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Risk Communication about Chemicals in Your Community

A Manual for Local Officials

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Risk Communication Resource Sheet

1. **State Emergency Response Commission:**

   Chairperson _____ Phone _____

2. **Local Emergency Planning Committee:**

   Chairperson _____ Phone _____

   Other Members _____ Phone _____

   _____ Phone _____

   _____ Phone _____

3. **Emergency Plan:**

   Coordinator or Director of Emergency Management for our town/county:

   _____ Phone _____

   Designated contact for non-emergency personnel who have questions:

   _____ Phone _____

4. **Who is authorized to direct citizens to evacuate or take other actions?**

   _____

   _____

5. **What are the elements of our response plan?**

   _____

   _____

   _____

6. **What are other resources (local, state, federal, university) on which I can call in an emergency?**

   _____

   _____

   _____

7. **Which state agency/official receives reports under section 313?**

   _____

8. **Which state agency/official receives reports under section 312?**

   _____

Introduction & Purpose

"STATE RATES HIGH IN CANCER RISK FROM FACILITY EMISSIONS"

"PLANT CHEMICAL SPILL FORCES HUNDREDS TO EVACUATE"

Have you seen headlines like these recently? Do they raise questions in your mind? If someone asked you about them, could you answer the questions?

People are becoming more concerned about hazardous materials in their communities and how these materials affect their health and well being. Their concerns become most pressing when there is an accident or a leaking waste site is discovered, but they are also concerned about hazardous chemicals they are exposed to every day. In response to these concerns, local officials are increasingly called upon to respond to questions about hazardous materials, including the risks they pose and how to reduce those risks. For many local officials this is a new role, one for which they may not be fully prepared.

Purpose

This workshop manual will help you learn how to respond to public questions about chemical risks. It also will help you find additional assistance and information about hazardous materials.

Recent federal legislation is likely to increase public awareness and concern especially because of the Emergency Planning and Community Right-to-Know Act, which is Title III of the 1986 amendments to the "Superfund" Act.

Title III is not a typical regulatory program; it is part of an innovative approach to managing environmental risk. It makes a great deal of information available that has never been provided before. The information is available to everyone—to the public and to governments at all levels—about the presence of hazardous chemicals in the community, about accidental and routine releases of these chemicals, and about their storage. The more citizens know about chemical hazards in their communities, the better equipped they and their local governments will be to make decisions and to take actions that will protect their families and neighbors from unacceptable risks.

The new information available under Title III is often complex, and its application and interpretation requires work from all those involved. It will cause citizens' existing concerns about hazardous chemicals to become more focused, and public officials will need to respond to these concerns. Title III establishes an ongoing forum at the local level for community discussion and action about hazardous chemicals. This forum is the Local Emergency Planning Committee, or LEPC.

LEPC members may be called upon to respond to public questions about the risks they are examining or to participate in public meetings about those risks—meetings where people will ask what the information means or about its significance for a particular person or segment of the community. If you are a member of the LEPC or participate in its work, you will be interacting with the community as you work to analyze and mitigate potential chemical hazards. Since LEPC membership by law includes a variety of categories—emergency responders such as firefighters and police, health professionals, the media, industry representatives, transportation representatives, and public interest groups—many different kinds of people with many different backgrounds will find themselves answering public questions. This manual is intended to help everyone who may have to answer questions develop some useful strategies.

Preview

The manual begins with a brief overview of the law and local responsibilities. To illustrate situations and suggest ways to respond, we will look at three kinds of incidents that cause citizens to seek out local officials. We will begin with an accident, then expand our discussion to include more routine events. These are not the only circumstances under which citizens may seek out local officials and become involved in considerations of risk in the community, but they illustrate ways in which public officials might interact with the public.

How to Use This Manual

The manual can be used in three ways: first, as part of a workshop on answering citizen questions about hazardous chemicals; second, as a stand-alone guide for local officials unable to attend a workshop; and third, as a reference.

Objectives

Reading or using the manual will help you:

- Know what kinds of questions citizens are likely to ask
  —after an accident
  —after learning about routine releases
  —after learning that large quantities of substances are stored nearby.

- Know the characteristics of a good answer to these questions.

- Understand the kinds of information needed to answer the questions and where that information may be found.

- Respond to the questions and identify some people in the community who can help answer them.

- Identify opportunities for all sectors of the community to participate in decisionmaking about potential risks from hazardous chemicals.

How the Manual is Organized

The manual is written so that later topics build on material presented earlier. Those using the manual for self-study will need to identify the local and state resources described in this manual.

Resource Guide

This manual should be retained as a resource guide. The materials are arranged so that specific information can be found easily when needed. Specific times to review this manual would be when an accident or a spill happens, when companies submit their required Title III reports on hazardous chemicals, or when the public or the media has concerns or questions to be answered.

Remember, there are many other resources available to help you respond to risk assessment questions and accidents, and the early identification of these resources will help you fulfill your official obligations in a safe and responsible manner.

Introduction to Title III

The Emergency Planning and Community Right to Know Act was included as the third part or title of the Superfund Amendments and Reauthorization Act of 1986. For this reason, it is often called "Title III." The law has four purposes (readers should not use the following brief descriptions as the basis for legal decisions about Title III):

(1) **Emergency planning.** Facilities that store or use any of the 366 Extremely Hazardous Substances in excess of the threshold planning quantity (TPQ) report this fact to the State Emergency Response Commission (SERC) and LEPC. The LEPC develops an emergency plan based on this and other information.

(2) **Emergency release reporting.** Facilities must report to the SERC and LEPC accidental releases in amounts over a reportable quantity of the Extremely Hazardous Substances and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) hazardous substances (which must also be reported to the National Response Center).

(3) **Hazardous chemical reporting.** Facilities where any hazardous chemicals are present in amounts over certain reporting thresholds (often 10,000 pounds) must submit Material Safety Data Sheets (MSDSs) or a list of chemicals for which MSDSs are required as well as an annual chemical inventory form to the local fire department, LEPC, and SERC.

(4) **Creation of an emissions inventory.** Manufacturing facilities that use any of a different list of about 300 chemicals in excess of reporting thresholds must report emissions to EPA and designated state agencies.

As indicated, different sections of the law apply to different facilities and different chemicals. Specific sections are listed in Appendix 3.

In order for the law to work, industry, interested citizens, environmental and other public-interest organizations, and governments at all levels must work together to plan for chemical accidents and to reduce the risk to the public from releases of toxic chemicals into the environment. The law represents a path-breaking approach to environmental protection, because it assumes that the more citizens know about chemical hazards in their communities, the better equipped they and their communities will be to make decisions

and take actions to protect their families and neighbors from risks they feel are unacceptable.

Special Provisions for Local Government Officials

Provisions of special concern to local officials include:

—The law required states to set up State Emergency Response Commissions, or SERCs.

—SERCs were then required to establish local emergency planning districts and Local Emergency Planning Committees, or LEPCs.

—LEPCs must include among their members local elected officials and staff with competence in health and emergency response, industry representatives, media representatives, and members of citizens groups.

—Facilities having more than certain quantities of any of the 366 Extremely Hazardous Substances must make themselves known to SERCs and participate in the LEPC.

—As noted, facilities where hazardous chemicals are present in certain quantities must submit MSDSs and inventories of the chemicals to SERCs, LEPCs and local fire departments. An MSDS describes the physical and chemical properties of the substance as well as its health effects, appropriate safety equipment, and emergency response measures.

—LEPCs must make the chemical inventories and the MSDSs available to citizens who want to see them.

—LEPCs must develop a plan for responding to and avoiding emergencies involving hazardous chemicals, drawing upon the chemical inventories and other information provided by facilities.

—Manufacturers must report their annual emissions of certain toxic chemicals into the air, water, or land. The reports are sent to the federal Environmental Protection Agency (EPA) and to the designated state agencies. Citizens also have access to these reports.

The information now available to citizens under Title III is one of the driving forces for citizen questions about hazardous materials in the community. Sections below describe three scenarios in which citizens have obtained Title III information.

Defining Terms

Title III makes use of three terms that often seem similar. They are:

Toxic - substances that are poisonous or can cause adverse health effects. These are the substances emissions of which are reported under Section 313 of Title III.

Hazardous - substances that are toxic, corrosive, flammable, or explosive. This is a general term, not specific to Title III.

Extremely hazardous - a set of chemicals defined by Title III as subject to reporting under Section 302, because they could cause death or irreversible damage after relatively short exposure to small amounts, generally in air.

As you talk with citizens, it is important to remember that they may not know the differences among these terms as well as you do. Listen to understand what they mean instead of concentrating on the particular terms they might use.

We know that citizens are often very concerned about toxic and hazardous chemicals in all these categories. Title III offers an important new step forward in allowing and encouraging citizens, working with government and industry, to participate in managing these chemicals in their own communities.

What is Risk?

"Risk" is a word that is used often when people talk about hazardous chemicals in the community.

What is risk? A convenient definition is:

The likelihood of injury, disease, or death.

Environmental risk then refers to

The likelihood of injury, disease, or death resulting from human exposure to a potential environmental hazard.

(In addition to human health, the environment itself may also be at risk. We will not mention these risks below, but the considerations are the same.)

Experts often use the definitions above. When experts are asked to describe or characterize a risk, they use statements like these:

Common Risk Characterizations

- There is a lifetime risk of 1 in 65 of dying in a motor vehicle accident.
- The range of risks in humans is between 100 and 1000 cancers per 1,000,000 people exposed.
- The chance of getting this disease is 1×10^{-7} (1 10-millionth, or 1 in 10 million.)
- The risk to children is high relative to that for adults.
- 25,000 people die each year from at-home injuries.
- The risk of death from leukemia is 1 in 12,500 people per year.
- The risk of cancer from indoor air is 600 times the risk from tap water.
- An airplane crash involving 100 or more deaths is likely to occur once in two years.

- The risk to this neighborhood from chemical releases at Facility A is likely to be higher than the risk to a different neighborhood from releases at Facility A.

- The risk of neighbors getting sick is higher with this waste disposal site here than it would be if the waste were not disposed here.

Experts tend to focus on the likelihood of a particular risk, but non-experts tend to think of other characteristics of the risk.

For example, an industry representative at a public meeting about a proposed new incinerator reported that a person who spent her whole life downwind of the incinerator would incur a risk that was smaller than the risk from dying her hair. A member of the audience stood up to say, "Yes, but I choose to dye my hair, while I don't choose to live downwind of the incinerator, and furthermore, I get some benefit from dying my hair, while I get none at all from the incinerator." This woman was reacting to the involuntary nature of the risk and the perceived balance between risks and benefits.

Table 1 on the next page illustrates some of the other features of risk that make it seem "riskier" to most people and gives brief examples.

Table 1: Characteristics of Risk
(Factors on Right Increase Perception of Riskiness)

Voluntary Driving a car	<⟶>	**Involuntary** Breathing air polluted by a neighboring factory
Natural Radon in basement	<⟶>	**Man Made** Industrial chemicals
Familiar Household cleansers	<⟶>	**Exotic** Genetically engineered organism
Chronic Routine small releases of chemicals from a facility	<⟶>	**Catastrophic** Large accidental release of chlorine gas from a plant
Visible Benefits Dying hair	<⟶>	**No Visible Benefits** Incinerator effluents
Controlled by Individuals Driving	<⟶>	**Controlled by Others** Industrial pollution
Fair	<⟶>	**Unfair**

The notion of "fairness" sums up many of the other aspects of risk that make people feel special concern or "outrage." If a person or community feels that it is bearing a lot of risk while someone else is getting most of the benefits, then the risk will seem especially unacceptable. Risk communicators must understand these feelings, or they will not succeed in working with the community to make good decisions about risk reduction.

We also know that most people seek information about hazardous chemicals only when something happens to make them interested or cause them to believe that they are directly affected.

Questions citizens ask about hazardous materials

We will use as examples three kinds of circumstances that may cause citizens to become concerned enough about hazardous chemicals in their communities to ask questions: during/after an incident, when they learn about routine releases, and when they learn about the many kinds of substances stored nearby. Most questions will concern human health, but many citizens also will ask questions about environmental and other possible effects of chemical exposure or release. In addition to these substantive questions about health or the environment, citizens also ask many "procedural" questions about where they can obtain additional information, why it was so difficult to get answers to their questions, or how they can get involved in making sure risks are managed properly.

Few public officials will be able to answer all these questions. Some questions have no sure answers, and others can be answered only in light of the particular conditions prevailing in the community. However, this manual is intended to help users understand the kinds of answers that are appropriate and find sources for the factual information that is available. Keep these questions in mind as you think about the scenarios from the perspectives of government, industry, or citizen representatives

Scenario 1

Unplanned Release of a Chemical

About 2:30 on a weekday afternoon you receive a telephone call from the Director of Emergency Management telling you that a chlorine tank in the basement of the local school has sprung a leak and that the gas, which is very dangerous, has entered the indoor swimming pool area and gym and is being sucked into the school's air circulation system. The tank has been removed from the basement to the open air and the leak is being repaired; emergency personnel are moving rapidly through the school to locate and rescue students and teachers; local hospitals have been notified; and vehicles are on their way to the school to transport anyone suffering impaired breathing.

Within fifteen minutes, your telephone starts ringing with questions from frantic parents and the media. What should you say to them? As an LEPC member, you would refer calls to the appropriate emergency response public contact. But what if you are that person? Or what if you have to answer "spillover" questions because you are on the LEPC or in another position in which people are likely to call you?

Procedures with Hazardous Chemicals

To answer people's questions, you must first know about the plans and procedures for emergencies involving hazardous chemicals.

1. SARA Title III requires any facility that stores any of 366 Extremely Hazardous Substances in amounts greater than specified Threshold Planning Quantities to notify the Local Emergency Planning Committee (LEPC) and the SERC. (Many of these substances are also covered by the annual toxic chemical reporting requirements of Title III described above on page 4.) A list of the Extremely Hazardous Substances appears in Appendix 5.

2. The LEPC uses this information to plan for accident prevention and for emergency response in case of an accident. Individual facilities also should have their own emergency response plans.

For some chemicals, including chlorine, there are professional standards for the kinds of emergency warning systems and emergency equipment that should be on hand.

3. The local emergency plan developed by the LEPC should:

Some Steps in the Emergency Plan

- Designate a coordinator for emergencies—usually the Director of Emergency Management or someone in the Fire Department. (Note that many states have rules about first responders that should have been considered as the plan was developed.)

- Provide a means for notifying appropriate authorities.

- Provide a means for emergency responders to obtain information about appropriate responses particular to specific chemicals involved in the incident (including needs for special equipment and clothing).

- Identify sources of necessary equipment and trained personnel and describe procedures for bringing them to the site.

- Specify the division of duties between the public and private sector response personnel. (Many companies insist on deploying their own specially-trained staff for accidents that do not cross the plant boundary, in part to limit possible liability for damages to non-employee emergency responders).

(Although cities or other jurisdictions smaller than the area covered by the LEPC could have their own plans, in this manual we focus on the LEPC plan. The planning principles would be the same for the smaller jurisdictions.)

Citizens' Questions

In the chlorine spill, the plan has worked quite well. Authorities, including you, have been notified, equipment mobilized, and the problem treated. Your callers ask:

a. What's going on?
b. Am I at risk?
c. Should I evacuate?
d. What are you doing to mitigate the consequences?

Although citizens will call the elected official, he is not necessarily the best person to provide answers. **The person designated as emergency coordinator should** in turn **have designated a particular person or position in his office to be the contact for non-emergency personnel who have**

questions. This person's name and especially phone number should be emphasized to the media before any accidents occur. (Many facilities are designating a particular contact person and inviting the media to meet with that person on an informal basis independent of any particular events. Public agencies could adopt this approach, ensuring that the media are aware of procedures and plans.) The elected official should refer almost all calls to the appropriate contact person, since during an emergency, it is often impossible to ensure that every office is kept up to date on rapidly changing events.

Where to get information to answer these questions.

Local officials should know about the system in place in their own communities for emergency planning and response and be prepared to talk about it with the public. You should know the answers to these questions:

a. Who is the central contact person or where information will be available?
b. Which departments, programs, or offices are responsible for emergency response?
c. Who has authority to direct citizens to evacuate or take other action?
d. What is their relationship to the Local Emergency Planning Committee (LEPC)? Who is chairman of the LEPC and what is the role of the LEPC during an emergency?
e. What are other sources of information to answer citizens' questions?

In short, officials need to be familiar enough with local procedures to be able to tell callers where to find the information they need right away. It is important to identify the LEPC and local emergency coordinators in advance. (The State Emergency Response Commission is a resource that should be used during the planning period and not during an emergency - see Appendix 4.)

Questions after the event

Another series of questions will arise after the event. Among the most likely to be asked are:

a. How did this happen?
b. How long will the "short-term" health effects (those that show up within a few weeks of the incident) continue to be felt?
c. Will we have other health effects that do not show up for a long time?
d. What are you doing to prevent it from happening again?

Of course, the answers differ for each incident. [Appendix 2 lists some sources for information about specific chemicals.] In answering what is being done to prevent a similar accident from occurring, officials may need to refer to state and local laws that give them power to prevent accidents, such as inspections for enforcing the building code.

For this incident, an official might issue a statement something like this:

Sample News Release

News Release

For release, Tuesday 9:00 AM. Office of the Mayor.

About 100 pounds of chlorine gas were accidentally released in the basement of North High yesterday when a storage tank began to leak during routine transfer of chlorine to the pool-cleaning system. The gas was sucked into the air circulation system of the school, which was turned off five minutes after the leak was detected. All 1100 people in the building were outside within fifteen minutes. Although some people experienced difficulty in breathing for several hours, and twenty people were treated at the hospital, no one was admitted and no one is experiencing after effects now.

Chlorine can affect human health in two ways. In high concentrations that may be present during accidents, it causes difficulty in breathing, choking, coughing, chest pain, and sometimes nausea and vomiting. It also reacts with moisture, including body moisture, to form acids that are very irritating to skin, eyes, and mucous membranes. In yesterday's incident, no one suffered any skin irritation because concentrations except in the basement were not high enough. Once the symptoms of chest tightness or difficulty in breathing have disappeared, there are no further health problems that we are aware of associated with an exposure to chlorine.

Our city has a plan in place for responding to emergencies involving hazardous chemicals. This plan worked well, with efficient and effective response by the Fire, Emergency Management, and Volunteer Rescue teams, although the first person calling to report the accident had some trouble finding the right telephone number and right place to report. The city has had a plan since 1973, but it has been revised and updated recently by the Local Emergency Planning Committee. This committee was established under a federal law that calls for emergency planning and public access to data about hazardous chemicals.

In order to limit the likelihood that any further such incidents will occur, the

School Board has agreed that transfer of chlorine will no longer be done during school hours. Chlorine is also stored in large quantities at city swimming pools and water and wastewater treatment plants. We have reviewed our systems for detecting leaks and made sure they are all working properly. We have also issued instructions that transfers of chlorine at city pools will only occur when the pools are closed for the day and will be made only by trained personnel. Finally, we have tried to publicize the telephone number to which initial accident reports should be made: it is 333-3333.

Characteristics of a good answer

To prepare a good answer:

—describe the incident, the response, and other events

—describe the chemical itself, including short- and long-term health effects of brief exposure at relatively high levels

—describe the health effects suffered in the incident and any longer-term concerns

—summarize the good and bad points of the response

—describe actions being taken to reduce the likelihood of a similar incident

There are a variety of sources of information about chemicals, including their physical properties and possible health effects. Some of these sources are listed in Appendix 2. Many public libraries and local emergency response departments have reference books that provide some of this information. The Material Safety Data Sheets (MSDSs) that facilities must supply to the LEPC on request also contain this information. EPA and several private companies maintain computerized databases with chemical information. CAMEO™, a computer program developed with assistance from EPA, contains information about more than 2700 chemicals. The National Library of Medicine has toxicological information in computer databases called TOXNET. These sources seldom contain any information about long-term health effects of exposures that may occur during an accident, because it is often the case that little is known about them.

Scenario 1: Unplanned Release of a Chemical

Summary

Citizens' concerns about an accidental release of a chemical focus first on response to the emergency. Later, citizens want to know what is being done to prevent a similar emergency from arising again, and they want to know more details about the health effects of exposure to the chemicals involved in the accident. Prior to any incidents, local officials should ensure that

—a plan has been developed
—a central source of information for the public has been designated,
—they are aware of the procedures to be followed during an emergency. (Filling out the Risk Communication Resource Sheet at the beginning of the manual will help meet this guideline.)

After incidents, local officials should be prepared to

—provide an evaluation of the effectiveness of the plan
—provide available information about health effects of the chemical
—provide information about how citizens can become involved in emergency planning and risk reduction through the LEPC.

Scenario 2

Learning about Routine Releases

As a result of the incident in scenario 1, the local media become very interested in the hazardous chemicals in the community. They obtain emissions reports from the state agency assigned the responsibility of keeping them or from EPA, which maintains the Toxic Release Inventory (TRI) database. The TRI can be accessed through the National Library of Medicine's TOXNET system. The following newspaper article is an example of the kinds of information being publicized.

Ourcity Daily News

325,000 Pounds of Four Toxic Chemicals Emitted Locally

Benzene, Chlorine, Pyridine, Ammonia Most Prominent
Industry Says, "Risk is Low"

Last year, fifteen local manufacturing facilities emitted more than 10,000 tons of toxic chemicals into the air, water, and land of Ourcity. The top chemicals emitted (in pounds) were benzene (200,000), chlorine (100,000), pyridine (10,000) and ammonia (15,000).

Benzene is a known carcinogen. Chlorine is a highly toxic chemical that may cause severe respiratory problems. Chlorine was involved in the recent accident at the North High School, causing evacuation of 1100 students and teachers. Pyridine is a reproductive toxin, causing possible damage to reproductive organs, as well as having serious effects on the central nervous system. Ammonia, a common household cleaner, is irritating to eyes and the respiratory system.

Newspaper staff examined reports submitted by fifteen local manufacturing facilities under the requirements of a federal law, the Emergency Planning and Community Right to Know Act. The federal Environmental Protection Agency requires facilities to disclose the amount of toxic chemicals they release into the environment each year.

In addition to benzene, chlorine, pyridine, and ammonia, local facilities emit more than 500,000 pounds per year of ethylene, creosols, formaldehyde, and twelve other chemicals.

Tom Jones, senior safety engineer for Newtown Chemical Company, noted that the emissions reported do not give cause for any alarm. Benzene emissions by all fifteen companies, he said, are only one-tenth of the benzene given off by automobiles in Ourcity. Jones also pointed to a recent study by the State Environmental Department which showed that total concentrations of benzene and seven other chemicals in

Ourcity are well below state standards. In Ourcity, they have been measured at about 20 parts per billion at the intersection of Broad and Main Streets.

Rodney Smith of the State Environmental Department stated that the department will be looking more closely at the emissions to see whether they violate any state standards. "For now," he said, "we are just happy to see the companies providing the reports, complying with the law. Later we will use the data to examine whether we need regulatory changes."

Citizens' Questions

After reading such a news article, the questions that people are likely to ask local officials include:

(1) What risk is posed by these exposures?
(2) Are these emissions the cause of (various health symptoms)?
(3) Why are the plants allowed to emit these substances?
(4) Was the facility in compliance with state and federal laws?
(5) Are there other facilities in the area that have not reported that also are emitting these substances? Should they be reporting too?
(6) What other sources might lead to my being exposed to these chemicals?

To answer the first two questions, we need to know about

Emissions vs. Exposure

- emissions, concentration, exposure, and dose
- toxicity
- acute, high-level vs. long-term, low-level exposures
- immediate vs. delayed risks

To answer questions 3 and 4, officials should know a little about the present system for regulating emissions, the procedures for getting information under Title III, and how citizens can begin to work with industry to reduce emissions if that is what they want to do.

An **emission or release** is the amount of a substance released from a facility. Releases are usually classified either as *routine*—small regularly released amounts that are planned to be released as part of a manufacturing process—or as *accidental.*

Just because a facility emits some amount of a substance does not mean that it affects anyone. Substances are diluted as they are released into the air and water. The **concentration** is the amount of the substance in a representative unit of the air, water, or land. For example, due to automobile exhaust, benzene may be found in the air of many cities in a concentration of about 8 parts per billion. The concentration is, of course, higher if emissions within a fixed time are higher and other conditions remain the same. Concentrations also will tend to be higher closer to the emission source.

Exposure happens when an individual comes in contact with a substance Exposure can occur through breathing, drinking, eating, and by direct skin contact. The amount of exposure is determined by many factors, including the concentration of the substance in the environment, how long the contact lasts, and how often the exposure occurs.

Figure 1 shows the paths by which emissions might lead to exposure. At each point, there are difficulties in determining how much a person is exposed. This makes it hard to estimate the risk.

Dose is the amount of the substance that actually enters the body. The dose is related to exposure, but differs according to individual susceptibilities and habits. The dose received from a hazardous chemical in the environment is influenced by the concentration, route of entry, length of exposure, presence of other chemicals, and the ability of the body to break down the substance.

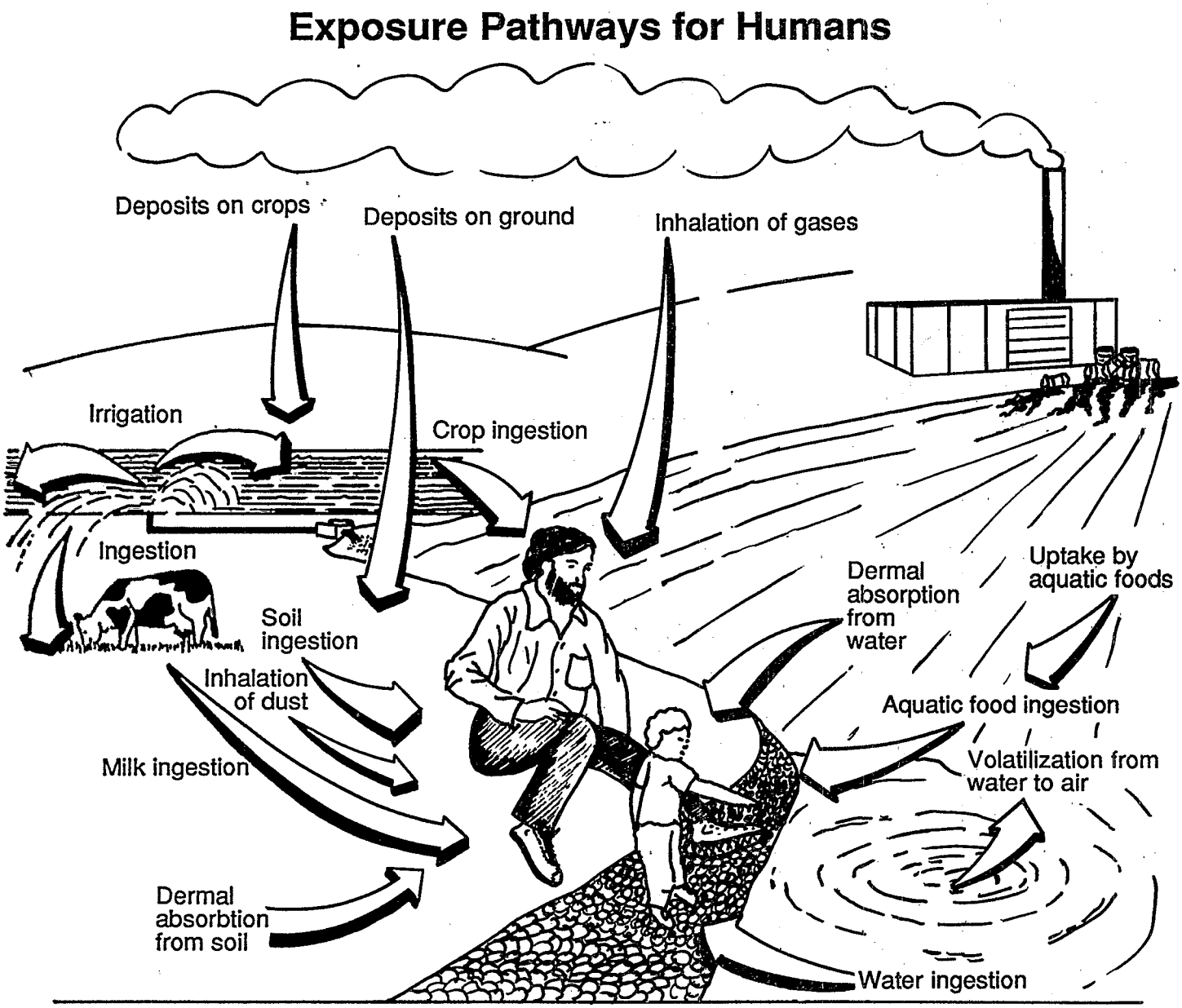
Characteristics of the chemical

Toxicity is a measure of how harmful a substance is to human health or to plants or animals. Highly toxic substances have adverse health effects at smaller doses.

An **acute** exposure is one that occurs over a short period of time. It could be a large exposure such as might occur during an accidental spill.

Long-term exposure can occur when a substance is present in the environment over an extended period.

Figure 1



From "Assessing Risk at Superfund Sites," prepared by CH2M HILL

Acute or short-term exposures may have **immediate or acute** effects and may have long-term effects. The immediate effect of the chlorine was to cause people to gasp and choke. We do not know about any delayed effects of acute exposures to chlorine.

Long-term, low level exposures also may cause health effects. Usually these are **delayed** health effects that may not show up for many years. Cancer and birth defects are often delayed health effects.

Determining delayed health effects

The ways in which we learn about delayed health effects make it difficult to discuss them with any certainty.

Most of our information about delayed health effects comes from laboratory studies conducted on test animals. Usually more than one species is used. Animals are exposed to the substance in different ways, including eating, drinking, breathing, or on the skin, and different groups are exposed to different quantities. After some time, animals are examined to see whether there are abnormal cells or other evidence of harm. The number of these abnormalities in the test animals is compared to that in unexposed control animals. Statistical tests are used to determine whether the difference between the test animals and the controls is "significant," or suggests that the substance may have a health effect.

Many people disregard laboratory studies because animals are exposed to quantities of the substance that are so much higher than humans ever would receive. Laboratory studies are done this way in order to reduce the number of test animals used and the time needed for the study; otherwise, studies would be prohibitively expensive. Results from the high doses are used to predict what would happen at more realistic doses. These results may tell us approximately how many people will get sick or die from particular exposure levels, but they can never tell us which people will be affected.

Some laboratory studies are conducted on tiny organisms in test tubes. Scientists have learned that substances that affect the growth of these organisms often have adverse human health effects. Usually these "in vitro" ("in glass") studies are used to screen chemicals; those that seem suspicious are further tested on animals ("in vivo").

Epidemiological studies use data about humans who have been exposed to a substance and data about their health to try to determine whether a substance causes health problems. Such studies are often difficult to interpret because people are exposed to so many substances throughout their lives and because the health effects of interest may not occur for many years. Combined with laboratory evidence, however, it is often possible to show that certain exposures cause unwanted health effects in humans.

Because the evidence about long-term effects, when it is available at all, is based on laboratory and/or epidemiological studies it is often open to different interpretations. There is never full proof about the cause of such effects. This may create political controversy between people who believe the chemical creates a risk for those exposed and those who believe that the evidence is not good enough to suggest that there is a risk. Citizens who want to discuss these questions should be referred to appropriate experts. Officials should try not to get caught in such arguments. Instead, they should try to present whatever facts are available and provide ways for opponents to work together to achieve acceptable policy solutions.

Answering health effects questions

Now we can turn back to some of the questions citizens ask:

1) What risk is posed by these exposures?
2) Are these emissions the cause of (various health symptoms)?

1) **What risk is posed by these exposures?**

The word "risk" often carries different meanings for different people. In communicating with the public, it is usually not helpful to say, "the risk is high" or "the risk is low."

The factors contributing to the risk include:

Factor	Example
Quantities	How much effluent was released
Concentrations	Parts per million
Exposures	How much is likely to be absorbed, inhaled, drunk
Probabilities	How likely is it to happen

Risk levels	Expected number of deaths or disease per year
Toxicity	How strong is the effect of exposure on human health

(Adapted from Hance, Chess, and Sandman, "Improving Dialogue With Communities" p. 64.)

In answering questions, people often confuse these factors when attempting to put risks into context. In addition to these risk factors, other characteristics we have noted on page 8 affect people's perceptions of risk, including how fair the risk seems to be, who benefits and who bears the risk, and whether the risk is voluntary or easy to understand.

One way to talk about risks of exposures is to provide:

1) A description of known health effects.

2) Any information about concentrations or levels of exposure.

3) Any comparisons of these concentrations with existing government standards or other directly comparable information. (Caution: Be careful when providing comparisons with risks from other chemicals or activities. For example, avoid making comparisons between risks such as drinking water containing hazardous chemicals and the risk of driving an automobile. Comparing dissimilar risks often makes citizens angry, especially when the comparison is between an involuntary risk such as drinking water containing hazardous chemicals emitted by a facility and a voluntary risk such as driving. However, people might find it useful to hear a comparison of similar risks of two chemicals, both of which are found in drinking water. The Covello, Sandman, and Slovic book mentioned in Appendix 2 gives other good examples.)

4) In addition, people like to know why the chemical is present in the community—that is, what it is being used for. Remember, familiar risks are likely to be perceived as less risky than unfamiliar or exotic ones. The multi-syllabic name of a chemical, in contrast, might increase concern.

A public official confronted with questions about benzene emissions might state the following:

> "Benzene is a chemical found in many common products such as gasoline and often used in making plastics, textiles, rubber, and solvents. It is known to cause leukemia if people are exposed to it at levels of hundreds of parts per million over many years. In our town, concentrations in the air are about 20 parts per billion. Because this is about 400 times lower than exposures known to cause leukemia, scientists do not know what kinds of health effects might result from exposures at this level. In other cities that do not have factories emitting benzene, concentrations in the air average about 9 parts per billion, because both automobile exhaust and other everyday activities such as pumping gasoline result in benzene emissions too."

For a substance with less well-documented effects, a statement might include the following:

> "We have recently found trichloroethylene (TCE) is a chemical that is emitted by local facilities into the water. TCE is used by these facilities as a solvent and a compound in cleaning fluid and typewriter correction fluid. In some laboratory tests on mice, TCE has been shown to have reproductive effects at levels hundreds of times higher than the levels found in our drinking water. We just do not know what effects exposure at lower levels may have."

2) **Are these emissions the cause of my unwanted health effects?**

Causation is the most difficult question officials are called upon to consider. Except in well-conducted laboratory experiments, causation is almost impossible to prove. Workers who develop certain rare diseases after being exposed to relatively high concentrations of workplace substances known to be associated with those diseases can reasonably say that workplace exposure caused their problem. Otherwise, it is almost impossible, since people are exposed to so many different substances in so many different ways. Again, laboratory studies suggest the rate at which people will experience the unwanted health effects, but can never tell which individuals will get sick.

Other Sources for Referral

Local officials should know how to get more information, including specialists to whom they can refer these more specific questions.

• Several books are available in most public libraries. Among them is the Concise Chemical Dictionary. Appendix 2 lists some others.

•Local health department officials may not have the necessary expertise but will know appropriate health officials at the state level.

•Local universities have professors who are familiar with the issues surrounding identification of long-term health risks.

Technical experts often anger people by emphasizing the difficulties in establishing causation or the extent of scientific uncertainty. Nevertheless, policy or legal decisions must often be made even when these uncertainties exist. Sometimes it is useful to respond to questions about individual symptoms and emissions or exposures with four kinds of statements:

Additional Responses

• Our scientific knowledge is not good enough for us to say whether these exposures cause your symptoms.

• You can try to reduce the exposures by. . . (give specific relevant directions such as drinking bottled water, keeping windows closed, etc.)

• (If appropriate) Emissions constitute only a small portion of most people's exposures.

• You have an opportunity to work with industry to reduce these emissions through the LEPC.

How Safe Am I?

Perhaps the most common question asked is some form of:

How safe am I?

As noted, individual exposures differ and individual susceptibilities also differ. More important, individuals' willingness to assume risks differ widely. In other words, safety is a relative term. This is especially true when we consider the non-quantitative aspects of risk, such as perceived fairness or controllability. Local officials can provide information about risk measurement, but each person must decide for himself or

herself whether a risk is acceptable—that is, whether something seems "safe."

Without supplementary information, the emissions data available under section 313 of Title III cannot answer questions about safety. The data can help people choose the facilities, media (air, water, land), or chemicals about which they would like to know more, however. Among the other information that would help determine whether the present level of safety is adequate (or the present level of risk is low enough) are the following things that affect the dose received : stack height, wind velocity, temperature, known health effects, concentrations at the fenceline, and the nature of the dose-response curve.

Perhaps the most important thing to remember is that because safety is a relative term, community members must be involved in decisions about the levels of safety they would like. One important feature of Title III is that it provides people with initial information to allow them to participate in such decisions, especially through the LEPC.

One other way a local official can help people make a determination about safety or acceptable risk is by "answering" as a citizen rather than as an official, describing how he or she would act or is acting:

"I drink the water", or "I let my children play outside."

An answer such as this is more effective when it includes a recognition of people's feelings:

"I can see that you are very concerned about this. What are your concerns and questions?"

Other questions about Scenario 2

In addition to questions about risk and safety, the newspaper article about emissions data is likely to elicit questions about existing government programs and enforcement:

3) Why are the plants allowed to emit these substances?
4) Is this facility in compliance with state or federal laws.
5) Are there other facilities in the area that have not reported that are also emitting these substances?

To answer question 3, we need to know about the present system for regulating emissions. Answering questions 4 and 5 requires obtaining and analyzing new information.

Present System for Regulating Emissions

The Present System for Regulating Emissions

It is difficult to answer the question about why plants are allowed to emit hazardous substances because of the intricacies of the federal and state laws regulating toxic chemicals. Although the emissions of many chemicals are indirectly controlled by air, water, or land disposal regulations, few are subject directly to specific federal emission permits or standards. Most EPA regulations deal with ambient levels of chemicals (in other words, they specify acceptable concentrations in the community's air or drinking water — not the amounts of the chemicals that can be released from a particular facility).

Where EPA does have regulations based on emissions, they generally apply to classes of chemicals (volatile organic compounds and particulate matter in the case of air; total suspended solids and certain types of waste streams for water). And in the handful of cases where EPA has established emission permits or standards for specific chemicals, they apply only to certain industries — not to all companies emitting those chemicals. For example, EPA has established a national air emission standard, or NESHAP, for benzene; but it applies only to certain industries and to certain processes within those industries. Therefore, to determine whether a particular company is complying with the benzene standard, you would need to know first, if the company is among the industries subject to the standard; second, which of its processes are regulated; and third, what percentage of the reported releases are emitted from those processes.

Citizens may ask whether all the emissions have been reported. The answer is no. Some facilities are not covered by the requirements of Title III; others may not know that they need to report; and still others may have decided not to do so.

Additionally, not all substances are covered - only those on the Section 313 list (see Appendix 5.) In short, the data provided by Title III, although better than anything we have had before, are still very limited. However, this question offers a good reason to discuss the opportunities for citizens to become involved in Title III activities.

Enforcement and Citizen Involvement Under Title III

Title III provides penalties for not submitting reports of routine releases. Facilities that do not submit may be sued by citizens and fined by EPA. In the many states that have passed their own right to know and chemical reporting laws, state agencies may also be able to obtain penalties for non-reporting. It may be difficult for states to determine that a facility has not reported, however. Local residents often have access to information that regulatory agencies do not have, so citizens may be able to help enforcement officials identify facilities that have failed to report.

Citizens who suspect that a facility is not reporting all or any of its emissions might begin by obtaining the chemical inventory lists available under Title III sections 311 and 312, and comparing those lists with the lists of chemicals reported as emissions on the section 313 report. Just because a chemical appears on the inventory does not mean it is emitted, so citizens will have to work with industry, local officials, and experts to determine whether it is likely that a substance is being emitted.

It is also important to recognize that the first emissions reports were due on July 1, 1988. Not every facility that should have reported even knew of its responsibility. Local officials and citizens can help identify facilities that are covered by the law and encourage them to report and notify state and EPA officials.

One answer to question 3—"**Why are the plants allowed to emit these substances?**" is

> "Not all emissions of toxic substances are harmful. Usually environmental or human health problems arise when the substance is present at more than a particular concentration. Government regulations are formulated to keep the concentrations at levels that evidence suggests are consistent with environmental and human well-being. If regulations made all emissions illegal, little manufacturing could take place. If new information becomes available that suggests that the existing standard is wrong or that some substance for which there is no standard should have one, regulatory agencies try to write new standards. Under Title III, citizens and regulatory

agencies are learning about emissions they may not have known about before. This will provide a better basis for appropriate policy responses. Because the information is also available to citizens, they have an opportunity to participate in policymaking concerning emissions to a greater extent than before. One way they can participate is by becoming active in the Local Emergency Planning Committee."

To answer question 4—**Is a particular facility in compliance with state and federal laws?** will require review of reports filed by the facility with EPA or the appropriate state agency. Local officials can provide citizens with telephone numbers where they can obtain answers.

The answer to question 5—**"Are there other facilities in the area that have not reported that are also emitting these substances?"**— is largely procedural, although it should have some substantive information if available:

"Probably. The Local Emergency Planning Committee, interested citizens, and government agencies can use other information provided under Title III and other laws to try to identify facilities that may be emitting substances. Industry associations are also trying to get word out to their members about the obligation to report. Citizens who live near manufacturing facilities can certainly check with EPA or the [appropriate state agency that receives reports under section 313] to see whether neighboring facilities have reported. If not, they may talk to the facility manager to find out why. Remember, section 313 covers only some chemicals, so many facilities may have emissions they do not need to report. Also, facilities need not report if they use chemicals in amounts below specified quantities. Among the kinds of facilities that emit this chemical but are not included in the Title III requirement are ____. Because there are many such facilities in our community, there may be some cause for concern."

6) What other sources might lead to my being exposed to these chemicals?

The answer to this question is related to the answer to question 5, but can be based more closely on the data available under sections 312 and 313. The chemical inventories submitted to the LEPC under section 312 tell what chemicals are stored in the community, thereby providing some indication of the range of possible exposures. More important, the emissions data provided under section 313 provide some basic information about which chemicals are disposed to which medium. If aggregated for the whole community, these data can suggest

the routes by which people might be exposed to particular chemicals. The newspaper article in which the emissions are reported for this scenario does not consider the medium to which the chemicals are emitted, but this information is readily available from the forms submitted to EPA and state agencies.

Because the answer to this question rests on considering data for all local facilities at the same time, officials may feel that they are unable to answer it—they lack the time to do the necessary calculations. In anticipation of such questions and needs, Congress required EPA to computerize the emissions data. The Toxic Release Inventory (TRI) database is available to the public at modest cost. It contains all the emissions reports and allows users to examine the data in a variety of ways, including adding up all emissions of a particular chemical to a particular medium in a city or county. Appendix 2 provides information on how to get access to the TRI database. SERCs also have access to a similar database maintained at EPA, and may be able to provide some data to questioners.

Summary of Scenario 2: Routine Emissions

Citizen concerns about the routine emissions reported under Title III section 313 and described in the newspaper article cover a broad range of complex issues. Officials without specific expertise in these areas should not attempt to explain the details, instead referring questioners to appropriate expert sources. On the other hand, they should anticipate questions and prepare replies, since citizens may become angry if constantly told, "I cannot answer that. Please call so-and-so." But don't make up an answer when you don't know.

Among the strategies for responding to questions about long-term health effects where there is uncertainty about whether the particular chemical causes a health effect and/or about whether the emissions in question are related to particular citizens' health problems are the following:

1. Risks or risk levels should be compared at two different times, compared against a government standard, or compared with different estimates of the same risk. Note that comparisons with government standards, which are set using a combination of political and scientific criteria, may be misleading—it is not true that everything less than the standard is "safe" while everything over it is "unsafe." Different risks, especially risks with different characteristics, should not be compared. (See above, page 8. For more on risk comparison, see Covello, Sandman, and Slovic, "Risk Communication, Risk Statistics, and Risk Comparisons.")

2. Questions of "safety" are difficult to answer, especially on the basis of section 313 emissions data alone. Different people assess safety differently. However, statements describing how you would or are behaving in the same circumstances in combination with a description of the risk provide listeners with a basis for their own comparisons. People should have an opportunity to participate in determining whether existing levels of safety are sufficient.

3. Concern about risks may really reflect concerns about power or other political issues. Try to ascertain people's real concerns and answer those. Many concerns are really about whether procedures are fair and allow for adequate participation. Use the Local Emergency Planning Committee (LEPC) as a forum for all parties to work together.

4. Where possible, indicate ways people can control risks. They may be able to take some personal preventive action such as drinking bottled water and using pesticides more carefully around the home, or they may be able to join the LEPC or other community groups to act collectively against a risk.

5. Help people understand why the substance is present in the community in the first place. Familiar risks seem less worrisome than unfamiliar ones. Long chemical names are usually unfamiliar. Explaining what familiar items the chemical is used to manufacture may help people balance the risks and benefits.

Scenario 3

Storing Large Quantities

About six weeks after publication of the article on emissions data, the following article appears in the local newspaper.

Ourcity Daily News

100 of 366 Extremely Hazardous Substances Present in Ourcity

Possibility of Serious Accidents Great
Emergency planning based on reports, but
only 70 reports filed: How many are missing?

More than 100 of the 366 chemicals the federal government calls "extremely hazardous" are found in our community in amounts greater than 10,000 pounds. Some of the chemicals are so hazardous that just a few pounds released into the air could kill hundreds of people under the worst conditions.

Seventy different facilities in New County have reported that they store these chemicals. Thirty of the chemicals are stored or used in quantities greater than 100,000 pounds. Forty facilities reported using chlorine, the chemical that spilled three months ago in the North High basement causing the evacuation of 1100 students and teachers. The New County Local Emergency Planning Committee, established under a new federal law designed to prevent chemical accidents, is developing a list of facilities that need to increase safety measures based on the list.

Extremely hazardous substances are chemicals determined by the federal Environmental Protection Agency to have the potential for causing serious human harm. Facilities must report these and many other hazardous chemicals under the federal Emergency Planning and Community Right-to-Know Act. The reports are available at the Ourcity Emergency Department, 110 Main Street.

Reporters from this newspaper examined the inventories submitted by local facilities as part of a continuing investigation into hazardous chemicals present in Ourcity. We learned that:

• Seventy facilities have submitted inventories. The federal law covers all commercial facilities that store hazardous chemicals in amounts greater than 10,000 pounds. There are 400 members of the Ourcity Chamber of Commerce. Charles Smith, president of Ourcity Citizens Against Toxics, stated that it seems likely that not all the facilities have reported that should have.

Scenario 3: Storing Large Quantities

• Forty facilities store substances in quantities greater than 100 thousand pounds, and some as much as 1 million pounds. If storage containers leak, large quantities of chemicals could leach into the air or groundwater. Accidents involving many people are possible, mostly from fire or explosion.

• Among the substances stored in large quantities are chlorine, which produces a highly irritating toxic gas,

• There are at least 50 substances being stored in underground storage tanks. According to a recent survey conducted by the State Environment Department, more than half the underground storage tanks in the state are improperly built and in imminent danger of leaking.

Industry spokesmen emphasized the care they use in storing and working with the hazardous chemicals. "We're closer to them than anyone else, so we have a strong incentive to be careful," said Tom Thomas of Generic Chemical. City and county emergency officials stated that the annual inspections of facilities storing hazardous chemicals convinced them that chemicals are properly stored. They are working with facilities to reduce the possibility of accidents further. They stated that the emergency response plan updated under the same federal law that requires submission of chemical inventories also ensures citizens' safety.

Neighbors of plants are not so sure. "About once a month I hear the sirens over there," says Sharon Shivers, who lives in the Northridge neighborhood near the Generic plant. "I think their storage is faulty but they don't want us to know."

Citizens' Questions

After reading this article, citizens might ask the following questions:

1) Are the hazardous materials used by nearby facilities stored properly? What is the chance of leaks developing?

2) How likely are stored materials to be involved in an accident?

3) If they are released, what kinds of health or other hazards do they present?

4) Can we reduce the amounts of these materials that are stored in order to reduce risk?

5) What about the danger from chemicals stored by facilities that didn't have to report because they had less than 10,000 pounds?

Answers to these questions require some understanding of the process by which we plan for hazardous materials accidents and how we assess potential risks posed by facilities that store and use hazardous materials. Some of the questions raise issues we have already considered—providing information about health effects and opportunities for citizens to participate in planning and risk reduction activities.

Planning for Hazardous Chemical Emergencies

Section 303 of Title III requires the Local Emergency Planning Committees (LEPCs) to formulate a plan for emergency response. In order to make a realistic plan, LEPCs must first learn where and what chemicals are stored. The chemical inventories submitted under sections 311 and 312 and the lists of extremely hazardous substances submitted under section 302 provide this information.

To plan for emergencies, LEPCs follow these steps:

1. Identify Hazards: using information provided by facilities, determine the ways in which they store and use hazardous chemicals.

2. Conduct a vulnerability analysis: using credible worst case assumptions, determine a vulnerability zone and identify special facilities within that zone such as nursing homes or schools or special problems such as a drinking water source.

3. Work with high-priority facilities to refine and re-evaluate the hazards identification and vulnerability analysis.

4. Complete a risk analysis: make a rough estimate of risks based on hazard identification and vulnerability analysis and likelihood of releases. Then, integrate this information into a community-wide emergency plan. (The components of a community-wide plan are described on page 12.)

Figure 2 shows a sample hazards analysis for an extremely hazardous chemical at one site. If such an analysis is conducted for all hazardous chemicals found in the community, it will

Figure 2

SAMPLE HAZARDS ANALYSIS FOR ONE EXTREMELY HAZARDOUS SUBSTANCE AT A HYPOTHETICAL SITE

(REPEAT THIS ANALYSIS FOR EACH EHS AND SITE IN THE COMMUNITY)

INITIAL SCREENING

1. HAZARDS IDENTIFICATION
(Major Hazards)

a. Chemical	Chlorine
b. Location	Water treatment plant
c. Quantity	800 lbs.
d. Properties	Poisonous; may be fatal if inhaled. Respiratory conditions aggravated by exposure. Contact may cause burns to skin and eyes. Corrosive. Effects may be delayed.

2. VULNERABILITY ANALYSIS

a. Vulnerable zone	A spill of 800 lbs. of chlorine from a storage tank could result in an area of radius-greater than 10 miles where chlorine gas may exceed the level of concern (LOC). This would be a credible worst case scenario.
b. Population within vulnerable zone	Approximately 600 residents of a nursing home; workers at a small factory; 29 workers at the water treatment plant; urban area-400 persons/sq. mile; total population in vulnerable zone is more than 125,000.
c. Essential services within zone	2 fire stations and 1 hospital

3. RISK ANALYSIS
(Initial Evaluation of Reporting Facilities—Relative Hazards) — Relative to potential hazards of other reporting facilites—high

REEVALUATION(PLANNING)

1. HAZARDS IDENTIFICATION

a. Chemical	Chlorine
b. Location	No change
c. Maximum quantity that could be released	500 lbs. (decrease)
d. Properties	No change

2. VULNERABILITY ANALYSIS

a. Vulnerable Zone	Zone decreases (new radius - 1.0 miles) due to smaller quantity released and use of urban dispersion model.
b. Population within vulnerable zone	Decreases; total population in vulnerable zone is 1250
c. Essential services	None

3. RISK ANALYSIS

a. Likelihood of hazard occurrence	Low-because chlorine is stored in an area with leak detection equipment in 24 hour service with alarms. Protective equipment is kept outside storage room.
b. Consequences if people are exposed	High levels of chlorine gas in the nursing home and factory could cause death and respiratory distress. Bed-ridden nursing home patients are especially susceptible. High severity of consequences. However, gas is unlikely to reach a nursing home under reevaluated release conditions.
c. Consequences for property	Possible superficial damage to facility equipment and structures from corrosive fumes (repairable).
d. Consequences of environmental exposure	Possible destruction of surrounding fauna and flora.
e. Summary: likelihood/severity of on site	Low/High. (The community would assess this on a site- and incident-specific basis.)

provide answers for many of the questions on page 34. For example, the answer to the question "How likely are stored materials to be involved in an accident" may be found under Part 3 (Risk Analysis) of the Reevaluation section, which assesses risk after a change in the amount of the chemical stored. There, the risk for accidents from chlorine is evaluated as being low because chlorine is stored in an area with leak detection equipment and alarms.

Information that the LEPC collects, even extra information such as a worst-case vulnerability analysis or transportation routes, is available to the public. If the LEPC has completed a plan using the steps outlined above, it should be able to assist in answering the question about proper storage.

It is difficult to estimate the chance of leaks or accidents. This question is answered by describing the planning process, which both encourages facilities to store their hazardous chemicals in the best way and sets up a plan for minimizing damage that might result if an accident does occur.

Again, in answering questions about accidents, it is important to remember the risk characteristics listed on page 8. People feel more confident when it seems that all likely causes of accidents have been considered and planned for, because the risks seem more controllable, better understood, and less likely to be catastrophic.

Facility owners and managers have the final say over reducing the amounts of stored hazardous chemicals. The LEPC can provide a forum in which citizens can voice concerns to industry representatives and work with them to get these amounts reduced. Many facilities are willing to do this after they see the results of a vulnerability analysis. They may find out that their inventory costs decrease as well by having less of each hazardous chemical on hand.

Information about the health effects of individual chemicals will also be available through the LEPC, health professionals in state and local health and environment departments, poison control centers, and academic institutions, or through the references listed in Appendices 2 and 4.

Summary

The kinds of questions that storage raises are hard to answer.

Because each facility and each community is different, the answers can only be obtained by working carefully through the specific data provided by local facilities. This is very time-consuming work. After the data are obtained, citizens will still have to work with experts to determine whether storage methods and quantities are appropriate and whether health effects are worrisome.

Rather than providing sample answers, as we did in the other scenarios, we can offer only general suggestions:

Officials can best answer most of these questions by

—referring to the plan and the procedures that went into creating it, and

—referring to the sources within government where citizens can work with government and industry.

Summary & Conclusion

The "Seven Cardinal Rules of Risk Communication, " written by Vincent Covello and Frederick Allen and available in an EPA pamphlet are reprinted here. They both summarize and add to the information presented in this manual.

1. Accept and Involve the Public as a Legitimate Partner

* Involve the community early.
* Involve all parties that have an interest or stake in the issue.
* Remember, you work for the public.

The goal of risk communication should be to produce an informed public that is involved, interested, reasonable, thoughtful, solution-oriented, and collaborative.

2. Plan Carefully and Evaluate Your Efforts

* Begin with clear, explicit objectives.
* Evaluate the information you have about risks and know its strengths and weaknesses.
* Identify and address the particular interests of different groups.
* Train your staff — including technical staff — in communication skills.
* Practice and test your messages.
* Evaluate your efforts and learn from your mistakes.

3. Listen to the Public's Specific Concerns

If you do not listen to people, you cannot expect them to listen to you. Communication is a two-way activity.

* Do not make assumptions about what people know, think, or want done. Take the time to find out what people are thinking.
* Let all parties with an interest in the issue be heard.
* Identify with your audience. Put yourself in their place and recognize their emotions.

People are often more concerned about trust, credibility, competence, control, voluntary fairness, caring and compassion than mortality statistics or quantitative risk assessment.

4. Be Honest, Frank and Open

* State your credentials; but do not ask or expect to be trusted.
* If you do not know the answer or are uncertain, say so. Get back to people with answers. Admit mistakes.
* Disclose risk information as soon as possible.
* Do not minimize or exaggerate the level of risk.
* Lean toward sharing more information, not less — or people may think you are hiding something.

Trust and credibility are difficult to obtain. Once lost they are almost impossible to regain completely.

5. Coordinate and Collaborate with Other Credible Sources

* Take time to coordinate with other organizations or groups.
* Devote effort and resources to the slow, hard work of building bridges with other organizations.
* Try to issue communications jointly with other credible sources.

Few things make risk communication more difficult than conflicts or public disagreements with other credible sources.

6. Meet the Needs of the Media

* Be open with and accessible to reporters; respect their deadlines.
* Provide risk information tailored to the needs of each type of media.
* Prepare in advance and provide background material on complex issues.
* Do not hesitate to follow up on stories with praise or criticism.
* Try to establish long-term relationships of trust with specific editors and reporters.

The media are frequently more interested in politics than in risk; more interested in simplicity than in complexity; more interested in danger than in safety.

7. Speak Clearly and with Compassion

Technical information and jargon are barriers to successful

communication with the public.

* Be sensitive to local norms, such as speech and dress.
* Use vivid, concrete images that communicate on a personal level. Use example and anecdotes that make technical risk data come alive.
* Use simple, non-technical language.
* Use risk comparisons to help put risks in perspective; but avoid comparisons that ignore distinctions that people consider important.
* Acknowledge and respond (both in words and with actions) to emotions that people express — anxiety, fear, outrage, helplessness.
* Always try to include a discussion of actions that are under way or that can be taken. Tell people what you cannot do. Promise only what you can do, and be sure to do what you promise.
* If people are sufficiently motivated, they are quite capable of understanding complex risk information, even if they may not agree with you.
* Regardless of how well you communicate risk information, some people will not be satisfied.

These rules seem to be only common sense. Yet it is surprising how often they are violated when communicating about risk. Following them does not guarantee effective risk communication. On the other hand, it is unlikely that you will communicate effectively without them. There is also an informal eighth rule, which underlies all the others:

Know what you are talking about.

Since no one person can be expected to know everything, we have tried to provide sources for additional information as well as sample answers to questions in which you refer citizens to these sources.

Talking to people about risk is difficult. Certain buzzwords or ideas such as "cancer" often set off reactions that may be too strong. Many familiar chemicals that people use every day may have more serious effects than some of the unfamiliar chemicals they will hear about under Title III. Public officials must try to help citizens keep these risks in perspective.

Opportunity for Citizen Involvement

One of the most important factors that affects people's perceptions of risk is whether they feel in control. That is why several of our suggestions for response to citizen questions, especially when the questions cannot be answered with unequivocal scientific information, is to offer people a means for participating in decisionmaking about chemicals in their communities. Local Emergency Planning Committees (LEPCs) offer, or should offer, a logical place for such participation. Because LEPCs include representatives from government, industry, and citizen groups, they offer a good setting for encouraging the different interests to work together.

Risk communicators should take every opportunity to suggest direct ways in which individuals can take control to reduce their exposures to hazardous chemicals, such as standing upwind while filling the gas tank of an automobile.

Perhaps the single most important factor in communicating risks is that the source be perceived as trustworthy and willing to listen as well as talk. Other kinds of communication also benefit from these characteristics. Public officials can improve their effectiveness in many areas by learning the lessons of risk communication: develop a relationship of trust with people before some particular incident (such as a chemical spill) occurs, and talk <u>with</u>, not <u>to</u>, citizens. Although time-consuming, this strategy will more than repay the costs when what would otherwise be a divisive community issue is settled through compromise and negotiation.

Plan of Action

We have covered the things you need to do to more effectively fulfill your role as a "risk communicator." How can you best use this information back on the job?

Unfortunately, there is no "formula" or "master plan" that will provide rote answers to every question you may ever face in risk communications. The following steps are suggested, however, as actions you can take starting today that will help prepare you for your responsibilities in this area:

1. Set a time by which you will have filled in all of the information on the "Risk Communication Resource Sheet" in the front of the manual. Some of the information you already have;

other information might take some "digging." This resource sheet will provide a quick reference to many of the contact people who are knowledgeable about emissions, releases, stored substances, etc. Update this resource sheet annually.

2. Obtain copies of this manual for persons involved in your emergency plan.

3. Initiate contact, if you have not already done so, with members of your Local Emergency Planning Committee, and learn more about their activities.

4. Keep this manual in an accessible place for periodic review and/or in case of emergencies.

Please let us know your successes in communicating about risk, and what works most effectively. Contact:

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APPENDIX 1

Glossary of Commonly Used Terms

Absorbed dose--The amount of a chemical that enters the body of an organism.

Acute--Sharp, severe; having a rapid onset, severe symptoms, and a relatively short duration.
Acute exposure: a single exposure of relatively short duration.
Acute toxicity: the development of adverse health effects soon after a single exposure to a substance.

Additive effect--Combined effect of two or more chemicals equal to the sum of their individual effects.

Ambient--Environmental or surrounding conditions.

Animal studies (sometimes called "laboratory studies")--Investigations using animals as surrogates for humans, on the expectation that results in animals are pertinent to humans.

ATSDR--Agency for Toxic Substances and Disease Registry, part of the U.S. Public Health Service, based in Atlanta, Georgia, 30333.

Carcinogen--A chemical that causes or induces cancer.

CAS registration number--A number assigned by the Chemical Abstracts Service to identify a chemical.

Chronic--Occurring over a long period of time, either continuously or intermittently.
Chronic effect--effects that last a long time even if caused by a single acute exposure. (See also delayed effect.)
Chronic exposure--long-term, low-level exposure to a to a chemical.

Concentration--the amount of the substance in a representative unit of the medium.

Delayed effect--an effect of exposure that does not occur for some time. Sometimes called a "chronic" effect.

Dose--The amount of the sbustance that actually enters the body.

Dose-response--A quantitative relationship between the dose of a chemical and an effect caused by the chemical.

Dose-response curve--graphical presentation of the relaionship between degree of exposure to a chemical (dose) and observed biological effect or response.

Emission or release--the amount of a substance released from a facility. Releases are usually classified as routine--small regularly-released amounts that are planned to be released as part of a manufacturing process--and accidental.

Endangerment assessment--a site-specific risk assessment of the actual or potential danger to human health or welfare and the environment from the release of hazardous substances or waste. The endangenment assessment document is prepared in support of enforcement actions under CERCLA or RCRA.

Environmental fate--The destiny of a chemical after release to the environment; involves considerations such as transport through air, soil, and water; bioconcentration; degradation.

EPCRA--The Emergency Response and Community Right-to-Know Act of 1986; same as SARA Title III.

Epidemiological studies--Investigation of factors contributing to disease or adverse health effects in human populations.

Exposure--The contact with a chemical or physical agent. This contact can occur through breathing, drinking, eating, and by direct skin contact.

Extrapolation--Estimation of unknown values by extending or projecting from known values.

Extremely hazardous substances--Chemicals that have the potential for causing death or irreversible toxicity after relatively short exposure to small amounts. (They are acutely toxic.) On the basis of toxicity, generally in air, EPA has identified the list of the chemicals in Appendix 5.

Latency--Time from the first exposure to a chemical until the appearance of an adverse health effect.

LC50--the concentration of a chemical in air or water that is expected to cause death in 50 percent of test animals living in that air or water.

LD50-The dose of a chemical by a specific exposure pathway (eating, breathing, injection, or absorbed by the skin) that is expected to cause death in 50 percent of the test animals so treated.

LEPC--Local Emergency Planning Committee. Local body established under Title III.

LOAEL--Lowest-Observed-Adverse-Effect Level; the lowest dose in an experiment that produced an observable adverse effect.

Laboratory studies--Studies of the effects of chemicals on animals or cells.
--In vitro studies--Studies of chemical effects conducted in tissues, cells or subcellular extracts from an organism (i.e., not in the living organism).
--In vivo studies--Studies of chemical effects conducted in intact living organisms.

Long-term exposure--This occurs when a substance is present in the environment around a person over a long period of time.

MSDS--Material Safety Data Sheet. A description of the chemical, physical, and health effects of a chemical along with methods for protection and emergency response written for workplace settings.

Materials balance--An accounting of the mass flow of a substance from sources of production, through distribution and use, to disposal or distribution, and including any releases to the environment.

Mutagen--An agent that causes a permanent genetic change in a cell other than that which occurs during normal genetic recombination.

NOAEL--No-Observed-Adverse-Effect Level; the highest dose in an experiment that did not produce an observable adverse effect.

NRC--National Response Center, 1-800-424-8802.

Pathogen--Any disease-causing agent, usually applied to living agents.

Permissible dose--The dose of a chemical that may be received by an individual without the expectation of a significantly harmful result.

RCRA--Resource Conservation and Recovery Act. Another federal statute concerning hazardous substances.

Release--see "Emission."

Reversible effect--An effect that is not permanent; an especially adverse effect that diminishes when exposure to a toxic chemical ceases.

Risk--The likelihood of injury, disease, or death.

Risk assessment-A qualitative or quantitative evaluation of the environmental and/or health risk resulting from exposure to a chemical or physical agent (pollutant); combines exposure assessment results with toxicity assessment results to estimate risk.

Risk estimate--A description of the probability that organisms exposed to a specified dose of chemical will develop an adverse response (e.g., cancer).

Risk factor--Characteristic (e.g., race, sex, age, obesity) or variable (such as smoking, occupational exposure level) associated with increased probability of an adverse health effect.

Route of exposure--the avenue by which a chemical comes into contact with an organism (e.g., inhalation, ingestion, dermal contact, injection).

SARA-Superfund Amendments and Reauthorization Act of 1986.

SERC--State Emergency Response Commission. Established under Title III.

Teratogenicity--The capacity of a physical or chemical agent to cause hereditary congenital malformations (birth defects) in offspring.

Threshold--The lowest dose of a chemical at which a specifed measurable effect is observed and below which it is not observed.

Title III--the common name for the Emergency Planning and Community Right to Know Act of 1986, which is Title III of the Superfund Amendments and Reauthorization Act.

Toxicity--The quality or degree of being poisonous or harmful to plant, animal, or human life.

TRI--Toxics (or Toxic Chemical) Release Inventory. The database containing annual toxic chemical release reports submitted by certain manufacturing facilities, specified in Section 313 of EPCRA. The TRI is available to the public in county libraries, through a national computerized database maintained by the National Library of Medicine, and through regional EPA offices. See Appendix 2 for more information.

APPENDIX 2

References and Sources

1. Title III

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Working Group on Community Right to Know. *What is the Emergency Planning and Community Right to Know Act?*

2. About Risk Communication

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U.S. EPA, Office of Toxic Substances. *Toxic and Hazardous Chemicals - Title III and Communities: An Outreach Manual for Community Groups.* Washington, D.C.: EPA. September, 1989.

3. About Specific Chemicals

Chemical Manufacturers Association. Chemical Referral Center. 1-800-262-8200.

CAMEO (Computer-Aided Management for Emergency Operations). (Software--contains descriptions, health effects information, and emergency response information for more than 2400 chemicals.)

Department of Transportation. Emergency Response Guidebook. Lists about 1,000 substances by name and DOT identification number, giving hazards and isolation distances. Available from Office of Hazardous Materials Transportation, DMH-50, RSPA, DOT, 400 7th Street, S.W., Washington, D.C. 20590.

Environmental Protection Agency. *Common Synonyms for Chemicals Listed under Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986.* December 1988.

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New Hampshire Department of Health and Human Services. *Health Information Summaries.* Concord, N.H.

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Virginia Department of Health. *Virginia Fact Sheets.* Richmond, Va.

U.S. Coast Guard, Chemical Hazards Response Information System 202-267-1577.

Washington Department of Social and Health Services. *Toxic Substances Fact Sheets.* Olympia, WA.

4. General Information about Health Effects

Agency for Toxic Substances and Disease Registry. *Case Studies in Environmental Medicine.*

Agency for Toxic Substances and Disease Registry. *Toxicological Profiles.* Profiles have been developed for the hazardous substances that pose a significant potential threat to human health and are common at Superfund sites. Each profile contains toxicological and health effects information for the substance. (Write for information on how to obtain the Profiles: ATSDR, E-28, Division of Toxicology, 1600 Clifton Road, N.E., Atlanta, Georgia 30333.)

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Marczewski, Alice E. and Michael Kamrin. *Toxicology for the Citizen,* 2nd ed. East Lansing, MI: Michigan State University, Center for Environmental Toxicology, 1987. (Write the Center for Environmental Toxicology, C231 Holden Hall, Michigan State University, East Lansing, Michigan, 48824.)

Moses, Susan . *Chemical Risk: A Primer.* Washington, D.C.: American Chemical Society, 1984. A pamphlet for nonscientists focuses on scientific issues involved in determining the health risks arising from exposure to chemicals and mentions public perceptions of risk.

National Cancer Institute. *Everything Doesn't Cause Cancer.* Bethesda, MD: National Cancer Institute, 1984.

Ottoboni, M. ALice. *The Dose Makes the Poison: A Plain-Language Guide to Toxicology.* Berkeley, CA: Vincente Books, 1984. A readable and concise introduction to risks from chemicals.

Sasnett, Sam K. *A Toxics Primer.* Washington, DC: League of Women Voters of the United States, no date.

Toxicology Data Network System (TOXNET), National Library of Medicine (NLM). Online computerized databases of toxicological information on specific chemicals. See Section 8 on databases for more information.

Wexler, Phillip. *Information Resources in Toxicology.* New York: Elsvier Science Publishing Co.,1987. Guide to literature, computer files, organizations, and activiites concerning toxicology.

5. Evaluation Methods for Use in Specific Communities

Brockbank, Brad, John Cohrsson, and Vincent T. Covello. A manual on risk assessment techniques for decisionmakers and citizens. Washington, D.C.: Council on Environmental Quality, 1988.

CAMEO (Computer-Aided Management for Emergency Operations). (software)

Chemical Manufacturers Association.*Chemicals in the Community: Methods to Evaluate Airborne Levels.* Washington, D.C.: CMA, 1988. Identifies methods used to evaluate emission leels of airborne chemicals in the community. Intended for health professionals who can judge the most appropriate approach and evaluate available data.

Environmental Protection Agency. *Guide to Exercises in Chemical Emergency Preparedness Programs.*

EPA, FEMA, and DOT. *Technical Guidance for Hazards Analysis.* December 1987.

National Response Team, *Criteria for Review of Hazardous Materials Emergency Plans.* (NRT 1-A) May, 1988

National Response Team. *Hazardous Materials Planning Guide.* (NRT-1). March 1987. Available by writing Hazmat Planning Guide, OS-120, EPA, 401 M Street, S.W., Washington, D.C. 20460.

Public Health Foundation, Environmental Health Program. *Resource Guide for Environmental Health Risk Assessment.* Washington, D.C.: PHF, 1986. Organizational contact and other resource information to assist professionals who are assessing risks from polluted environments.

Rall, David P. *Medicine for the Layman: Environment and Disease.* Bethesda, MD: National Institutes for Health, 1982.

Sherry, Susan. *High Tech and Toxics: A Guide for Local Communities.* Washington DC: Golden Empire Health Planning Center, 1985.

Working Group on Community Right to Know. *Hazard Assessments and Plume Mapping Documents for LEPCs.*

6. State and Local Level Contacts and Resources (also see Appendix 4.)

Public Health Foundation, Environmental Health Program. *Directory of State and Territorial Environmental Health Services.* Washington, D.C.: PHF, 1987. Updated annually and in possession of each state's health department.

7. Waste Reduction

Irwin, Frances H. and Edwin Clark. *America's Waste: Managing for Risk Reduction.* Washington DC: The Conservation Foundation, 1987.

Muir, Warren and Joanna Underwood. *Promoting Hazardous Waste Reduction: Six Steps States Can Take.* New York: INFORM, 1987.

Sarokin, David J., Warren Muir, Catherine G. Miller, and Sebastian R. Sperber, *Cutting Chemical Wastes: What 29 Organic Chemical Plants are Doing to Reduce Hazardous Wastes.* New York: INFORM, 1985.

8. Databases.

National Library of Medicine (NLM), 8600 Rockville Pike, Bethesda, MD. 20894. 1-800-638-8480 or 301-496-6193. Databases are available online through a personal computer and modem connection, or in a medical library.

TOXLINE. A collection of online bibliographic information convering the pharmacological, biochemical, physiological, and toxicological effects of drugs and hazardous chemicals. For information: MEDLARS Management Section at the NLM address given above.

Toxicology Data Network System (TOXNET). A computerized system of files oriented to toxicology and related areas. The files include the Hazardous Substances Data Bank (HSDB), the Registry of Toxic Effects of Chemical Substances (RTECS), and the Environmental Protection Agency's Toxic Chemical Release Inventory (TRI). For information, contact the NLM at the address given above.

CCINFOdisc. Canadian Centre for Occupational Health and Safety.

CCINFOdisc is a compact disk with several toxic substances databases, including the New Jersey Fact Sheets.

APPENDIX 3

Brief Description of Title III by Section

301 - establishes LEPCs and SERCs (State Emergency Response Commissions).

302 - requires facilities to notify the LEPC and SERC if they store more than the threshold planning quantity of any of the extremely hazardous substances.

303 - requires the LEPC to formulate an emergency plan.

304 - requires facilities that release more than a reportable quantity to notify the LEPC and the SERC (and NRC for CERCLA hazardous substances).

311 - requires all facilities that store any hazardous substance in amounts greater than 10,000 pounds (for hazardous chemicals) or 500 pounds or the threshold planning quantity, whichever is less (for extremely hazardous substances), to submit a chemical list or Material Safety Data Sheet (MSDS) to the local fire department, LEPC, and SERC.

312 - requires an annual report including quantities of chemicals characterized by hazard (Tier 1 report) or as individual chemicals (Tier II report) to be submitted to the local fire department, LEPC, and SERC.

313 - An annual report by manufacturing facilities only of emissions to air, water, or ground of chemicals on a list of about 300.

321 - in general, Title III does not preempt state laws; states and localities may require supplementary information.

322 - allows manufacturers to claim chemical identity as trade secret if they meet several conditions.

323 - allows some doctors, nurses, and public health officials to obtain even information declared trade secret if they need it for treating patients and they promise not to disclose the information further.

326 - provides for lawsuits under certain circumstances by citizens against facilities that do not comply with the law and against agencies that do not fulfill their duties, and allows state and local governments to sue facilities.

Appendix 4

Contacts

The Emergency Planning and Community Right-To-Know Act of 1986

State Emergency Response Commission/Title III Contacts

November 1, 1989

Prepared by
The Emergency Planning and Community Right-To-Know Information Hotline
For more information call
1-800-535-0202
(or (202) 479-2449 in the Washington, DC metro area)

State Emergency Response Commission and State-Designated Agencies for the Emergency Planning and Community Right-to-Know Act

November 1, 1989

This list is the U.S. Environmental Protection Agency's listing of State Emergency Response Commissions and State designated agencies for the Emergency Planning and Community Right-to-Know Act. The EPA has verified each contact individually. All addresses listed under State Commissions receive the Section 302 emergency planning notification and the Section 304 emergency release notification unless otherwise specified. The State designated agencies receive the submissions for the sections listed in their headings. If one address is listed with no heading, the State commission receives all submissions for every section of the Act. If an additional address is listed under the heading "Mailing Address," this address is to be used for mailings to the State Commissions other than the P.O. boxes used for the form submissions.

ALABAMA

State Commission:
J. Danny Cooper, Co-Chair
Alabama Emergency Response Commission
Director, Alabama Emergency Management Agency
520 South Court Street
Montgomery, AL 36130
(205) 834-1375

Contact: Dave White

Section 311/312 Submissions:
Leigh Pegues, Co-Chair
Alabama Emergency Response Commission

Director, Alabama Department of Environmental Management
1751 Congressman W.L. Dickinson Drive
Montgomery, AL 36109
(205) 271-7700

Contact: L.G. Linn (205) 271-7700
E. John Williford (205) 271-7931

Section 313 Submissions:
E. John Williford, Chief of Operations
Alabama Emergency Response Commission
Alabama Department of Environmental Management
1751 Congressman W.L. Dickinson Drive
Montgomery, AL 36109
(205) 271-7700

Contact: L.G. Linn (205) 271-7700
E. John Williford (205) 271-7931

ALASKA

Dennis Kelso, Chair
Alaska State Emergency Response Commission
P.O. Box O
Juneau, AK 99811
(907) 465-2600

Mailing Address:
Linda VanHouten
Alaska State Emergency Response Commission
9000, Old Glacier Highway
P.O. Box 32420
Juneau, AK 99803

AMERICAN SAMOA

State Commission:
Maiava O. Hunkin
Program Coordinator for the Territorial Emergency Management Coordination Office
American Samoan Government
P.O. Box 1086
Pago Pago, American Samoa 96799
International Number (684) 633-2331

Section 311/312 & 313 Submissions:
Pati Faiai, Director
American Samoa EPA
Office of the Governor
Pago Pago, American Samoa 96799
International Number (684) 633-2304

ARIZONA

Carl F. Funk, Executive Director
Arizona Emergency Response Commission
Division of Emergency Services
5636 East McDowell Road
Phoenix, AZ 85008
(602) 231-6326

ARKANSAS

State Commission:
Randall Mathis, Director
Arkansas Department of Pollution Control and Ecology
P.O. Box 9583
8001 National Drive
Little Rock, AR 72219
(501) 562-7444

Contact: John Ward (501) 562-7444

Section 311/312 & 313 Submissions:
Becky Bryant
Depository of Documents
Arkansas Department of Labor
10421 West Markham
Little Rock, AR 72205

Contact: Becky Bryant (501) 682-4534

Mailing Address:
Arkansas Department of Pollution Control and Ecology
P.O. Box 9583
8001 National Drive
Little Rock, AR 72219
Attn: John Ward

CALIFORNIA

State Commission:
William Medigovich, Chair
California Emergency Planning and Response Commission
Director, Office of Emergency Services
2800 Meadowview Road
Sacramento, CA 95832
(916) 427-4287

Section 302, 304, 311/312 Submissions:
California Emergency Planning and Response Commission
Office of Emergency Services
Hazardous Materials Division
2800 Meadowview Road

Sacramento, CA 95832
(916) 427-4287

Contacts: Gary Burton
Michelle LaBella
Dave Zocchetti

Section 313 Submissions:
Chuck Shulock
Office of Environmental Affairs
P.O. Box 2815
Sacramento, CA 95812
Attn: Section 313 Reports
(916) 324-8124
(916) 322-7236 Completed *Form R* Information

COLORADO

State Commission:
David C. Shelton, Chair
Colorado Emergency Planning Commission
Colorado Department of Health
4210 East 11th Avenue
Denver, CO 80220
(303) 331-4880

Emergency Release Notification:
(303) 331-4858
After Hours & Weekends (Emergencies Only):
(303) 377-6326

Section 302, 304, 311/312 & 313 Submissions:
Colorado Emergency Planning Commission
4210 East 11th Avenue
Denver, CO 80220

Contact: Judy Waddill (303) 331-4858

CONNECTICUT

Sue Vaughn, Title III Coordinator
State Emergency Response Commission
Department of Environmental Protection
State Office Building, Room 161
165 Capitol Avenue
Hartford, CT 06106
(203) 566-4856

DELAWARE

State Commission:
Patrick W. Murray, Chair
Delaware Commission on Hazardous Materials
Department of Public Safety
P.O. Box 818
Dover, DE 19903

Contact: George Frick (302) 736-3169

Section 302 Submissions:
Dominick Petrilli, Acting Director
Division of Emergency Planning and Operations
P.O. Box 527
Delaware City, DE 19706
(302) 834-4531

Section 304 Submissions:
Phillip Retallick, Director
Division of Air and Waste Management
Department of Natural Resources and Environmental Control
Richardson and Robbins Building
89 Kings Highway
P.O. Box 1401
Dover, DE 19903
(302) 736-4764

Section 311/312 Submissions:
Dr. Lawrence Krone, Chief
Bureau of Environmental Health
Jesse Cooper Building
Federal Street
P.O. Box 637
Dover, DE 19903
(302) 736-4731

Section 313 Submissions:
Robert French, Chief Program Administrator
Air Resource Section
Department of Natural Resources and Environmental Control
P.O. Box 1401
Dover, DE 19903
(302) 736-4791

DISTRICT OF COLUMBIA

Joseph P. Yeldell, Chair
State Emergency Response Commission for Title III
in the District of Columbia
Office of Emergency Preparedness
2000 14th Street, NW
Frank Reeves Center for Municipal Affairs
Washington, DC 20009
(202) 727-6161

Contact: Pamela Thurber, Environmental Planning Specialist

FLORIDA

Mr. Thomas G. Pelham, Chair
Florida Emergency Response Commission
Secretary, Florida Department of Community Affairs
2740 Centerview Drive
Tallahassee, FL 32399-2149
(904) 488-1472
In FL: 800-635-7179

Contact: Eve Rainey

GEORGIA

State Commission:
Mr. J. Leonard Ledbetter, Chair
Georgia Emergency Response Commission
Commissioner, Georgia Department of Natural Resources
205 Butler Street, SE
Floyd Towers East, 11th floor
Atlanta, GA 30334
(404) 656-4713

Section 302, 304, 311/312 & 313 Submissions:
Jimmy Kirkland
Georgia Emergency Response Commission
205 Butler Street, SE
Floyd Tower East
11th Floor, Suite 1166
Atlanta, GA 30334
(404) 656-6905
Emergency Release Number (800) 241-4113

GUAM

State Commission & Section 311/312 Submissions:
Dr. George Boughton, Chair
Guam State Emergency Response Commission
Civil Defense
Guam Emergency Services Office
Government of Guam
P.O. Box 2877
Aguana, Guam 96910
(671) 472-7230
FTS 550-7230

Section 313 Submissions:
Roland Solidio
Guam EPA
P.O. Box 2999
Aguana, Guam 96910
(671) 646-8863

HAWAII

State Commission and Section 311/312 Submissions:
Bruce S. Anderson, Ph.D., Vice-Chair
Hawaii State Emergency Response Commission
Hawaii Department of Health
P.O. Box 3378
Honolulu, HI 96801
(808) 548-2076
(808) 548-5832

Contact: Samir Araman (808) 543-8249
Mark Ingoglia (808) 543-8276

Section 313 Submissions:
John C. Lewin, M.D., Chair
Hawaii State Emergency Response Commission
Hawaii State Department of Health
P.O. Box 3378
Honolulu, HI 96801-9904
(808) 548-6505

IDAHO

State Commission:
Idaho Emergency Response Commission
State House
Boise, ID 83720
(208) 334-5888

Section 311/312 & 313 Submissions:
Idaho Emergency Response Commission
State House
Boise, ID 83720
Attn: Jenny Records

Contact: Jenny Records (208) 334-5888

ILLINOIS

State Commission and Section 311/312 Submissions:
Oran Robinson
Illinois Emergency Response Commission
Illinois Emergency Services & Disaster Agency
Attn: Hazmat Section
110 East Adams Street
Springfield, IL 62706
(217)782-4694

Section 313 Submissions:
Joe Goodner
Emergency Planning Unit
Illinois EPA
P.O. Box 19276
2200 Churchill Road
Springfield, IL 62794-9276
(217) 782-3637

INDIANA

Skip Powers, Director
Indiana Emergency Response Commission
5500 West Bradbury Avenue
Indianapolis, IN 46241
(317) 243-5176

IOWA

State Commission & Section 302 Submissions:
Ellen Gordon, Chair
Iowa Disaster Services
Hoover Building, Level A
Room 29
Des Moines, IA 50319
(515) 281-3231

Section 304 Submissions:
Department of Natural Resources
Division of Environmental Protection
Emergency Response Section
Wallace Building, 5th Floor
Des Moines, IA 50319
(515) 281-8694

Contact: Ron Kozel

Section 311/312 Submissions:
Iowa Emergency Response Commission
Division of Labor
1000 East Grand Avenue
Des Moines, IA 50319
(515) 281-6175

Contact: Don Peddy

Section 313 Submissions:
Department of Natural Resources
Records Department
900 East Grand Avenue
Des Moines, IA 50319
(515) 281-8852

Contact: Pete Hamlin

KANSAS

State Commission:
Karl Birns, Staff Director
Kansas Emergency Response Commission
and
Community Right-To-Know Program
Mills Building, 5th Floor
109 S.W. 9th Street
Topeka, KS 66612
(913) 296-1690

Section 302 & 304 Submissions:
Karl Birns
Kansas Department of Health and Environment
Right-to-Know Program
Mills Building, 5th Floor
109 S.W. 9th Street
Topeka, KS 66612
(913) 296-1690
Emergency Release Number Only (24 hrs):
(913) 296-3176

Section 311/312 & 313 Submissions:
Right -to- Know Program
Kansas Department of Health and Environment
Mills Building, 5th Floor
109 S.W. 9th Street
Topeka, KS 66612
(913) 296-1690

Contact: Karl Birns

KENTUCKY

State Commission & Section 311/312 Submissions:
Colonel James H. "Mike" Molloy, Chair
Kentucky Emergency Response Commission
Kentucky Disaster and Emergency Services
Boone National Guard Center
Frankfort, KY 40601-6168
(502) 564-8660
(502) 564-8682

Contact: Mike Molloy or Craig Martin

Section 313 Submissions:
Valerie Hudson
Kentucky Department of Environmental Protection
18 Reilly Road
Frankfort, KY 40601
(502) 564-2150

Mailing Address:
Lucille Orlando
SARA Title III
Kentucky Department of Environmental Protection
Kentucky Disaster and Emergency Services
Boone National Guard Center
Frankfort, KY 60601-6161

LOUISIANA

State Commission & Section 311/312 Submissions:
Sergeant Ronnie Mayeaux
Louisiana Emergency Response Commission
Office of State Police
P.O. Box 66614
7901 Independence Boulevard
Baton Rouge, LA 70896
(504) 925-6113

Section 313 Submissions:
R. Bruce Hammatt
Emergency Response Coordinator
Department of Environmental Quality
P.O. Box 44066
333 Laurel Street
Baton Rouge, LA 70804-4066
(504) 342-8617

MAINE

David D. Brown, Chair
State Emergency Response Commission
Station Number 72
Augusta, ME 04333
(207) 289-4080
(800)452-8735 in ME

Contact: Tammy Gould

MARYLAND

State Commission:
June L. Swem
Governor's Emergency Management Agency
c/o Maryland Emergency Management Agency
2 Sudbrook Lane, East
Pikesville, MD 21208
(301) 486-4422

Section 302, 304, 311/312 & 313 Submissions:
Marsha Ways
State Emergency Response Commission
Maryland Department of the Environment
Toxics Information Center
2500 Broening Highway
Baltimore, MD 21224
(301) 631-3800

MASSACHUSETTS

Arnold Sapenter
c/o Title Three Emergency Response Commission
Department of Environmental Quality Engineering
One Winter Street, 10th floor
Boston, MA 02108
(617) 292-5993
For LEPC Information: Jack Callahan (508) 820-2060

MICHIGAN

Title III Coordinator
Michigan Department of Natural Resources
Environmental Response Division
Title III Notification
P.O. Box 30028
Lansing, MI 48909
(517) 373-8481

MINNESOTA

Lee Tischler, Director
290 Bigelow Building
450 North Syndicate
St. Paul, MN 55155
(612) 643-3000

MISSISSIPPI

J.E. Maher, Chair
Mississippi Emergency Response Commission
Mississippi Emergency Management Agency
P.O. Box 4501
Fondren Station
Jackson, MS 39296-4501
(601) 960-9973

Contact: Bill Austin

MISSOURI

Dean Martin, Coordinator
Missouri Emergency Response Commission
Missouri Department of Natural Resources
P.O. Box 3133
Jefferson City, MO 65102
(314) 751-7929

Mailing Address:
Dean Martin
Missouri Emergency Response Commission
Missouri Department of Natural Resources
2010 Missouri Boulevard
Jefferson City, MO 65109

MONTANA

Tom Ellerhoff, Co-Chair
Montana Emergency Response Commission
Environmental Sciences Division
Department of Health & Environmental Sciences
Cogswell Building A-107
Helena, MT 59620
(406) 444-6911
Contact: Guy Youngblood

NEBRASKA

Clark Smith, Coordinator
Nebraska Emergency Response Commission
Nebraska Department of Environmental Control
P.O. Box 98922
State House Station
Lincoln, NE 68509-8922
(402) 471-2186
Emergency Number (After-hours): (402) 471-4545

NEVADA

State Commission and Section 311/312 Submissions:
Joe Quinn
Nevada Division of Emergency Management
2525 South Carson Street
Carson City, NV 89710
(702) 885-4240
Emergency Release Number (After Hours & Weekends): (702) 885-5300

Section 313 Submission:
Bob King
Division of Emergency Management
2525 South Carson Street
Carson City, NV 89710
(702) 885-4240

NEW HAMPSHIRE

Gerorge L. Iverson, Director
State Emergency Management Agency
Title III Program
State Office Park South
107 Pleasant Street
Concord, NH 03301
(603) 271-2231

Contact: Leland Kimball

NEW JERSEY

State Commission:
Tony McMahon, Director
New Jersey Emergency Response Commission
SARA Title III Project
Department of Environmental Protection
Division of Environmental Quality
CN-405
Attn: 304 Notification
Trenton, NJ 08625
(609) 292-6714
Emergency Number: (609) 292-7172

Section 302, 311/312 Submissions
New Jersey Emergency Response Commission
SARA Title III Project
Department of Environmental Protection
Division of Environmental Quality
CN-405
Trenton, NJ 08625
(609) 292-6714

Section 304 Submissions:
New Jersey Emergency Response Commission
SARA Title III Project
Department of Environmental Protection
Division of Environmental Quality
CN-027
Trenton, NJ 08625
(609) 292-6714

Section 313 Submissions:
New Jersey Emergency Response Commission
SARA Title III Section 313
Department of Environmental Protection
Division of Environmental Quality
Bureau of Hazardous Substances Information
CN-405
Trenton, NJ 08625
(609) 292-6714

NEW MEXICO

Samuel Larcombe
New Mexico Emergency Response Commission
New Mexico Department of Public Safety
P.O. Box 1628
Santa Fe, NM 87504-1628
(505) 827-9222

NEW YORK

State Commission:
Anthony Germano, Deputy Director
State Emergency Management Office
Building 22
State Campus
Albany, NY 12226
(518) 457-9996

Section 302, 304, 311/312 & 313 Submissions:
New York Emergency Response Commission
New York State Department of Environmental Conservation
Bureau of Spill Response
50 Wolf Road/Room 326
Albany, NY 12233-3510
(518) 457-4107

Contact: William Miner

NORTH CAROLINA

State Commission:
Joseph Myers, Chair
North Carolina Emergency Response Commission
116 West Jones Street
Raleigh, NC 27603-1335
(919) 733-3867

Section 302, 304, 311/312 & 313 Submissions:
North Carolina Emergency Response Commission
North Carolina Division of Emergency Management
116 West Jones Street
Raleigh, NC 27603-1335
(919) 733-3867
(800) 451-1403 (In NC General Information Only)

Contacts: Vance Kee (919) 733-3844
Emily Kilpatrick (919) 733-3865

NORTH DAKOTA

State Commission:
Ronald Affeldt, Chair
North Dakota Emergency Response Commission
Division of Emergency Management
P.O. Box 5511
Bismark, ND 58502-5511
(701) 224-2111

Section 302, 311/312 & 313 Submissions:
SARA Title III Coordinator
North Dakota State Department of Health and Consolidated Laboratories
1200 Missouri Avenue
P.O. Box 5520
Bismarck, ND 58502-5520
(701) 224-2374

Contact: Charles Rydell

COMMONWEALTH of NORTHERN MARIANA ISLANDS

State Commission and Section 311/312 Submissions:
Felix A. Sasamoto, Civil Defense Coordinator
Office of the Governor
Capitol Hill
Commonwealth of Northern Mariana Islands
Saipan, CNMI 96950
International Number (670) 322-9529

Section 313 Submissions:
Russell Meecham, III
Division of Environmental Quality
P.O. Box 1304
Saipan, CNMI 96950
(670) 234-6984

OHIO

State Commission and Section 311/312 Submissions:
Ken Schultz, Coordinator
Ohio Emergency Response Commission
Ohio Environmental Protection Agency
Office of Emergency Response
P.O. Box 1049
Columbus, OH 43266-0149
(614) 644-2260

Section 313 Submissions:
Cindy Sferra-DeWulf
Division of Air Pollution Control
1800 Watermark Drive
Columbus, OH 43215
(614) 644-2266

OKLAHOMA

Emergency Response Commission
Office of Civil Defense
P.O. Box 53365
Oklahoma City, OK 73152
(405) 521-2481

Contact: Aileen Ginther

OREGON

Ralph M. Rodia
Oregon Emergency Response Commission
c/o State Fire Marshall
3000 Market Street Plaza
Suite 534
Salem, OR 97310
(503) 378-2885

PENNSYLVANIA

State Commission:
Richard Rodney
Pennsylvania Emergency Response Commission
SARA Title III Officer
PEMA Response and Recovery
P.O. Box 3321
Harrisburg, PA 17105
(717) 783-8150
Emergency Release Number — 24 hours (717) 783-8150

Section 311/312 Submissions:
Pennsylvania Emergency Response Commission
c/o Bureau of Right-to-Know
Rm 1503
Labor and Industry Building
7th & Forrester Streets
Harrisburg, PA 17120
(717) 783-2071

Section 313 Submissions:
James Tinney
Bureau of Right -To- Know
Room 1503
Labor and Industry Building
7th & Forrester Streets
Harrisburg, PA 17120
(717) 783-2071

PUERTO RICO

State Commission and Section 311/312 Submissions:
Mr. Santos Rohena, Chair
Puerto Rico Emergency Response Commission
Environmental Quality Board
P.O. Box 11488
Sernades Juncos Station
Santurce, PR 00910
(809) 722-1175
(809) 722-2173

Section 313 Submissions:
SERC Commissioner
Title III-SARA Section 313
Puerto Rico Environmental Quality Board
P.O. Box 11488
Santurce, PR 00910
(809) 722-0077

RHODE ISLAND

State Commission:
Charles Givens, Acting Executive Director
Rhode Island Emergency Response Commission
State House Room 27
Providence, RI 02903
(401) 277-3039
Emergency Release Number (401) 274-7745

Contact: John Aucott

Section 311/312 Submissions:
Anthony Diccio
Rhode Island Department of Labor
Division of Occupational Safety
220 Elmwood Avenue
Providence, RI 02907
(401) 457-1847

Section 313 Submissions:
Department of Environmental Management
Division of Air and Hazardous Materials
291 Promenade Street
Providence, RI 02908
Attn: Toxic Release Inventory
(401) 277-2808

Contact: Martha Mulcahey

SOUTH CAROLINA

State Commission and Section 302 Submissions:
Stan M. McKinney, Chair
South Carolina Emergency Response Commission
Division of Public Safety Programs
Office of the Governor
1205 Pendleton Street
Columbia, SC 29201
(803) 734-0425

Section 304 & 311/312 Submissions:
South Carolina Emergency Response Commission
Division of Public Safety Programs
Office of the Governor
1205 Pendleton Street
Columbia, SC 29201
Attn: Purdy McLeod
(803) 734-0425

Section 313 Submissions:
Ron Kinney
Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201
(803) 734-5200

SOUTH DAKOTA

State Commission and Section 311/312 Submissions:
Clark Haberman, Director
South Dakota Emergency Response Commission
Department of Water and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181
(605) 773-3151

Section 313 Submissions:
Lee Ann Smith, Director
South Dakota Emergency Response Commission
Department of Water and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181
(605) 773-3153

TENNESSEE

Mr. Lacy Suiter, Chair
Tennessee Emergency Response Commission
Director, Tennessee Emergency Management Agency
3041 Sidco Drive
Nashville, TN 37204
(615) 252-3300
(800) 258-3300 (out of TN)
(800) 262-3300 (in TN)

Contact: Lacy Suiter or Tom Durham

TEXAS

State Commission:
David Haun, Coordinator
Texas Emergency Response Commission
Division of Emergency Management
P.O. Box 4087
Austin, TX 78773-0001
(512) 465-2138

Section 302, 311/312 Submissions:
Dr. William Elliot
Texas Department of Health
Division of Occupational Safety and Health
1100 West 49th Street
Austin, TX 78756
(512) 458-7410

Section 313 Submissions:
David Barker, Supervisor
Emergency Response Unit
Texas Water Commission
P.O. Box 13087-Capitol Station
Austin, TX 78711-3087
(512) 463-8527

Contact: Priscilla Seymour

UTAH

State Commission:
Lorayne Frank, Director
Comprehensive Emergency Management
P.O. Box 58136
1543 Sunnyside Avenue
Salt Lake City, UT 84158-0136
(801) 584-8370

Section 311/312 & 313 Submissions:
Neil Taylor
Utah Hazardous Chemical Emergency Response Commission
Utah Division of Environmental Health
288 North 1460 West
P.O. Box 16690
Salt Lake City, UT 84116-0690
(801) 538-6121

VERMONT

State Commission:
Jeanne VanVlandren, Chair
Vermont Emergency Response Commission
Department of Labor and Industry
5 Court Drive
Montpelier, VT 05602
(802) 828-2286

Contact: Robert McLeod (802) 828-2765

Section 311/312 & 313 Submissions:
Dr. Jan Carney, Commissioner
Department of Health
60 Main Street
P.O. Box 70
Burlington, VT 05402
(802) 863-7281

VIRGIN ISLANDS

Allan D. Smith, Commissioner
Department of Planning and Natural Resources

U.S. Virgin Islands Emergency Response Commission
Title III
Suite 231
Nisky Center
Charlotte Amalie
St. Thomas, VI 00802
(809) 774-3320 Extension 169 or 170

Contact: Gregory Rhymer

VIRGINIA

Wayne Halbleib, Director
Virginia Emergency Response Council
Department of Waste Management
James Monroe Building
14th Floor
101 North 14th Street
Richmond, VA 23219
(804) 225-2513

WASHINGTON

State Commision:
Chuck Clarke
Washington Emergency Response Commission
Department of Community Development
Mail Stop GH-51
9th and Columbia Building
Olympia, WA 98504
(206) 753-5625

Contact: Bill Bennett (206) 459-9191
(800) 633-7585 (in WA)

Section 311/312 and 313 Submission:
John Ridgway, Chair
Washington State Department of Ecology
Hazardous Substance Information Office
MS-PV/11
Olympia, WA 98504
(206) 438-7252

WEST VIRGINIA

Carl L. Bradford, Director
West Virginia Emergency Response Commission
West Virginia Office of Emergency Services
State Capital Building 1, Rm. EB-80
Charleston, WV 25305
(304) 348-5380
Emergency Release Number (304) 348-5380

Contact: Bill Jopling

WISCONSIN

State Commission:
Richard I. Braund, Director
Wisconsin Emergency Response Commission
Division of Emergency Government
4802 Sheboygan Avenue
P.O. Box 7865
Madison, WI 53707
(608) 266-3232

Section 313 Submissions:
Department of Natural Resources
P.O. Box 7921
Madison, WI 53707
Attn: Russ Dumst
(608) 266-9255

WYOMING

Ed Usui, Executive Secretary
Wyoming Emergency Response Commission
Wyoming Emergency Management Agency
Comprehensive Emergency Management
P.O. Box 1709
Cheyenne, WY 82003
(307) 777-7566
Contact: Brooke Hefner

Mailing Address:
Ed Usui
Wyoming Emergency Response Commission
Wyoming Emergency Management Agency
Comprehensive Emergency Management
5500 Bishop Boulevard
Cheyenne, WY 82009

APPENDIX 5

Extremely Hazardous Substances

CAS Number	Chemical Name
75865	ACETONE CYANOHYDRIN
1752303	ACETONE THIOSEMICARBAZIDE
107028	ACROLEIN
79061	ACRYLAMIDE
107131	ACRYLONITRILE
814686	ACRYLYL CHLORIDE
111693	ADIPONITRILE
116063	ALDICARB
309002	ALDRIN
107186	ALLYL ALCOHOL
107119	ALLYLAMINE
20859738	ALUMINUM PHOSPHIDE
54626	AMINOPTERIN
78535	AMITON
3734972	AMITON OXALATE
7664417	AMMONIA
300629	AMPHETAMINE
62533	ANILINE
88051	ANILINE, 2,4,6-TRIMETHYL-
7783702	ANTIMONY PENTAFLUORIDE
1397940	ANTIMYCIN A
86884	ANTU
1303282	ARSENIC PENTOXIDE
1327533	ARSENOUS OXIDE
7784341	ARSENOUS TRICHLORIDE
7784421	ARSINE
2642719	AZINPHOS-ETHYL
86500	AZINPHOS-METHYL
98873	BENZAL CHLORIDE
98168	BENZENAMINE, 3-(TRIFLUOROMETHYL)-
100141	BENZENE, 1-(CHLOROMETHYL)-4-NITRO-
98055	BENZENEARSONIC ACID
3615212	BENZIMIDAZOLE,4,5-DICHLORO-2-(TRIFLUOROMETHYL)-
98077	BENZOTRICHLORIDE
100447	BENZYL CHLORIDE
140294	BENZYL CYANIDE
15271417	BICYCLO[2.2.1]HEPTANE-2-CARBONITRILE, 5-CHLORO-6-((((METHYLAMINO)CARBONYL)OXY)IM
534076	BIS(CHLOROMETHYL) KETONE
4044659	BITOSCANATE
10294345	BORON TRICHLORIDE
7637072	BORON TRIFLUORIDE
353424	BORON TRIFLUORIDE COMPOUND WITH METHYL ETHER (1:1)
28772567	BROMADIOLONE
7726956	BROMINE
1306190	CADMIUM OXIDE
2223930	CADMIUM STEARATE
7778441	CALCIUM ARSENATE
8001352	CAMPHECHLOR
56257	CANTHARIDIN
51832	CARBACHOL CHLORIDE
26419738	CARBAMIC ACID, METHYL-, O-(((2,4-DIMETHYL-1, 3-DITHIOLAN-2-METHYL)METHYLENE)AMINO)-
1563662	CARBOFURAN
75150	CARBON DISULFIDE
786196	CARBOPHENOTHION
57749	CHLORDANE
470906	CHLORFENVINFOS
7782505	CHLORINE
24934916	CHLORMEPHOS
999815	CHLORMEQUAT CHLORIDE
79118	CHLOROACETIC ACID
107073	CHLOROETHANOL
627112	CHLOROETHYL CHLOROFORMATE
67663	CHLOROFORM
542881	CHLOROMETHYL ETHER
107302	CHLOROMETHYL METHYL ETHER
3691358	CHLOROPHACINONE
1982474	CHLOROXURON
21923239	CHLORTHIOPHOS
10025737	CHROMIC CHLORIDE
10210681	COBALT CARBONYL
62207765	COBALT, ((2,2'-(1,2-ETHANEDIYLBIS (NITRILOMETHYLIDYNE))BIS(6-FLUOROPHENOLATO))
64868	COLCHICINE
56724	COUMAPHOS
5836293	COUMATETRALYL
95487	CRESOL, o-
535897	CRIMIDINE
4170303	CROTONALDEHYDE
123739	CROTONALDEHYDE, (E)-
506683	CYANOGEN BROMIDE
506785	CYANOGEN IODIDE
2636262	CYANOPHOS
675149	CYANURIC FLUORIDE
66819	CYCLOHEXIMIDE
108918	CYCLOHEXYLAMINE
17702419	DECABORANE(14)
8065483	DEMETON
919868	DEMETON-S-METHYL
10311849	DIALIFOR
19287457	DIBORANE
111444	DICHLOROETHYL ETHER
149746	DICHLOROMETHYLPHENYLSILANE
62737	DICHLORVOS
141662	DICROTOPHOS
1464535	DIEPOXYBUTANE
814493	DIETHYL CHLOROPHOSPHATE
1642542	DIETHYLCARBAMAZINE CITRATE
71636	DIGITOXIN
2238075	DIGLYCIDYL ETHER
20830755	DIGOXIN
115264	DIMEFOX
60515	DIMETHOATE
2524030	DIMETHYL PHOSPHOROCHLORIDOTHIOATE
77781	DIMETHYL SULFATE
75183	DIMETHYL SULFIDE
99989	DIMETHYL-p-PHENYLENEDIAMINE
75785	DIMETHYLDICHLOROSILANE
57147	DIMETHYLHYDRAZINE
644644	DIMETILAN
534521	DINITROCRESOL
88857	DINOSEB
1420071	DINOTERB
78342	DIOXATHION
82666	DIPHACINONE
152169	DIPHOSPHORAMIDE, OCTAMETHYL-
298044	DISULFOTON
514738	DITHIAZANINE IODIDE
541537	DITHIOBIURET

CAS Number	Chemical Name
316427	EMETINE, DIHYDROCHLORIDE
115297	ENDOSULFAN
2778043	ENDOTHION
72208	ENDRIN
106898	EPICHLOROHYDRIN
2104645	EPN
50146	ERGOCALCIFEROL
379793	ERGOTAMINE TARTRATE
1622328	ETHANESULFONYL CHLORIDE, 2-CHLORO-10140871 ETHANOL, 1,2-DICHLORO-, ACETATE
563122	ETHION
13194484	ETHOPROPHOS
538078	ETHYLBIS(2-CHLOROETHYL)AMINE
371620	ETHYLENE FLUOROHYDRIN
75218	ETHYLENE OXIDE
107153	ETHYLENEDIAMINE
151564	ETHYLENEIMINE
542905	ETHYLTHIOCYANATE
22224926	FENAMIPHOS
122145	FENITROTHION
115902	FENSULFOTHION
4301502	FLUENETIL
7782414	FLUORINE
640197	FLUOROACETAMIDE
144490	FLUOROACETIC ACID
359068	FLUOROACETYL CHLORIDE
51218	FLUOROURACIL
944229	FONOFOS
50000	FORMALDEHYDE
107164	FORMALDEHYDE CYANOHYDRIN
23422539	FORMETANATE HYDROCHLORIDE
2540821	FORMOTHION
17702577	FORMPARANATE
21548323	FOSTHIETAN
3878191	FUBERIDAZOLE
110009	FURAN
13450903	GALLIUM TRICHLORIDE
77474	HEXACHLOROCYCLOPENTADIENE
4835114	HEXAMETHYLENEDIAMINE, N,N'-DIBUTYL-
302012	HYDRAZINE
74908	HYDROCYANIC ACID
7647010	HYDROGEN CHLORIDE (Gas Only)
7664393	HYDROGEN FLUORIDE
7722841	HYDROGEN PEROXIDE (Conc.> 52%)
7783075	HYDROGEN SELENIDE
7783064	HYDROGEN SULFIDE
123319	HYDROQUINONE
13463406	IRON, PENTACARBONYL-
297789	ISOBENZAN
78820	ISOBUTYRONITRILE
102363	ISOCYANIC ACID, 3,4-DICHLOROPHENYL ESTER
465736	ISODRIN
55914	ISOFLUORPHATE
4098719	ISOPHORONE DIISOCYANATE
108236	SOPROPYL CHLOROFORMATE
625558	ISOPROPYL FORMATE
119380	ISOPROPYLMETHYLPYRAZOLYL DIMETHYLCARBAMATE
78977	LACTONITRILE
21609905	LEPTOPHOS
541253	LEWISITE
58899	LINDANE
7580678	LITHIUM HYDRIDE
109773	MALONONITRILE
12108133	MANGANESE, TRICARBONYL METHYLCYCLOPENTADIENYL
51752	MECHLORETHAMINE
950107	MEPHOSFOLAN
1600277	MERCURIC ACETATE
7487947	MERCURIC CHLORIDE
21908532	MERCURIC OXIDE
10476956	METHACROLEIN DIACETATE
760930	METHACRYLIC ANHYDRIDE
126987	METHACRYLONITRILE
920467	METHACRYLOYL CHLORIDE
30674807	METHACRYLOYLOXYETHYL ISOCYANATE
10265926	METHAMIDOPHOS
558258	METHANESULFONYL FLUORIDE
950378	METHIDATHION
2032657	METHIOCARB
16752775	METHOMYL
51382	METHOXYETHYLMERCURIC ACETATE
80637	METHYL 2-CHLOROACRYLATE
74839	METHYL BROMIDE
79221	METHYL CHLOROFORMATE
624920	METHYL DISULFIDE
60344	METHYL HYDRAZINE
624839	METHYL ISOCYANATE
556616	METHYL ISOTHIOCYANATE
74931	METHYL MERCAPTAN
3735237	METHYL PHENKAPTON
676971	METHYL PHOSPHONIC DICHLORIDE
556649	METHYL THIOCYANATE
78944	METHYL VINYL KETONE
502396	METHYLMERCURIC DICYANAMIDE
75796	METHYLTRICHLOROSILANE
1129415	METOLCARB
7786347	MEVINPHOS
315184	MEXACARBATE
50077	MITOMYCIN C
6923224	MONOCROTOPHOS
2763964	MUSCIMOL
505602	MUSTARD GAS
13463393	NICKEL CARBONYL
54115	NICOTINE
65305	NICOTINE SULFATE
7697372	NITRIC ACID
10102439	NITRIC OXIDE
98953	NITROBENZENE
1122607	NITROCYCLOHEXANE
10102440	NITROGEN DIOXIDE
62759	NITROSODIMETHYLAMINE
991424	NORBORMIDE
	0 ORGANORHODIUM COMPLEX(PMN-82-147)
630604	OUABAIN
23135220	OXAMYL
78717	OXETANE, 3,3-BIS(CHLOROMETHYL)-
2497076	OXYDISULFOTON
10028156	OZONE
1910425	PARAQUAT
2074502	PARAQUAT METHOSULFATE
56382	PARATHION
298000	PARATHION-METHYL
12002038	PARIS GREEN
19624227	PENTABORANE
2570265	PENTADECYLAMINE
79210	PERACETIC ACID
594423	PERCHLOROMETHYLMERCAPTAN
108952	PHENOL
97187	PHENOL, 2,2'-THIOBIS(4,6-DICHLORO-

CAS Number	Chemical Name
4418660	PHENOL, 2,2'-THIOBIS[4-CHLORO-6-METHYL-
64006	PHENOL, 3-(1-METHYLETHYL)-, METHYLCARBAMATE
58366	PHENOXARSINE, 10,10'-OXYDI-
696286	PHENYL DICHLOROARSINE
59881	PHENYLHYDRAZINE HYDROCHLORIDE
62384	PHENYLMERCURY ACETATE
2097190	PHENYLSILATRANE
103855	PHENYLTHIOUREA
298022	PHORATE
4104147	PHOSACETIM
947024	PHOSFOLAN
75445	PHOSGENE
732116	PHOSMET
13171216	PHOSPHAMIDON
7803512	PHOSPHINE
2703131	PHOSPHONOTHIOIC ACID, METHYL-, O-ETHYL O-(4-(METHYLTHIO)PHENYL) ESTER
50782699	PHOSPHONOTHIOIC ACID, METHYL-, S-(2-(BIS(1-METHYLETHYL)AMINO)ETHYL) O-ETHYL ESTER
2665307	PHOSPHONOTHIOIC ACID, METHYL-,O-(4-NITROPHENYL) O-PHENYL ESTER
3254635	PHOSPHORIC ACID, DIMETHYL 4-(METHYLTHIO) PHENYL ESTER
2587908	PHOSPHOROTHIOIC ACID,0,0-DIMETHYL-5-(2-(METHYLTHIO)ETHYL)ESTER
7723140	PHOSPHORUS
10025873	PHOSPHORUS OXYCHLORIDE
10026138	PHOSPHORUS PENTACHLORIDE
1314563	PHOSPHORUS PENTOXIDE
7719122	PHOSPHORUS TRICHLORIDE
57476	PHYSOSTIGMINE
57647	PHYSOSTIGMINE, SALICYLATE (1:1)
124878	PICROTOXIN
110894	PIPERIDINE
5281130	PIPROTAL
23505411	PIRIMIFOS-ETHYL
10124502	POTASSIUM ARSENITE
151508	POTASSIUM CYANIDE
506616	POTASSIUM SILVER CYANIDE
2631370	PROMECARB
106967	PROPARGYL BROMIDE
57578	PROPIOLACTONE, beta-
107120	PROPIONITRILE
542767	PROPIONITRILE, 3-CHLORO-
70699	PROPIOPHENONE,4-AMINO
109615	PROPYL CHLOROFORMATE
75569	PROPYLENE OXIDE
75558	PROPYLENEIMINE
2275185	PROTHOATE
129000	PYRENE
140761	PYRIDINE, 2-METHYL-5-VINYL-
504245	PYRIDINE, 4-AMINO-
1124330	PYRIDINE, 4-NITRO-, 1-OXIDE
53558251	PYRIMINIL
14167181	SALCOMINE
107448	SARIN
7783008	SELENIOUS ACID
7791233	SELENIUM OXYCHLORIDE
563417	SEMICARBAZIDE HYDROCHLORIDE
3037727	SILANE, (4-AMINOBUTYL)DIETHOXYMETHYL-
7631892	SODIUM ARSENATE
7784465	SODIUM ARSENITE
26628228	SODIUM AZIDE (Na(N3))
124652	SODIUM CACODYLATE
143339	SODIUM CYANIDE (Na(CN))
62748	SODIUM FLUOROACETATE
131522	SODIUM PENTACHLOROPHENATE
13410010	SODIUM SELENATE
10102188	SODIUM SELENITE
10102202	SODIUM TELLURITE
900958	STANNANE,ACETOXYTRIPHENYL-
57249	STRYCHNINE
60413	STRYCHNINE, SULFATE
3689245	SULFOTEP
3569571	SULFOXIDE, 3-CHLOROPROPYL OCTYL
7446095	SULFUR DIOXIDE
7783600	SULFUR TETRAFLUORIDE
7446119	SULFUR TRIOXIDE
7664939	SULFURIC ACID
77816	TABUN
13494809	TELLURIUM
7783804	TELLURIUM HEXAFLUORIDE
107493	TEPP
13071799	TERBUFOS
78002	TETRAETHYL LEAD
597648	TETRAETHYLTIN
75741	TETRAMETHYL LEAD
509148	TETRANITROMETHANE
10031591	THALLIUM SULFATE
6533739	THALLOUS CARBONATE
7791120	THALLOUS CHLORIDE
2757188	THALLOUS MALONATE
7446186	THALLOUS SULFATE
2231574	THIOCARBAZIDE
39196184	THIOFANOX
297972	THIONAZIN
108985	THIOPHENOL
79196	THIOSEMICARBAZIDE
5344821	THIOUREA, (2-CHLOROPHENYL)-
614788	THIOUREA, (2-METHYLPHENYL)-
7550450	TITANIUM TETRACHLORIDE
584849	TOLUENE 2,4-DIISOCYANATE
91087	TOLUENE 2,6-DIISOCYANATE
110576	TRANS-1,4-DICHLOROBUTENE
1031476	TRIAMIPHOS
24017478	TRIAZOFOS
1558254	TRICHLORO(CHLOROMETHYL)SILANE
27137855	TRICHLORO(DICHLOROPHENYL)SILANE
76028	TRICHLOROACETYL CHLORIDE
115219	TRICHLOROETHYLSILANE
327980	TRICHLORONATE
98135	TRICHLOROPHENYLSILANE
998301	TRIETHOXYSILANE
75774	TRIMETHYLCHLOROSILANE
824113	TRIMETHYLOLPROPANE PHOSPHITE
1066451	TRIMETHYLTIN CHLORIDE
639587	TRIPHENYLTIN CHLORIDE
555771	TRIS(2-CHLOROETHYL)AMINE
2001958	VALINOMYCIN
1314621	VANADIUM PENTOXIDE
108054	VINYL ACETATE MONOMER
81812	WARFARIN
129066	WARFARIN SODIUM
28347139	XYLYLENE DICHLORIDE
1314847	ZINC PHOSPHIDE
58270089	ZINC, DICHLORO(4,4-DIMETHYL-5((((METHYLAMINO) CARBONYL)OXY)IMINO)PENTANENITRILE)

APPENDIX 6

SECTION 313 TOXIC CHEMICAL LIST FOR REPORTING YEAR 1988
Toxics Release Inventory Chemicals
(including Chemical Categories)
Alphabetical Chemical List

CAS Number	Chemical Name	De Minimus Concentration (percent)
75-07-0	Acetaldehyde	0.1
60-35-5	Acetamide	0.1
67-64-1	Acetone	1.0
75-05-8	Acetonitrile	1.0
53-96-3	2-Acetylaminofluorene	0.1
107-02-8	Acrolein	1.0
79-06-1	Acrylamide	0.1
79-10-7	Acrylic acid	1.0
107-13-1	Acrylonitrile	0.1
309-00-2	Aldrin {1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a, 5,8,8a-hexahydro-(1.alpha., 4.alpha.,4a.beta.,5.alpha., 8.alpha.,8a.beta.)-}	1.0
107-05-1	Allyl chloride	1.0
7429-90-5	Aluminum (fume or dust)	1.0
1344-28-1	Aluminum oxide	1.0
117-79-3	2-Aminoanthraquinone	0.1
60-09-3	4-Aminoazobenzene	0.1
92-67-1	4-Aminobiphenyl	0.1
82-28-0	1-Amino-2-methylanthraquinone	0.1
7664-41-7	Ammonia	1.0
6484-52-2	Ammonium nitrate (solution)	1.0
7783-20-2	Ammonium sulfate (solution)	1.0
62-53-3	Aniline	1.0
90-04-0	o-Anisidine	0.1
104-94-9	p-Anisidine	1.0
134-29-2	o-Anisidine hydrochloride	0.1
120-12-7	Anthracene	1.0
7440-36-0	Antimony	1.0
7440-38-2	Arsenic	0.1
1332-21-4	Asbestos (friable)	0.1
7440-39-3	Barium	1.0
98-87-3	Benzal chloride	1.0
55-21-0	Benzamide	1.0
71-43-2	Benzene	0.1
92-87-5	Benzidine	0.1
98-07-7	Benzoic trichloride (Benzotrichloride)	0.1
98-88-4	Benzoyl chloride	1.0
94-36-0	Benzoyl peroxide	1.0
100-44-7	Benzyl chloride	1.0
7440-41-7	Beryllium	0.1
92-52-4	Biphenyl	1.0
111-44-4	Bis(2-chloroethyl) ether	1.0
542-88-1	Bis(chloromethyl) ether	0.1
108-60-1	Bis(2-chloro-1-methylethyl) ether	1.0
103-23-1	Bis(2-ethylhexyl) adipate	0.1
75-25-2	Bromoform	1.0

	{Tribromomethane}	
74-83-9	Bromomethane	1.0
	{Methyl bromide}	
106-99-0	1,3-Butadiene	0.1
141-32-2	Butyl acrylate	1.0
71-36-3	n-Butyl alcohol	1.0
78-92-2	sec-Butyl alcohol	1.0
75-65-0	tert-Butyl alcohol	1.0
85-68-7	Butyl benzyl phthalate	1.0
106-88-7	1,2-Butylene oxide	1.0
123-72-8	Butyraldehyde	1.0
4680-78-8	C.I. Acid Green 3*	1.0
569-64-2	C.I. Basic Green 4*	1.0
989-38-8	C.I. Basic Red 1*	0.1
1937-37-7	C.I. Direct Black 38*	0.1
2602-46-2	C.I. Direct Blue 6*	0.1
16071-86-6	C.I. Direct Brown 95*	0.1
2832-40-8	C.I. Disperse Yellow 3*	1.0
3761-53-3	C.I. Food Red 5*	0.1
81-88-9	C.I. Food Red 15*	0.1
3118-97-6	C.I. Solvent Orange 7*	1.0
97-56-3	C.I. Solvent Yellow 3*	0.1
842-07-9	C.I. Solvent Yellow 14*	0.1
492-80-8	C.I. Solvent Yellow 34*	0.1
	Auramine)	
128-66-5	C.I. Vat Yellow 4*	1.0
7440-43-9	Cadmium	0.1
156-62-7	Calcium cyanamide	1.0
133-06-2	Captan	1.0
	{1H-Isoindole-1,3(2H)-dione, 3a,4,7,7a-tetrahydro-2-[(trichloromethyl)thio]-}	
63-25-2	Carbaryl	1.0
	{1-Naphthalenol, methylcarbamate}	
75-15-0	Carbon disulfide	1.0
56-23-5	Carbon tetrachloride	0.1
463-58-1	Carbonyl sulfide	1.0
120-80-9	Catechol	1.0
133-90-4	Chloramben	1.0
	{Benzoic acid, 3-amino-2,5-dichloro-}	
57-74-9	Chlordane	1.0
	{4,7-Methanoindan, 1,2,4,5,6,7, 8,8-octachloro-2,3,3a,4,7,7a-hexahydro-}	
7782-50-5	Chlorine	1.0
10049-04-4	Chlorine dioxide	1.0
79-11-8	Chloroacetic acid	1.0
532-27-4	2-Chloroacetophenone	1.0
108-90-7	Chlorobenzene	1.0
510-15-6	Chlorobenzilate	1.0
	{Benzeneacetic acid,4-chloro-.alpha.-(4-chlorophenyl)-alpha.-hydroxy-,ethyl ester}	
75-00-3	Chloroethane	1.0
	{Ethyl chloride}	
67-66-3	Chloroform	0.1
74-87-3	Chloromethane	1.0
	{Methyl chloride}	
107-30-2	Chloromethyl methyl ether	0.1
126-99-8	Chloroprene	1.0
1897-45-6	Chlorothalonil	1.0
	{1,3-Benzenedicarbonitrile, 2,4,5,6-tetrachloro-}	
7440-47-3	Chromium	0.1

7440-48-4	Cobalt	1.0
7440-50-8	Copper	1.0
120-71-8	p-Cresidine	0.1
1319-77-3	Cresol (mixed isomers)	1.0
108-39-4	m-Cresol	1.0
95-48-7	o-Cresol	1.0
106-44-5	p-Cresol	1.0
98-82-8	Cumene	1.0
80-15-9	Cumene hydroperoxide	1.0
135-20-6	Cupferron	0.1
	{Benzeneamine, N-hydroxy-N-nitroso, ammonium salt}	
110-82-7	Cyclohexane	1.0
94-75-7	2,4-D	1.0
	{Acetic acid, (2,4-dichlorophenoxy)-}	
1163-19-5	Decabromodiphenyl oxide	1.0
2303-16-4	Diallate	1.0
	{Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester}	
615-05-4	2,4-Diaminoanisole	0.1
39156-4	`1-7 2,4-Diaminoanisole sulfate	0.1
101-80-4	4,4'-Diaminodiphenyl ether	0.1
25376-45-8	Diaminotoluene (mixed isomers)	0.1
95-80-7	2,4-Diaminotoluene	0.1
334-88-3	Diazomethane	1.0
132-64-9	Dibenzofuran	1.0
96-12-8	1,2-Dibromo-3-chloropropane	0.1
	{DBCP}	
106-93-4	1,2-Dibromoethane	0.1
	{Ethylene dibromide}	
84-74-2	Dibutyl phthalate	1.0
25321-22-6	Dichlorobenzene (mixed isomers)	0.1
95-50-1	1,2-Dichlorobenzene	1.0
541-73-1	1,3-Dichlorobenzene	1.0
106-46-7	1,4-Dichlorobenzene	0.1
91-94-1	3,3'-Dichlorobenzidine	0.1
75-27-4	Dichlorobromomethane	1.0
107-06-2	1,2-Dichloroethane	0.1
	{Ethylene dichloride}	
540-59-0	1,2-Dichloroethylene	1.0
75-09-2	Dichloromethane	0.1
	{Methylene chloride}	
120-83-2	2,4-Dichlorophenol	1.0
78-87-5	1,2-Dichloropropane	1.0
542-75-6	1,3-Dichloropropylene	0.1
62-73-7	Dichlorvos	1.0
	{Phosphoric acid, 2,2-dichloroethenyl dimethyl ester}	
115-32-2	Dicofol	1.0
	{Benzenemethanol, 4-chloro-alpha.-(4-chlorophenyl)-alpha.- (trichloromethyl)-}	
1464-53-5	Diepoxybutane	0.1
111-42-2	Diethanolamine	1.0
117-81-7	Di-(2-ethylhexyl) phthalate	0.1
	{DEHP}	
84-66-2	Diethyl phthalate	1.0
64-67-5	Diethyl sulfate	0.1
119-90-4	3,3'-Dimethoxybenzidine	0.1
60-11-7	4-Dimethylaminoazobenzene	0.1
119-93-7	3,3'-Dimethylbenzidine	0.1
	{o-Tolidine}	
79-44-7	Dimethylcarbamyl chloride	0.1

57-14-7	1,1-Dimethyl hydrazine	0.1
105-67-9	2,4-Dimethylphenol	1.0
131-11-3	Dimethyl phthalate	1.0
77-78-1	Dimethyl sulfate	0.1
534-52-1	4,6-Dinitro-o-cresol	1.0
51-28-5	2,4-Dinitrophenol	1.0
121-14-2	2,4-Dinitrotoluene	1.0
606-20-2	2,6-Dinitrotoluene	1.0
117-84-0	n-Dioctyl phthalate	1.0
123-91-1	1,4-Dioxane	0.1
122-66-7	1,2-Diphenylhydrazine {Hydrazobenzene}	0.1
106-89-8	Epichlorohydrin	0.1
110-80-5	2-Ethoxyethanol	1.0
140-88-5	Ethyl acrylate	0.1
100-41-4	Ethylbenzene	1.0
541-41-3	Ethyl chloroformate	1.0
74-85-1	Ethylene	1.0
107-21-1	Ethylene glycol	1.0
151-56-4	Ethyleneimine {Aziridine}	0.1
75-21-8	Ethylene oxide	0.1
96-45-7	Ethylene thiourea	0.1
2164-17-2	Fluometuron {Urea, N,N-dimethyl-N'-[3-(trifluoromethyl)phenyl]-}	1.0
50-00-0	Formaldehyde	0.1
76-13-1	Freon 113 {Ethane, 1,1,2-trichloro-1,2,2-trifluoro-}	1.0
76-44-8	Heptachlor {1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene}	1.0
118-74-1	Hexachlorobenzene	0.1
87-68-3	Hexachloro-1,3-butadiene	1.0
77-47-4	Hexachlorocyclopentadiene	1.0
67-72-1	Hexachloroethane	1.0
1335-87-1	Hexachloronaphthalene	1.0
680-31-9	Hexamethylphosphoramide	0.1
302-01-2	Hydrazine	0.1
10034-93-2	Hydrazine sulfate	0.1
7647-01-0	Hydrochloric acid	1.0
74-90-8	Hydrogen cyanide	1.0
7664-39-3	Hydrogen fluoride	1.0
123-31-9	Hydroquinone	1.0
78-84-2	Isobutyraldehyde	1.0
67-63-0	Isopropyl alcohol (manufacturing-strong acid process, no supplier notification)	0.1
80-05-7	4,4'-Isopropylidenediphenol	1.0
7439-92-1	Lead	0.1
58-89-9	Lindane {Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1.alpha.,2.alpha, 3.beta.,4.alpha., 5.alpha., 6.beta.)-}	0.1
108-31-6	Maleic anhydride	1.0
12427-38-2	Maneb {Carbamodithioic acid, 1,2-ethanediylbis-, manganese complex}	1.0
7439-96-5	Manganese	1.0
7439-97-6	Mercury	1.0
67-56-1	Methanol	1.0
72-43-5	Methoxychlor {Benzene, 1,1'-(2,2,2-trichloroethylidene)bis-4-methoxy-}	1.0

109-86-4	2-Methoxyethanol	1.0
96-33-3	Methyl acrylate	1.0
1634-04-4	Methyl tert-butyl ether	1.0
101-14-4	4,4'-Methylenebis(2-chloroaniline) {MBOCA}	0.1
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzenamine	0.1
101-68-8	Methylenebis (phenylisocyanate) {MBI}	1.0
74-95-3	Methylene bromide	1.0
101-77-9	4,4'-Methylenedianiline	0.1
78-93-3	Methyl ethyl ketone	1.0
60-34-4	Methyl hydrazine	1.0
74-88-4	Methyl iodide	0.1
108-10-1	Methyl isobutyl ketone	1.0
624-83-9	Methyl isocyanate	1.0
80-62-6	Methyl methacrylate	1.0
90-94-8	Michler's ketone	0.1
1313-27-5	Molybdenum trioxide	1.0
505-60-2	Mustard gas {Ethane, 1,1'-thiobis[2-chloro-}	0.1
91-20-3	Naphthalene	1.0
134-32-7	alpha-Naphthylamine	0.1
91-59-8	beta-Naphthylamine	0.1
7440-02-0	Nickel	0.1
7697-37-2	Nitric acid	1.0
139-13-9	Nitrilotriacetic acid	0.1
99-59-2	5-Nitro-o-anisidine	0.1
98-95-3	Nitrobenzene	1.0
92-93-3	4-Nitrobiphenyl	0.1
1836-75-5	Nitrofen {Benzene, 2,4-dichloro-1-(4-nitrophenoxy)-}	0.1
51-75-2	Nitrogen mustard {2-Chloro-N-(2-chloroethyl)-N-methylethanamine}	0.1
55-63-0	Nitroglycerin	1.0
88-75-5	2-Nitrophenol	1.0
100-02-7	4-Nitrophenol	1.0
79-46-9	2-Nitropropane	0.1
156-10-5	p-Nitrosodiphenylamine	0.1
121-69-7	N,N-Dimethylaniline	1.0
924-16-3	N-Nitrosodi-n-butylamine	0.1
55-18-5	N-Nitrosodiethylamine	0.1
62-75-9	N-Nitrosodimethylamine	0.1
86-30-6	N-Nitrosodiphenylamine	1.0
621-64-7	N-Nitrosodi-n-propylamine	0.1
4549-40-0	N-Nitrosomethylvinylamine	0.1
59-89-2	N-Nitrosomorpholine	0.1
759-73-9	N-Nitroso-N-ethylurea	0.1
684-93-5	N-Nitroso-N-methylurea	0.1
16543-55-8	N-Nitrosonornicotine	0.1
100-75-4	N-Nitrosopiperidine	0.1
2234-13-1	Octachloronaphthalene	1.0
20816-12-0	Osmium tetroxide	1.0
56-38-2	Parathion {Phosphorothioic acid, o, o-diethyl-o-(4-nitrophenyl) ester}	1.0
87-86-5	Pentachlorophenol {PCP}	1.0
79-21-0	Peracetic acid	1.0

108-95-2	Phenol	1.0
106-50-3	p-Phenylenediamine	1.0
90-43-7	2-Phenylphenol	1.0
75-44-5	Phosgene	1.0
7664-38-2	Phosphoric acid	1.0
7723-14-0	Phosphorus (yellow or white)	1.0
85-44-9	Phthalic anhydride	1.0
88-89-1	Picric acid	1.0
1336-36-3	Polychlorinated biphenyls {PCBs}	0.1
1120-71-4	Propane sultone	0.1
57-57-8	beta-Propiolactone	0.1
123-38-6	Propionaldehyde	1.0
114-26-1	Propoxur {Phenol, 2-(1-methylethoxy)-, methylcarbamate}	1.0
115-07-1	Propylene {Propene}	1.0
75-55-8	Propyleneimine	0.1
75-56-9	Propylene oxide	0.1
110-86-1	Pyridine	1.0
91-22-5	Quinoline	1.0
106-51-4	Quinone	1.0
82-68-8	Quintozene {Pentachloronitrobenzene}	1.0
81-07-2	Saccharin (manufacturing, no supplier notification) {1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide}	0.1
94-59-7	Safrole	0.1
7782-49-2	Selenium	1.0
7440-22-4	Silver	1.0
1310-73-2	Sodium hydroxide (solution)	1.0
7757-82-6	Sodium sulfate (solution)	1.0
100-42-5	Styrene	0.1
96-09-3	Styrene oxide	0.1
7664-93-9	Sulfuric acid	1.0
100-21-0	Terephthalic acid	1.0
79-34-5	1,1,2,2-Tetrachlroethane	0.1
127-18-4	Tetrachloroethylene {Perchloroethylene}	0.1
961-11-5	Tetrachlorvinphos {Phosphoric acid, 2-chloro-1- (2,3,5-trichlorophenyl) ethenyl dimethyl ester}	1.0
7440-28-0	Thallium	1.0
62-55-5	Thioacetamide	0.1
139-65-1	4,4'-Thiodianiline	0.1
62-56-6	Thiourea	0.1
1314-20-1	Thorium dioxide	1.0
7550-45-0	Titanium tetrachloride	1.0
108-88-3	Toluene	1.0
584-84-9	Toluene-2,4-diisocyanate	0.1
91-08-7	Toluene-2,6-diisocyanate	0.1
95-53-4	o-Toluidine	0.1
636-21-5	o-Toluidine hydrochloride	0.1
8001-35-2	Toxaphene	0.1
68-76-8	Triaziquone {2,5-Cyclohexadiene-1,4-dione, 2,3,5-tris(1-aziridinyl)-}	0.1
52-68-6	Trichlorfon {Phosphonic acid,(2,2,2-trichloro-1-hydroxyethyl)-,dimethyl ester}	1.0
120-82-1	1,2,4-Trichlorobenzene	1.0
71-55-6	1,1,1-Trichloroethane	1.0

	(Methyl chloroform)	
79-00-5	1,1,2-Trichloroethane	1.0
79-01-6	Trichloroethylene	1.0
95-95-4	2,4,5-Trichlorophenol	1.0
88-06-2	2,4,6-Trichlorophenol	0.1
1582-09-8	Trifluralin	1.0
	{Benzenamine, 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)-}	
95-63-6	1,2,4-Trimethylbenzene	1.0
126-72-7	Tris(2,3-dibromopropyl phosphate)	0.1
51-79-6	Urethane	0.1
	(Ethyl carbamate)	
7440-62-2	Vanadium (fume or dust)	1.0
108-05-4	Vinyl acetate	1.0
593-60-2	Vinyl bromide	0.1
75-01-4	Vinyl chloride	0.1
75-35-4	Vinylidene chloride	1.0
1330-20-7	Xylene (mixed isomers)	1.0
108-38-3	m-Xylene	1.0
95-47-6	o-Xylene	1.0
106-42-3	p-Xylene	1.0
87-62-7	2,6-Xylidine	1.0
7440-66-6	Zinc (fume or dust)	1.0
12122-67-7	Zineb	1.0
	{Carbamodithioic acid, 1,2-ethanediylbis-, zinc complex}	

Reporting thresholds:

Calendar year 1988: 50,000 poinds for manufactured or processed substances; 10,000 pounds for otherwise used.
Calendar year 1989: 25,000 poinds for manufactured or processed substances; 10,000 pounds for otherwise used.

SECTION 313 CHEMICAL CATEGORIES

Section 313 requires emissions reporting on the chemical categories listed below, in addition to the specific chemicals listed above. The metal compounds listed below, unless otherwise specified, are defined as including any unique chemical substance that contains the named metal (i.e., antimony, copper, etc.) as part of that chemical's structure. For further definitions of the other compounds, consult EPA guidance documents.

Chemical categories are subject to the 1 percent *de minimis* concentration unless the substance involved meets the definition of an OSHA carcinogen.

Antimony Compounds
Arsenic Compounds
Barium Compounds
Beryllium Compounds
Cadmium Compounds -
Chromium Compounds
Cobalt Compounds
Copper Compounds
Lead Compounds
Manganese Compounds
Mercury Compounds
Nickel Compounds
Selenium Compounds
Silver Compounds
Thallium Compounds
Zinc Compounds

Categories of chemicals with special conditions: see EPA guidance.
Chlorophenols
Cyanide Compounds
Glycol Ether
Polybrominated Biphenyls

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