INFORMATION SOURCES ON CHEMICAL ACCIDENTS: BASIC LIBRARY

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INTRODUCTION

If we consider all the possible causes of chemical accidents—human error ranking among the most frequent—and analyze past incidents involving chemical substances, deficiencies in response activities and their consequences for human health and/or the environment, it becomes clear that one of the key elements in preventing such accidents or minimizing their effects is good planning and preparation of the various sectors involved in emergency response.

A common denominator of all the activities carried out in connection with an accident—whether prevention, preparation, or response—is information. The paragraphs that follow will address a number of questions that may arise concerning the nature of this information, for example: What requirements must it meet? Who are the principal users? What kind of information is needed and for what purpose? From what sources can it be obtained?

What are the requirements for information on prevention, preparation, and response to a chemical accident?

The information should be:

- **Current:**

The information should be current in two respects:

1) The source utilized, which should be kept up-to-date and should be regularly enriched with information on accidents that have occurred.

2) The information itself, which should be updated before, during, and after an accident.

   Before: It is essential to periodically update information on chemical substances that are being handled, used, stored, transported, etc.; hazardous materials facilities; and the equipment, personnel, and other resources available to respond in the event of an accident.

   During: During an accident situation, information on the various stages and events should be updated as they occur, since the action taken may vary depending on the way the situation evolves.

   After: After the accident, updating of all relevant information will facilitate the investigations and serve as an important record for future events.

- **Selective:**

When information is disseminated, account must be taken of the target audience and its level of action. For example, the first persons to respond to an accident need information about the properties of the chemicals to which the victims they will be assisting have been exposed, what kind of personal protection equipment they need in order to avoid becoming contaminated themselves, what first aid measures they should take, what medium they should use to extinguish a fire, and similar concerns. Those responsible for planning and organizing the response, on the other hand, will need detailed information on the exact location of the

facilities in which hazardous materials are processed, stored, or handled and on the size of the population at risk in order to ensure correct evacuation and planning of care for victims in the event of an accident (including calculation of needs for transportation, medical equipment, drugs, etc).

- **Available for everyone who needs it:**

  Many different people will require information during the various stages of planning for and responding to a chemical accident, and information should be available and/or accessible to everyone who needs it.

- **Clear, concise, and easily understood:**

  The information should not be too extensive or complex. In an accident response situation, the personnel involved need information that is very clear and concise in order to be most effective.

- **Timely:**

  The information should be available when it is needed. For example, populations living in the vicinity of a hazardous materials facility who have received information on the products to which they may be exposed in case of an accident and on how to behave in order to minimize the consequences will not respond in the same way as those who have not received such information on a timely basis. Similarly, for health workers at all levels who participate in the care of victims, the necessary information should be supplied as early as possible, since the lives of many may depend on how quickly action is taken.

- **Provided by experts:**

  The effectiveness of the information provided to the public, the media, health workers, or anyone else who needs it will depend largely on the skills and knowledge of those who supply it. One of the requirements for information on activities relating to planning, preparation, and response to chemical accidents is therefore that it be provided by expert personnel, since in most cases this information must be interpreted and supplemented with practical experience, something that only a person trained for this purpose can do.

Who are the principal users of the information?

- Personnel involved in the organization and planning of responses.

- First-response personnel: fire fighters, police, Red Cross, paramedical personnel, workers from hazardous materials facilities, and others.

- Health workers from all levels of the chain of treatment (triage, hospitals and/or other treatment facilities, intensive care, etc).

- Environmental organizations.
- Public authorities.
- General public (potentially affected population, community at large, mass media).
- Others.

What kind of information is needed and for what purpose?

The nature of the information varies widely depending on:

- The purpose for which it will be used (for example, the information needed for risk identification and assessment—one of the stages of planning for chemical accidents—is not the same as that required for treatment of accident victims).
- The target audience (for example, those who are first to respond need information on how to care for victims, while the potentially affected population needs information on how to behave in order to minimize health risks).

Mentioned below are some general examples of the type of information that may be needed to plan for and respond to chemical accidents.

1. Hazardous materials facilities
   a) Location
   b) Hazardous activities, processes, and points
   c) Types and quantities of chemical products that are being processed, stored, used, and/or transported
2. Types of accidents that might occur in a given region
3. Potentially affected population
4. Information on chemical products that could be or are involved in an accident
   a) Chemical properties
   b) Toxicological properties
   c) Acute and long-term clinical effects of different types of exposure

d) Possible transformation or breakdown of the chemicals in the environment or the human body

5. Information on available medical facilities

a) Location of hospitals and other medical facilities (dispensaries, polyclinics, or other health care centers)

b) Resources available in medical facilities: number of beds, medical equipment, drugs and antidotes, etc.

c) Principal means of victim transport (ambulances, helicopters, adapted transport, etc.) and evacuation routes

d) Availability of laboratories for clinical and toxicological studies

6. Information on medical treatment

a) Decontamination of patients

b) Medical treatment (including use of antidotes), depending on the circumstances, how seriously the victims are injured, means of exposure, and availability of supplies and equipment all along the chain of treatment (including prehospital and hospital care)

7. Protective measures to be taken by rescue personnel and those providing care for victims in order to avoid contamination

As is obvious from the preceding list, the volume of information required for preventing, planning for, and responding to a chemical accident is rather large, and it is therefore essential to identify sources where it can be obtained. It is equally important to guarantee the existence of channels of communication that will ensure a smooth flow of information, bearing in mind that communication problems may arise as a result of damaged lines or human error caused by stress.

The principal sources of information before and during a chemical accident are:

- Industry
- Specialized information centers
  - Chemical response centers
  - Toxicology information centers
- International organizations

Industry:

Provides information related to hazardous activities, processes, and points, as well as information on the chemical products that are being handled, processed, and transported (nature and quantity).

Specialized information centers:

These are centers created to compile, process, and disseminate information on chemical products.

In order to prepare for and respond to a chemical accident, the ideal would be to have two types of center in the countries: chemical response centers and toxicology information centers. In the countries with the highest degree of industrial development, which are most vulnerable to chemical accidents, ideally there should be a network of these centers, which should function 24 hours a day, 365 days a year. The centers should be closely linked at the national level and should also maintain communication with international centers and organizations.

These centers should have trained personnel, not only to convey the information contained in the resources of the center (databases, publications, etc.), but also in order to interpret and give practical application to that information, adapting it to the varying circumstances that may characterize a chemical accident.

Some Latin American countries, such as Argentina, Brazil, Mexico, and Venezuela, have both types of centers. In others, such as Cuba and Uruguay, toxicology information centers serve as focal points for information and advisory services in the event of chemical accidents.

International organizations:

Several international organizations—including the IPCS (WHO International Program on Chemical Safety), UNEP (United Nations Environment Program), EPA (U.S. Environmental Protection Agency), ATSDR (U.S. Agency for Toxic Substances and Disease Registry), OECD (United Nations Organization for Economic Cooperation and Development), PAHO (Pan American Health Organization), and others—prepare and disseminate information and data on chemical products—information that can be used at the national level by the authorities responsible for regulating and legislating on the use of hazardous materials, as well as by the health sector in order to prepare for and respond to chemical accidents.

INFORMATION RESOURCES

Multiple information resources can be used in connection with activities for prevention, preparation for, and response to emergencies involving chemical substances. Described below are some of the most highly recommended resources, which can be used to create a basic library suited to the needs of specific users. The list includes sources in various formats, including publications and databases available on CD-ROM or through the Internet. This basic reference library can be augmented, resources permitting, with other sources of information on the subject, including books and journals on toxicology, epidemiology, occupational health, etc.

PUBLICATIONS

- *Dangerous Goods. Initial Emergency Response Guide.* 1992, CANUTEC, Canada.

- *Guía de respuestas de emergencia. Respuesta inicial a accidentes con materiales peligrosos.* Mutual de Seguridad, Chile.

- *Guía de respuestas iniciales en caso de emergencias ocasionadas por materiales peligrosos.* 1992, SETIQ, Mexico.

These three publications are extremely useful guides for first-response personnel (fire fighters, police, paramedics, and others). Their format makes it easy to find information quickly at times when it is imperative to take swift action in order to minimize loss of life and reduce environmental damage. Chemical substances can be looked up by name or by an identification number, which refers the reader to a guide that groups products by chemical type. Each guide contains specific, concise, practical information on the potential dangers in the event of fires, explosions, or chemical spills and describes the emergency action that should be taken in each case, including first aid measures.

- International Chemical Safety Cards. IPCS/WHO.

Like the materials mentioned above, these cards provide concrete information on chemical substances and the emergency actions to be taken in dealing with each of them. They also contain information on the physical and chemical properties of the substances; their health impact, depending on the route of exposure and whether the effects are acute or chronic; occupational exposure thresholds; and other facts. Unlike the preceding materials, the information is provided for each substance but not by groups.

- Health and Safety Guidelines. IPCS.

This is a serial publication on chemical substances, published in English by the IPCS and translated into Spanish by the Pan American Center for Human Ecology and Health (ECO)/PAHO. For each chemical product, the guidelines provide concise information on emergency actions to be taken in the event of accidents during storage and transportation, as well as spills, fires, and explosions. They also include data on physical and chemical properties, product identification, impact on the environment and people, and current regulations and standards, and they are cross-referenced to the international chemical safety cards.

- Managing Hazardous Materials Incidents. ATSDR.

  Volume II: Hospital Emergency Departments, 1991
  Volume III: Medical Management Guidelines for Acute Chemical Exposures.

This is an excellent reference for health personnel, both those at the planning level and those involved in the chain of treatment of chemical accident victims. It includes information on physical-chemical properties, routes of exposure, uses, exposure thresholds, physical properties, incompatibilities,

acute and chronic health effects, management of patients at various points—from the focus of contamination through intensive care institutions—and descriptions of principles for treating victims of chemical poisoning, including antidote therapy.

- Sullivan JB and Krieger GR. *Hazardous Materials Toxicology. Clinical Principles of Environmental Health.* Williams & Wilkins. 1992. ISBN 0-683-08025-3.

- OECD publications

- OECD Environment Monograph No. 24 - Accidents involving hazardous substances.

- OECD Environment Monograph No. 28 - Prevention of accidents involving hazardous substances. Good management practice.

- OECD Environment Monograph No. 29 - The provision of information to the public and on the role of workers in accident prevention and response.

- OECD Environment Monograph No. 30 - The role of public authorities in preventing major accidents.

DATABASES

- Chemical Hazard Response Information System (CHRIS)

This is a very useful database for first-response personnel. In addition to providing information on the physical-chemical properties of substances, fire hazards, chemical reactivity, data on transport, and other subjects, which can be utilized by other types of users, it first gives a summary description of the substance, including very specific information about its characteristics, emergency action, and first aid measures.

- Hazardous Substance Data Bank (HSDB).

This is a current, nonbibliographic database containing information on approximately 4,300 chemical products. It also contains data on toxicology and related areas such as emergency management procedures, including data on product identification, physical-chemical properties, U.S. Department of Transportation (DOT) emergency guidelines, National Fire Protection Association (NFPA) classification, procedures for dealing with fires, explosions, product incompatibilities, personal protection equipment, waste clean-up methods, etc.

- Computer-Aided Management of Emergency Operations (CAMEO-APELL).

The program is designed to help in planning for and responding to accidents involving chemical substances. It contains specific response information for 3,300 products, several databases for storage of local information on hazardous materials facilities, an inventory of chemical substances, an inventory of resources and contacts, and other information. The program can also be used for risk mapping and creating scenarios.

- IPCS-INTOX.

This is a compact disk containing information on chemical substances. The data are organized so that the user can search for a specific substance and easily obtain access to the information on that substance in all the databases contained on the disk, which are:

- IPCS Poison Information Monographs (PIMs)
- IPCS International Chemical Safety Cards
- IPCS publications on environmental health criteria (full text)
- CCOHS CHEMINFO database: A good platform for accessing a broad range of information on chemical substances and their effects on health, treatment methods, etc.
- WHO/FAO pesticide information pamphlets
- Directory of Centers of Toxicology at the World Level (Yellow Tox).