

Chapter 2

Emergency and Disaster Preparedness and Response

Designing an Emergency and Disaster Prevention and Response Program essentially involves carrying out the tasks outlined in the previous chapter, as well as others that will be described below. This chapter will focus in greater detail on the Emergency Operations Plans.

If you would like more information on disaster prevention and mitigation measures for water supply and sewerage systems, please consult the bibliography at the end of this book.

Emergency and Disaster Management

Objective: To ensure, in emergency and disaster situations, the least possible impact on water supply and sewerage services, as well as an effective response that contributes to preserving the health of the population.

Generally, water supply and sewerage companies and agencies have standard procedures for routine repair of damage to canals, pipes, and other infrastructure, responding to electrical power failures, fluctuations in the quality and quantity of the water supply, etc. Such procedures might be described as the first level of intervention in emergency management, which makes it a natural starting point and foundation for the development of actions aimed at responding to disasters or major emergencies. This first level of intervention has also served to



Distributing emergency drinking water supplies following Hurricane Pauline in Mexico in 1997.

C. Osorio, 1997

provide water supply and sewerage companies with a certain degree of experience in disaster management whenever major adverse events have taken place.

History reveals that greater attention has been paid to rehabilitation and reconstruction efforts than to making them unnecessary in the first place. This approach should be changed by setting in motion emergency and disaster reduction plans. These must focus on the preventive maintenance of structures and equipment, as well as the establishment and updating of those operational procedures and manuals that help to integrate the accumulated expertise of the staff.

As noted elsewhere, emergency and disaster management consists of a coherent set of planning, organization, control, evaluation, and training activities, involving all institutional, human, and operational resources that should be developed and integrated into the agency or company. The objective is to restore in the shortest time possible those water supply and sewerage services most essential to the population.

In order to launch the emergency and disaster management process, an official state of alert must first be declared. This should immediately set in motion the units or departments of the company or agency in charge of responding to each stage of the disaster cycle. (It should be noted that prevention and mitigation activities have a role to play even after a disaster has struck.)

Bearing in mind that each company or agency must act within the constraints of its own resources, the following is a list of those organizational components that should play a role, followed by a description of what that role should be.

1. Company or Agency Directors
2. The Central Emergency Committee
3. The Emergency and Disaster Office or Unit
4. The Emergency Operations Committee
5. The Situation Room
6. The Declaration of States of Alert and Emergency

The Company or Agency Directors

The highest decision-making body of the company or institution must establish all policies and strategies concerning emergencies and disasters. Depending on the structure of the company or institution, the relevant body might be a Board of Directors, Executive Board or the General Manager's Office.

The intervention of the decision-making entity with the greatest executive capacity will be most effective and relevant to the extent that there is, under its direct supervision, a specific unit or office responsible for emergency and disaster management. The organizational structure of the water supply and sewerage service company or agency will determine whether the following groups play an advisory role or are in the direct line of command.

In addition, attention must be paid to regulatory authorities, which might have established emergency and disaster response policies to ensure that water supply and sewerage services remain available in a crisis. The conditions for continuity of these services will be included in the Emergency Plans.

Functions and Responsibilities

- Set the general company or agency policy regarding emergency situations;
- Approve the establishment of an emergency and disaster office or unit;
- Appoint the members of the Central Emergency Committee;
- Approve the Emergency Plan and the protocols for declaring a state of alert or an emergency within the company;
- Declare a state of emergency for the company or agency;
- Ask relevant government authorities to declare a state of emergency regarding the water supply and sewerage system if justified by the situation;
- Give consent and support to actions taken before, during, and after an emergency.

The Central Emergency Committee

The Central Emergency Committee is the functional organ in charge of planning, organizing and guiding the use of human, material and financial resources, and any mitigation, prevention, preparedness, response, rehabilitation or reconstruction activities regarding emergencies or disasters. It is a decision-making committee that should be directly accountable to the company's directorate or other relevant top-level body, and will assume maximum authority in emergency and disaster situations.

Structure of the Committee

The Committee should comprise, whenever possible, the company's highest-level decision-makers, including those in charge of the operational, administrative and financial divisions and other units relevant to emergency and disaster management. One option is to invite professionals from other institutions and sectors to be part of the Committee as a way of furthering inter-institutional and cross-sectoral coordination. The Committee should at the very least include representatives from the following areas:

- The general management office;
- The heads of the production, operations and maintenance divisions;
- The head of the administrative and financial division;
- The head of procurement (supplies and transportation);
- The heads of the development, works and engineering departments;
- The head of the planning department;
- The head of the company's public relations department;
- Representatives of the committee that drafted the Emergency Plan;

- The official responsible for representing the company or agency in its interactions with civil defense bodies (in case he or she is not the same as the representative from the company's management office);
- The person in charge of the company's Emergency and Disaster Office or Unit.

The chair of the Committee should be occupied by the highest formal authority among the representatives appointed to the group.

Depending on the size of the organization or the complexity of the system, this Central Emergency Committee may be replicated at a smaller scale in the various geographical regions or sectors in which the company is involved, so as to respond just as effectively to regional emergencies. Whenever necessary, the various committees should be called "operational committees."

The relations of the Central Emergency Committee with civil defense or the national emergency commission, which normally includes representatives from several ministries, the police, and firefighters, are extremely important, particularly for coordinating the actions needed in a disaster situation. Accordingly, it is essential to make sure that a representative of the water supply and sewerage sector is a member of the national emergency commission.

Functions and Responsibilities

The chief role of the Central Emergency Committee is to make the decisions needed to ensure that water supply and sewerage services can be restored in the shortest time possible after an adverse event. This calls for carrying out specific actions at each of the various stages in the disaster cycle.

Its members should meet periodically, at least twice a year or more frequently depending on their work-load, and obviously as often as needed during a state of alert or emergency. They should also discuss and approve the general guidelines for the unit or group entrusted with designing the emergency plan, including guidelines on mitigation, prevention, and preparedness.

The functions of the Central Emergency Committee will depend on the company's policies, characteristics, and organizational structure. In broad terms, however, the following functions should be mentioned:

- Declaring a state of alert based on the relevant protocols established by the company's directors;
- Setting up the emergency and disaster office or unit;
- Monitoring the drafting and implementation of the emergency plan;
- Coordinating the working program with the emergency and disaster unit;
- Monitoring the ongoing staff training on emergency procedures, which should include both theory and practice;

- Assigning priorities, coordinating, and overseeing the appropriate use of resources during an emergency;
- Forging and maintaining communications and coordination with the public institutions responsible for emergency and disaster management, both at the local and national level;
- Maintaining contact with private companies such as suppliers of equipment, chemical products and pipes, professional associations, and sub-contractors;
- Coordinating emergency and disaster response efforts with the Emergency Operations Committees;
- Supporting the actions of the Emergency Operations Committees whenever there is a need for intervention at higher levels;
- Establishing the communication procedures, both within and outside of the company;
- Approving and securing the necessary financing for prevention and mitigation programs.

The Emergency and Disaster Unit

It is the responsibility of this office or unit to carry out, on an ongoing basis, the company's internal disaster prevention, mitigation and preparedness actions required by the Central Emergency Committee, as well as to coordinate mitigation and response efforts with other institutions.

In the case of some water supply and sewerage companies or agencies, this office has a formal and permanent place in the organizational chart, which evidently makes it possible to effect improvements in less time. When such a unit is not official, the functions described below must be assigned to the company's operational unit or other units selected for this purpose. Regardless of its internal status, this office is the executor of the guidelines provided by the Central Emergency Committee.

Structure of the Unit

The Emergency and Disaster Unit—or whichever other organizational component is entrusted with the same functions—should comprise a coordinator who is assisted by professionals in operations, maintenance, planning, and engineering, as well as any others who may be needed. The office will work as a technical committee entrusted with specific goals, employing whatever existing technology may be required (such as geographic information systems or GIS). It should be provided with the necessary budget to outsource any specific studies that the company or agency cannot carry out on its own due to lack of specialized personnel. Such studies may include hydrogeology, structural, or soil assessments.

This unit should also be able to requisition technicians and professionals on a part-time basis to engage in specific tasks such as the vulnerability analysis of a treatment plant. This would also require the collaboration of the head of the plant and other professionals.

Functions and Responsibilities

The chief responsibility of the unit must be the formulation, evaluation, control and monitoring of the Emergency and Disaster Prevention and Response Program. To fulfill this mission, the unit must procure vulnerability analyses of each of the components of the company's water supply and sewerage systems, follow up on the design of the operational plans, and carry out periodic evaluations to ensure that the plans remain up to date. In order to perform this work, it is essential for the unit to remain in direct and close contact with the Emergency Operations Committees.

Depending on the size and characteristics of the company, this office may transfer some of its responsibilities to the various Emergency Operations Committees.



As an emergency measure during the eruption of the Pichincha volcano in Ecuador, in 1999, temporary coverings were installed to protect the water treatment plant from ash-fall.

C. Osorio, 1999

The following are some of its main functions:

- Coordinate vulnerability analysis of the water supply and sewerage systems with the Emergency Operations Committee or Committees;
- Coordinate specialized vulnerability assessments with private or academic consultants;
- Assess the training needs of all staff regarding emergencies and disasters, including the type and level of training required by the various departments and employees;
- Promote, together with the company's training unit, the training required in the various relevant fields;
- Coordinate training activities with government agencies and universities;
- Review and periodically update the Emergency Plan;

- Ensure that all relevant information has been collected, including personnel and logistical data, plans and diagrams, descriptions of the systems, etc., required for vulnerability analyses and emergency plans;
- Oversee and assess the process for documenting emergencies so that the Emergency Plan remains up to date;
- Gather and document the lessons learned from various emergencies and disasters;
- Represent the company when dealing with civil defense or national emergency agencies.

The role of this unit is crucial when it comes to personnel training, an essential requirement when dealing with emergency situations. One of the key points is to disseminate relevant information to all employees and produce, in cooperation with the company's training unit, a structured training program involving different subjects and levels of detail to meet the needs of the various professionals and technicians who work for the firm. This training program must be carefully aligned with the objectives not only of the Central Emergency Committee but of the company or agency as a whole, so that it is not perceived as extraneous to the firm's core activities.

It is advisable to call upon members of civil defense agencies and universities to assist in training, particularly when it comes to specialized aspects.

A key component of the training must be emergency drills and simulations, which make it possible to assess the teamwork involved, especially decision making in high-pressure situations. Drills and simulations are generally carried out in the field and should cover the full range of potential scenarios, based on the existing hazards, so that the reactions by the staff, especially in terms of decision making, can be evaluated and serve as inputs to further refine the Emergency Plan.

The Emergency Operations Committee

The Emergency Operations Committee, which plays an executive and operational role in disasters and major emergencies, is subordinate to the Central Emergency Committee through the company's Emergency and Disaster Unit or, should one not exist, the Operations Unit.

Depending on the characteristics and complexity of the system or company, several Emergency Operations Committees may be needed: for example, one for the water supply system and another for the sewerage system, or even one for each of the major components of the system. For instance, within the drinking water supply system, one committee might be in charge of production and another one in charge of distribution, their functions differing in terms of the components involved, but complementary in terms of the benefits to the entire system.

The implementation of Emergency Operations and response plans will be in the hands of these Emergency Operations Committees, which should also participate actively alongside the company's Emergency and Disaster Unit in designing the Emergency and Disaster Prevention and Response Program.

Delegation of authority to the various Emergency Operations Committees during a disaster or major emergency is essential for their success.

Structure

The structure of the Emergency Operations Committees will vary depending on the characteristics of the firm, as already noted. In any case, they must include a top-level technical and operational authority as well as representatives from production areas (treatment plant and transmission lines), operational control, engineering and electromechanical maintenance, and administration and logistics.

Functions and Responsibilities

The main objective of the Emergency Operations Committees is to prepare Emergency Operations Plans to confront an emergency situation and carry out the rehabilitation of the services, as well as to cooperate in the execution of the vulnerability analyses and the prevention and mitigation programs.

Other functions it might assume include the following:

- Designing the Emergency Operations Plans;
- Keeping the Emergency Operations Plans up to date;
- Coordinating and guiding emergency preparedness, response and rehabilitation efforts in their respective fields of action, as well as other functions designated by the Central Emergency Committee;
- Participating in post-disaster reconstruction to ensure that the system's vulnerability is reduced;
- Designing or carrying out, with the support of the Emergency and Disaster Unit or Office, the vulnerability analyses and water supply and sewerage mitigation programs;
- Participating in the development of the company's Emergency Plan and helping to ensure that it remain up to date.

The Situation Room

In order to respond in a coordinated fashion to an emergency or disaster, there must be a physical space available that is secure and contains all the resources needed to function optimally during the most critical moments. Such a space is generally known as the "situation room."

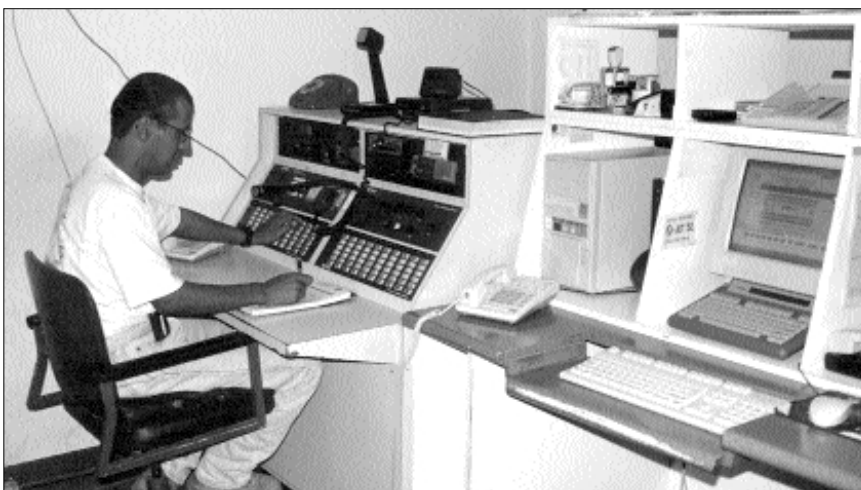
This room is the meeting place of the Emergency Committee and all other key personnel. It is from there that all decisions will be made in response to an

emergency. Control of the situation room will be entrusted to the highest ranking member of the agency or company until the person who chairs the Central Emergency Committee arrives.

One option is for the situation room to be located where the systems control center is in normal situations, taking advantage of the telecommunications and control infrastructure if such is available.

Depending on the characteristics of the agency or company, the situation room may play a national role and be supported by additional situation rooms in each of the regions in which the company or agency operates, or else by situation rooms for each of the systems into which the company is divided. What is outlined here applies to each of these situation rooms.

It is important that the location of the situation room be chosen strategically to allow for easy access and good communications. Above all, it is essential that



Costa Rica's National Risk Prevention and Emergency Response Commission (CNE).

R. Madrigal, 2000

the situation room not be affected in any way by the adverse event. It should be located next to the company's communications center and be permanently equipped with the following items:

- A list of telephone and fax numbers of the company's main officials as well as of key outside contacts;
- A connection to an electrical generator;
- Radio transmission equipment with the necessary communications protocols and power source;
- Radio and television receivers;
- Telephone and fax equipment;
- An Internet connection;
- Copies of the Emergency Plan and annexes;

- Technical specifications and plans of the system;
- Operations control panel or operational information system;
- Desks and meeting-room tables;
- Computer equipment and office equipment and supplies;
- Food and drink;
- Set of keys to all vehicles and infrastructure;
- Basic tools;
- General information, maps and plans of shelters, hospitals, health centers and other strategic facilities in the country.

It is advisable for the Emergency Plan to identify two alternative situation rooms, properly supplied as indicated above. These alternative rooms may be located in production facilities such as treatment plants.

Declaring States of Alert or Emergency

Alerts may be issued by the company or by a governmental agency at the national or provincial level.

A state of alert covers the period between the moment an alert is issued and the mobilization of resources begins, and the moment of impact. In these situations it is prudent to establish two or three levels of alert, depending on the proximity and likelihood of impact. It is also advisable for colors to be assigned to each level of alert. In order to prevent confusion with the states of alert issued by civil defense or national emergency authorities, however, it may be better to employ other systems of classification.

As an example, Table 4 shows the hydrometeorological hazard alert system employed by Costa Rica's National Risk Prevention and Emergency Response Commission (CNE). Boxes 1 and 2 illustrate the phases of alert planned by water supply and sewerage companies in Latin America for response to earthquakes and heavy rainfall.



Safe drinking water in shelters, Hurricane Mitch, Honduras, 1998.

C. Osorio, 1998

**Box 1. Declarations of State of Alert and State of Emergency
Employed by a Latin American Water Supply and Sewerage
Company in Response to Earthquakes**

EARTHQUAKES

Declaration of a State of Alert

When a seismic event occurs surpassing level V in the Modified Mercalli Scale, a seismic alert is issued immediately to all members of the Crisis Committee and the Emergency Operations Committees. One explicit indication of an earthquake of such intensity is the interruption of the power supply.

Declaration of a State of Emergency

Its objective is to activate the organization, coordination and resource allocation mechanisms included in the Emergency Plan by declaring an internal state of emergency.

First phase: The deputy managers of the various geographical areas serviced provide information on the condition of the system components compiled during the preliminary damage assessment. It is to be presented to the Emergency Committee no later than 12 hours after the event. During the Emergency Committee meeting, a state of emergency may be declared within the company, part of it, or one of its systems, if the level of damage is catastrophic. The decision to declare a state of emergency is the responsibility of the Chair of the Committee, as stipulated in the Chair's functions and responsibilities contained in the Emergency Plan. If the general state of the components is not catastrophic after the preliminary assessment, a more detailed assessment will be carried out to review the situation, as described in the second phase.

Second phase: Area deputy managers are convened to report to the Emergency Committee on the information compiled during the detailed damage assessment, which should be completed no later than two days after the event. The meeting will be convened on the third day after the impact of the catastrophic event, and its members will discuss whether to declare a state of emergency for the company, and whether it should be company-wide or only apply to some of its parts or systems. The Chair of the Committee will decide whether to declare a state of emergency.

Depending on the impact of the adverse event, whether sudden onset (earthquakes, floods down slopes, volcanic eruptions or certain types of landslides) or gradual onset (drought, flatland floods, environmental degradation, or certain types of landslides), different states of alert may arise. The Emergency Plan must specify in various protocols how to handle each of these types of emergencies. The protocols must be approved by the Board of Directors of the company and be widely known by the company staff.

States of emergency declared outside of the country (e.g., by the civil defense, National Emergency Committee, state or municipal governments) should immediately activate the Central Emergency Committee. Such external declarations need not coincide with the company's internal declarations of states of emergency, or vice versa.

In the event of sudden-onset emergencies or disasters, the Emergency Plan should be activated immediately, and it should stipulate clearly what procedures to apply. In the case of gradual onset emergencies, states of alert of different levels may be declared in order to take preventive measures and mitigate the potential effect of the phenomenon in question, such as preventive maintenance actions, specific training and drills, guidelines issued to the company's customers, or the signing of agreements not previously arranged with other institutions.