibility of a hazardous substance release requires actions that will eventually restore the situation to the condition that existed prior to the accident. Although each accident has its own operational requirements, there are nonetheless a certain number of operations that are common to all emergency response operations.

The planning and implementation of emergency response operations requires at the very least that auxiliary workers:

- Organize, select key personnel, assign responsibilities, and make whatever modifications are necessary as they proceed with the operations.

- Evaluate the situation and, based on the information available, make a preliminary evaluation of the hazards, assessing the impact of the accident with or without intervention.

- Develop a plan of action and a preliminary plan of operations for information gathering, immediately take steps to combat the problem and begin rescue operations, establish emergency activities, and constantly reassess the situation as additional information becomes available.

- Perform preliminary research outside the site, obtain additional data to assess the situation, use direct reading instruments, obtain samples, make visual observations, determine the emergency activities to protect public health and the environment, identify requirements for

reconnoitering at the site of the accident, determine, if needed, the level of protection required for personnel outside the site, and demarcate boundaries for contaminated areas.

- Survey the site of the accident. Obtain data (using instruments for direct readings, taking samples, and making visual observations) that will make it possible to determine or confirm hazardous conditions and make a general assessment of the accident; modify initial entry safety procedures as more data becomes available; determine the levels of protection required for the initial entry team (8) and subsequent operations; plan and execute control and decontamination procedures.

- Modify or adapt the original plan of action based on the additional information obtained during the initial observations at the site.

Review the immediate emergency measures. The long-term activities of the plan include:

→ Additional observation and sampling
→ Resource requirements
→ Safety plan, clean-up, and restoration measures
→ Legal implications and litigation
→ Documentation of on-site activities

The safety and health of the personnel engaged in emergency response operations is highly important in any undertaking of this nature. The risk for such personnel increases as they move closer to the hazardous materials. On-site operations should be planned and executed with caution. Before entering the immediate area of an actual or potential release, an effort should be made to obtain as much information as possible, given the time constraints, about the kinds of materials involved and the extent of potential hazards and risks (through shipping documents, transport labels, files, container labels, and other visual observations).

The information available is used to determine:

- Whether there is a need to institute measures off-site
- The need to enter the site
- The kinds of equipment available
- The data required to assess potential hazards:

Steam/organic gases
Steam/inorganic gases
Particulate matter
Oxygen concentration
Radiation
Samples required for laboratory testing

The levels of protection required by initial entry teams:

- The equipment needed
- The number and kinds of personnel in the entry team

- The frequency with which instructions should be given to the team regarding on-site control procedures, including:

  → Designation of work areas
  → Control of access
  → Physical barriers

Identification of required decontamination procedures.

The need for back-up medical resources.

Emergency measures to deal with the problem.

Priorities for obtaining data and acquiring samples.

BIBLIOGRAPHY

Canadian Standards Association, Emergency Planning for Industry. Major Industrial Accidents. 1994.

Consejo Canadiense de Accidentes Industriales Mayores, Principios de Planeación en Casos de Emergencia. Typed document. 1991.

World Health Organization, Prevention of Chemical Accidents, Hemisphere Publishing Corporation. 1989.

Manual de Adiestramiento para Reacciones a Incidentes con Materias Peligrosas, Environmental Protection Agency. 1990.